The ICT pedagogic challenges and enablers of grade eight Natural Science and Mathematics teachers in South African classrooms

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Dedication

I dedicate this thesis to my Lord and Saviour, Jesus Christ. In His light, I see light

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ABSTRACT

In South Africa, Science and Technology Education faces many problems. Insufficient numbers of Science and Technology teachers, inadequate in-service training, large classes, instruction with the aim of narrowly orienting students towards examination passes an insufficient integration of technology in the curriculum, and insufficient physical infrastructure dominates the list. The Department of Education envisages the use of ICT as a tool for learning and teaching. ICT has the potential to improve the quality of education and training. If adequate resources are available, and teachers have confidence in the usefulness of ICTs, then the integration of Information and Communication Technology (ICT) may improve the teaching and learning of Mathematics and Science.

A review of the literature indicated that the deployment of ICT resources alone will not bring about desirable pedagogical practices in the classroom. There exists a need for interventions that will enhance ICT pedagogical practices in South Africa. The following main research questions were formulated:

What are the ICT pedagogic practices used by grade 8 Mathematics and Science teachers in South African classrooms?

How do the barriers that grade 8 Mathematics and Science teachers encounter, as well as the support they receive, influence their pedagogical practices?

What is the Principal's role in promoting the emerging pedagogic practices using ICT in South African classrooms?

This research comprises a secondary data analysis of the SITES 2006 South African data base. The population and sample for this study was based on the South African grade 8 Mathematics and Natural science teachers. In SITES 2006, the samples comprised more than 504 schools. Due to the fact that ICT is only significantly implemented in two out of nine provinces in South Africa, 25 strata were created to secure fair representation of the population with 666 Mathematics teachers and 622 Natural Science teachers.

Bromfenbrenner's Ecological Systems Theory and Engeström's Activity Theory was used to investigate Natural Science and Mathematics teachers' progress in their ICT pedagogical practices through the time-frame 2004 to 2013, as stipulated in the South Africa's White paper on e-Education policy. Statistical analysis using Statistical Package for Social Sciences was used to address the research and sub-questions. The study found that South African Mathematics and Natural Science teachers' level of ICT use is small; when they do use ICT,

it is enhanced 21st century pedagogic practices. This is in accordance with findings from the international literature study.

Keywords

ICT pedagogic practices
Learning
Behaviourism
Constructivism
Research Framework
Quantitative Research
Secondary Data Analysis
Concentric Ecological Systems
Activity Theory
Effect Size

OPSOMMING

Wetenskap- en Tegnologie-onderwys in Suid-Afrika beleef baie probleme. Die tekort aan Wetenskap- en Tegnologie-onderwysers, ontoereikende indiensopleiding, groot klasse, instruksies wat ten doel het om leerlinge te oriënteer om eksamens te slaag, ontoereikende integrasie van tegnologie in die kurrikulum, en ontoereikende fisiese infrastrukture, domineer die lys. IKT beskik oor die potensiaal om die kwaliteit van onderwys en opleiding te verbeter. Indien voldoende infrastruktuur beskikbaar is, en onderwysers oor voldoende opleiding beskik om dit met selfvertroue te kan gebruik, kan die onderrig en leer van Wiskunde en Wetenskap in Suid-Afrikaanse klaskamers verbeter. Die literatuuroorsig dui aan dat voldoende infrastruktuur nie noodwendig verbetering in klaskamer te weeg sal bring nie, aangesien die behoefte bestaan om opvoedkundige praktyke te verbeter. Die volgende navorsingsprobleme is geformuleer:
Wat is die IRT onderriggebruike van Graad 8 Wiskunde- en Wetenskaponderwysers in Suid-Afrika?
Hoe sal die hindernisse wat Graad 8 Wiskunde- en Wetenskaponderwysers beleef, of die ondersteuning wat hulle ontvang, hul klaskamerpraktyke beïnvloed?

Hierdie navorsing is ’n sekondêre data-analise (SDA) van die Second Information and Technology Study (SITES 2006) se Suid-Afrika databasis. Die populasie en steekproefneming van die oorspronklike studie was gebaseer op die Suid-Afrikaanse Graad 8 Wiskunde- en Wetenskaponderwysers se response op ‘n opname-tegniek studie wat vanaf 2004 tot 2008 plaasgevind het. SITES 2006 het uit ‘n steekproef van minstens 504 skole bestaan. As gevolg van die feit dat IKT slegs betekenisvol in twee uit die nege provinsies in Suid-Afrika geïmplementeer is, is 25 strata geskep om ’n geldige en betroubare verteenwoordiging van die populasie van 666 Wiskunde-onderwysers en 622 Wetenskaponderwysers daar te stel.

Bromfenbrenner se Ekologiese Sisteem Teorie en Engeström se Aktiwiteitsteorie is as konseptuele raamwerk gebruik om Wetenskap- en Wiskunde-onderwysers se vordering van hul IRT opvoedkundige praktyke te ondersoek in die tydperk vanaf 2004 tot 2013 en met die Suid-Afrikaanse Witskrif van die beleid van e-Onderwys te vergelyk. Statistiese analises is deur middel van die Statistiese Pakket vir Sosiale Wetenskappe uitgevoer om die navorsing se subvrae van hierdie studie aan te spreek. Die studie het bevind dat Suid-Afrikaanse Wiskunde- en Wetenskaponderwysers se vlak van IKT-gebruik swak is, en wanneer IKT gebruik

word, versterk dit een-en-twintigste eeuse onderrig en leer praktyke. Hierdie bevindinge is in ooreenstemming met die bevindinge van die internasionale literatuuroorsig.

Sleutelwoorde

IKT onderrig- en leerpraktyke
Leer
Gedragsleer
Konstruktivisme
Navorsingsraamwerk
Kwantitatiewe navorsing
Sekondêre navorsingsanalise
Konsentriese Ekologiese Sisteme
Aktiwiteitsteorie
Effekgrootte

SOLEMN DECLARATION OF AUTHORSHIP

CERTIFICATE OF PROFFREADING AND EDITING

Certificate of proof reading and editing

Herewith I, the undersigned, declare that I have proof read and edited the doctoral thesis: ICT pedagogic challenges and enablers for Grade eight Natural Science and Mathematics teachers in South African classrooms, by James Varughese

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LIST OF ABBREVIATIONS

ACOT	Apple Classrooms of Tomorrow
ANNOVA	Analysis of Variance
ARPAnet	Advanced Research Projects Agency Network
AT	Activity Theory
ATM	Automatic Teller Machine
BASIC	Beginners All-purpose Symbolic Instruction Code
CAI	Computer-Assisted Instruction
CERN	European Council for Nuclear Research
CFA	Confirmatory Factor Analysis
DBE	Department of Basic Education
FET	Further Education and Training
GET	General Education and training
HE	Higher Education
HEIMS	Higher Education Management Information System
HTTP	Hyper Text Transfer Protocol
ICC	International Coordinators Committee
ICT	Information and Communication Technologies
IEA	International Association for the Evaluation of Educational Achievement
ISD	Instructional Systems Design
ISTE	International Society for Technology in Education
M1	Module 1
M2	Module 2
MIT	Massachusetts Institute of Technology
MT	Mathematics Teachers
NDoE	The National Department of Education
NETS	National Educational Technology Standards
NRC	National Research Coordinators
NRF	National Research Foundation
NST	Natural Science teachers
ODC	Online Data Collection
PLATO	Programmed Logic for Arithmetic Teaching Operations
SABC	South Africa Broadcast Cooperation
SAQA	The South African Qualifications Authority
SAR	South African Republic

SDA	Secondary Data Analysis
SGB	School Governing Body
SITES	Second Information Technology in Education Study
SMS	Short message service
SP	School Principal
SPSS	Statistical Package for Social Sciences
TC	Technical Coordinators
TICCIT	Time-Shared Interactive Computer-Controlled Information Television
TPCK	Technological-Pedagogical-Content-knowledge
TPD	Teacher Professional Development
UNESCO	United Nations Educational Scientific and Cultural Organization
WWW	World Wide Web
ZPD	Zone of Proximal Development

Chapter 1

Orientation to the Study

1.1 Introduction

The International Association for the Evaluation of Educational Achievement (IEA) investigated the nature of ICT in education through three consecutive studies (modules) as the Second International Technology in Education Studies (SITES). SITES 2006, the third module, was an international comparative study of the pedagogical use of ICT in 22 educational systems, including South Africa. SITES 2006 took place between 2004 and 2008, with the main study in 2006. It identified the pedagogical uses of ICT in grade 8 Mathematics and Natural Science classrooms (Plomp, Anderson, Law, & Quale, 2009). Amongst others, SITES 2006 found that ICT adoption by itself did not determine the pedagogical orientation, but that the impact of ICT use on learners was dependent on the pedagogical orientation that teachers adopted when using ICT. It also found that most serious obstacles to the use of ICT in the classroom were school-related, rather than student-related. In addition, the extent of ICT use is partly dependent on national curriculum policies. These findings have important implications for the pedagogical use of ICTs in grade 8 Mathematics and Science classrooms in South Africa, as it compares the ICT pedagogical practices in South Africa with other educational systems (Law & Chow, 2008).

In the years 1995-1998, the Third International Mathematics and Science Study Repeat (TIMSS-R) reports showed that South African grade 8 learners performed poorly in Mathematics and Science when compared to other international participating countries (Howie, 1999). South Africans scored significantly below the mean scores of the other 37 participating countries, which included Australia, Korea, Slovenia, Canada and Israel. South Africa was the only African country that participated in the TIMSS-R. Less than 0.5% of South African learners reached the international top-ten benchmark. The study found that learners on the whole were unable to communicate in the language of the test, and they lacked the basic Mathematics and Science knowledge and skills expected at grade 8 level. The average South African class size for Mathematics and Science was about 50 learners (Reddy, 2006), compared, for example, to 24 learners in the USA, 26 learners in Australia, fifty learners in Korea, and 36 learners in Singapore (Pong & Pallas, 2001). The Progress in International Reading Literacy Study (PIRLS) revealed that South African learners, when compared to other international participants such as Albania, China, Iran, USA and Qatar, do not read at appropriate levels in grades 4 and 5 (Mail & Guardian Online, 2008). It can be speculated that insufficient foundation phase education, unqualified teachers, and strategies used in the South African school system may be reasons for this backlog.

The study analysed the ICT pedagogical practices employed by grade 8 Mathematics and Science teachers in South African classrooms by conducting a secondary data analysis (SDA) of the grade 8 Mathematics and Science data collected by the SITES 2006 (Pelgrum & Law, 2008). Currently, no comprehensive analysis of the South African SITES 2006 data exists.

1.2. Use of ICT in Teaching and Learning

Many researchers argue that ICTs have a significant effect on teaching and learning (Becta, 2007; Nicola, Greg, & Eva, 2008; Peter & Steve, 2008; Pritchard, 2007; South Africa, 2004). ICT tools, when used with tested instructional practices and curriculum, can act as an effective catalyst for education reform and enhance teaching and learning (Cradler & Bridgeforth, 2006; NCRTEC, 2008). Using ICT does not relate to transformation on its own. The Office of Educational Research and Improvement of the US Department of Education (SRI, 2008) maintains that when used effectively, ICT applications can support higher-order thinking by engaging learners in authentic, complex tasks within collaborative learning contexts.

Becta, the British Educational Technology Association (Becta, 2007) reports that ICT can improve learners' achievement in schools where technology is effectively embedded. ICT can make learning more enjoyable and rewarding—especially for those who are geographically isolated. ICT also can empower learners to become responsible for their learning, and increase productivity and educational efficiency. ICT allows more time for personalised teaching and learning. It assists in subject specific improvements (Ofsted, 2004). Well-implemented and supported ICTs can encourage active learning, assist innovative teaching, relieve the professional isolation of teachers, and enable users to become active researchers and learners. ICTs also can provide instructional opportunities otherwise not available (Cradler & Bridgeforth, 2006).

ICT has enabled teachers to record, monitor and set targets for student performance in all subjects in a secondary school in the United Kingdom (Harris & Kington, 2002). Learners are motivated by knowing that their teachers closely monitored their performance. The authors indicated that a teacher could act as an organiser of learning events, a promoter of independent learning, a helper of learners to evaluate their own progress, and a role model for communication skills. They also found that the use of ICT in the classroom could elevate the teaching role of teachers by reinforcing their role as the designer of learning activities, rather than the dispenser of information. The introduction of innovative practices in the schools studied placed an additional demand on the teachers as they had to develop ICT skills; be willing to change their existing practices; support learners as their roles and activities changed; monitor the implementation of activities they introduced; and identify possible solutions to any problems that arose. Their learners' roles and activities also changed as they developed more independence and adopted more responsibility for their own work, worked towards targets and deadlines, and became more reflective about their work. A large UK impact study indicated a rise in performance through the use of ICT in English, Science, and Design and Technology (Balanskat, Blamir, & Kefalla, 2007).

The use of ICT for educational purposes comprises a well-balanced deployment of four building blocks (Kennis.Net, 2006). They are: vision of education, knowledge and skills, educational software and content, and ICT infrastructure. In developing countries, knowledge, skills, infrastructure and software are often lacking or underutilized. It has been indicated that high levels of ICT use results in a poorer learning experience, even when compared with absolutely no use of ICT. The phenomenon that the use of more ICT does not result in better learning was noted in Mathematics and Languages. An appropriate mix of ICT materials in learning situations is therefore essential, and calls for considerable expertise on the part of teachers (Kennis.Net, 2006). The International Institute for Communication and Development (IICD, 2008) conducts impact studies on the use of ICTs in various sectors in developing countries. Together with its local partners, the IICD studied the use of ICT in enhancing educational activities. They carried out 32 projects over eight years in Jamaica, Bolivia, Zambia, Burkino Faso, Mali, Ghana, Tanzania and Uganda. ICT can improve the quality of education by enhancing educational content development; by supporting administrative processes in schools; and by easing access to education for both teachers and learners (IICD, 2008). The study also indicated that ICT improves the employment prospects of students and young people living in rural communities. Sixty percent of the participants indicated experiencing a direct improvement in the teaching and learning process. The study indicated that ICT could bring inspiration and fun to teaching and learning. Martin *et al.* (2001) indicated that women, the unemployed and those without ICT access and ICT awareness, benefited from ICT-based development.

The current South African education system faces challenges in the school education sector. According to Naledi Pandor, the former Minister of Education, only three in ten schools in

South Africa have access to computers. Official statistics reveal that about 23% of South African schools have computers available for teaching and learning, of which 67% have access to the Internet (South Africa, 2004). Only 38% of grade 8 students in the SITES 2006 use computers for the learning of Mathematics and Science (Pelgrum & Law, 2008). Many schools lack basic physical resources. Out of 26 592 public schools, 2 688 do not have a water supply, 5 233 do not have electricity and 46 do not have road access (South Africa, 2004). Fundamental changes in the curriculum form part of the challenges facing the South African school education system. Examples of such changes are the move from teacher centred-pedagogy to learner-centred pedagogy; unqualified and under qualified teachers; teachers and learners who are using a medium of instruction in which neither are fully confident; and poor education management information systems (Evoh, 2007).

The Department of Basic Education (DoBE) envisages the use of ICT as a tool for learning and teaching. According to the Annual Report of the DoE (currently DoBE), for the 2006-2007 financial years, various strategies contributed towards the improvement of the performance of the department. One of these is the quality improvement and development strategy (QIDS-UP) to improve teaching and learning by enhancing key content and academic skills. This is directed at enhancing the performance in Mathematics, Science and Technology. ICT has the potential to improve the quality of education and training. If there are resources available and confidence in the usefulness of ICTs, then the proper deployment of technology may improve the teaching and learning of Mathematics and Science in South African classrooms (South Africa, 2004).

New Partnership for Africa's Development (NEPAD), of which South Africa is a partner, recognises the pivotal role of ICT in the establishment of regional distance learning and health education programmes to improve the health and education sectors. Cost, sustainability and efficient utilisation are identified as critical factors in the successful use of ICT for social and economic development. The use of the Internet for teaching and learning is limited in South African classrooms due to high connectivity costs, insufficient local content, and inadequate technical and pedagogical support at school level (South Africa, 2004).

It is important that learners acquire knowledge and skills in the use of ICT in order to achieve the social transformation envisaged in contemporary South Africa. According to the South African governments' e-Education policy document (South Africa, 2004), ICT has the potential to promote change from a teacher-centred, memory-based education with technology at the periphery, to learner-centred real-life activity-based education with technology acting as a tool. ICT can assist in addressing issues such as access, the readdressing of inequalities, and the removal of barriers to learning (Ngcuka, 2008). Thus ICT, when used effectively, can improve the quality of teaching and learning across curricula. ICT can also enhance learner achievement through collaborative learning, creative thinking, and problem solving skills, as well as provide opportunities for inclusive education, life-long learning and useful services to communities that surround schools (South Africa, 2004).

In summary, ICTs can significantly save teachers' time in the gathering of information, the preparation of learning materials, the presentation of information, classroom management, the monitoring of learner progress and achievement and report writing. ICT-rich environments can support learner-centred constructivist classrooms in South African schools (South Africa, 2004).

1.3 Using ICTs in Mathematics and Science Teaching

Mathematics and Science concepts are general and of an abstract nature. It is often not easy for teachers to use only words to explain concepts. ICT could help teachers to visually present abstract concepts. Verbal presentations combined with visual images under the control of a teacher can improve science learning (Bohren, 1993). The ability to think with external representations of processes by means of ICTs can scaffold the development of mathematical understanding (Shaffer & Kaput, 1999). ICT could change negative perceptions of learners about Mathematics, Science, Engineering and Technology (Norton, 2007). Learning with useful integration tools can lead to a functional understanding of mathematical concepts, as well as develop a broader understanding of the nature of Mathematics. Hjalmarson (2008) proposes three types of Mathematics curricular system models: content focused, pedagogically focused, and learner-centred. He further maintains that the curriculum model comprises of different pedagogical strategies, inter alia collaborative learning, problem-based learning and direct representation, in which ICT can act as a learning tool. Web-based enquiry, online communication and student multimedia projects can assist in creating a student-centred constructivist Mathematics learning environment in classrooms (Betne & Castonguay, 2007).

1.4 Research Questions

A fundamental review of the literature above indicated that the deployment of ICT resources alone will not bring about desirable pedagogical practices in the classroom. There exists a need to thoroughly investigate factors that enhance or inhibit desirable pedagogical practices in South African classrooms. The following research questions were formulated:

- What are the ICT pedagogic practices used by grade 8 Mathematics and Science teachers in South African classrooms?
- How do the barriers that grade 8 Mathematics and Natural Science teacher's encounter, as well as the support they receive, influence their pedagogical practices?
- What is the Principal's role in promoting pedagogic practices using ICT in South African classrooms?

Based on the main research questions, the following sub-questions are derived:

1. What are the ICT pedagogical practices of grade 8 Natural Science teachers, as represented in the SITES 2006 data through studying the descriptive statistics?
2. What are the ICT pedagogical practices of the grade 8 Mathematics teachers, as represented in the SITES 2006 data through studying the descriptive statistics?
3. What are the barriers faced by grade 8 Mathematics and Natural Science teachers as represented by the SITES 2006 data through studying the descriptive statistics?
4. What is the support received by grade 8 Mathematics and Science teachers as represented in the SITES 2006 data through studying the descriptive statistics?
5. What are the practically significant correlations between the variables represented in the questions of the SITES 2006 teacher questionnaire in the combined Mathematics and Science dataset?
6. What ICT practices can be identified through factor analyses of the SITES 2006 teachers' data?
7. How can school Principals lower the ICT pedagogic constraints of grade 8 Mathematics and Science teachers?
8. Are there any significant differences between the responses of male and female teachers?

1.5 Research Aims

The researcher aimed to analyse and describe the ICT pedagogic practices used by grade 8 Mathematics and Natural Science teachers in South African classrooms to identify the important benefits, barriers and support needed. The researcher also aimed to compare ICT pedagogic practices between grade 8 Mathematics and Natural Science teachers and to investigate principals' roles in promoting desirable pedagogic practices, through the use of ICT in South African classrooms.

1.6 Research Design and Methodology

A fusion of Bronfenbrenner's Ecological Systems Theory (Bronfenbrenner, 1979b; Bronfenbrenner, 1986) and Engeström's Activity Theory (1987b; 1996; 2009; Vygotsky, 1978) provided a conceptual framework for the investigation of Natural Science and Mathematics teachers' ICT pedagogical practices through the time-frame from year 2004 to 2013, as stipulated in South Africa's White paper on e-Education policy (South Africa, 2004).

South Africa was a participant in all three SITES studies and therefore an analysis of the data received from the SITES 2006 revealed valuable information relevant to teaching of Mathematics and Science in South African classrooms. The researcher had access to the results of the descriptive statistics of the SITES 2006 as it is available in the public domain (Brese & Carstens, 2009). Due to the random sample size of 504 schools, and the ordinal nature of the data, parametric statistical analysis was a valid operation that could be conducted (Elliot & Woodward, 2007). This study comprises a secondary data analysis (SDA) of the South African participation of SITES 2006 frequency tables using the Statistical Program for Social Sciences (SPSS™) (SPSS, 2011). The study relates to the radical structuralist or positivist quadrant of the Burrel and Morgan's (1979) sociological paradigms of organisational analysis, where the ontology is realistic, epistemology is positivistic and methodology is nomothetic. The researcher assumes that a real world exists outside the human mind, knowledge is hard, real, and capable of being transmitted in tangible forms, and that scientific investigations can be conducted to find out relationships and regularities between selected factors in this world.

The population and sample for this SDA study is the South African dataset for the SITES 2006. South African schools with grade 8 Mathematics and Science teachers form the population. Five hundred and four schools were randomly selected in accordance with the directives of IEA. SITES 2006 gathered information about variables under a number of themes, including curriculum goals, teacher practice, teacher support and assessment practices. Variables that are revealed by the factor analysis for this study are listed in § 5.5.1. Other variables revealed by the factor analysis are also investigated.

The researcher conducted factor analysis on the combined grade 8 Mathematics and Science teachers' dataset to examine the correlations among the variables and to identify the clusters of highly interrelated variables that reflect underlying themes or factors within the combined dataset. The following procedures were carried out:

1. A reliability test on identified factors
2. A mean count on these identified factors
3. A t-Test to determine if the mean scores for Mathematics and Science teachers' responses were different
4. Effect sizes to determine if the difference in the scores of Mathematics and Science teachers were practically significant
5. A two-way ANNOVA on biographical variables to find out if there are any differences in the responses based on biographical differences
6. Spearman's rank-order coefficients were calculated on factors identified during factor analysis in order to reveal the correlations that exist among the factors (Nicole & Pexman, 2000).

1.7 Ethical Aspects

This study uses data available in the public domain (Brese & Carstens, 2009). It did not involve issues of an ethically sensitive nature and all relevant permission obtained during the main study. The researcher acknowledges the part of the IEA and the integrity of the data is respected.

1.8 Contribution of the Study

When studying and applying ICT in education, the country's unique context, reality, priorities, long-term budgetary prospects and commitment should be taken into account (Pedro, Enrique, Ernesto, & Lucio, 2004). Therefore, this study is valuable, as it identifies factors that could inhibit or support effective ICT pedagogical practices for Mathematics and Science classrooms in South Africa. It also provides opportunities for re-analysing and re-interpreting the SITES 2006 findings (Smith, 2006).

Though general guidelines are available (Bialobrzeska & Cohen, 2005) for managing ICT in South African schools, there is little evidence why certain ICT pedagogical practices are chosen over others. This study aims to identify ICT-specific pedagogic practices which can be correlated to the support received and the barriers faced by grade 8 Mathematics and Science teachers in the classroom. Information derived from this study can help to determine school principals' roles in the integration of ICT pedagogic practices in South African classrooms. It also revealed information regarding gender differences related to the ICT pedagogic practices of grade 8 Mathematics and Science teachers. In addition, the statistical analysis revealed differences in ICT pedagogic practices between Natural Science and Mathematics teachers. As this study is based on an SDA of the SITES 2006 data (which was an international survey), it presented ICT teaching and learning in South Africa from an international perspective. Table 1.1 indicates how the chapters are divided for this study.

Table 1.1: Chapter Divisions of the Study

Chapters		Description
1	Orientation to the study	Context of the research problem, problem statement, indication of research design and methodology
2	Ecological activity system theory as a conceptual framework	Fusion of Bronfenbrenner's Ecological Systems Theory and Engeström's Activity Theory
3	Review of literature	Critical analysis of materials read, framework for the study, summary of main conclusions according to the conceptual framework
4	An overview of the Second Information Technology in Education studies	The SITES projects, conceptual frameworks, methodologies, data analyses, and conclusions of SITES
5	Research Design and Methodology	Key variables, methods of data analysis
6	Findings from the secondary data analysis	Discussion of the results, factor analysis, correlations and interpretations
7	Summary and recommendations	Summaries, interpretation in terms of conceptual framework, anomalies and deviations, significance of findings, conclusions and questions for future research

Table 1.2 presents the key terms, concepts and their descriptions used in this study

Table 1.2: Descriptions of Concepts Used in This Study

Concepts	Description
Information and Communication Technology (ICT)	Information and Communication Technology (ICT) represents data processing and sharing using computers, networks, software and peripherals (Anderson, 2005). According to UNESCO (2007) ICT refers to forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means. This broad definition of ICT thus incorporates radio, television, DVDs, landline and cellular phones, computer hardware, networks, computer software, video conferencing, instant-messaging, blogs and e-mail as part of ICT. For this study, Anderson's definition is chosen as the working definition of ICT
Pedagogy	The word pedagogy is derived from the ancient Greek word *paidagogos*, referring to the slave who guided the children to school. Pedagogy is generally considered as the *art and science* of teaching. Alexander (1992), as quoted by Cox (2003), identifies *teaching methods* and *learner organisation* as the two main facets of pedagogy. The above explanations are based on teacher-centred pedagogy. Currently (and for this study) pedagogy represents the processes, experiences, contexts, outcomes and relationships of teaching *and* learning (Beetham & Sharpe, 2007). Unlike in the past, pedagogical practices should now place more emphasis on learning (by the learner and the teacher) and less on teaching (by the teacher alone). Beetham and Sharpe propose

	that *design for learning* should replace *Pedagogy*
ICT pedagogic practices	Developments in ICT provide different learning opportunities for learners. The choice and use of ICT resources may differ in terms of pedagogical practices for different (learning area) teachers. McLoughlin and Oliver (1999) define pedagogical roles for teachers in a technology-supported classroom as setting joint tasks, rotating roles, promoting student self-management, supporting meta-cognition, fostering multiple perspectives and scaffolding learning
Learning	Learning is one of the most basic abilities and manifestations of human life. However, it is viewed differently by people according to their specific contexts. Generally speaking, learning is the process of gaining more knowledge or gaining the ability to do something (Pritchard, 2008). For this study, it is defined as any process in living organisms that leads to permanent capacity change and which is not solely due to biological maturation or aging (Illeris, 2009). Learning may transform experience into knowledge, skills, and values. According to Jarvis (2006), learning is the combination of processes whereby the whole person—body (genetic, physical, biological) and mind (knowledge, skills, attitudes, values, emotions, beliefs and senses) experiences a social situation. The perceived content of this is then transformed cognitively, emotively, or practically (or through any combination of those) and integrated into the person's individual biography, resulting in a changed (or more experienced) person
Behaviourism	Behaviourists see learning as a relatively permanent, observable change in behaviour due to experience. This change is effected through a process of rewards and reinforcements but initially has little regard for mental processes or understanding (Pritchard, 2008). Three types of learning are identified. Respondent learning (e.g., the use of classical conditioning where involuntary actions are elicited), operand conditioning (the development of a relationship between a stimulus and response), and observational learning (a change of behaviour brought about by the experience of observing others)
Constructivism	Constructivists view learning as the result of mental construction. Learning takes place when new information is built into and added onto the individual's current structure of knowledge, understanding and skills (Pritchard, 2008). Constructivist learners are mentally active and they create their own individualistic meaning and structure of the world. Knowledge construction involves an integration of individual cognitive and social processes. Knowledge is constructed, rather than discovered, which implies that it is neither independent of human knowing, nor value free (Gordon, 2009)
Research design	Research design describes the procedures for conducting the study, including when, where and under what conditions the data will be obtained (McMillan & Schumacher, 2001)
Research methods	"Research methods represent a range of approaches used in educational research to gather data which is used as a basis for inference. interpretation, for explanation and prediction" (Cohen, Manion, & Morrison, 2007, p. 38)
Quantitative research	Quantitative research is a means for testing objective theories by examining the relationship among variables. These variables can be measured, typically on instruments, so that numbered data can be analysed using statistical procedures. The final report has a set structure consisting of introduction, literature and theory, methods, results and discussion (Creswell, 2009)
Secondary data analysis (SDA)	Secondary Data Analysis is any further analysis of an existing dataset which presents interpretations, conclusions or knowledge additional to, or different from, those produced in the first report on the inquiry as a whole and its main results (Smith, 2006)
Theory	Theory refers to a set of interrelated concepts, definitions and propositions that represent a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena (Cohen *et al.*, 2007)
Variable	Variable refers to a characteristic or attribute of an individual or organisation that can be measured or observed and that varies among the people or organisation being studied. A variable will typically vary in two or more categories or on a continuum of scores which can be measured (Creswell, 2009)

Effect size	Effect size identifies the strength of the conclusions about group differences or the relationships among variables in quantitative studies (Creswell, 2009)
Activity theory	Activity theory is a framework for studying humans and their use of artefacts. Emphasis is placed on an object's purpose and how it is used by an individual, often working with others, to achieve a particular goal. Activity theory emphasises purposeful social interactions (Molenda, 2008)
TPACK	Technology Pedagogy Content Knowledge (Koehler, 2011)
Unit of analysis	Unit of analysis specifies the boundary of phenomena that one is attempting to measure (Schuh & Barab, 2008)
Concentric ecological systems	A concentric ecological system (micro, meso, exo and macro) affects the development of a person or group from the outside (Bronfenbrenner, 1986)

Chapter 2

Ecological Activity Systems Theory as a Conceptual Framework

2.1 Introduction

Chapter 2 proposes the *Ecological Activity Systems Theory* as a conceptual framework for conducting research during the current investigation. The proposed conceptual framework is a fusion of Urie Bronfenbrenner's (Bronfenbrenner, 1979b; Bronfenbrenner, 1986) *Ecological Systems Theory* and Yrjö Engeström's *Human Activity Systems Theory*. The *Ecological Systems Theory* explains the different concentric ecological systems relevant to ICT implementation, use and research in developing contexts, as proposed by Blignaut and Els (2010). Thereafter, Engeström's *Human Activity Systems Theory* explains various activities taking place between the different ecological systems identified through the *Ecological Systems Theory*. Finally, in Chapters 6 and 7, the researcher indicates how the proposed conceptual framework will be applied for the SDA used in this study.

2.2 Concentric Ecological Systems Relevant to ICT Implementation, Use and Research in Developing Contexts

This section explains Bronfenbrenner's *Ecological Systems Theory* (Bronfenbrenner, 1979b) , the historical development of the theory and the motivation for its use in the current investigation. It also discusses each of the concentric ecological systems.

2.2.1 Historical Development and Motivation for Use

In the late 1970's, Urie Bronfenbrenner, an American developmental psychologist and co-founder of the *Head Start Programme* for disadvantaged pre-school learners, proposed the *Ecological Systems Theory,* consisting of four concentric systems that influence and shape human development throughout a person's life, i.e. microsystems, mesosystems, exosystems, and macrosystems (Bronfenbrenner, 1979b). He later added another system called the chronosystem (Bronfenbrenner, 1986). This theory is still used as research framework across a variety of disciplines, such as anthropology, human biology and health, economics, education, sociology and psychology. While exploring the literature for an appropriate research framework, the researcher identified and applied *Ecological Systems Theory* to explain the different concentric systems relevant to ICT implementation, use and research in developing contexts (Blignaut & Els, 2010).

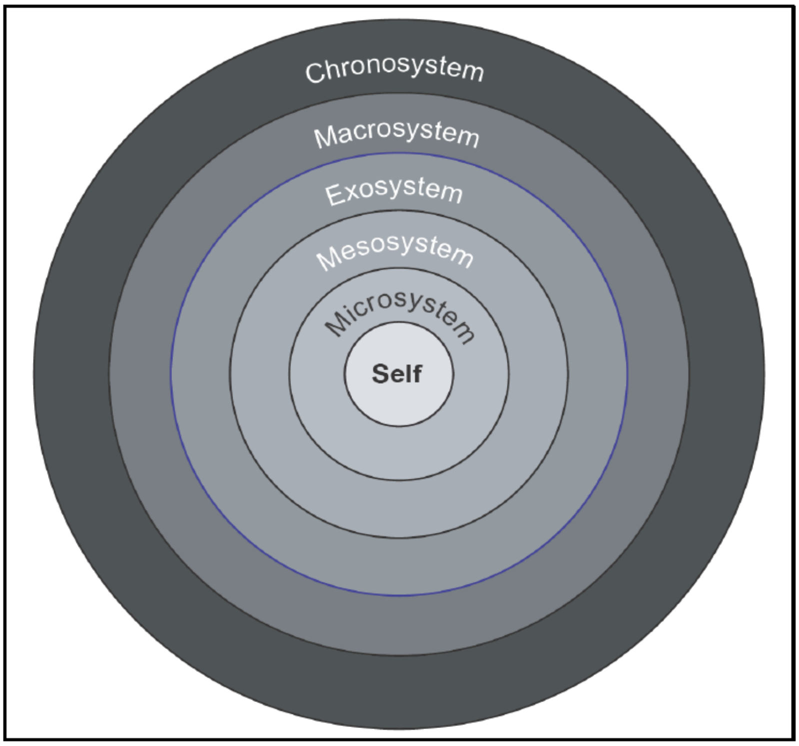


Figure 2.1: Bronfenbrenner's (1979b) Concentric Ecological Systems Theory (Blignaut & Els, 2010)

Figure 2.1 shows the five concentric ecological systems (Bronfenbrenner, 1979b). The ecological environment is viewed as a set of nested structures, similar to a set of Russian dolls. At the inner level rests the developing person (Blignaut & Els, 2010), who in the context of the current investigation, are the grade 8 Mathematics and Natural Science teachers and learners that the SITES 2006 focussed on. In the following sections the concentric systems are defined with relevant examples related to this study.

2.2.2 Microsystem

Microsystems represent the complex interrelationships within a person's immediate context. A microsystem is a pattern of bi-directional activities, roles, interaction and inter-personal relationships (with or without ICT) experienced between the developing person and another person in a concrete setting (Bronfenbrenner, 1986). For example, the roles, activities, interactions and inter-personal relationships (with or without the use of ICT) that take place between grade 8 Mathematics and Natural Science teachers and learners are individual microsystems. Bronfenbrenner (1986) defines *development* as a lasting change in the way in which the developing person perceives and deals with his or her environment. An ecological transition occurs whenever a person's position in the ecological environment is altered as the result of a change in role, settings, or both. For example, a Mathematics teacher's roles, activities and inter-personal relationships with parents, colleagues and learners (various microsystems) change after being promoted to school principal.

2.2.3 Mesosystem

A mesosystem comprises the relations among two or more settings in which the developing person actively participates (Bronfenbrenner, 1979b). One or more microsystems form a mesosystem. A mesosystem incorporates the objects (e.g. ICT equipment) to which a person responds, as well as the people with whom the person interacts. For example, in the Natural Science classroom (setting of the mesosystem), the Natural Science teacher (specific role) has different inter-social relationships with each learner (separate microsystems), while the learners form microsystems among themselves. The teacher's interaction and bi-directional relationship with another Natural Science teacher overseas via the Internet is also part of this mesosystem.

2.2.4 Exosystem

An exosystem represents one or more settings that do not involve the developing person as an active participant, but in which events occur that affect, or are affected by what happens in the setting containing the developing person (Bronfenbrenner, 1979b). The National Department of Basic Education (NDoBE), the National Curriculum (NDoBE, 2011), and the Provincial Departments of Education are typical examples of exosystems. Decisions by these policy makers affect learners and teachers, although learners and teachers are not involved in policy-making. The NDoBE's decision to change the school curriculum, teacher mass-actions (e.g. striking and staying away from school for weeks during the school calendar for better salaries) (Cohen, 2010), ICT equipment being stolen by criminal elements in the community (Ajam & Bailey, 2009) and unsatisfied community members burning down the public library as a result of poor service delivery (Brooks, 2009), are all examples of settings within an exosystem. These settings affect the development of individual learners and teachers without them necessarily being an active participant in these processes.

2.2.5 Macrosystem

The macrosystem denotes consistencies in the structure and content of lower-order systems (micro, meso and exo), which exist or may exist at a subculture level or the culture as a whole. The macrosystem also includes the belief systems or ideologies that underlie these consistencies (Bronfenbrenner, 1979b). Microsystems represent blueprints of behaviour for systems in a society. The South African Constitution (South Africa, 1996a), together with parliament, judiciary and public servants make provision in form and content for consistent educational opportunities for all eligible citizens.

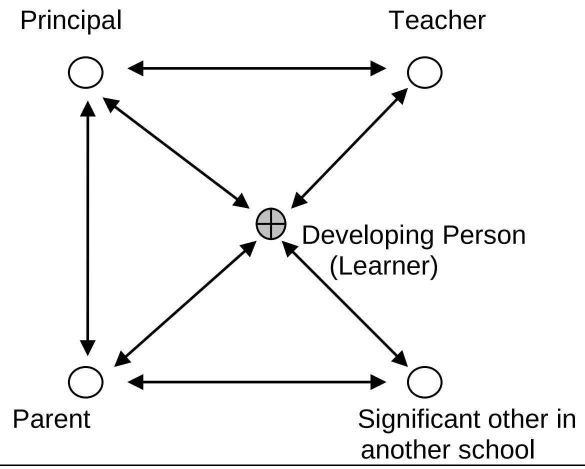
2.2.6 Chronosystem

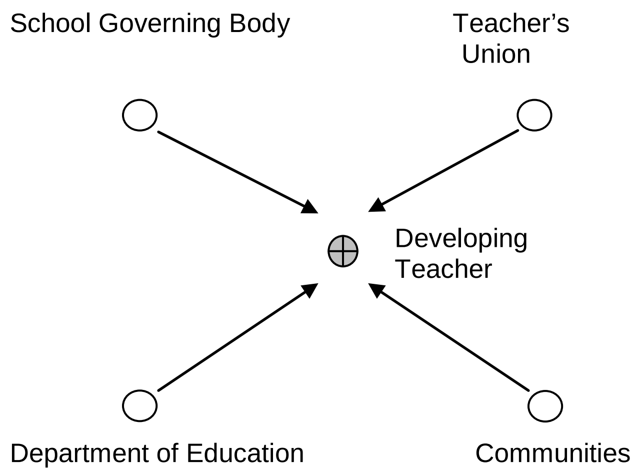
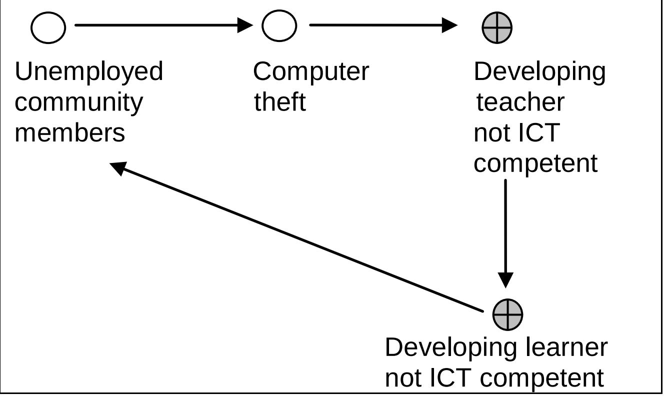
A chronosystem examines the evolution of systems, as well as the development, changes and continuities of individuals (teachers and learners, in the context of the current investigation) over time (Bronfenbrenner, 1986). A chronosystem is the patterning of environmental events and the transition of the individual and the group. Longitudinal research observes, records, understands and interprets the cumulative effect of a sequence of developmental transitions of individuals and groups within the chronosystem. The IEA's longitudinal studies on the use of computers in education (SITES M1, M2 and SITES 2006) investigate various aspects relating to the use of ICT in teaching and learning in schools across the world (Law & Chow, 2008). SITES 2006 provides the data for this research. Another example of the chronosystem is the system-wide implementation and use of ICT for pedagogical purposes over time (projected up to the year 2013)—guided by the strategic objectives of the White Paper on e-Education (South Africa, 2004).

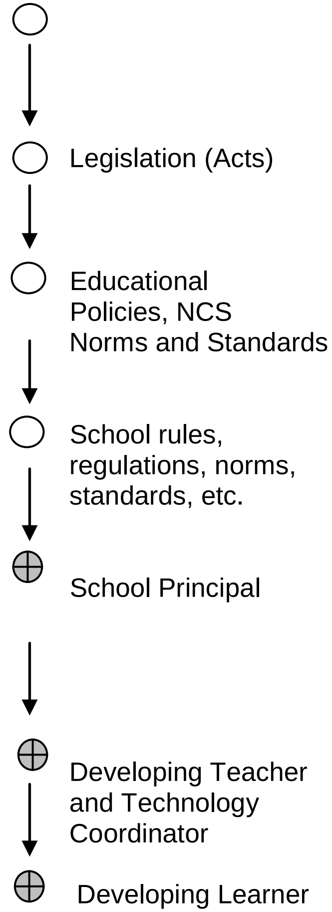
While exploring Bronfenbrenner's (1979b; 1986) *Ecological Systems Theory,* the researcher identified interaction dynamics of each concentric system, as well as relevant examples of each concentric system within the context of the current study, presented in Table 2.1.

Table 2.1: Bronfenbrenner's Concentric Ecological Systems Applied to the Current Investigation

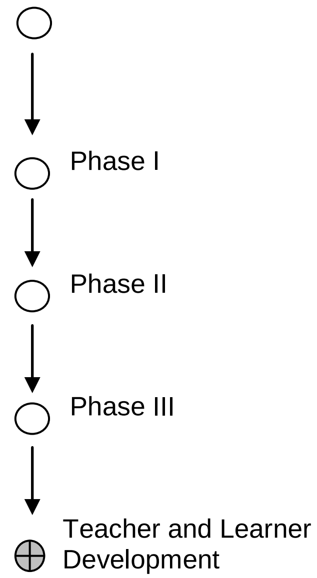
Bronfenbrenner's Concentric Ecological Systems	Interaction Dynamics	Examples Identified in the Current Investigation	Examples Illustrated through Symbolic Representations
Self Developing person	Intra-personal (self-dialogue and reflection)	▪ A developing Technology Coordinator ▪ A developing Teacher (Grade 8, Mathematics and Natural Science)	***Example 1:*** ⊕ Developing Technology Coordinator --- ***Example 2:*** ⊕ Developing Teacher
Microsystem "A pattern of bi-directional activities, roles, interaction and inter-personal relationships (with or without ICT) experienced between the developing person and another person in a concrete setting" (Bronfenbrenner, 1979)	Inter-personal and bi-directional	Activities, roles, interactions and inter-personal relations (with/without ICT) between: ▪ A teacher and teacher ▪ A teacher and learner ▪ A teacher and principal ▪ A teacher and technology coordinator ▪ A principal and technology coordinator ▪ A principal and learner ▪ A principal and parent ▪ A teacher and parent	***Example 1:*** ⊕ ⟷ ○ Developing Teacher Developing Learner --- ***Example 2:*** ⊕ ⟷ ○ Developing Teacher Developing Principal

Bronfenbrenner's Concentric Ecological Systems	Interaction Dynamics	Examples Identified in the Current Investigation	Examples Illustrated through Symbolic Representations
Mesosystem "Interrelations among two or more settings in which the developing person actively participates" (Bronfenbrenner, 1979)	Inter-social: two or more microsystems (interactions between the developing person and two or more developing persons, as well as possible interactions between them)	Interrelationship, roles and activities between the developing person and two or more developing persons, for example: ▪ The developing learner (in a ***classroom***) interacts with the teacher (micro-system), as well as with class mates (micro-systems), and with a friend (another micro-system) ▪ The developing teacher in a ***school*** interacts with other teachers (microsystems), the principal (microsystem), a technology coordinator (microsystem), learners (microsystems), parents (microsystems), and community leaders (microsystems), as well as the interactions between these microsystems	

Bronfenbrenner's Concentric Ecological Systems	Interaction Dynamics	Examples Identified in the Current Investigation	Examples Illustrated through Symbolic Representations
Exosystem "One or more settings that do not involve the developing person as an active participant, but in which events occur that affect, or are affected by, what happens in the setting containing the developing person" (Bronfenbrenner, 1979)	Intra-social - dialogue reflections, decisions and actions between different systems/settings that affect the developing person without them being an active participant	▪ The developing learner/teacher is affected by the decisions made by the School Governing Body and the Department of Education, without being an active participant in their decision processes ▪ The developing learner is affected by the ICT training provided by the Department of Education ▪ The high unemployment of community members increases crime in and around the school, which may lead to newly donated computers being stolen from the school's computer classroom, which in turn, have a negative effect on the ICT development of teachers and learners ▪ The developing learner is indirectly affected by the Department of Education's supply of ICTs, the School Governing Body's promotion of ICT, the attitude of the Principal, as well as their teacher's ICT competency	 

Bronfenbrenner's Concentric Ecological Systems	Interaction Dynamics	Examples Identified in the Current Investigation	Examples Illustrated through Symbolic Representations
Macrosystem "Consistencies, in the form and content of lower-order systems (micro, meso and exo) that exist, or could exist at the level of sub-culture or the culture as a whole, along with any belief systems or ideologies underlying such consistencies" (Bronfenbrenner, 1979b)	Trans-social	Blueprints for the consistent organization and functioning of lower-order systems, for example: ▪ The South African Constitution ▪ Legislation: Educational Acts, Green Papers, Regulations and Government Notices ▪ Educational Policies, Norms, Standards, National Curriculum Statements and Assessment Standards, School Rules and Regulations ▪ Rights and responsibilities of parents, teachers, principals, schools, Governing Bodies, etc. ▪ The South-African Qualifications Authority	*South African Constitution* 

Bronfenbrenner's Concentric Ecological Systems	Interaction Dynamics	Examples Identified in the Current Investigation	Examples Illustrated through Symbolic Representations

Chronosystem
 	
The evolution of external systems over time, which "makes possible examining the influence on the person's development of changes (and continuities) over time in the environment in which the person is living" (Bronfenbrenner, 1986)
	Trans-social	▪ The attainment of each learner's Constitutional right to equal ICT education over time
		▪ The system-wide implementation and use of ICT for pedagogical purposes over time (projected up to the year 2013), guided by White Paper on e-Education (South Africa, 2004):
		  ▪ Phase I: Enhance system-wide and institutional readiness to use ICTs for learning, teaching and administration
		  ▪ Phase II: System-wide integration of ICTs into teaching and learning
		  ▪ Phase III: ICTs integrated at all levels of the education system-management, teaching, learning and administration
		▪ Longitudinal evaluation of the implementation, use and effectiveness of ICT for educational purposes, including SITES and the current Secondary Data Analysis
			Publication of White Paper on e-Education (South Africa, 2004)
			
			
			e-Education Policy Goal for 2013:
			"Every South African learner in the general and further education and training bands will be ICT capable (that is, use ICT confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the Global community) by 2013" (South Africa, 2004) (Figure 4.1)

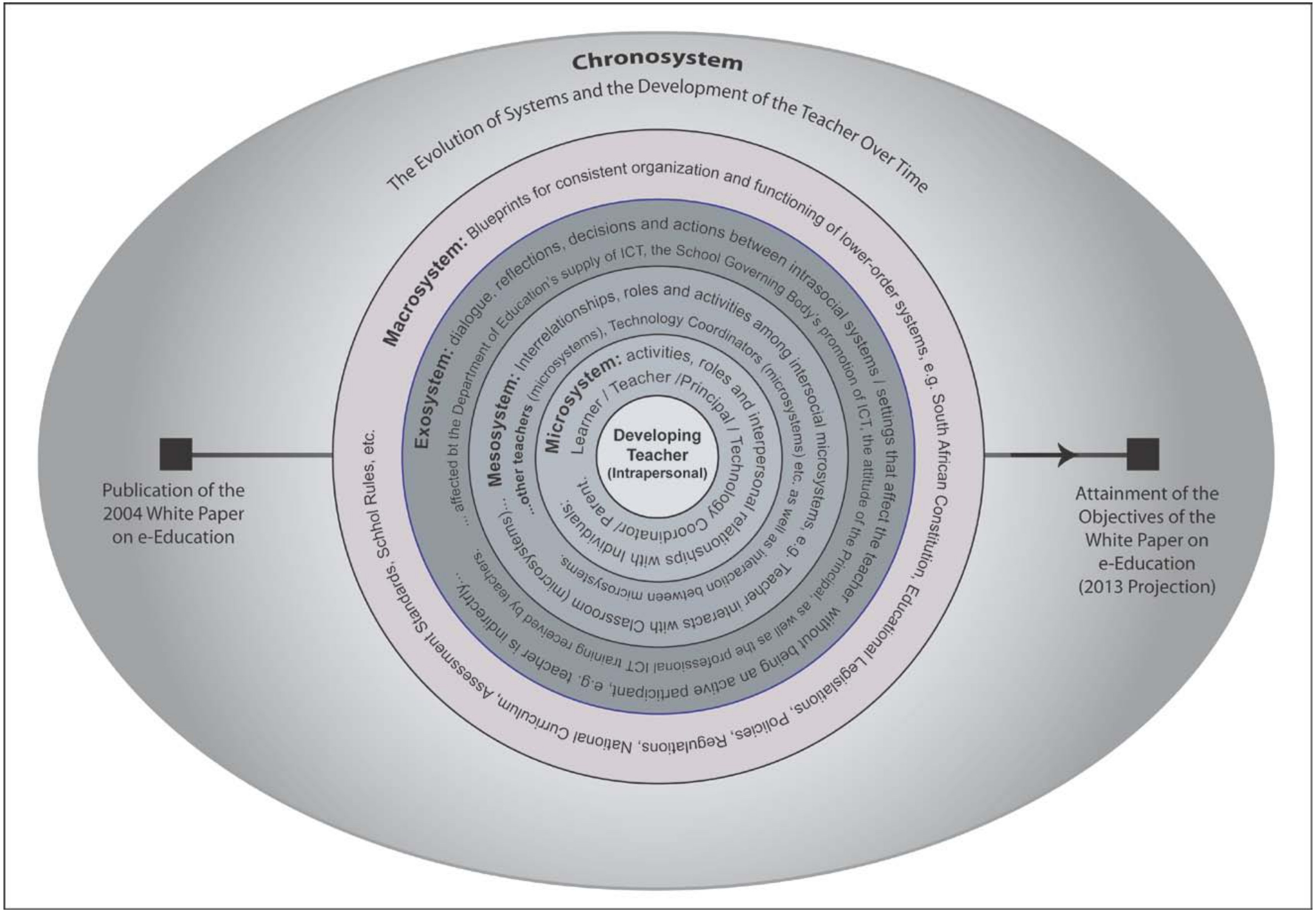


Figure 2.1: Bronfenbrenner's Concentric Ecological Systems Theory aligned with the Objectives of the e-Education White Paper

2.3 Activity Theory

This section explores Engeström's (1996) *Activity Theory* in terms of its historical development, as well as a motivation for its use in the current investigation. This is followed by a description of the main constructs of *Activity Theory,* as well as an outline of three generations of *Activity Theory* research.

2.3.1 Historical Development and Motivation for Use

Holzman (2006) uses the term *Activity Theory* to address a wide range of approaches inspired by Vygotsky (1978). Lev Vygotsky initiated *Cultural-Historical Activity Theory* in the 1920s and early 1930s—the ontological womb from which contemporary *Activity Theory* was born. His colleagues Alexei Leont'ev and Alexander Luria developed the theory further (Leont'ev, 1977; Luria, 1928; Luria, 1962; Sannino, Daniels, & Gutierrez, 2009). The development of *Activity Theory* progressed through three research generations, of which the third generation of *Activity Theory,* as proposed by Engeström (1987b; 1996; 2009), is utilised in the current investigation.

Activity Theory (Engeström, 1987a; 2009; Kaptelinin & Nardi, 2009; Ryder, 2009), a variant of *Cultural Historical Activity Theory* (Lektorosky, 2009), is unique in human and social sciences. It contrasts other approaches typically based on a single individual's endeavours—for example Freud's psychoanalysis (Freud, Strachey, & Gay, 1990), Satre's (Satre, 1958) existentialism, Rogers' (1951) client-centred therapy and student-centred learning, and Piaget's (1954) genetic epistemology (Sannino *et al.*, 2009). *Activity Theory* is usually discussed in contexts of *Socio-cultural Theory* and *Cultural Historical Theory* (Martin & Peim, 2009). *Socio-cultural Theory* is grounded in North American traditions of anthropology, interactionism and the pragmatism of the adaptable self. *Cultural Historical Theory,* on the other hand, is embedded in European traditions of thought, in particular Russian cultural psychology (Lektorosky, 2009). One school of thought stemmed from Engeström's (Engeström, 1996) development of *Cultural Historical Activity Theory,* while another school of thought stemmed from Bedny's (2005) *Systemic Structural Activity Theory*. Variations and adaptations of *Activity Theory* have been very popular among Russian psychologists and philosophers for many decades. In Russia, much research has been carried out in different human sciences within the framework of *Cultural-Historical Activity Theory.* Many of its key ideas continue to be insufficiently elaborated, it is given different interpretations, and there are discussions about the meaning of its basic tenets (Lektorosky, 2009). The basic tenet of *Cultural-Historical Activity* is that human beings do not live in a vacuum, but our thinking and activities are mediated through the cultural symbol systems, artefacts used, and social mediators (e.g. rules and division of labour) (Engeström, 2009). Also, there are debates among Activity theorists about the inclusion of *emotions* and *body* in the formulation of the unit of analysis (Sannino *et al.*, 2009). However, there continue to be boundary crossings between different approaches which enrich the development of *Activity Theory* (Edwards, 2005; 2007), e.g. *Activity Theory* is increasingly being used in diverse research and development fields, such as information system development (Korpela, Soriyan, & Olufokunbi, 2000), conflict monitoring networks (Foot, 2001), change management (Jarzabkowski, 2003) and learning theory (Engeström, 2009).

According to Kuuti (1996), *Activity Theory* is a philosophical and cross-disciplinary conceptual framework for studying different forms of human practices as developmental processes, in which the theory seeks to explain and influence qualitative changes in human practices over time (Engeström, 1999b), and is therefore chronosystematic in nature. While Bronfenbrenner's *Concentric Ecological Systems* enables the researcher to analyse the implementation and use of ICT across various systems, including the evolution of these systems and the ICT development of teachers and learners, Engeström's (1996) *Activity Theory* enabled the researcher to investigate, in detail, the activities taken place within each of the systems. *Activity Theory* allows the researcher to explore, in a structured and coherent way, the subjects, objects, outcomes, mediating artefacts, rules, community participation, and division of labour involved in the implementation and use of ICT for pedagogical purposes in South African grade 8 Mathematics and Natural Science classrooms.

2.3.2 Main Constructs of Activity Theory

The following main constructs of Activity Theory are described in this section: (i) objects, (ii) mediating artefacts, (iii) subjects, (iv) activity, (v) division of labour, (vi) community, (vii) rules, and (viii) outcomes.

2.3.2.1 Objects

Engeström defines objects as:

> Object of an activity can best be regarded "as a project under construction, moving from potential raw material to a meaningful shape and to a result or outcome. In this sense the object determines the horizon of possible goals and actions. But it is truly a horizon: as soon as an intermediate goal is reached, the object escapes and must be reconstructed by means of new intermediate goals and actions (Engeström, 1999a, p. 65).

In *Activity Theory*, objects ceased to be just raw materials for the formation of logical operations in the subject, as they were for Piaget. Objects became cultural entities, while the object-orientedness of action became the key to understanding human behaviour. Object-orientedness means that elements that represent reality around human beings have two kinds of properties. Natural Sciences define the first kind, while the history and culture of elements define the second kind (Bannon, 1997; Kaptelinin & Nardi, 2009; Ryder, 2009). While a computer has physical properties such as height, weight, screen size, etc., each component of the computer (e.g. central processing units, hard drives, monitors, etc.) carries properties associated with its history. For example, in this investigation ICT pedagogical practices are one of the objects.

2.3.2.2 Mediating Artefacts

The relationship between human agents and objects of the environment is mediated by cultural artefacts, i.e. tools and signs. The human mind develops and can only be understood within the context of meaningful, goal-oriented, and socially determined interaction between human beings and their material environment (Bannon, 1997; Kaptelinin & Nardi, 2009; Ryder, 2009). As an individual engages and interacts with the environment, tools are produced. These tools are "exteriorised" forms of mental processes. Because these mental processes manifest in tools, they become more readily accessible and communicable to other people. Then these tool manifestations of mental processes become useful for individual and social interaction. Artefacts are present when we are engaged in a certain activity, but they can also become a product of our activity. Artefacts are constantly changed through activities. Animals use a low level of tools and signs, while humans can use high levels of tools and signs, e.g. ICT. Artefacts or tools can be physical, such as a computer, or an artefact could be an idea, a language, or a theoretical framework. In this research, examples of tools and artefacts may range from sophisticated computer hardware, software and networks to the simple things such as teachers' chalk and black board. The Internet and the WWW is perhaps history's largest collective human artefact (Bannon, 1997; Kaptelinin & Nardi, 2009; Ryder, 2009).

Tools have limitations and impose a perspective on the object, which may hide some of its features. For example, trying to learn a language solely by reading printed material may not enable the learner to acquire the phonological features of the language. Learning how to use a tool has a deep impact on the subject. People not only change tools they use, but are also changed by them. For example, a person who learns how to read becomes a different person. Tools can be imperative for the transmission and accumulation of knowledge. People learn with tools they use, and use this knowledge to produce new or improved tools.

2.3.2.3 Subject

The subject is the bearer of an activity. An individual activity has an individual subject, while a collective activity has a collective subject (Lektorosky, 2009). In this study, teachers, learners, group of learners, and even the Government, depending on the context, form the subjects.

2.3.2.4 Activity

Activity is the engagement of a subject toward a certain goal or objective. Activities organize human life. In activities humans develop skills, personalities, and consciousness. Through activities we transform our social conditions, resolve contradictions, create new tools, and create new forms of life and self-actualization. Activities connect the inner subjective world of consciousness with the outer world of people and things (Lektorosky, 2009). Activity is a concept that denotes the basic unit of concrete human life (Sannino *et al.*, 2009). Because of changes that occur within the socio-historical context in which activities are located, the dynamic of activities are continuously developing and redeveloping. Societal changes could affect any activity component (e.g. subject, object, rules, tools, etc.), which affect the entire activity. Activities are long-term formations adjusted to a motive or object, which consist of actions directed at specific conscious goals, performed by a community in a specific context. Goals are carried out by an individual or group, and are subordinated to activities. Operations are determined by the existing conditions of an activity, are realised subconsciously, and automatically carried out by human routines or machines. *Activity is the primary unit of analysis in Activity Theory.* Activity systems travel through zones of proximal development (Engeström, 1999a). In this study, amongst others, teaching, learning, facilitation, counselling and guidance constitute the activities, depending on the context.

2.3.2.5 Division of labour

Division of labour is the component which allocates responsibility to the members of the community in relation to the object (Engeström, 1987a). In the school community, the division of labour defines the roles to be played by the people involved in the development of the activity, including teachers, principals, technology coordinators, and learners. Activity may be carried out individually or collectively. When more than one person is involved in the activity, labour is divided according to the available expertise. For example, when learners are involved in problem-solving as a group, one may search and find information, another one may create PowerPoint™ presentations, a third may orally present it before the class.

2.3.2.6 Community

The community in which the subject is present is called the immediate environment, including people and social artefacts they use. The community can be home, work place, school, church, sports club, or any discourse community. The community elements set the stage for subjects to perform their actions. Intelligence, cognition, and knowledge, are not only individual attributes, they are distributed among the members of the community in which we live. Consequently, we do not learn by ourselves alone—we learn in contact with other people, interacting with them; we learn in a community. People surrounding the learners could facilitate learning using ICT. Teachers, group leaders, peers, parents, experts outside the school, and the Internet community, all could scaffold learning activities depending on the requirements of the context (University of Tasmania, 2009).

2.3.2.7 Rules

Rules can be defined as the norms which regulate the actions carried out by the subject. They are placed between the subject and the community and may be explicit, such as printed regulations, standards, policies, and statutes; or implicit, such as cultural beliefs, values and power relations. Learning within schools takes place in an environment surrounded by formal and informal rules, traditions, acceptable practices, etc. All schools have norms and standards for behaviour. For example, the curriculum prescribes what, and on what level; learning should take place; time-tables prescribe how much time teachers and learners may spend on each subject while at school; and assessment criteria prescribe levels of achievement (NDoBE, 2010).

2.3.2.8 Outcomes

Outcomes specify the results of the activity. Efficient ICT pedagogical practices of teachers could enable the learners to effectively achieve the South African curriculum goals.

2.3.3. Outline of the Three Generations of Activity Theory Research

The following section presents the history of *Activity Theory.* According to Engeström, (Engeström, 1996) *Activity Theory* has evolved through three generations of research. The unit of analysis was individually focussed on the first generation. The second generation of *Activity Theory* resolved this. It explicated the crucial difference between an individual action and collective activity. However, questions of diversity and dialogue between different traditions or perspectives remained as serious challenges in the second generation of *Activity Theory,* which led to the development of the third generation of *Activity Theory (1996)*.

2.3.3.1 First Generation of Activity Theory Research

The first generation, based on the work of Vygotsky (1978), created the idea of *mediation*. The triangular model (Figure 2.2) in which the conditioned direct connection between Stimulus (S) and Response (R) (Figure 2.2A) was transcended by an artefact (e.g. ICT) (Figure 2.2B), that mediates activity between the subject (e.g. the developing teacher) and the object (e.g. ICT pedagogical practices).

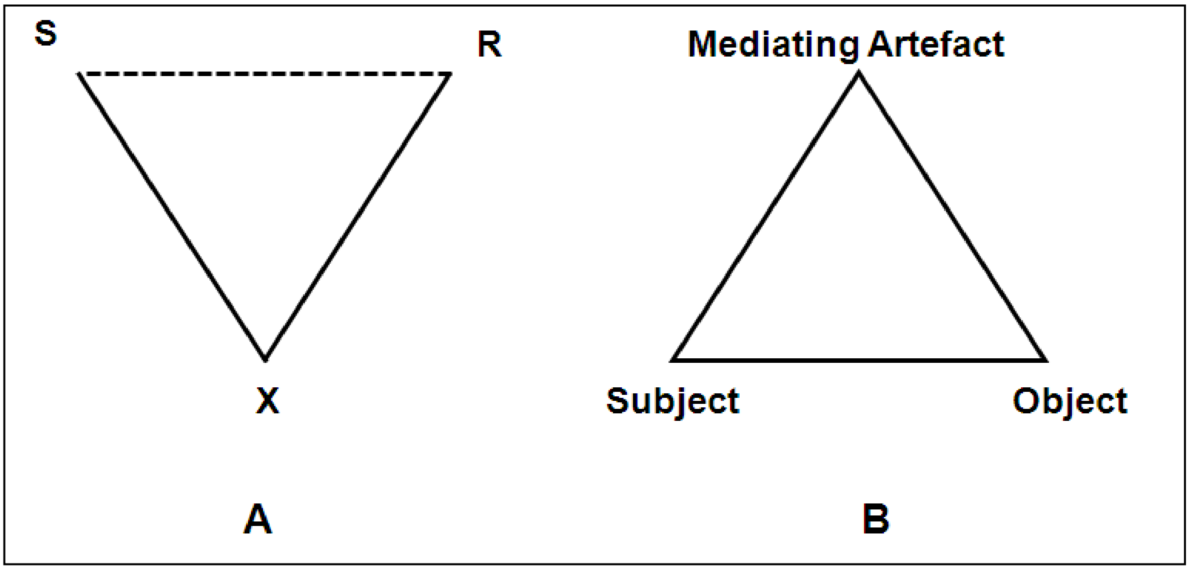


Figure 2.2: Vygotsky's Model of Mediated Act and its Common Reformulation (Engeström, 2009)

The insertion of mediating artefacts into human actions was revolutionary in that the basic unit of analysis combined an individual with social structure, i.e. the individual could no longer be understood without his or her cultural means, and society could no longer be understood without the agency of individuals who use and produce mediating artefacts (Engeström, 2009).

According to *Activity Theory,* cultural means, tools and signs mediate relationships between the human agent and objects. *Activity Theory* asserts that artefacts (e.g. ICT) act as mediators of human thoughts and behaviour. Artefacts act as channels for the communication and transmission of social knowledge (Kaptelinin & Nardi, 2009; Ryder, 2009). They shape the way in which humans interact with reality, and influence the nature of both internal functioning of the individual, as well as external behaviour. The unit of analysis for human behaviour remains individually focussed in the first generation of *Activity Theory*. The second generation of *Activity Theory* incorporates collective human action.

2.3.3.2 Second Generation of Activity Theory Research

Leont'ev (1977) expounds the important difference between an individual's action and collective activity. Humans engage in actions that in themselves may not satisfy a need, but may rather contribute to the ultimate satisfaction of a need. These actions are only meaningful if they take place in a social context of shared work activity. Figure 2.3 explains the hierarchical model of human activity where people share work.

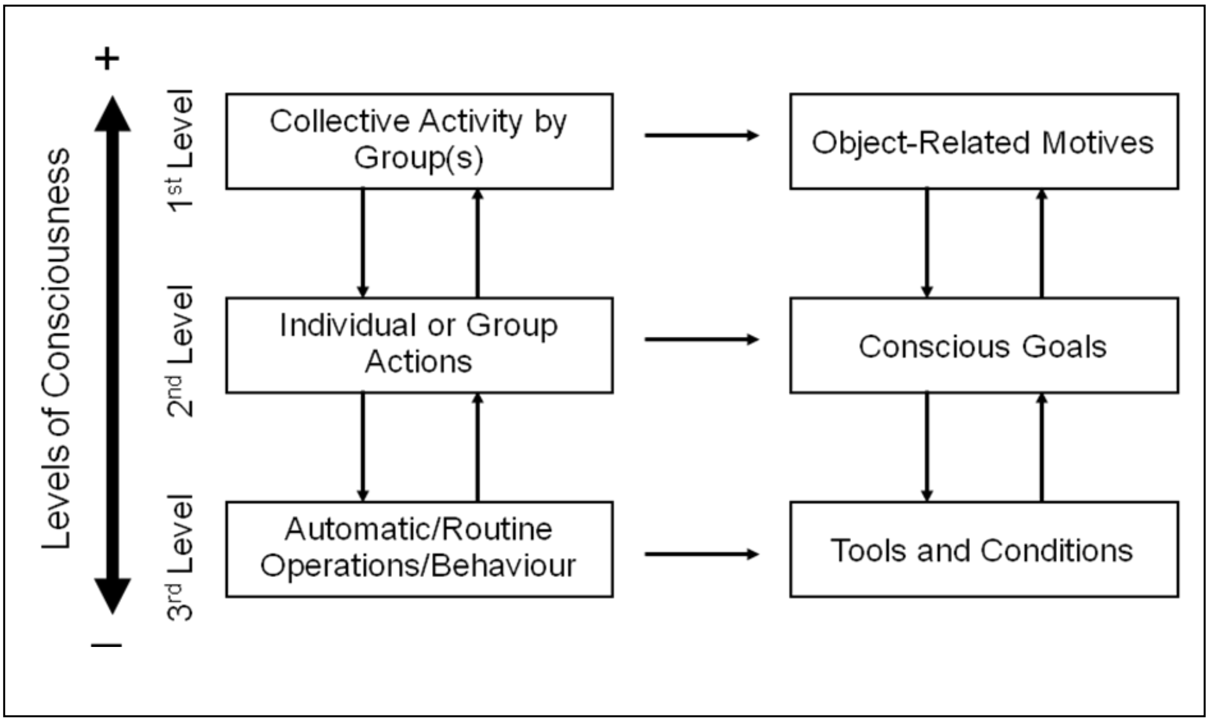


Figure 2.3: Hierarchical Model of Human Activity (adapted from Wilson (2006, p. 6))

Leont'ev's hierarchical model of human activity has three levels. *Activity Theory* defines "activity" as a goal directed system in which cognition, behaviour, and motivation are integrated and organised by goals and the mechanisms of self-regulation (Bedny, Seglin, & Miester, 2000). An activity (1^{st} level on Figure 4.3) is made up of one or more *actions* (2^{nd} level on Figure 4.3), and actions, in turn, are made up of one or more *operations* (3^{rd} level on Figure 4.3). Actions are connected to conscious goals; operations are related to routine behaviours performed automatically without including the same level of consciousness. Learning takes place on all three levels, e.g. a group of teachers participate in a social network on the Internet (*Activity*) so that they can be part of the Information Age (*Motive*). To do this, they open an account on a social networking website and regularly visit the website to make contact with colleagues, read comments, respond to comments, and to write on the profiles of their listed colleagues (*Actions*), in order to be accepted by others as valued members of the online community (*Goal*). In order to achieve the above, they routinely and progressively perform automatic *Operation*s, like switching on the computer, logging onto the online social network, typing on the keyboard, using short-cut keys and menus, using emoticons, understanding and using unique language, slang and tones accepted by the social networking as a sub-culture. For these *Operations* to take place they need specific *Tools and Conditions*, such as an electricity supply, access to a computer and the Internet, computer competency, etc. (Ogunlade & Mwakasonda, 2009).

Another example is grade 8 students doing a Natural Science group project in a science laboratory (*Activity*), in order to understand a specific component of the Natural Science curriculum to pass the exam and to please their teacher and parents (*Motives*). For them to perform the group project they select the specific laboratory equipment, use the equipment according to the Natural Science teacher's instructions, and afterwards clean and store the equipment (*Actions*), in order for them to satisfy their intrinsic needs, like the exploratory need to gain skills and knowledge through practical exercise or just to have fun with their peers (*Goals*). While doing the group project, they routinely and progressively perform automatic operations, like switching on the light, opening laboratory cupboards, opening and closing bottles, lighting a Bunsen burner, mixing chemicals and cleaning up (*Operations*). In order to perform these *Operations* they need certain *Tools and Conditions*, for example, the school needs a safe and fully equipped Science laboratory, and the students need clear and sufficient guidance from their teacher on how to perform the practical work.

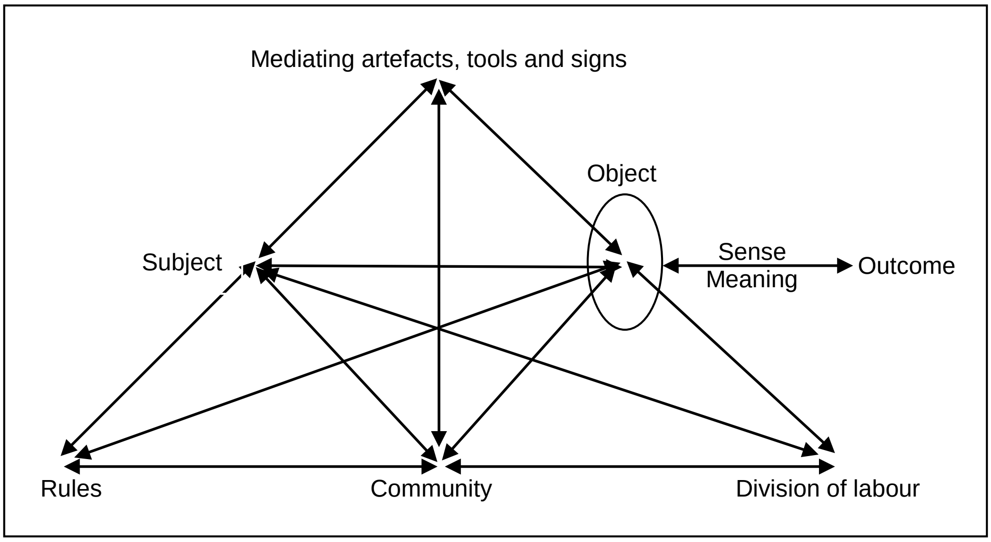


Figure 2.4: The Structure of the Human Activity System (Engeström, 1987a, p. 78)

Engeström reformulated the collective activity system by including "rules" and "collective subjects" and created a graphical representation (Figure 2.4). *Subjects* undertake an activity, e.g. teachers who participate in an ICT training course, who together with the instructor and the technician from the *Community*. They use specific *ICT Artefacts*, like computers, the Internet, software and the course manual, to mediate the activity between the *Subjects* (teachers) and the *Object* (e.g. the skills and knowledge to use ICT in teaching and learning). They work in collaboration with others (the *Community*) according to specific *Rules* (e.g. computer laboratory rules, instructions from the trainers, directions from the course manual and their mutual respect for each other). Within the training *Community* there exist a *Division of Labour* according to expertise, e.g. the instructor presents the course and guides teacher-students, the technician solve technical problems, the teacher-students perform specific tasks on the computers, and the two teachers-students with the most computer competency assist the instructor to transfer skill and knowledge to other less computer competent teacher-students. The *Outcomes* of this *Activity System* are ICT competent teachers who effectively use ICT with confidence for teaching and learning.

2.3.3.3 Third Generation of Activity Theory Research

Engeström initiated the third generation of *Activity Theory* (Sannino et al., 2009). When *Activity Theory* went international, questions of diversity and dialogue between different traditions or perspectives became increasingly serious challenges (Engeström, 2009). The second generation *Activity Theory* was insensitive to the cultural diversity that could be present in an activity system. The third generation *Activity Theory* developed conceptual tools to understand dialogue, multiple perspectives, and networks of interacting activity systems. This third generation *Activity Theory* expanded the basic structural model for a human activity system (Figure 4.4) to include a minimum of two interactive activity systems (Figure 2.5).

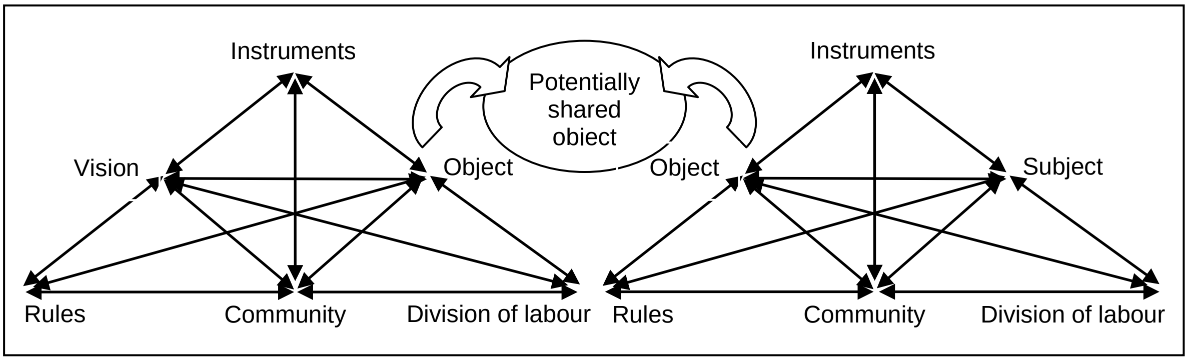


Figure 2.5: Two Interacting Activity Systems as Minimal Model for 3rd Generation of Activity Theory (Engeström, 2009)

The *Object* in Figure 2.5 moves from an initial state of un-reflected contextually given "raw material" to a collectively meaningful *Object* constructed by the activity system in Figure 2.5, and to a potentially shared or jointly constructed *Object* (Engeström, 2009).

Contradictions in the activity systems act as agents of change and development (Engeström, 2009). Contradictions are not the same as conflicts or problems. They are historically accumulating structural tensions within and between activity systems. Activities are open systems. The possibility for expansive transformations exists in the activity systems. Activity systems move through relatively long cycles of qualitative transformations. A full cycle of expansive transformations may be understood as a collective journey through the *Zone of*

Proximal Development of that activity (Engeström, 2009). The *Zone of Proximal Development* (ZPD) (Vygotsky, 1978) is an area where learners meet with others more knowledgeable and learn beyond the limit of own capacities. It is the difference between actual learning and potential learning: what "children can do with [the] assistance of others might be in some cases more indicative of their mental development than what they can do alone" (Vygotsky, 1978). Vygotsky suggests that by imitation learners can achieve beyond the limits of their capabilities. Support mechanisms should be provided for the learners to grow and develop within their *Zone of Proximal Development*—these Vygotsky called *scaffolding*. As learners achieve this additional growth, the scaffolding can slowly be removed.

When an activity system adopts a new element (like the installation of ICT equipment) the division of labour and rules of engagement within the system may require changes. This in turn may improve quality and productivity in the work place. Demiraslan and Usluel (2008) used activity theory to investigate the integration of ICT into Turkish schools. Murphy and Rodriquez-Manzanares (2008) suggest that *Activity Theory* is useful in analysing structural tensions in the research of ICT integration.

Table 2.2: Questions for exploring the components of a single Activity System, including tensions and contradictions (Mwanza & Engeström, 2003, p. 32)

Component	Questions
Activity	What sort of activity am I interested in?
Object(ive)	Why is the activity taking place?
Subjects	Who is involved in carrying out the activity?
Tools	By what means are the subjects performing the activity?
Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?
Division of labour	Who is responsible for what when carrying out the activity, and how are these roles organised?
Community	What is the environment in which this activity is carried out?
Outcomes	What is the desired outcome in carrying out this activity?

Mwanza and Engeström (2003) list eight questions (Table 2.2) that need to be addressed when investigating a system and which provide an opportunity to identify tensions and contradictions within a single activity system.

Table 2.3: Ecological Activity Systems Theory as Conceptual Research Framework for the Secondary Data Analysis

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
Activity	***Curriculum Goals*** *Intra-personal* dialogues and reflections on the planning of teaching methods that prepare learners to become competent and responsible ICT and Internet users	***Curriculum Goals*** Teacher's activities, roles, interactions and *inter-personal* relations with an individual learner using ICT that prepare them in becoming a competent and responsible ICT and Internet user	***Curriculum Goals*** Teacher's activities, roles, interactions and *inter-social* relations with two or more learners using ICT that prepare them in becoming competent and responsible ICT and Internet users	***Curriculum Goals*** *Intra-social* dialogues, reflections, decisions and actions of School Governing Bodies and the National Department of Education to organise professional development courses. These courses aim to develop and empower teachers to be competent, effective and responsible in ICT pedagogical practices in line with the school curriculum	***Curriculum Goals*** *Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools. This would result in professional development courses to develop and empower teachers to be competent, effective and responsible in ICT pedagogical practices, in line with the school curriculum	The evolution of the Education System and the development of teachers over a period of time (2004-2013) according to the Objectives of the 2004 White Paper on e-Education (Chapter 7)
Activity	***Learning Opportunities*** *Intra-personal* dialogues and reflections on planning to make use of scheduled time for learners to use ICT, search for information on the Internet, and to process and analyse data	***Learning Opportunities*** Teacher's activities, roles, interactions and *Inter-personal* relations with an individual learner, making use of scheduled time for them to use ICT, search for information on the Internet, and to process and analyse data	***Learning Opportunities*** Teacher's activities, roles, interactions and *Inter-social* relations with two or more learners, making use of scheduled time for them to use ICT, search for information on the Internet, and to process and analyse data	***Learning Opportunities*** *Intra-social* dialogues, reflections, decisions and actions of School Governing Bodies and the National Department of Education to organise professional development courses, These courses would develop and enable teachers to provide learners with scheduled time to use ICT, to	***Learning Opportunities*** *Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools. to organise professional development courses. These courses would develop and enable	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
				search for information on the Internet, and to process and analyse data	teachers to provide learners with scheduled time to use ICT, to search for information on the Internet, and to process and analyse data	
Activity	***Teacher Practices and the Use of ICT*** *Intra-personal* dialogues and reflections on planning to use ICT to organise and/or mediate communication between learners and mentors, to provide enrichment/ remedial instructions, and to demonstrate or present information	***Teacher Practices and the Use of ICT*** Teacher's activities, roles, interactions and *Inter-personal* relations with an individual learner, making use of ICT to organise and/or mediate communication between the learner and mentors, to provide enrichment/ remedial instructions, and to demonstrate or present information	***Teacher Practices and the Use of ICT*** Teacher's activities, roles, interactions and *Inter-social* relations with two or more learners, making use of ICT to organise and/or mediate communication between them and mentors, to provide enrichment/ remedial instructions, and to demonstrate or present information	***Teacher Practices and the Use of ICT*** *Intra-social* dialogues, reflections, decisions and actions of School Governing Bodies and the National Department of Education to organise professional development courses. These courses would develop and empower teachers to make use of ICT to organise and/or mediate communication between learners and mentors; to provide enrichment/ remedial instructions; and to demonstrate or present information	***Teacher Practices and the Use of ICT*** *Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These courses would develop and empower teachers to make use of ICT to organise and/or mediate communication between learners and mentors; to provide enrichment/ remedial instructions; and to demonstrate or present information	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
Activity	***Assessment and Use of ICT*** *Intra-personal* dialogues and reflections on planning to make use of ICT for assessing learners' project report and/or multimedia project, and for the assessment of learners' written work or exercises	***Assessment and Use of ICT*** Teacher's activities, roles, interactions and *Inter-personal* relations with an individual learner, making use of ICT for assessing their project report and/or multimedia project, and for the assessment of the their written work or exercises	***Assessment and Use of ICT*** Teacher's activities, roles, interactions and *Inter-social* relations with two or more learners, making use of ICT for assessing their project reports and/or multimedia projects, and for the assessment of their written work or exercises	***Assessment and Use of ICT*** *Intra-social* dialogues, reflections, decisions and actions of School Governing Bodies and the National Department of Education to organise professional development courses. These courses would develop and empower teachers to make use of ICT for assessing learners' project reports and/or multimedia projects, and for the assessment of their written work or exercises	***Assessment and Use of ICT*** *Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These courses would develop and empower teachers to make use of ICT for assessing learners' project reports and/or multimedia projects, and for the assessment of their written work or exercises	
Activity	***Learning Resources*** *Intra-personal* dialogues and reflections on planning to make use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** Teacher's activities, roles, interactions and *Inter-personal* relations with an individual learner, making use of tutorial/ exercise software, Office Suite and simulations or modelling software in	***Learning Resources*** Teacher's activities, roles, interactions and *Inter-social* relations with two or more learners, making use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** *Intra-social* dialogues, reflections, decisions and actions of School Governing Bodies and the National Department of Education to organise professional development courses. These courses would develop and empower teachers to make use	***Learning Resources*** *Trans-social* improvement and further development of educational Policies, as well as clearer Curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
		teaching		of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	courses would develop and empower teachers to make use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	
Activity	***General and Pedagogical Uses of ICT*** *Intra-personal* dialogues and reflections on planning to prepare lessons that involve the use of ICT by learners; planning to know which learning or teaching situations are suitable for ICT use; and planning to use ICT in collaboration with others	***General and Pedagogical Uses of ICT*** Teacher's activities, roles, interactions and *Inter-personal* relations with an individual learner by preparing lessons that involve the use of ICT by the learner; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	***General and Pedagogical Uses of ICT*** Teacher's activities, roles, interactions and *Inter-social* relations with two or more learners by preparing lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	***General and Pedagogical Uses of ICT*** *Intra-social* dialogues, reflections, decisions and actions of School Governing Bodies and the National Department of Education to organise professional development courses. These courses would develop and enable teachers to prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	***General and Pedagogical Uses of ICT*** *Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These courses would develop and enable teachers to prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
Object(ive)	***Curriculum Goals*** To prepare learners to become competent and responsible ICT and Internet users	***Curriculum Goals*** To prepare the individual learner to become a competent and responsible ICT and Internet user	***Curriculum Goals*** To prepare learners to become competent and responsible ICT and Internet users	***Curriculum Goals*** School Governing Bodies and the National Department of Education organising professional development courses to develop and empower teachers to be competent, effective and responsible in ICT pedagogical practices in line with the school curriculum	***Curriculum Goals*** The improvement and development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These courses would develop and empower teachers to be competent, effective and responsible in ICT pedagogical practices in line with the school curriculum	The evolution of the Education System and the development of teachers over a period of time (2004-2013) according to the objectives of the 2004 White Paper on e-Education (Chapter 7)

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
Object(ive)	***Learning Opportunities*** To make use of scheduled time for learners to use ICT, search information on the Internet, and to process and analyse data	***Learning Opportunities*** To make use of scheduled time for the individual learner to use ICT, search information on the Internet, and to process and analyse data	***Learning Opportunities*** To make use of scheduled time for learners to use ICT, search information on the Internet, and to process and analyse data	***Learning Opportunities*** School Governing Bodies and the National Department of Education organising professional development courses. . These courses would develop and enable teachers to provide learners with scheduled time to use ICT, to search information on the Internet, and to process and analyse data	***Learning Opportunities*** Improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise professional development courses. . These courses would develop and enable teachers to provide learners with scheduled time to use ICT, to search information on the Internet, and to process and analyse data	
Object(ive)	***Teacher Practices and Use of ICT*** To make use of ICT to organise and/or mediate communication between learners and mentors; to provide enrichment/remedial instructions; and to demonstrate or present information	***Teacher Practices and Use of ICT*** To make use of ICT to organise and/or mediate communication between the individual learner and mentors; to provide enrichment/remedial instructions; and to demonstrate or present information	***Teacher Practices and Use of ICT*** To make use of ICT to organise and/or mediate communication between learners and mentors; to provide enrichment/ remedial instructions; and to demonstrate or present information	***Teacher Practices and Use of ICT*** School Governing Bodies and the National Department of Education organise professional development courses. . These courses would develop and empower teachers to make use of ICT to organise and/or mediate communication	***Teacher Practices and Use of ICT*** Improvement and further development of educational Policies, as well as clearer Curriculum guidelines for more effective ICT integration in schools to organise professional development courses. . These	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
				between learners and mentors; to provide enrichment/ remedial instructions; and to demonstrate or present information	courses would develop and empower teachers to make use of ICT to organise and/or mediate communication between learners and mentors; to provide enrichment/ remedial instructions; and to demonstrate or present information	
Object(ive)	***Assessment and Use of ICT*** To make use of ICT for assessing learners' project report and/or multimedia project, and for the assessment of learners written work or exercises	***Assessment and Use of ICT*** To make use of ICT for assessing the individual learner's project report and/or multimedia project, and for the assessment of the learner's written work or exercises	***Assessment and Use of ICT*** To make use of ICT for assessing learners' project reports and/or multimedia projects, and for the assessment of their written work or exercises	***Assessment and Use of ICT*** School Governing Bodies and the National Department of Education organise professional development courses. . These courses would develop and empower teachers to make use of ICT for assessing learners' project reports and/or multimedia projects, and for the assessment of their written work or exercises	***Assessment and Use of ICT*** Improvement and development of educational policies, as well as clear curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These courses would develop and empower teachers to use ICT for assessing learners' project reports and multimedia projects, and for the assessment of their written work	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
Object(ive)	***Learning Resources*** To make use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** To make use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** To make use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** School Governing Bodies and the National Department of Education organise professional development courses. These courses would develop and empower teachers to make use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** Improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These courses would develop and empower teachers to make use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	
Object(ive)	***General and Pedagogical Uses of ICT*** To prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	***General and Pedagogical Uses of ICT*** To prepare lessons that involve the use of ICT by the individual learner; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	***General and Pedagogical Uses of ICT*** To prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	***General and Pedagogical Uses of ICT*** School Governing Bodies and the National Department of Education organise professional development courses. . These courses would develop and enable teachers to prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are	***General and Pedagogical Uses of ICT*** Improvement and further development of educational Policies, as well as clearer Curriculum guidelines for more effective ICT integration in schools to organise professional development courses. . These courses would develop and enable	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
				suitable for ICT use; and to use ICT in collaboration with others	teachers to prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	
Subject(s)	Grade 8 Natural Science and Mathematics Teachers	A grade 8 Natural Science and Mathematics Teacher and Learner	Grade 8 Natural Science and Mathematics Teachers and Learners	Members of the National and Provincial Departments of Education and School Governing Bodies	Policy makers and Members of Parliament	Members of the South African Government, and the National and Provincial Departments of Education
Tools	Self (teacher's mind) and curriculum objectives	Curriculum objectives, ICT and technical support	Curriculum objectives, ICT and technical support	Professional programmes for the ICT skills development of teachers. ICT, funding, curriculum guidelines and technical support	Policy and Implementation Protocol	2004 White Paper on e-Education
Rules and Regulations	Personal values, ethics, norms and attitudes	Personal values, ethics, norms and attitudes; school rules and regulations; netiquette	Teachers' values, ethics, norms and attitudes; school rules and regulations; netiquette	Department of Education policies, rules and regulations. School Governing Body rules and regulations	Constitution of the Republic of South Africa; Existing Educational Policies, Acts and White Papers	Constitution of the Republic of South Africa; 2004 White Paper on e-Education
Division of labour	No division of labour (only teacher's thoughts and self-reflections)	Teacher provides interesting and efficient learning opportunities to an individual learner according to curriculum guidelines	Teachers provide interesting and efficient learning opportunities to two or more learners according to curriculum guidelines. Technology coordinators, teachers and the school Princi-	Department of Education and School Governing Bodies organise professional ICT development courses for teachers, provide ICT resources and infra-	Policy makers create new policies or amend existing policies. Parliament adopt, amend or repeal policies	The South African Government and the National and Provincial Departments of Education

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
			pal encourage and support each other and learners	structure		
Community (Environ-ment)	Teacher's Mind	School computer laboratory	School computer labo-ratory	Schools	Parliament	The entire education system
Outcomes	***Curriculum Goals*** Learners who are competent and re-sponsible ICT and Internet users	***Curriculum Goals*** An individual learner who is a competent and responsible ICT and Internet user	***Curriculum Goals*** Learners who are com-petent and responsible ICT and Internet users	***Curriculum Goals*** Professional developed and empowered teach-ers who are competent, effective and responsi-ble in ICT pedagogical practices in line with the school curriculum	***Curriculum Goals*** Improved and further developed educa-tional policies, as well as clearer curriculum guidelines for more effective ICT integra-tion in schools to or-ganise professional development courses. These courses would de-velop and empower teachers to be com-petent, effective and responsible in ICT pedagogical practices in line with the school curriculum	The evolution of the Education System and the development of teachers over a period of time (2004-2013) according to the objectives of the 2004 White Paper on e-Education (Chapter 7)
Outcomes	***Learning Opportuni-ties*** Scheduled time for learners to use ICT, search for information on the Internet, and to process and analyse	***Learning Opportuni-ties*** Scheduled time for the individual learner to use ICT, search for information on the Internet, and to proc-	***Learning Opportuni-ties*** Scheduled time for learners to use ICT, search for information on the Internet, and to process and analyse	***Learning Opportuni-ties*** Professional developed and empowered teach-ers who are able to provide learners with scheduled time to use ICT, to search for in-	***Learning Opportuni-ties*** Improved and further developed educa-tional policies, as well as clearer curriculum guidelines for more effective ICT integra-	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
	data	ess and analyse data	data	formation on the Internet, and to process and analyse data	tion in schools to organise professional development courses. These courses would develop and enable teachers to provide learners with scheduled time to use ICT, to search for information on the Internet, and to process and analyse data	
Outcomes	***Teacher Practices and Use of ICT*** The use of ICT to organise and/or mediate communication between learners and mentors; the provision of enrichment or remedial instructions, and the demonstration and presentation of information	***Teacher Practices and Use of ICT*** The use of ICT to organise and/or mediate communication between the individual learner and mentors; the provision of enrichment or remedial instructions; and the demonstration and presentation of information	***Teacher Practices and Use of ICT*** The use of ICT to organise and/or mediate communication between learners and mentors; the provision of enrichment or remedial instructions; and the demonstration and presentation of information	***Teacher Practices and Use of ICT*** Professional developed and empowered teachers who make use of ICT to organise and/or mediate communication between learners and mentors; to provide enrichment or remedial instructions; and to demonstrate or present information	***Teacher Practices and Use of ICT*** Improved and further developed educational policies, as well as clear curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These courses would develop and empower teachers to make use of ICT to organise and mediate communication between learners and mentors; to provide enrichment or remedial instructions; and to demonstrate or present in-	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
					formation	
Outcomes	***Assessment and Use of ICT*** The use of ICT for assessing learners' project report and/or multimedia project, and for the assessment of learners' written work or exercises	***Assessment and Use of ICT*** The use of ICT for assessing an individual learner's project report and multimedia project, and for the assessment of the learner's written work or exercises	***Assessment and Use of ICT*** The use of ICT for assessing the project reports and multimedia projects of learners; and for the assessment of learners' written work or exercises	***Assessment and Use of ICT*** Professional developed and empowered teachers who make use of ICT for assessing learners' project reports and multimedia projects, and for the assessment of their written work or exercises	***Assessment and Use of ICT*** Improved and further developed educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These courses would develop and empower teachers to make use of ICT for assessing learners' project reports and/or multimedia projects, and for the assessment of their written work or exercises	
Outcomes	***Learning Resources*** The use of tutorial or exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** The use of tutorial or exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** The use of tutorial or exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** Professional developed and empowered teachers who can make use of tutorial or exercise software, Office suite and simulations or modelling software in teaching	***Learning Resources*** Improved and further developed educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These	

	ECOLOGICAL SYSTEMS ACCORDING TO BRONFENBRENNER'S (1979; 1986) ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
					courses would develop and empower teachers to make use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching	
Outcomes	***General and Pedagogical Uses of ICT*** Lessons that involve the use of ICT by learners; the knowledge of learning or teaching situations that are suitable for ICT use; and the use of ICT for collaboration with others	***General and Pedagogical Uses of ICT*** Lessons that involve the use of ICT by the individual learner; the knowledge of learning or teaching situations that are suitable for ICT use; and the use of ICT for collaboration with others	***General and Pedagogical Uses of ICT*** Lessons that involve the use of ICT by learners; the knowledge of learning or teaching situations that are suitable for ICT use; and the use of ICT for collaboration with others	***General and Pedagogical Uses of ICT*** Professional developed and empowered teachers who can prepare lessons that involve the use of ICT by learners; who know which learning or teaching situations are suitable for ICT use; and who use ICT for collaboration with others	***General and Pedagogical Uses of ICT*** Improved and further developed educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise professional development courses. These courses would develop and enable teachers to prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT for collaboration with others	

2.4 Ecological Activity Systems Theory as Conceptual Research Framework for the Secondary Data Analysis

From the above exposition, Urie Bronfenbrenner's (1979b; Bronfenbrenner, 1986) *Ecological Systems Theory* can be applied to explain the different concentric ecological systems relevant to ICT implementation, use and research in developing contexts, as proposed by Blignaut and Els (2010). Furthermore, Yrjö Engeström's (1987b; Engeström, 1996; 2009) *Human Activity Systems Theory* can be used to explain various activities taking place between the different ecological systems identified through the *Ecological Systems Theory*. Table 2.3 proposes a fusion of the two theories into one Conceptual Research Framework for the Secondary Data Analysis (SDA) (Chapter 6). The findings of the SDA (Chapter 6) related to the implementation and use of ICT in South African schools is applied to the chronosystem in Chapter 7. Here the progress and realization of the objectives of the White Paper on e-Education are evaluated with the findings of the SDA.

Chapter 3

Review of Literature

3.1 Introduction

Chapter 2 presented the conceptual framework used in this study, which is a fusion of Bronfenbrenner's (Bronfenbrenner, 1979b; Bronfenbrenner, 1986) *Ecological Systems Theory* and Engeström's (1987; Engeström, 1996; 2009) *Human Activity Systems Theory*. In accordance with this Ecological Activity Systems Theory Conceptual Framework, Table 3.1 provides structure for this chapter as a continuous train of thought throughout the thesis.

Table 3.1: Ecological Activity Systems Theory Conceptual Framework Used for the Literature Review and the Secondary Data Analysis

	BRONFENBRENNER'S ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
ENGESTRÖM'S HUMAN ACTIVITY SYSTEMS THEORY (activity, objective, subjects, tools, rules and regulations, division of labour, community, out-	*Curriculum Goals* *Learning Opportunities* *Teacher Practices and the Use of ICT* *Assessment and Use of ICT* *Learning Resources* *General and Pedagogical Uses of ICT*	*Curriculum Goals* *Learning Opportunities* *Teacher Practices and the Use of ICT* *Assessment and Use of ICT* *Learning Resources* *General and Pedagogical Uses of ICT*	*Curriculum Goals* *Learning Opportunities* *Teacher Practices and the Use of ICT* *Assessment and Use of ICT* *Learning Resources* *General and Pedagogical Uses of ICT*	*Curriculum Goals* *Learning Opportunities* *Teacher Practices and the Use of ICT* *Assessment and Use of ICT* *Learning Resources* *General and Pedagogical Uses of ICT*	*Curriculum Goals* *Learning Opportunities* *Teacher Practices and the Use of ICT* *Assessment and Use of ICT* *Learning Resources* *General and Pedagogical Uses of ICT*	The evolution of the Education System and the development of teachers over a period of time (2004-2013) according to the objectives of the 2004 White Paper on e-Education

As indicated by Table 3.1, the Conceptual Framework integrates both *Ecological Systems Theory* and *Human Activity Systems Theory* as matrix dimensions. However, within this scaffolding matrix, the following ICT related themes are investigated: (i) curriculum goals; (ii) learning opportunities; (iii) teacher practices and uses of ICT; (iv) assessment practices using ICT; (v) learning resources; and (vi) the general and pedagogical uses of ICT. These six ICT related themes constitute the pattern of investigation in the literature review (the current chapter), as well as the pattern for the SDA in Chapter 6.

Chapter 3 opens with a historical overview of the development of ICT in education; followed by a literature exploration of Natural Science and Mathematics teachers' ICT pedagogical practices pertaining to the six ICT related themes in Table 3.1.

3.2 Historical Overview of the Development of ICT in Education

The first documented instructional use of computers was in 1950 at the Massachusetts Institute of Technology (MIT™) when a computer flight simulator first trained pilots. Later in 1959, an IBM 650 computer taught binary algebra to school children in New York City. In the 1960s, Stanford University developed Computer-Assisted Instruction (CAI) in reading and Mathematics. In the early 1960s, punched cards presented and controlled instruction through with mainframe computers. Early experiments in CAI began just in the time when programmed instruction was at its peak, and many CAI programs comprising drill-and-practice or tutorial format programs appeared on shop shelves (Molenda, 2008; Sharp, 2009). In a typical tutorial format, a computer confirmed a correct response, while incorrect responses directed the learner to remedial sequences or easier questions.

The use of computers in education is closely related to the development and use of educational software. Some of the earliest, most popular educational computer software developed for instructional purpose include: Beginners All-purpose Symbolic Instruction Code (*BASIC*™) in 1964, to teach programming at Dartmouth College; Programmed Logic for Arithmetic Teaching Operations (*PLATO*™) at University of Illinois (1970); Seymour Papert's Logo programming at MIT in the same year; and Time-Shared Interactive Computer-Controlled Information Television (TICCIT) at the MITRE™ Corporation, University of Texas, and Bringham Young University in 1971 (Merril et al., 1996).

The introduction of the Apple II computer by Steve Jobs and Steve Wozniak in 1977 was a significant landmark in the use of computers in education (Sharp, 2009). Networking emerged in the 1980s and 1990s. In 1998, the International Society for Technology in Education (ISTE) developed National Educational Technology Standards (NETS) for learners, teachers and administrators. These standards prescribed what they should know and be able to accomplish with technology. Internet and e-mail became widespread during the 1990s and the last decade has witnessed an increasing use of video conferencing, especially in distance education (Sharp, 2009).

The Department of Defence of United States of America sponsored the ARPAnet project in 1969. This project tested the feasibility of maintaining a telecommunication network among critical parties through computer networks in emergencies, like a war. This network later became known as Internet. The Internet became very popular after the invention of the World Wide Web (WWW) by Tim Bernes-Lee in 1989 at the European Council for Nuclear Research (CERN) in Switzerland. The WWW represents millions of websites that can be accessed by a web browser smoothly in a nonlinear way using Hyper Text Transfer Protocol (HTTP). The WWW stores text, pictures, sound, videos, animations, and other multimedia objects. As masses of the population began to use the Internet, information ceased to became the monopoly of the academic world (Sharp, 2009). Teachers and learners all over the world use computers and the Internet for teaching and learning. They can access vast amounts of information from anywhere in the world using a computer with an Internet connection. The development of modern technologies and their extension to every domain of our daily life nowadays is indisputable. The widespread use of computers renders training in these technologies for teachers and learners unavoidable (Paraskeva, Bouta, & Papagianni, 2008).

According to Resnick (2009), there is a need to rethink how ICT can help teaching and learning. The focus should be less on things to know and more on strategies for learning things one does not know. Success in the Knowledge Society, to a large extent, will be based not on how much one knows but on one's ability to think and act creatively (Resnick, 2009). ICT in education has great potential. It may provide personalised learning, higher attainment standards, wider participation, improved retention, a closer relationship between education and the workplace, lifelong learning opportunities and a more highly skilled workforce for the knowledge economy. ICT is the mediating tool in the modern workplace. It provides affordances for cooperation, teamwork and collaboration with colleagues nearby and far away (Russel, 2000).

ICT is considered important in education because a new society requires new skills and enhances productivity, and ICT creates opportunities for quality learning. The most important consideration promoting policy and community interest in the pedagogical integration of ICT is the belief that ICT is important for bringing changes to classroom teaching and learning. This would serve to develop 21st century skills, like the ability to collaborate, communicate, create, innovate, and think critically, and it would promote self-initiated and self-sustained learning to learners (Pedro et al., 2004).

ICT appears to be a possible facilitator for realising school reforms aimed at preparing the general public for the Information Society (Pelgrum & Anderson, 1999b). Education should exceed the framework of initial schooling in order to prepare and support citizens for life-long learning, and consequently to overcome social exclusion and to maintain competitiveness in a global economy. Some believe that ICT in education can help to reduce socio-economic inequalities and improve the quality of teaching and learning experiences (European Round Table of Industrialists, 1997). International developmental agencies such as World Bank and UNESCO promote network-based technology in education because of its potential to facilitate “anytime, anywhere” learning opportunities, thereby advancing international socioeconomic progress (Blurton, 1999; World Bank, 1998).

As the world moved from an agrarian to an industrial society (Castells, 2000b), there was a consensus about the necessity to have people educated in Science and Technology. The pedagogy of school science tends to be didactic, authoritarian, and non-discursive with little room for autonomous learning or for the development of critical reasoning (Osborne & Hennessy, 2006). Teachers tend to use ICT largely to support, enhance, and compliment existing classroom practices rather than re-shaping subject content, goals and pedagogies (Cox et al., 2003). However, the form and content of Science Education has since that time been a matter of dispute. There are those who emphasise the need for Science Education to develop a knowledge and understanding of the *basic* scientific principles–the foundation on which the edifice rests–and the others who would argue for an emphasis on the processes of *scientific thinking (product versus process)*. The latter contend that the value of Science education lies in the critical and evaluative habits of mind it develops that are of ubiquitous value for all individuals in all domains. Intensive and widespread use of ICT in Mathematics and Science Education may help to create opportunities for autonomous learning and critical thinking.

Developing and developed countries alike are facing problems in Mathematics and Science teaching. The third International Mathematics and Science Study (Schmidt, 2000) found that grade 8 learners in the United States performed dismally in Mathematics and Science compared to their peers in other countries. American learners barely scored above the international average in Mathematics and Science. Grade 12 learners finished in the bottom for their performance in Physics. Schmidt concedes to the perception that American Mathematics and Science education is *a mile wide and an inch deep*. This is the country, which after launching of the world's first satellite Sputnik, by the Soviet Union, quadrupled the funding for National Science Foundation and creation of the National Aeronautical and Space Administration in 1957 that helped in breathtaking achievements, from the first man on the moon to the information superhighway and the decoding of life's genetic blue print—the human genome (Leshner, 2009). Leshner suggests that funding for Science education and research must be increased at all levels. Further, there should be national science-learning standards and competitive pay for teachers. This researcher agrees with Leshner; his suggestions are equally valid for South Africa.

The number and nature of problems in Science and Technology Education are similar in developing countries like Turkey and South Africa. An insufficient number of Science and Technology teachers, inadequate in-service training, large classes, instruction with the aim of narrowly orienting students towards exam passes, insufficient integration of Technology in the curriculum and insufficient physical infrastructure dominates the list. South Africa has reaffirmed its commitment to promote Mathematics, Science, and Technology education in high schools by its intention to deploy both local and foreign teachers fully qualified in those fields to the country's schools. In order to fast-forward Mathematics and Science skills, the Department of Education has embarked on the Dinaledi schools initiative in 2001 (currently in 400 schools) across the country, which aims to increase access to Mathematics, Science and Technology for learners in under privileged communities (Osden, 2007; SouthAfrica.info, 2007; Usun, 2009).

The National Research Foundation (NRF) of South Africa recognises that Mathematics and Science Education is the base upon which expertise in technological deployment exists, and that school Mathematics and Science enhance the scientific literacy and technological fluency of citizens so that they can participate more fully in decisions that affect their lives. The NRF notes that South African students perform poorly in terms of international comparisons of achievements in Mathematics and Science; matric pass rates in Mathematics and Science are generally poor and student enrolment at tertiary educational institutions is decreasing in Science- and Engineering-related fields (Holtman, Mukwada, & Du Plooy, 2009; Mail & Guardian Online, 2009). In the year 2011, South Africa ranked 54 out of 59 countries in terms of competitiveness on global ranking, in basic infrastructure for the fields of science, technology, health, environment and education (Hazelhurst, 2011).

Comparative research on China, India, and the United States reveals that by the middle of this century, both China and India may displace America as a super power (Blanpied & Ratchford, 2008). One of the most important variables in this growth equation is scientific capability, specifically, a large number of well-trained scientists and engineers at all levels of specialisation. Competence in Science and Engineering is the controllable driving factor on the path to super power status (Blanpied & Ratchford, 2008). Thus, there is a strong case for South Africa to spend more money on the teaching and learning of Mathematics and Science in the schools.

3.3. Mathematics and Natural Science teachers' ICT Pedagogical Practices

Mathematics and Science concepts are abstract. The growth of one's thinking from concrete experiences and tasks towards generalisations, modelling, analysis, and synthesis needs guidance from those who have gone before. For learners, the guide is the teacher, who may or may not be personally well-equipped for the task (Bradley & Schreiber, 2010). It is not easy for a teacher to present abstract concepts using words or pictures alone. ICT could help the teacher to provide a better representation of concepts, like the structure of an atom or the movement of gas molecules in a container. Verbal presentations combined with visual images under the control of a teacher could improve Science learning (Bohren, 1993). Chemistry teachers use computer-based simulations as economical and safe substitutes during laboratory work (Sharp, 2009). The ability to think with external representations of processes (such as those provided by the computing environment) can scaffold the development of Mathematical understanding (Rivero, 2006). Rivero presents different ways in which one can leverage existing or easily accessible ICTs to bolster Mathematics and Science education in the classrooms. ICT can assist student in connecting to remote peers and experts in Mathematics or Science.

Computers help visualise phenomena that is inherently visual or not. It can be used to present inner mental imagery or outer-worldly realities. An object's form, colour, texture, motion and functions can be represented on a computer screen. For example, the representation of an abstract mathematical function on a computer screen may inspire learners to learn Mathematics. Computers can transform the logical-mathematical thought of a computer programmer to interesting interactive video games. Dangerous experiments (such as Chemistry experiments with high-energy output or corrosive chemicals) or costly laboratory practicals (such as learning how to dissect an animal) can be conducted safely and economically using computers with mathematical accuracy and with a low level of error. Computers can aid the human brain in information-processing by a visual representation of the abstract, e.g. plotting an algebraic function on a computer screen. Pictures and videos can condense large amounts of information. A preconscious part of our brain can help process visual inputs leaving the conscious part of our brain to higher levels of critical analysis and synthesis (Anderson, 2005). Computers can amplify our mental activities and enable interaction with humans and machines across the globe. ICT supports the model of learning that involves a cycle of internalization of what is outside, then externalization of what is inside (Anderson, 2005; Kaptelinin & Nardi, 2009). Representational media can contribute to the thought. Features of the presentation of information may dominate comprehension. Strong graphics, including animate portrayals of relationships and transformational processes, might conceivably reduce the need for the individual cognitive construction of relationships and transformations (Kritt & Winegar, 2007). ICT can provide many possibilities for disabled students to improve their Mathematical abilities (Kanbul & Tezer, 2009).

3.3.1 Using ICT to Achieve Curriculum Goals

In April 2008, Becta (2008) launched a major research programme covering the education and training system. It focussed on pedagogy and curriculum relating to the school sector and young learners. The research identified six crosscutting trends: (i) young learners increasingly use Web 2.0 technologies; (ii) mobile, ubiquitous and contextual computing is developing; (iii) ICT capital building programmes are increasing; (iv) workplaces demand increasing technological skills; (v) economic, social and technological factors are transforming the character and organisation of education and training; and (vi) there is a challenge of the continuous professional development of teachers (Becta, 2008). Though this research was conducted in the United Kingdom, the trends listed above, by their universal potential for influence, have a direct bearing on the curriculum goals to be achieved in South African classrooms.

ICT could help teachers provide unique learning experiences to learners with special needs. Learners can benefit from opportunities for independent learning. Activities could be tailored to meet individual ability levels, and learning can occur when and where it is convenient. ICT could provide a content-rich multimedia learning environment. Teachers could use ICT to present information in multiple formats (e.g. text, pictures, sound, animations, and video clips). Teachers also could present activities in a layered order and with varying scaffolding levels. Facilities provided by ICT can help teachers improve communication with parents, other teachers or experts far away, and this could have a positive effect on the performance of the teacher in the classroom (South Africa, 2004). In addition, ICT can help circumvent difficulties of handicapped learners and cater for the needs of the gifted few.

ICT may function as a neutral mediator, without gender or cultural allegiances, thereby facilitating uninhibited communication. It may facilitate learning for children who have different learning styles and varying ability levels. Traditional systems could perpetuate social inequalities but ICT improves access to disadvantaged groups of learners who cannot afford expensive on-campus education (South Africa, 2004). The DoBE aims to use technology as a tool for teacher education as well as integrating it into the school curriculum (Surty, 2010).

ICT could be employed on three kinds of curriculum use (Fowler & Mayes, 1999): ICT for presenting information (primary); ICT for supportive active learning tasks and feedback (secondary); and ICT for supporting dialogue, about application of the new learning (tertiary). Such a classification provides opportunities for a strategic use of ICT that serves different pedagogical goals in different ways. Contradictory to this, Kozma (1991) suggests that learning with media is a complimentary process between the learner and the medium. Capabilities of a particular medium, in conjunction with methods that take advantage of these capabilities, interact with and influence the ways learners represent and process information. This may result in more or different learning when one medium is compared to another for certain learner and tasks (Kozma, 1991). There is another school of thought that *media is like a delivery truck*; it has no effect on learning (Clark, 1994).

3.3.2 Learning Opportunities Using ICT

ICT coupled with appropriate pedagogical strategies may facilitate the development of higher order thinking skills (South Africa, 2004). Learners should have autonomy over their learning process in order for them to engage in higher order thinking skills, e.g. focussing skills, information-gathering skills, remembering skills, analysing skills, generating skills, integrating skills and evaluating skills. Orienting activities could support learner autonomy (Lim & Chai, 2008). ICT may help in creating effective orienting activities. Examples are: introductory sessions, advanced organisers and instructional objectives, worksheets and checklists, dialogue among participants, and tools for post-instructional reflection. Hence higher-order thinking skills could be promoted in the ICT-based learning environment. Such an environment provides learners substantial control over their rate of learning and sequence of learning (Lim & Chai, 2008).

According to Valente (1997), traditional pedagogic practices are not conducive to the effective, efficient, and creative use of ICTs in the classroom, as they are based on the transmission of information which assumes that learners are empty vessels to be filled with knowledge, skills and values by teachers. Traditional practices may produce a passive learner, without the capacity to critique and with a vision of the world according to what was transmitted to him or her. Traditional teaching produces students who are obsolete in the knowledge society (Valente, 1997). The knowledge society (Castells, 2000c) requires creative individuals with the capability to critique, learn about learning, work in a group and constantly reflect on one's own strength and weaknesses.

Despite the unfashionable behaviourist aspect of drill and practice programs, the curriculum for professional and vocational education currently requires the acquisition of essential practical skills using ICT as part of a practitioner's knowledge base. Typical drill and practice designs for learning make use of online resources to demonstrate and exemplify essential practical skills. Video clips and Flash™ movies can be particularly valuable in supporting drill and practice as they allow learners to experience an expert performance as often as they need to, and in their own time. These virtual experiences should not replace real practice. It must follow actual practice so as to sustain validity and competency in real situations (Rachel, 2007).

Developments in ICT provide a variety of learning opportunities for learners as suggested by the curriculum. Teachers can select and use appropriate ICT resources suitable for different learning needs that exist in the classroom. McLoughlin and Oliver (1999) define pedagogical roles for teachers in a technology-supported classroom as setting joint tasks, rotating roles, promoting student self-management, supporting meta-cognition, fostering multiple perspectives and scaffolding learning (McLoughlin & Oliver, 1999).

3.3.3 Mathematics and Natural Science Teachers' Use of ICT

Beetham and Sharpe (2007), along with Hayes (2007) observe that ICT often supports traditional modes of teaching—improving the quality of lecture presentations using interactive white boards, making lesson notes on PowerPoint™, making them available online, extending library services through using digital resources, and recreating face-to-face discussions asynchronously online. However, most of them are incremental improvements in quality and flexibility, but nowhere near being transformational.

There are learner-inspiring digital resources available on the Internet. For example, the exploration of online museums could be very interesting to young learners. Simulation experiences using applications like *Earth Browser* from Lunar software (2011) may be highly rewarding to the young mind. This software presents a three-dimensional globe with real-time weather conditions and seven-day forecasts for thousands of locations. By pointing and clicking, learners obtain current weather conditions and forecasts, real time earthquake information, current cloud cover, and webcam images from around the globe. The program *Accelerated Mathematics* generates unlimited individually tailored practice assignments from grade 1 to grade 12, adjusted to the previous results. *Algebra in the Real World* from the Futures Channel describes and analyses some of the most intriguing phenomena of our world using algebra (Futures Channel, 2011). Learners can explore the Internet to learn about rockets, the weather, the human body, outer space and science-fair projects. Student information system such as *PowerSchool* can generate schedules, attendance records, report cards, transcripts and letters in minutes (Power School, 2011).

Productivity software tools, such as Microsoft Office™, assist in teaching and learning activities, planning, designing, drawing, data collection, data storage, data analysis, presentation, information searches and communication. ICT can help Science education by supporting or replacing practical work as a vehicle for investigation and through the use of multimedia and the Internet as a vehicle for the development of scientific reasoning.

Computer simulations can be effectively used in the teaching of Mathematics and Science. A model or a simulation is a simplified representation of an object, phenomenon, or concept created in an attempt to gain a better understanding of the reality represented by the model. Scientists refine their ideas by changing existing models, building new models, or creating more than one model to represent the same reality. Scientific modelling involves continuous evaluation and revision until a satisfactory explanation is found. Models can be physical, conceptual and mathematical (e.g., atom models, Maslow's hierarchy of needs model, economic cycle models). Computer simulations provide ways of studying interesting and complex phenomena (such as the formation of hurricanes or the working of a volcano) and when appropriately used, can promote subject matter understanding, inquiry skills and systems thinking (Hennessy et al., 2007). Computer software effectively scaffolds modelling in Science lessons. It enables learners to quickly build and test their models as well as reflect on the viability of their models (Valanides & Angeli, 2008). Simulations are idealised, simplified (and sometimes exaggerated, and inaccurate) *dynamic* models of reality. They provide the power of visual representation. Teachers are afforded dynamic visual representation, interactivity and immediate feedback. Computer simulations could make underlying scientific concepts and processes more accessible to learners. They may repeat Science experiments as often as necessary, which cannot be done practically. However, learners should be made aware of the limitations of simulations and the assumptions on which software is created (Hennessy *et al.*, 2007).

Osborne and Hennessy (2006), in their literature review of Science education and the role of ICT, summarises the potential contribution of ICT: (i) ICT could release teachers and learners from laborious manual processes and provide more time for thinking, discussion, and interpretation; (ii) it could help to link school science to contemporary science and access to experiences not otherwise possible; (iii) it could provide opportunities for experimentation and exploration with immediate visual feedback; (iv) it could foster self-regulated and collaborative learning; and (v) ICT could improve motivation and engagement. Considering the barriers that teachers and learners face in South African classrooms, the potential contributions that ICT can make in Mathematics and Science education are highly desirable.

Specific conditions have to be satisfied in order that ICT may have an advantage, if any, over traditional tools in the classroom. ICT equipment must be well maintained and should be in good working order in order to prevent unexpected technical problems from sabotaging the teaching and learning processes, especially in science experiments. Teacher training and sustained support services are essential. Teachers have to know about or to be given the time to learn about various software programs and thus have to develop their own competence in how to best use ICT in their teaching. ICT hardware and software should be user-friendly and should meet the requirements for achieving the outcomes of learning activities. The placement of computers must facilitate individual as well as group work depending on the specific Mathematics or Science learning activities (Pelgrum, 2001).

In order to make ICT best serve Science education, it is necessary first to identify the precise objectives of that education and then to match the appropriate use of the technologies to the achievement of those objectives (McFarlane & Sakellariou, 2002).

3.3.4 Mathematics and Natural Science Teachers' Assessment Practices using ICT

Assessment in a traditional classroom is mainly summative and norm-referenced in congruence with teacher-centred pedagogical practices. However, in comparison with the past (agrarian and industrial societies) (Castells, 2000a), pedagogy in the present (information society) encourages the kind of learning where learners are more active participants in the classroom. They support each other and work in small heterogeneous groups. They are given opportunities to solve problems by using higher order thinking skills, which integrates theory with practice. Instructional emphasis is on creating relationships and promoting inquiry and invention, not on the memorisation of facts. There is more emphasis on the quality of understanding compared to the quantity. Assessment is criterion-referenced, diagnostic and learner-centred rather than summative and teacher-centred (Pelgrum & Voogt, 2005). Teacher's role changes from a fact-teller or an always-expert, to a collaborator and an occasional-expert. As part of their assessment activities, teachers can use ICT for: preparing tests; record-keeping; report writing; and the distribution dissemination of assessment results.

3.3.5 Mathematics and Natural Science Teachers' use of ICT Resources as Tools

This section provides, firstly, a brief description of Ihde's (1991) concept of mediated action; secondly, the role of computers as a mediating tool in teaching and learning; and thirdly, the pedagogical uses of ICT. According to Ihde (1991), the human mind perceives the world with or without mediation. Symbolically this is presented in Figure 3.1.

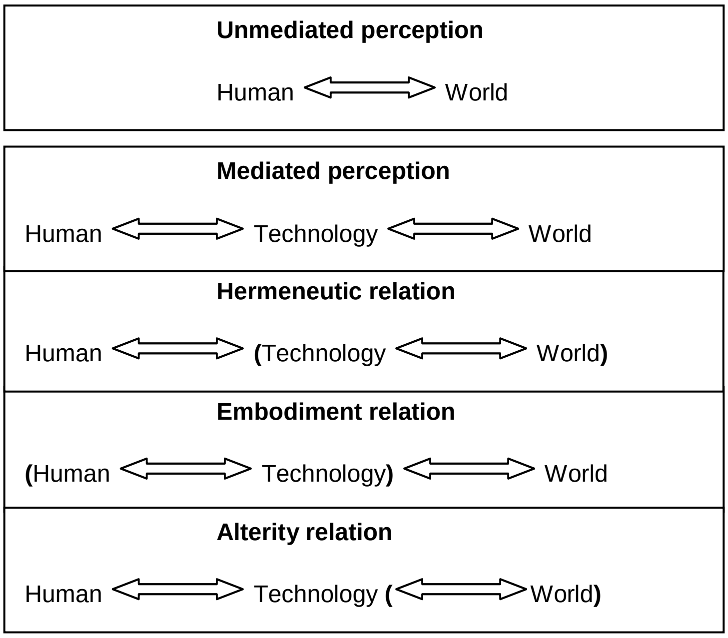


Figure 3.1: Unmediated and Mediated Perceptions (Ihde, 1991)

A teacher talking face to face to a learner is an example of unmediated perception, while a teacher talking to a learner using a telephone is a mediated perception. Within mediated perception, Ihde identifies three kinds of relationships: (i) in embodiment relations, the person is not normally conscious of the presence of technology. A learner receiving a telephone call is an example; (ii) in hermeneutic relations, technology is not transparent. A learner sending a short message service (SMS) to the teacher using a cell phone is an example of a hermeneutic relation. Here there is conscious interaction between human and technology; (iii) in alterity relations, technology is embedded with the human. Technology has little to do directly with the world. A watch on the wrist or the use of a pace-maker for a human heart is an example. Ihde (1991) views these not as distinct categories, but as part of a continuum. South African teachers and learners have to master the use of technology up to the level of alterity relations in order to use it in a constructive and creative way in teaching and learning.

3.3.5.1 The Computer as a Mediating Tool in Teaching and Learning

Depending on the degree of control available for the learner, educational software may be very broadly classified into two kinds (Maddux, Johnson, & Willis, 1997). The first kind allows minimum control for the learner. The type of interaction between user and computer is determined by the developers of the software; the interaction of the learner must conform to a very limited repertoire of acceptable responses, for example, drill and practice. These applications are usually aimed at the acquisition of facts by rote memory. The second kind allows creative activities within the limits of the software and hardware, like using a tool. Here the learner is mainly in control of the interaction, for example, them creating a newsletter or magazine.

According to Taylor (1980), the computer plays three roles in education; that of the computer as a tutor, tool and tutee. The computer as a *tutor* mostly acts as a traditional teacher. The interaction is mainly directed and controlled by the computer software. When the computer is used as a *tool*, it helps to amplify some capabilities of human mind such as improving the speed, accuracy, consistency, and ability to store, process, search, find, add value to and present information. In the role of a *tutee*, computer acts like a learner. In this role, learners become involved in deep thinking such as programming the computer to do specific activities.

3.3.5.2 ICT as a Pedagogical Tool

ICT in education may include any resource or any process that facilitates learning. A teacher can use it for quality and clarity in communication. The extent to which ICTs can facilitate dialogue is the extent to which they succeed as educational tools (Johnson, 2010). ICT can be used as a tool to fit specific learning style. A learner may use it to suit his or her cognitive style. ICT can provide stimulus, rewards and feedback, and help a learner construct and test mental models. It could also help learners construct new knowledge through social interaction (Lever-Duffy & McDonald, 2008).

ICT can be considered as a cultural artefact (Wertsch, 1998). We think with and through artefacts (Säljö, 1995). Each artefact has its own affordances and constraints (Gibson, 1979). Accordingly, ICT could provide opportunities for optimum facilitation in educational activities.

3.3.6 Mathematics and Natural Science Teachers' Confidence to Use ICT for General and Pedagogical Practices

A very important factor that determines the teachers' levels of engagement in ICT is their level of confidence in using ICT (Jones, 2004). Teachers who have little or no confidence in using computers in their work will try to avoid them altogether. In addition, there is a close relationship between teachers' levels of confidence to use ICT and the amount of technical support available to them (Bradley & Russel, 1997; Cuban, 1999). Pelgrum (2001) showed that school principals involved in the SITES Module 1 identified insufficient competence and confidence as a major obstacle to the effective implementation of ICT. A meta-analysis of ICT in teaching and learning environments by Bingimlas (2009) reveals that a lack of confidence, competence and access to resources are the major barriers to its successful integration. Examples of ICT resources are software, hardware, effective professional development, sufficient time and technical support for teachers. No single component in itself is sufficient to provide effective ICT integration in classrooms.

3.4 ICT Support to Mathematics and Natural Science Teachers

The amount, quality of training and support available determine the level of confidence and level of ICT use by teachers (Lee, 1997). Any support system for teachers should take into account the various barriers currently facing teachers and learners. The requirement to provide quality education for all learners has motivated countries to develop plans focussed on the use of, and support for, ICT for teaching and learning (South Africa, 2004). However, the goal of fully integrating ICT in educational, administrative and pedagogical practices in South Africa continues to be constrained by a number of barriers such as a lack of access to ICT infrastructure, affordable connectivity with sufficient bandwidth, a reliable supply of electricity and a lack of technical support (Farrel & Issacs, 2007).

3.4.1 Professional Support

According to Veen (1993), inadequate professional training results in teachers' low levels of ICT use. Courses which do not cover pedagogical aspects are likely to be unsuccessful. When teachers are provided with ICT professional development focussing primarily on technical skills, they may fall back on ICT uses consistent with their existing instructional practices simply because they have not been provided with an alternative vision for the use of ICT (Matzen & Edmunds, 2007). It is possible, however, that when professional development presents ICT training within the context of learner-centred instructional practices, teachers may be more likely to change their instructional practices with their use of ICT. Teachers who do not realise the advantages of using technology in their teaching are less likely to make use of ICT (Cox, Preston, & Cox, 1999). Any training programme needs to ensure that teachers are made aware of the benefits of using ICT. As schools start using more ICT, the need for appropriate professional training and support for teachers grows (Pelgrum, 2008). Professional training for teachers needs to focus on generic and pedagogic skills. Basic generic skills are related to the installation, operation, and maintenance of ICT hardware and software while pedagogic skills are related to the effective integration of ICTs into all school subjects to achieve specified curriculum objectives.

3.4.2 Technical Support

Becta (2006) provides a framework for school ICT technical support. It is based on a collection of best practice principles and models used successfully in education and industry. The framework is aimed to help schools implement best practices in manageable chunks. The framework incorporates six functions as presented in Figure 3.2.

Systems Administration				
Storage Management	Directory Services Administration	Print and Output Management	Security Administration	Patch Management

Figure 3.2: ICT Technical Support Framework Adapted from Becta (2006)

Software that can assist the smooth and efficient handling of administration and support at a school. Storage management activity software can track and maintain data resources. "Directory services make the school's network resources easy to find and access. Print and output management refers to managing printed output in line with the school's requirements. A security and administration function ensures the confidentiality, integrity and availability for data, together with asset security. Patch management keeps components installed on the network—hardware, software and services—updated with the latest patches" (Becta, 2006). Systems administration is the overarching function that guides the performance of each of the others. Storage management, directory services, print and output management, security and administration function and patch management all share equal importance in day-to-day operations management. A lapse in any function could affect the availability and reliability of school ICT services (Becta, 2006).

With the number of computers in schools increasing, technical support is an important issue to be considered. This issue becomes more important as computer software frequently gets updated on the Internet and old school computers may become unable to access the full features of modern academic websites. Access to websites using Flash™ videos is one example. School computers without Flash™ will not be able to view certain videos. Adequate technical support is indispensable for teachers' effective ICT use. Schools may use different approaches to realise technical support depending on their fiscal strength (Pelgrum, 2008). Large schools may be able to appoint a full time IT technician while poorer schools may not be able to do so.

3.5 Mathematics and Natural Science Teachers' Barriers when using ICT

The quality of an education system does not exceed the quality of its teachers (McKinsey & Company, 2007). South Africa faces an acute shortage of skilled teachers needed to meet the increasing demand for secondary education. Many teachers of Mathematics and Science are unqualified. The weakness of the knowledge and skills of most Mathematics and Science teachers has been well-known for many years (Bradley & Schreiber, 2010; Evoh, 2007; South Africa, 2008).

Usun (2009) proposes that ICT at schools will have little impact if teachers are not actively involved in all phases of their integration to the curriculum. The role of the teacher remains vital. Teachers are required to decide how to make appropriate educational use of ICT in the classroom. John and Sutherland (2004) identify a number of issues when subject teachers engage with ICT in their classroom, for instance, the tension between teaching about and teaching through ICT; the tension between information accretion and information discernment; and the tension between subject and technological culture. They further warn that an appropriate pedagogic deployment of ICT does not necessarily reduce subject complexity but can increase it, thereby creating new opportunities for thinking and engagement (John & Sutherland, 2004).

The *Survey of ICT and Education in Africa: A Summary Report, Based on 53 Country Surveys* sought to gather in a single resource the most relevant and useful information of ICT in educational activities in Africa (Farrel & Issacs, 2007). This report presents the findings of the survey regarding constraining features affecting the ICT implementation in Africa, including South Africa. The authors found that the predominant focus of teachers is more on the development of ICT operational skills than on the integration of ICT in pedagogical practices.

They also found that political advocacy needs to be both visionary and practical in the sense of not raising expectations beyond what is possible in the short term. A large number of policies ignored gender equity issues. The authors identified a lack of or insufficient infrastructure, energy and access. Under-utilisation of the collaboration-facilities available was clearly observable. There is an acute shortage of fiscal resources, skilled, dedicated human resources and training and development. Insufficient availability of local digital content, considering the predominant use of English on the Internet also contribute towards slow implementation of ICT. There exist inter-ministerial conflicts regarding the management of ICT hardware and software. Barriers to teachers using ICT relate to maintenance, security, support and the replacement of ICT hardware and software (Farrel & Issacs, 2007).

Sanchez and Salinas (2008) evaluated the Enlaces network, a national ICT education initiative, designed as a part of a series of programmes to overcome inequality and quality issues of public education in Chile by integrating teachers and learners into the knowledge society. During the last two decades Enlaces systematically and longitudinally implemented programmes to use and integrate computers into school curriculum with permanent support from the government and an expenditure of 250 million US dollars. These authors found that the improvement provided by the use of technology goes more along the lines of supporting the development and use of general cognitive abilities than with the achievement of higher and better learning of the content of a specific subject matter (Sanchez & Salinas, 2008).

The single most important barrier regarding the integration of ICT into the curriculum might be compatibility (Karasavvidis, 2009). Teachers do not use technology because the pedagogy implicit in the activities contained by technology may not be compatible with teacher's preferred teaching strategies. Display technologies are popular because they are compatible with current practices and are used to enhance such practices, as opposed to changing them. Moreover, the insufficient fit of ICT with established practices entails that the introduction of technology might disturb existing routines and practices. In addition, values of the market place and values of the traditional academic institution are brought into conflict by the use of ICT. Boundaries are becoming blurred between formal and informal education; learning *for* work and learning *at* work (Beetham & Sharpe, 2007). Teachers list insufficient computers, technology failures, incompatibility and a lack of familiarity, skills and time as the major barriers that inhibit ICT use in their practices (Jones, 2004; Karasavvidis, 2009).

With the introduction of computers in classrooms, there was the exuberant hope that technology would bring about the same kind of successful transformation as in business (Granic, Mifsud, & Cukusic, 2009). When compared to the impact it had on other sectors of society, the advent of ICT has not dramatically changed how teachers teach and how learners learn in schools. The reasons for insufficient ICT integration into school curricula may be due to the complex mix of the level of access to ICT, teacher motivation, and the incompatible relationships between pedagogy and a number of available technologies (Granic *et al.*, 2009). Nearly twenty years since the first computers reached classrooms, the paces of technological developments continue to outdo the pace of pedagogical developments (Gillespie, 2006). The introduction of computers, although still being gradual, does not reach the usage range and acceptance necessary to make the desired qualitative leap forward in education. The simple fact of placing a computer in the classroom does not guarantee its effective use (Ortega et al., 1999).

3.6 Summary

Chapter 3 explored the pedagogical use of ICT in education with special reference to Mathematics and Science education in South Africa. The six ICT related themes explored in this chapter constitute the pattern for the SDA in Chapter 6. Chapter 4 presents an overview of SITES 2006.

Chapter 4

An Overview of the Second Information Technology in Education Studies

4.1 Introduction

Chapter 4 sets the background for this study. It describes the three modules of the Second Information Technology in Education Study (SITES). The emergence of ICT in education has been rapid, causing a serious gap in the infusion of technology in education. A rapid growth in technology and technological applications in education requires the regular updating of the actual educational practice. During the late 1990s, the International Association for the Evaluation of Educational Achievement (IEA) started the Second Information Technology in Education Studies (SITES) in order to develop a perspective of the landscape of ICT in education around the world (Pelgrum & Anderson, 1999b).

The three international comparative studies on the use of ICT in education were conducted from 1998 to 2006. The central theme of the SITES projects are to foster an understanding of how ICT affects teaching and learning in schools. The three studies, Module M1 (Pelgrum & Anderson, 1999b), M2 (Kozma, 2003e), and SITES 2006 (Law, Pelgrum, & Plomp, 2008b), are presented in this chapter.

4.2 SITES Module 1

Module 1 started in 1997. The aim of the SITES M1 was to help countries estimate their current position relative to other countries in the educational use of ICT. The study was designed as a survey of school principals and technology coordinators from the representative sample of computer-using schools from at least one of the following educational levels: primary, lower secondary and upper secondary schools from 26 countries and education systems. Data collection for this study took place between November 1998 and February 1999. In South Africa the study only related to computer-using schools, and not a representative sample. The South African data was not reflected in the international data tables due to too small a non-random sample (Pelgrum & Anderson, 1999a).

Twenty six countries, Belgium (French), Bulgaria, Canada, Chinese Taipei, Cyprus, Czech Republic, Denmark, Finland, France, Hong Kong (SAR), Hungary, Iceland, Israel, Italy, Japan, Latvia, Lithuania, Luxemburg, Norway, New Zealand, Russia, Singapore, the Slovak Republic, Slovenia, South Africa, and Thailand participated in the study. England, the Netherlands, and the United States did not participate in the data collection for SITES Module 1, but comparative statistics from their national studies, conducted at the same time, were included in the SITES Module 1 report (Pelgrum & Anderson, 1999a).

4.2.1 Conceptual Framework for the SITES Module 1

Education in the information society envisages schools that are integrated in the society and information that is openly available to all stake holders. Teachers facilitate learners' self-initiated, self-guided and self-assessed activities. Communication skills are considered as important. Learners are expected to be motivated, active learners, and to make use of opportunities for learning within and outside school, individually and collaboratively. Parents are expected to take up active roles in the learning of their children and to become role models for life-long learning. Curriculum, infrastructure, staff development, management and organization form the most important elements for describing and comparing ICT-related activities in education (Pelgrum & Anderson, 1999b). Figure 4.1 presents the conceptual framework for the SITES Module 1.

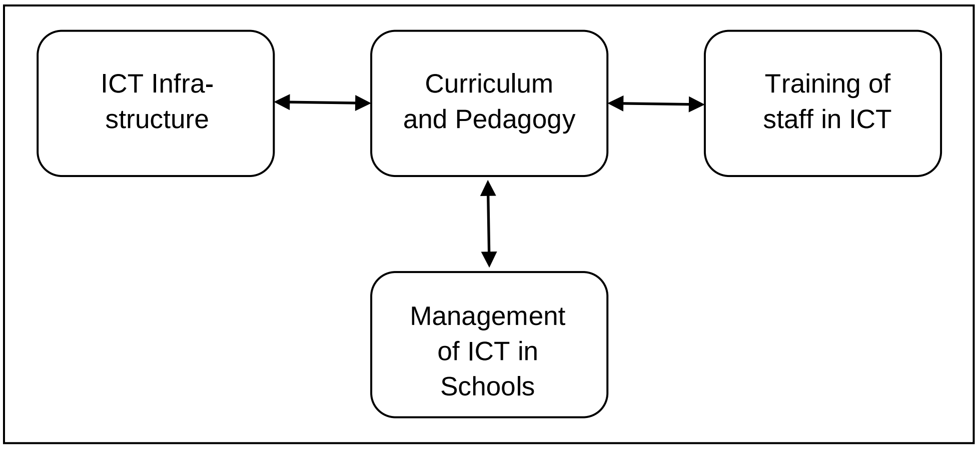


Figure 4.1: Conceptual Framework for the SITES Module 1

4.2.2 Research Questions for the SITES Module 1

SITES M1 surveyed four questions (Pelgrum & Anderson, 1999a):

1. To what extent does the school management offer a supportive climate for the use of ICT in the school?

2. What ICT infrastructure (such as equipment, software and access to the internet) is available in schools?
3. What staff development and support services exist with regard to ICT?
4. To what extent have schools adopted objectives and practices that reflect a focus on autonomous learning strategies?

4.2.3 Population and Sampling for the SITES Module 1

Even though the school was the unit of analysis, three school populations were chosen for convenience of analyses. Population 1 represented learners turning age ten during the eighth month of the school year (representing primary education); Population 2 represented learners turning fourteen on the eighth month of the school year (representing lower secondary); and Population 3 represented the final grade of secondary education (Pelgrum & Anderson, 1999a). The base criteria for national sampling were:

1. Schools using ICT to be selected on the basis of a probability proportional to the number of students from the desired target population
2. The response rate to be at least 85% after one replacement, 70% in situations with no replacements for non-responding schools, and 70% for complete enumeration
3. The minimum sample size to be 200 ICT-using schools per population level.

South Africa, along with a number of other countries, was not able to generate samples that satisfied the international criteria. Only a fraction of the student population of South Africa was represented. Even then, this student population represented only the lower secondary and upper secondary education (Pelgrum & Anderson, 1999b).

4.2.4 Instruments

The research instruments for the SITES Module 1 consisted of two questionnaires (Pelgrum & Anderson, 1999a):

1. A questionnaire for school principals
2. A questionnaire for a person in the school who was knowledgeable about the ICT facilities and their use.

The SITES M1 focussed on schools using ICT for educational purposes. Schools using ICT only for administrative activities were excluded. The data collection for the study took place between November 1998 and February 1999. The International Coordinators Committee

(ICC) from the IEA coordinated the study and the University of Twente in Netherlands was the main coordination centre (Pelgrum & Anderson, 1999a).

4.2.5 Key Findings

In general, school principals indicated positive attitudes towards ICT-use in their schools. They reported plans for equipment replacement, staff development, software acquisition, equity of access and Internet use. The study found a substantial decrease in the student: computer ratios. However, on the question of how many schools had access to the Internet for instructional purposes, the responses varied from 4% for the Russian lower secondary schools to 100% for Singapore and Iceland. Insufficient hardware and teachers' low knowledge and skills were identified as the main problems (Pelgrum, 2001; Pelgrum & Anderson, 1999b).

Most importantly, the M1 identified two kinds of pedagogical practices, namely traditional practices and emerging practices. Traditional practices emphasise the development of skills, where all learners work on the same materials at the same pace, and where teachers keep track of all student activities and progress. Emerging practices are those that make learners engage in, and responsible for, their learning. These practices involve co-operative and project-based learning where learners search for information, are allowed to work at their own pace, and determine themselves when to be assessed (Bos, Pelgrum, Visscher, & Voogt, 1999).

In summary, the SITES M1 established that many school principals considered ICT important in their schools, and that many had developed local policies regarding their use. ICT is changing fast and schools around the world are adapting to the evolving technology (Pelgrum, 1999). The main constraints of ICT in education found in the SITES M1 in South Africa were financial constraints, a lack of computer literacy amongst teachers, a lack of training regarding the integration of computers into different learning areas and the absence of properly developed curriculum for teaching computer skills (Howie & Blignaut, 2009).

The next section discusses the SITES M2.

4.3 SITES Module 2

ICT has improved effectiveness in medicine, finance, manufacturing and numerous other sectors of society. ICT has the potential to help students master 21st century skills—digital literacy, the ability to work as a team member, critical thinking and self-initiated, self-sustained problem solving in a collaborative environment. The SITES M2 documented various ways in which the integration of learning technologies into instruction enabled deep content, sophisticated pedagogy, and impressive student outcomes (Kozma, 2003e). The SITES M2 is built on the SITES M1, as it examined primary and upper secondary classrooms in more detail regarding the emerging pedagogical practices reported by principals and technology coordinators during M1 (Kozma, 2003b).

4.3.1 Introduction

M2 was a qualitative study of innovative pedagogical practices that used ICT in the classroom. One hundred and seventy four case studies from 28 educational systems from North America, South America, Europe, Asia and Africa, were involved in this study. These case studies contributed towards a rich archive for the comparative analysis of the successful transfer of innovations from one educational context to another (Kozma, 2003e).

4.3.2 Objectives of SITES Module 2

The objectives of SITES Module 2 were to (Kozma, 2003d):

1. Identify and provide rich descriptions for innovations that are considered valuable by each country and that might be considered for large-scale implementation or adoption by schools in other countries
2. Provide information to the national and local policy makers that they can use to make decisions related to ICT and the role it might play in advancing their country's educational goals and addressing educational needs and problems
3. Add to the body of research knowledge and theory about the contexts and factors, within and across the countries, which contribute to the successful and sustained use of innovative knowledge-based pedagogical practices.

4.3.3 Conceptual Framework

The conceptual framework represents a broad and varied body of literature on the factors that influence the use of technology in the classroom, and its impact on educational outcomes. The SITES M2 framework specifies a set of factors and general relationships that provide a detailed context to the primary focus of this study: innovative pedagogical practices that use technology. This framework relies on literature from comparative education, school improvement and reform, technology and education, evaluation, cultural psychology, and the adoption and diffusion of innovations (Kozma, 2003d).

The successful implementation of innovative practices depends not only on the characteristics of innovation, but also on factors such as classroom organization and personal characteristics of the teachers and learners (micro level), the school organization and personal characteristics of administrators and community leaders (meso level), and national and state policies and international trends (macro level) (Kozma, 2003d). The essential conditions for the successful use of learning technologies in schools include complementary shifts in curriculum, pedagogy, assessment, professional development, administration, organisational structures, and partnership between schools, businesses, homes and communities (Dede, 1998). Figure 4.2 from Kozma (2003d) provides the detailed conceptual framework.

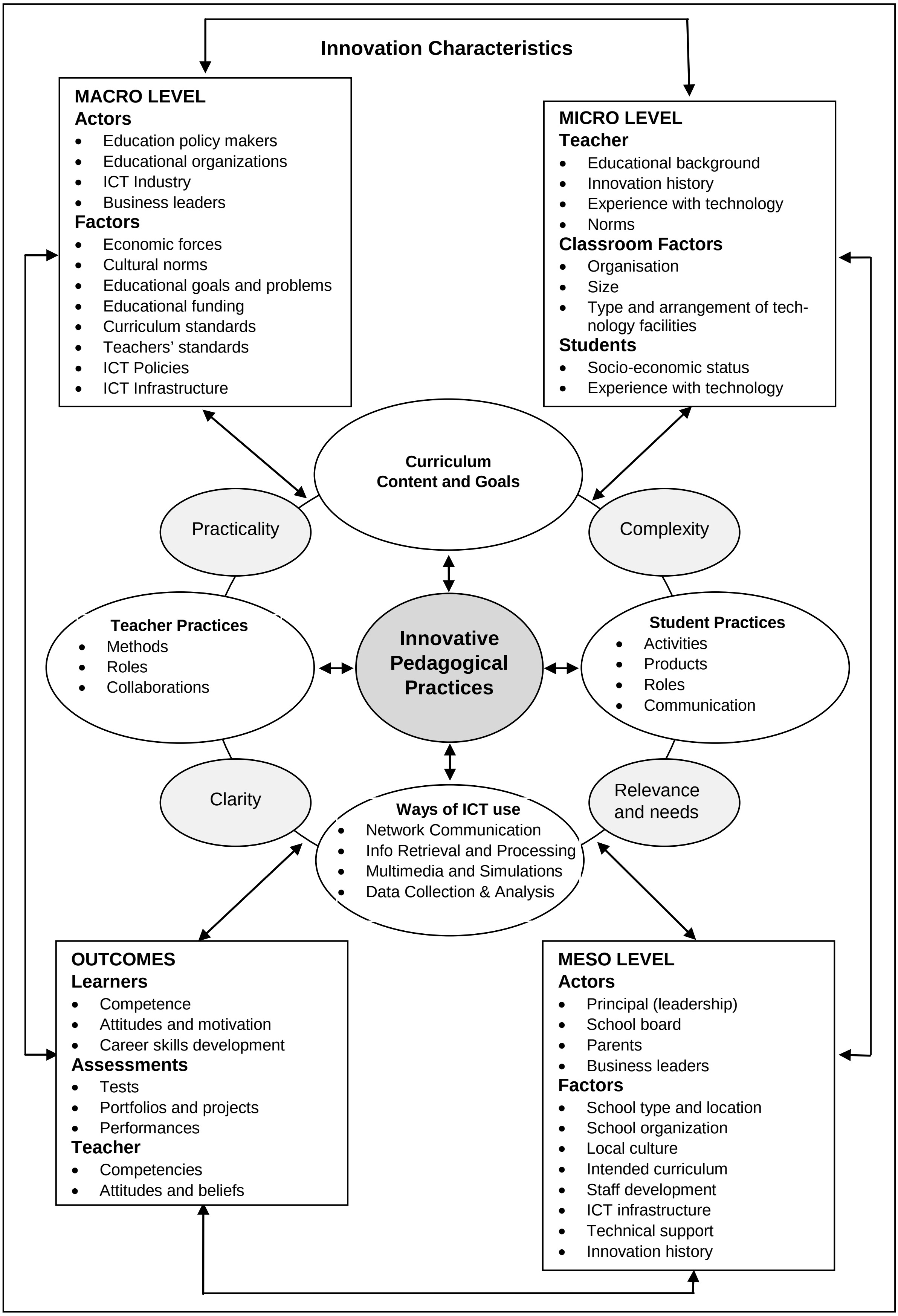


Figure 4.2: The SITES Module 2 Conceptual Framework (Kozma, 2003a)

4.3.4 Participating Educational Systems

SITES M2 had similar criteria as SITES M1 in selecting educational systems. This was to ensure some level of comparability from country to country. The criteria also had to be sensitive to the unique circumstances and cultural differences in each country (Kozma, 2003a).

Table 4.1: Education Systems Participated in SITES Module 2

Education Systems	
Australia	Korea
Canada	Latvia
Chile	Netherlands
Chinese Taipei	Norway
Czech Republic	Philippines
Denmark	Portugal
England	Russia
Finland	Singapore
France	Slovak Republic
Germany	South Africa
Hong Kong(SAR)	Spain (Catalonia)
Israel	Thailand
Italy	United States
Japan	

4.3.5 Research Questions

A conceptual framework for the SITES M2 forms the basis for the survey instrument for this study. Research questions were founded on the following constructs: ICT and innovative classroom practices, ICT and the curriculum, ICT in schools, and ICT policies (Kozma, 2003a).

4.3.5.1 ICT and Innovative Classroom Practices

Kozma and McGhee (2003) proposed the following questions for SITES M2 study: "What ICT-based pedagogical practices do countries consider as innovative? How are these innovative practices similar and different from one country to another? What new teacher and student roles are associated with innovative pedagogical practices using technology? How are these innovations changing what teachers and students do in the classroom? How do they affect the patterns of teacher-student and student-student interactions? How do these practices change the classroom? In which ways do the use of ICT change the organisation of the classroom, extend the school day, break down the walls of the classroom, and involve other actors (such as parents, scientists, or business people) in the learning process? What capabilities of the applied technologies support innovative pedagogical practices? How do these capabilities shape the practices they support?" (Kozma & McGhee, 2003, p. 44).

4.3.5.2 ICT and the Curriculum

SITES M2 sought answers to following questions about ICT and curriculum: How do these practices change the curriculum content and goals? What impact do these practices have on student competencies, attitudes, and other outcomes? Have they changed the ways students are learning and what teachers need to learn? Have they changed the ways student outcomes are assessed? (Voogt & Pelgrum, 2003).

4.4.5.3 ICT in Schools

SITES M2 sought answers to following questions about ICT in schools: What contextual factors are associated with use of these innovations? Which factors seem to be present across different innovative pedagogical practices? Which ones are associated with different practices? What are the implications of the contextual factors for the sustainability and transferability of these innovations? What are barriers to using ICT in these innovative ways? How are teachers overcoming these barriers? How do they cope with limited resources? (Owston, 2003).

4.4.5.4 ICT Policies

SITES M2 sought answers to following questions about ICT policies: Which local policies related to staff development, student computer fees, facilities access, technical support, and other issues appear to be effective in supporting these innovations? Which national telecommunication policies related to things such as school internet access, equipment purchase, teacher training, and student internet use seem to be effective in supporting these innovations? (Jones, 2003).

4.3.6 Design of the study

SITES M2 generated 174 case studies of ICT-based innovative pedagogical practice from 28 participating educational systems. The national panels used a common set of international criteria to select the case studies. The criteria specified that cases be selected in which there was a change in the activities and roles of the teachers and students, instructional materials, and assessment. Technology had to support the changes—it had to have an impact on student and teacher outcomes, and it had to be sustainable and transferable (Kozma, 2003e).

The National Research Coordinators (NRCs) compiled standardised instruments and protocols to collect a variety of data from multiple sources for each of the case studies. These included questionnaires from principals and technology coordinators; individual interviews with administrators and teachers, focus group interviews with teachers, students and parents; classroom observations, and documents such as teacher lesson plans and learner products. The data were analysed using standard guidelines, and case reports were compiled for each case, using a common format. The International Coordinating Committee (ICC) coordinated the effort and they were also responsible for the monitoring of quality (Kozma, 2003e). A number of policies and procedures were put into place to assure the high quality of data and case reports. ICCs used a blend of qualitative and quantitative methodologies to analyse the 174 case reports. South Africa contributed case study data for eight schools showing exemplary innovations across the country (Howie & Blignaut, 2009).

4.3.7 Summary of Findings

The results of SITES M2 provided outstanding examples of ICT use in the classroom and guidelines for the effective use of ICT in classrooms to policy makers. Most importantly, M2 found that learners are engaging in *constructivist activities* such as searching for information, doing projects in collaboration with others outside the class room, designing products, and publishing their work. A large majority of case reports indicated that teachers created structure for the learners by organising learning activities. Teachers advised learners and monitored and assessed learner performance while they engaged in constructivist activities. The majority of cases reported that teachers collaborated with each other as part of their practises. Some teachers collaborated with professionals outside the school, such as professors, scientists, or business people. In cases where ICT supported learners to collaborate with each other, to conduct research, and to analyse data, they were far more likely to report that learners acquired new ICT, problem solving, and collaboration knowledge and skills than cases with other practice patterns. A large number of cases related to the natural sciences and languages (both mother tongue and foreign). Many cases involved multidisciplinary projects. In only 29% of the cases innovation related only to a single subject area (Kozma, 2003c).

The commitment of teachers, student support, the perceived value of the innovation, the availability of professional development opportunities for teachers, and administrator support influenced the sustained innovative practices. Particularly important was the support from national ICT policies which provided resources that often enabled the innovation to succeed. However, these technology-supported practices had a limited impact on the curriculum. Only 18% of the 174 cases reported a change in curriculum goals or content that was supported by technology (Pelgrum & Law, 2008)

All over the world, the M2 provided teachers with outstanding examples of how technology could change classroom teaching. It also provided policy makers with guidelines they could use to increase the impact that technology could have on their educational systems. A significant finding from the M2 was that despite the extremely wide economic and cultural differences among the 28 participating countries and education systems, the NRCs could establish strong commonalities in the selection criteria for innovativeness. In addition, the 174 case studies collected from primary and secondary schools around the world shared many common features in terms of their classroom practises. However, only eight case studies from South Africa contributed towards the international dataset (Kozma, 2003e).

Changes in the roles of learners and teachers in the use of technology to connect learners and teachers with peers and experts outside the school were examples of good use of ICTs in education, even though the school curriculum and the level of access to technology in those schools were very different. However, in South Africa, computer use was not sufficient to foster this ideal (Kozma, 2003e).

4.4 SITES 2006 Module 3

4.4.1 Introduction

SITES 2006 was an international comparative study of pedagogy and ICT use in schools. It was designed as a survey of schools and teachers, and building on the SITES M1 and SITES M2, investigated the kinds of ICT-related pedagogical practices adopted by the participating educational systems (Law & Chow, 2008; Law et al., 2008a). It examined the evidence for pedagogical practices considered to be conducive to the development of 21st century skills in Mathematics and Science classrooms. These skills were defined as the capacity to engage in life-long learning (understood as self-directed and collaborative enquiry) and as connectedness (communication and collaboration with experts and peers around the world) (Voogt, 2008).

SITES 2006 focussed on the use of ICT in teaching and learning activities in grade 8 Mathematics and Science classrooms. This study made the following assumptions: (i) ICT-using pedagogical practices (this term is used interchangeably with teaching and learning activities) are part of the overall pedagogical practices for the teacher, (ii) the teachers' pedagogical vision and competency determines the reasons for using ICT and the ways of using ICT in learning activities, (iii) school and system level factors affect classroom practices, (iv) the teachers' continued use of ICT is related to the perceived learner outcomes of previous ICT-using lessons, (v) traditional pedagogic practices are teacher-driven, lock-stepped and have homogenous pacing, and (vi) traditional assessment practices use close-ended tests and examinations (Pelgrum & Law, 2008).

SITES 2006 aimed to provide an overall picture of the status of pedagogical practices and ICT use in the participating countries and systems, and specifically to collect evidence for "emerging pedagogical practices" by investigating learning by doing, self-directed learning and collaborative inquiry (Law, 2008b).

4.4.2 Conceptual Framework for SITES 2006

SITES 2006 conceptual framework took the view that ICT-using pedagogical practices are part of the overall pedagogical practices of the teacher (Law & Chow, 2008). This is consistent with the conceptual framework of SITES M1 and SITES M2. Teacher and learner characteristics, school and system factors, and pedagogical practices interact and create learning outcomes. Figure 4.3 presents the SITES 2006 conceptual framework.

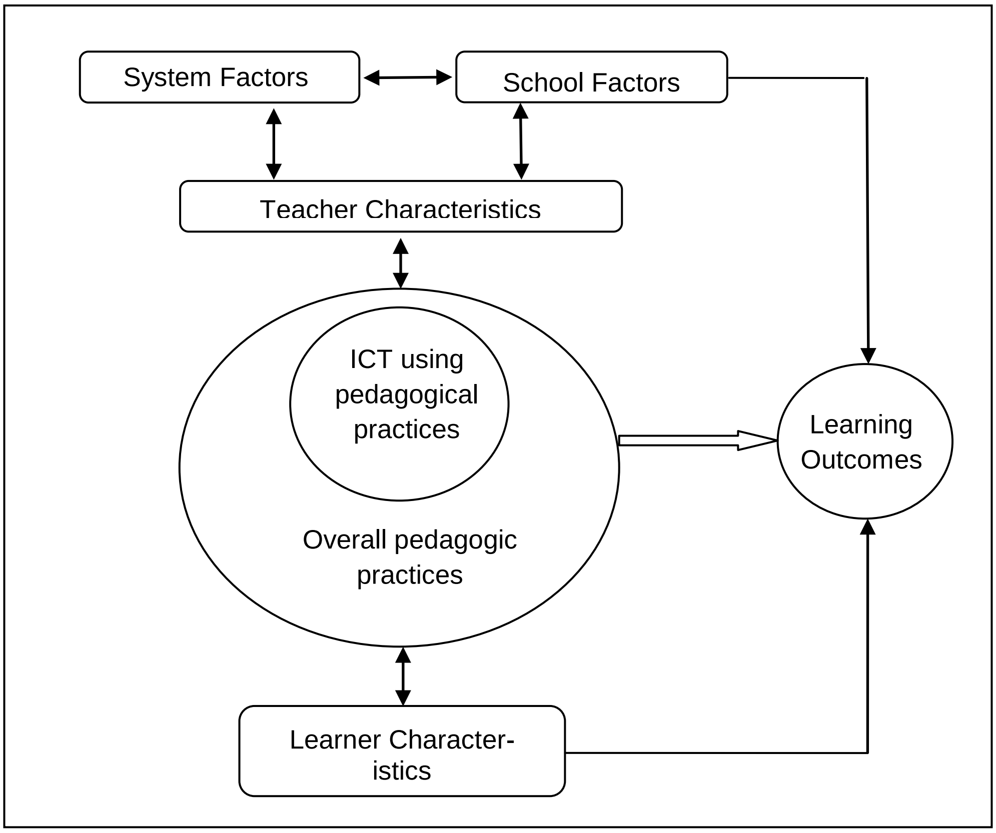


Figure 4.3: Overall Conceptual Framework for SITES 2006 (Law & Chow, 2008)

4.4.3 Three Main Research Questions of SITES 2006

The study aimed to produce: (i) international comparisons of various indicators (ii) ICT in education policy recommendations and (iii) an in-depth analysis of the ways in which ICT affects the teaching and learning process. The research questions relating to SITES 2006 were (Law & Chow, 2008):

1. What are the pedagogical practices adopted in schools and how is ICT used in them?
2. How is ICT used in specific situations when it has been used extensively within a pedagogical practice?
3. What are the teacher, school, community, and system factors that are associated with different pedagogical approaches and ICT use, and can an exploratory model be identified?

4.4.4 Design of SITES 2006 Survey Instruments

SITES 2006 used three survey questionnaires as the instruments for data collection: a teacher questionnaire, a principal questionnaire, and a technical questionnaire. In addition, a national context questionnaire was distributed to the NRCs to collect relevant contextual information at the system level from each country or system in the study. Depending on the context, three to four teachers per school answered questions relating to the pedagogical use of ICT at their particular schools, depending on the number of technology coordinators and Science and Mathematics teachers at schools that adhered to the selection criteria. An important feature of SITES 2006 was the online data collection (ODC) procedure used extensively for the first time. However, South Africa collected data through face-to-face interviews by means of a large number of trained fieldworkers. SITES 2006 conducted this longitudinal large-scale survey in 22 countries and education systems (Law & Chow, 2008).

The teacher questionnaire (core component) represented the pedagogical orientation of the teacher. Three sets of core indicators on pedagogical orientation were developed, namely the curriculum goal orientation, teachers' role orientation, and learners' role orientation indicators. These indicators were constructed based on teachers' responses to questions on the relative importance of a range of curriculum goals and the relative frequency of occurrence of a range of teacher and student activities. Supplementary indicators were also constructed to provide a comprehensive answer to the teachers' questionnaire in addition to the core indicators. The supplementary indicators contained methods of organising teaching and learning, the location and time when teaching and learning occurred, the learning resources (including ICT) used, and the perceived impact of pedagogical ICT use on students. The teachers' questionnaire contained 41 questions (Law & Chow, 2008).

The principals' questionnaire addressed policy issues and contextual factors. It contained 34 questions, covering 222 variables. The technical questionnaire addressed technical ICT-related issues and contained 19 questions covering 115 variables. The principals' and technology questionnaire together is called the school questionnaire, which summarises the concepts: infrastructure (ICT and others), life-long learning practices, vision of the school regarding ICT and pedagogy, staff development needs, technical and pedagogic support, and the role of the school principal (Law & Chow, 2008).

4.4.5 SITES 2006 Design and Methodology

SITES 2006 was designed as a survey of schools and teachers to examine the kinds of pedagogic practices adopted in different countries and the use of ICT in them. It started in October 2004 and the main data collection process took place in 2006. In 2005, the NRCs of the participating countries modified and piloted the instruments. While NRCs trained local project personnel and supplementary field workers, the ICCs from the University of Twente, Hong Kong University, and the IEA data processing centre internationally coordinated the study (Law & Chow, 2008; Pelgrum & Law, 2008).

4.4.6 SITES 2006 Sampling

The South African sample of the SITES 2006 comprised about five hundred schools. These consisted of a stratified random sample of computer-using and non-computer-using schools. Two teacher populations were targeted: Grade 8 Mathematics teachers and grade 8 Natural Science teachers. Due to the fact that ICT is only significantly implemented in two out of nine provinces in South Africa (Gauteng and the Western Province), 25 strata were created to secure fair representation of the population with 666 mathematics teachers and 622 science teachers. NRCs obtained permission from provincial and national departments of education to administer survey instruments to sampled schools in nine South African provinces. One hundred and two trained field workers (Masters Students in Education from the Tshwane University of Technology) participated in the data collection process. South Africa, due to local constraints, used a completely paper-based data collection strategy, while all other countries used either the ODC or a mixed-mode involving ODC and the pencil and paper method. South African field workers used personal interviews for answering the survey questionnaire. This method yielded a more than 90% return rate of the completed questionnaire, which exceeded the 85% return rate requirement of IEA. South Africa, for the first time of its participation in the SITES, was represented in all the international data tables (Howie & Blignaut, 2009; Law & Chow, 2008).

The objectives of SITES 2006 were to: (i) compare participating country's ICT use in schools by using different indicators; (ii) analyse the inclusion of ICT in education policy recommendations; and (iii) analyse in depth the way in which ICT affects teaching and learning processes in classrooms in the participating countries (Howie & Blignaut, 2009; Law & Chow, 2008). South African data collection for SITES 2006 took place during October and November 2006. The final dataset became available in the public domain during April 2008 (SITES, 2008). The NRCs, in consultation with the IEA Data Processing Centre in Hamburg, Germany, sampled about 500 South African schools from a Higher Education Management Information System (HEIMS) database. Research questions addressed by SITES 2006 required that data and results be reported at both the school level and the teacher level in their own rights. Therefore, two target populations were defined: the school population and the teacher population. The sampling design had to optimize the accuracy of the survey estimates at both levels. In order to overcome these conflicting requirements, size strata were created within each explicit stratum. Thus, the SITES 2006 sample design is a two-stage stratified sample. Schools constitute the first level and teachers the second level (Law & Chow, 2008; Law *et al.*, 2008a). Table 4.2 presents the international education systems participating in SITES 2006.

Table 4.2: Education Systems Participated in SITES 2006

Education Systems Participated in SITES 2006	
Alberta province, Canada	Japan
Catalonia, Spain	Lithuania
Chile	Moscow, Russian federation
Chinese Taipei	Norway
Denmark	Ontario province, Canada
Estonia	Russian Federation
Finland	Singapore
France	Slovak Republic
Hong Kong	Slovenia
Israel	South Africa
Italy	Thailand

4.4.7 Methodological Issues

Although SITES 2006 used two methods of data collection, ODC and pencil-and-paper method methods, no substantial differences were indicated between the data collected between the two methods. However, the length of the questionnaire as well as the type and complexity of the question types appeared to be factors that increased the non-response for online administered questionnaires, especially towards the end of the questionnaire. The SITES 2006 was the first in the history of international comparative-education assessments to apply online data collection (Law, 2008a).

SITES 2006 used confirmatory factor analysis (CFA) as a statistical technique to construct measurement models for confirming or disproving hypothesised underlying variable structures. Cronbach's Alpha reliability score of 0.5 or above was considered acceptable for a set of items to be used as a scale. The factor analysis yielded four factors with acceptable CFA goodness of fit statistics for pedagogical orientation constructs: (i) traditionally important (ii) collaborative inquiry (iii) student-centred and (iv) connectedness. Collaborative inquiry and student-centred orientation indicators had a high correlation and so were combined into one factor, labelled as life-long learning, in line with constructs in the conceptual framework. Figure 4.4 presents a visual representation of school level conditions in SITES 2006 (Law, 2008b).

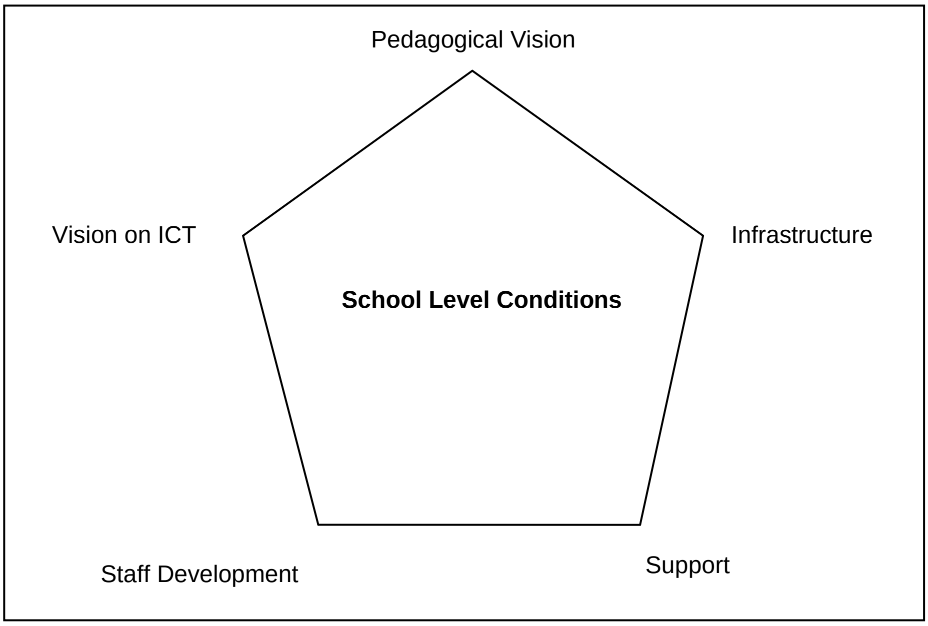


Figure 4.4: Visual Representation of School Level Conditions in SITES 2006

4.4.8 Main findings of SITES 2006

Trend analyses regarding the presence of life-long learning practices (based on the perceptions of school principals) have shown that pedagogical practices that involved information handling (searching for information, processing data, and presenting information) increased between 1998 and 2006. However, some systems have shown an increase in autonomous learning while others have shown a decrease in autonomous learning (Anderson & Plomp, 2008).

School leaders in general promote visions that regard traditional, and life-long-learning and connectedness-related pedagogical practices. ICT was recognised as a catalyst for change in some systems (such as those in Chile, Chinese Taipei, Israel, Lithuania, Slovenia and Thailand) but had little effect in other systems (such as those in Catalonia, Finland and Japan) (Law *et al.*, 2008a).

Grade 8 learners in all participating education systems, except South Africa, had access to computers. A substantial increase in access to the internet took place in most education systems between 1998 and 2006. Huge differences were observed between education systems in terms of ICT infrastructure conditions. In developing countries, hardly any schools had student-computer ratios of less than ten. SITES 2006 indicates that grade 8 Natural Science and Mathematics teachers in South Africa and the Russian federation reported the lowest level of competence in both general and pedagogical uses of ICT (Law *et al.*, 2008a)

There is large variation between education systems with regard to indicators for the existence of pedagogical and technical support for teachers. In most of the education systems, few were trained on the new pedagogy and ICT (Law & Chow, 2008).

4.5 Summary of Chapter

Chapter 2 presented an overview of SITES, with special reference to the South African participation in the three SITES modules. The central theme of SITES was to foster an understanding of how ICT affects the way learning and teaching takes place in schools. This chapter briefly described SITES M1 and M2. It then continued with a detailed description of SITES 2006 with a conceptual framework for the study, the main research questions, the design of survey instruments, sampling and survey, methodological issues, the representation of school level conditions and important findings.

Chapter 5

Research Design and Methodology

5.1 Introduction

Research is the systematic process of collecting data and logically analysing information for some purpose. It may be to answer a question, solve a problem or create knowledge (McMillan & Schumacher, 2001; Voogt, 2007). By its nature, research is cyclical (Leedy & Ormrod, 2005). Research is also considered as a way to reduce uncertainties from the world. Research design specifies the kind of research planned and the kind of results aimed at. It focuses on the logics of research. Research design refers to the blueprint for the research and identifies the kind of evidence required to address the research question adequately (e.g. quantitative and qualitative research design). Research methodology specifies the kind of tools and procedures (e.g. surveys and data analyses) used in the research. It focuses on individual steps, and specific tasks (Mouton, 2006).

This research is a systematic, controlled, empirical and critical investigation of presumed relations within the topic *ICT pedagogic challenges and enablers of grade 8 Mathematics and Natural Science teachers in South African classrooms*. SITES 2006 administered three questionnaires, a questionnaire to Mathematics and Natural Science teachers (Addendum 5.1); a questionnaire to principals (Addendum 5.2); and a questionnaire to technology coordinators (Addendum 5.3).

The researcher conducted a comprehensive secondary data analysis (SDA) on the SITES 2006 South African dataset relating to the dataset of the Mathematics and Natural Science teachers (Addendum 5.4); dataset of the principals(Addenda 5.5); and the dataset of the technology coordinators (Addendum 5.6). The following sections present: philosophical and epistemological foundations, population, sample, variables, statistical analysis, validity and reliability, ethical considerations, and limitations of this research. This chapter ends with a summary of the design and methodology.

5.2 Philosophical Foundations of this Research

Research may be regarded as a product of experience and reasoning. A researcher chooses his or her research design and methodology based on the researchers' conceptions of social reality and of individual and social behaviour (Cohen *et al.*, 2007; McMillan & Schumacher, 2001). For example, is reality objective in nature, or the result of individual cognition (ontology)? How can reality be understood, and how can it be communicated to other human beings (epistemology)? Are human beings products of their environment, or do they create their own environment (human nature)? How the researcher responds to these questions will decide the kind of his or her research design and methodology. This researcher has chosen an objectivist (also known as positivist, rationalist or quantitative) approach to the topic of research. Hitchcock and Hughes (1995), as well as Creswell (2009; 1995), suggest that ontological assumptions give rise to epistemological assumptions; these in turn, give rise to methodological considerations. In this research the ontology is realistic, epistemology is positivist, human nature is deterministic, and methodology is nomothetic (Burrel & Morgan, 1979).

The researcher believes that the world exists, and is knowable as it really is. Society is ordered, and is governed by a uniform set of values, made possible only by those values. Organisations are real entities with a life of their own. They are goal-oriented and independent of people. Organisations are instruments of order in a society serving both the society and the individual. The role of research is to discover universal laws of the society and the human conduct within it. A theory is the rational edifice built by scientists to explain, predict and control human behaviour. Abstraction of reality is possible, especially through mathematical models and quantitative analysis (Cohen *et al.*, 2007). While holding the beliefs listed above, the researcher admits that a physical scale cannot wholly measure human life. Human nature is immensely complex for a general theory to explain, predict and control people's behaviour. There is an elusive and intangible (hermeneutic, aesthetic, critical, moral, creative) aspect in all human interactions that is beyond the reach of a natural scientist, who ignores human intentions, individualism and freedom (Cohen *et al.*, 2007).

Burrel and Morgan (1979) claim that one can understand the range of sociological debates by mapping theories on a two-dimensional map (Figure 5.1), with subjective-objective debate on one axis and the regulation-radical change on the other. Each quadrant corresponds to a particular paradigm (humanist, radical humanist, functionalist, and radical functionalist) in sociology. Most researchers stay in one paradigm. In practice, the research in four different sociological paradigms have evolved into hybrid forms that overlap and/or complement each other (Paulston & Liebman, 1996). This researcher is in the radical functionalist paradigm.

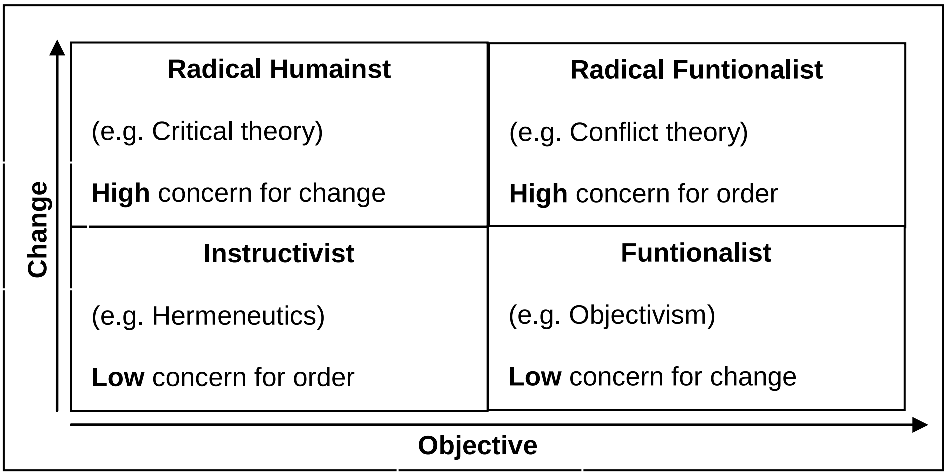


Figure 5.1: Four Sociological Paradigms Adapted from Burrell and Morgan (1979)

5.3 Epistemological Foundations of this Research

SDA is the epistemological foundation of this research. This research is a SDA of SITES 2006. It reanalyses existing data using standard statistical techniques (Mouton, 2006). Due to the large sample size of 504 schools, the random sampling, and the ordinal nature of the data, the parametric statistical analysis is a valid operation that can be conducted (Elliot & Woodward, 2007) on the SITES 2006 database. An investigation of the SITES 2006 South African data (Addenda 5.4-5.6) enabled the researcher to develop an understanding of:

(i) Grade 8 Mathematics and Natural Science teachers' ICT pedagogical practices
(ii) Barriers facing grade 8 Mathematics and Natural Science teachers in implementing ICT pedagogical practices
(iii) Support available to grade 8 Mathematics and Natural Science teachers in implementing ICT pedagogical practices
(iv) The role of school principals' in reducing the barriers and improving the support for implementing ICT pedagogical practices in South African schools.

The classification of secondary data analysis within the overall research fields is presented in the Figure 5.2 (Mouton, 2006).

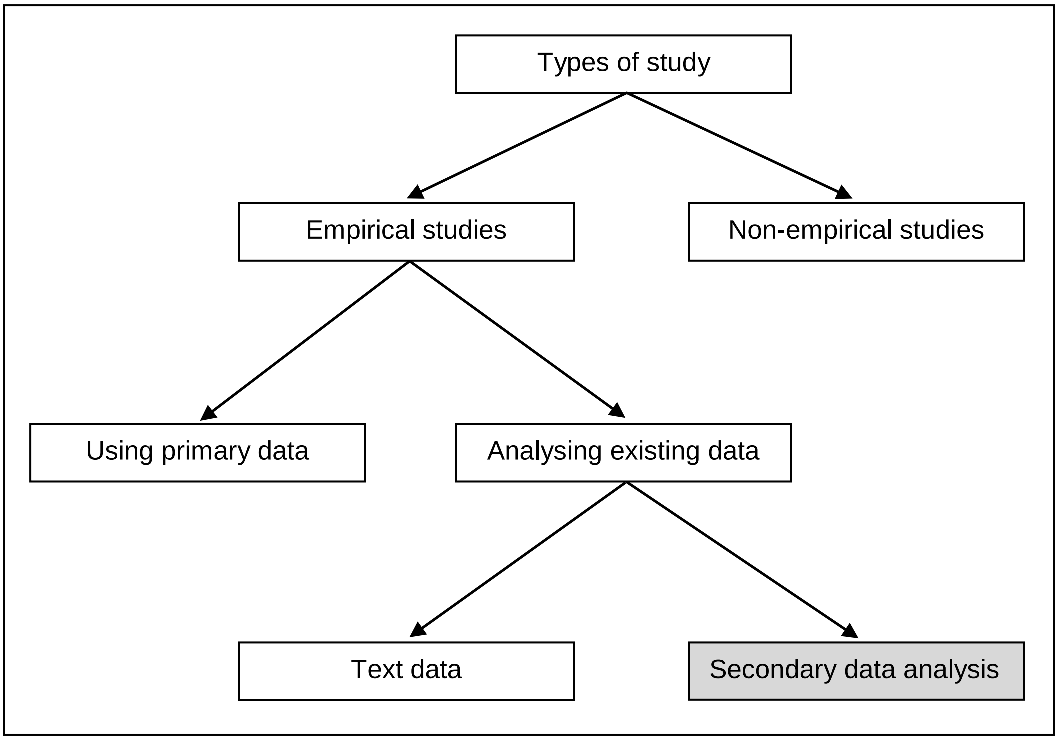


Figure 5.2: Typology of Secondary Data Analysis Research Design (Mouton, 2006)

SDA is described as the research method perfectly suitable to "the research needs of a person with macro-interest and micro-resources." SDA is any further analysis of an existing dataset, which presents interpretations, conclusions, or knowledge additional to, or different from, those produced in the first report on the inquiry as a whole and its main results (Smith, 2006). Even reanalysis by researchers of data that they collected previously qualifies as SDA if it is for a new purpose or in response to a methodical critique (Schutt, 2007). SDA is possible on quantitative and qualitative data. SITES 2006 South African data set (Addenda 5.4-5.6) serves as secondary (quantitative) data for this researcher.

The most typical way of using secondary data for research is to begin with a research question and seek a data set that will allow analysis of that question. An alternative method is to begin by selecting from among the available secondary data sets, and then formulating a research question that may be answered using the data sets chosen (Boslaugh, 2009). Although the first method conforms more to standard beliefs about how the research is done, the second approach is particularly useful in classroom instruction, and both methods can produce quality research. In the second approach, a researcher would begin by looking at the variables contained in the secondary data set and consider how one might combine them to create interesting and useful questions. In this study, this researcher used the second approach.

There are many advantages to SDA. Time, money and effort and saved in using already existing data. It is not disruptive or intrusive as in ordinary research. The breadth of data available is incomparable to what an individual researcher can collect (Smith, 2006). Often professional research teams, using complex sample design, collect primary data with a system of weighing that allows the researcher to reanalyse balanced, quality, purified data. Furthermore, secondary data can be helpful in the research design of subsequent primary research and can provide a baseline with which the collected primary data results can be compared. SDA is also relatively more democratic, as most large-scale data sets are in the public domain. However, the objectives of the primary data collection restrict the scope of SDA (Boslaugh, 2009).

In order to be objective, fair, and neutral, it is important, as much as possible, not to choose primary data that was collected to serve, political, business or personal interests. To become convinced of the suitability of the research questions to the information available in the secondary data set, the researcher should satisfactorily answer the following questions before any secondary data analysis begins (Boslaugh, 2009): (i) What was the original purpose for which the data was collected? (ii) What kind of data is it? (iii) When and how was the data collected? (iv) What cleaning and/or coding procedures have been applied to the data? For example, SITES 2006 is representative of grade 8 Mathematics and Science teachers in South Africa. From a practical point of view, SITES 2006 data set is objective, fair and neutral.

5.4 Research Methodology

Research methodology describes the population, sampling, instruments and procedures used in the research. As this research is a SDA of SITES 2006; the population and sample are same as the South African survey of SITES 2006. This researcher conducted two kinds of analyses on the South African SITES 2006 data set in order to unearth new and valuable information. Firstly, a fusion of Bromfenbrenner's Ecological Systems Theory (Bronfenbrenner, 1979b; Bronfenbrenner, 1986) and Activity Theory (Engeström, 1987a; 2009; Vygotsky, 1978) was used as the conceptual framework to investigate the Mathematics and Natural Science teachers' progress in their ICT pedagogical practices in the time-frame of 2004-2013, as stipulated in South Africa's White paper on e-Education policy (South Africa, 2004). The framework for this analysis is described in Chapter 2. Secondly, statistical analysis using Statistical Package for Social Sciences (SPSS, 2011) was conducted to address the nine research sub-questions of this study.

5.4.1 Population

A population is a group of elements or cases, whether individuals, objects or events, that conform to specific criteria and to which we intend to generalise the results of the research. This group is also referred to as the target population or universe (McMillan & Schumacher, 2001). This research uses SDA as the research design and the population for this study is grade 8 Mathematics and Natural Science teachers at South African schools.

5.4.2 Sampling Frame

The survey population or sampling frame refers to elements of the population from which data is collected (McMillan & Schumacher, 2001). This research comprises SDA, therefore the population and sample for this study was based on South African grade 8 Mathematics and Natural Science teachers. In SITES 2006, the South African sample comprised about 500 schools. These consisted of computer-using and non-computer-using schools. Two teacher populations were targeted: Grade 8 Mathematics teachers and grade 8 Natural Science teachers. Due to the fact that ICT is only significantly implemented in two out of nine provinces in South Africa, 25 strata were created to secure fair representation of the population with 666 Mathematics teachers and 622 Natural Science teachers (Howie & Blignaut, 2009). Five hundred and four schools were randomly selected in accordance with the directives of IEA (Castens & Pelgrum, 2009).

5.4.3 Procedures

South African National Research Coordinators (NRC) of the SITES 2006 obtained permission from the national and provincial Departments of Education for administering survey instruments to sampled schools in nine South African provinces. One hundred and two trained field workers (Masters Students at the Tshwane University of Technology) participated in the data collection process. South Africa, due to local constraints, used a completely paper-based data collection strategy while all other countries used either online data collection (ODC) or a mixed-mode involving ODC and the pencil and paper method. South African field workers used personal interviews for answering the survey questionnaire. This method yielded a more than 90% return rate of the completed questionnaire, which exceeded the

85% return rate requirement of IEA. The objectives of SITES 2006 were: to compare participating countries' ICT use in schools by using different indicators; to analyse the inclusion of ICT in education policy recommendations; and to analyse in depth the way in which ICT affects teaching and learning processes in the classrooms of participating countries (Howie & Blignaut, 2009).

5.4.4 Variables

A variable is an event, category, behaviour, or attribute that represents a construct (a higher level abstract concept that is not directly observable) and has different values (McMillan & Schumacher, 2001). SITES 2006 gathered information about variables under a number of themes, including curriculum goals, teacher practice, teacher support and assessment practices. Variables that are revealed by the factor analysis for this study are listed in § 5.5.1.

5.5 Statistical Procedures

Statistics have two principal functions: to help the researcher describe data (descriptive statistics) and to draw inferences from the data (inferential statistics). Statistics help the human mind comprehend disparate data as an organised whole (Leedy & Ormrod, 2005). The statistical software, SPSS software (SPSS, 2011) assisted the researcher to conduct analysis of the large SITES 2006 data set with efficacy and accuracy. IEA has made the SITES 2006 international database available to the public to promote secondary data analysis (Brese & Carstens, 2009). The IEA's Independent Database Analyser software enabled the researcher to combine SPSS data files from the IEA SITES 2006 and conduct analyses. The researcher conducted a factor analysis (Nicole & Pexman, 2000) on the combined Mathematics and Science teachers' dataset (Addendum 5.4). Confirmatory Factor Analysis (CFA) is widely recognized as a rigorous statistical technique for confirming or disproving hypothesized underlying latent variable structures (Byrne, 1989). Due to the large sample size of about 500 schools, the random sampling and the ordinal nature of the data, the parametric statistical analysis is a valid operation that can be conducted (Elliot & Woodward, 2007) on the SITES 2006 database.

A factor analysis was conducted on the combined grade 8 Mathematics and Natural Science teachers' dataset to examine the correlations among the variables and to identify the clusters of highly interrelated variables that reflect underlying themes or factors within the combined dataset. The following procedures were also carried out:

- Cronbach's alpha was calculated as a reliability test on identified factors. It is a measure of the internal consistency of items on questionnaires. It is used when all or some of the items are intended to measure the same concept (Cramer & Howitt, 2004). When the measure is internally consistent, all of the individual questions or items making up that measure should correlate well with others
- Mean count (Nicole & Pexman, 2000) on these factors
- t-Test to (Nicole & Pexman, 2000) determine if the mean scores for Mathematics and Natural Science teachers' responses are significantly different
- Effect sizes to determine if the difference in the scores of Mathematics and Natural Science teachers are practically significant. Effect sizes are used in meta-analysis and more generally indicate the strength of the relationship between two variables (Cramer & Howitt, 2004)
- Two-way ANNOVA on biographical variables to find out if there are any differences in the responses based on biographical differences of grade 8 South African Mathematics and Natural Science teachers (McMillan & Schumacher, 2001)
- As SITES 2006 frequency tables represent ordinal variables, Spearman's rank-order coefficients were calculated on factors identified during factor analysis in order to reveal the correlations that exist among the factors. Spearman's rank-order coefficient is a non-parametric measure of statistical dependence between two variables. It benchmarks the monotonic relationship between two variables (Nicole & Pexman, 2000).

5.5.1 Factors Identified through Factor Analyses

Table 5.1 lists the factors identified through factor analysis.

Table 5.1: Factors Identified through Factor Analysis

Themes	Factors
Roles of the teacher	Conventional role of the teacher Mediating Role of the Teacher
Roles of the learners	Conventional role of the learner Structured inquiry role of the learner Guided inquiry role of the learner
Assessment practices	Conventional assessment practices Constructivist assessment practices
Barriers to ICT pedagogical practices	Teacher level barriers School level barriers Curriculum level barriers

Factors identified through factor analysis are discussed in Chapter 6. The practically significant correlations found among the factors and their importance to teaching and learning in South African classrooms are also presented in Chapter 6.

5.6 Reliability

Reliability represents the consistency and ability to replicate research findings over time (Leedy & Ormrod, 2005). For research to be reliable, it must demonstrate that if it were carried out on a similar group of respondents in a similar context, then similar results would be found. Reliability is a necessary but not sufficient condition for the validity of the research (Cohen *et al.*, 2007). Reliability is a pre-condition for validity and has more importance in quantitative research compared to that in qualitative research (McMillan & Schumacher, 2001). Secondary data generally has a pre-established degree of validity and reliability, which need not be re-examined by the researcher who is re-using the data. SITES 2006 was conducted by IEA, which is an established, experienced, professional, international research organisation and hence the SITES 2006 data set used for this research is assumed to have acceptable levels of reliability and validity.

5.7 Validity

Validity is the ability of research instruments to measure exactly what it purports to measure (Cohen *et al.*, 2007; Leedy & Ormrod, 2005). In the context of research design, validity refers to the truth or falsity of propositions generated by the research. There are two types of design validity. Internal validity expresses the extent to which extraneous variables have been controlled or accounted for. External validity refers to the extent to which the results and conclusions can be generalised to other people and settings (McMillan & Schumacher, 2001). In quantitative data collection, data validity might be improved through careful sampling, appropriate instrumentation and the appropriate statistical treatment of the data. The researcher admits that it is impossible for research to be 100% valid because of standard errors inherent in all measurements (Cohen *et al.*, 2007).

5.8 Ethical Considerations

Ethical concerns arise from the conflict between the demands placed on researchers as professionals in pursuit of truth and their subjects' rights and values threatened by the research (Cohen *et al.*, 2007). Ethical issues may stem from the kinds of problems investigated and/or the methods they use to obtain valid and reliable data. Informed consent is used to secure permission for collecting data from participants. Informed consent represents procedures in which individuals choose whether or not to participate in an investigation after being informed of facts that would be likely to influence their decisions. Ethical issues are not irrelevant in secondary data analysis (Smith, 2006). There is the question of using the data for a purpose other than that for which it was collected and for which the respondents did not necessarily agree. This research is a SDA of the SITES 2006 and so ethical issues, if any, were addressed during the original data collection. Appropriate acknowledgement to the IEA is provided and the integrity of the data is respected.

5.9 Limitations of this study

This was a quantitative study, and was restricted by the limitations of that kind of research. However, the chosen framework, statistical analysis and detailed interpretation helped the researcher to develop a better understanding of the ICT pedagogical practices of grade 8 Mathematics and Natural Science teachers in South African classrooms.

SDA is the re-analysis of previously analysed research data and therefore the scope of this research is limited by the objectives of the original data collection. However, this researcher was able to formulate interesting and useful questions, the answers of which are found using standard statistical techniques using SPSS and an Independent Database Analyser of IEA.

5.10 Summary of the Chapter

Chapter 5 presented details of research design and research methodology. It started with definitions of terms and established the ontological and epistemological foundations of this research. It continued with a description of the characteristics of secondary data analysis and its suitability to the research presented within the epistemological foundations. Thereafter, in research methodology, population, sampling, variables, statistical procedures, reliability, validity, and ethical considerations for this research are presented. Chapter 5 also presented the limitations of this research. Chapter 6 presents the data analysis and findings.

Chapter 6

Findings from the Secondary Data Analysis

6.1 Introduction

Chapter six presents a secondary data analysis of the South African combined dataset of the Mathematics and Science teachers' questionnaire of SITES 2006 (Brese & Carstens, 2009; Law *et al.*, 2008a), as well as selected data collected by the questionnaires to TCs and principals. The SPSS (2011) was used for the secondary data analysis to address the nine research sub-questions of this study. Descriptive statistics (percentage frequencies) were calculated to examine the variables of the questionnaires. Then factor analyses were performed to identify clusters of interrelated variables that reflect the underlying themes or factors within the combined dataset, which were then correlated with each other. The analyses addressed the following sub-questions as follows:

- What are the ICT pedagogical practices of grade 8 Mathematics and Science teachers as represented in SITES 2006 data through studying the descriptive statistics? (§ 6.2)
- What support is received by grade 8 Mathematics and Science teachers as represented in SITES 2006 data through studying the descriptive statistics? (§ 6.3)
- What are the barriers faced by grade 8 Mathematics and Science teachers as represented by SITES 2006 data through studying the descriptive statistics? (§ 6.4)
- How can SPs influence the ICT pedagogic practices of grade 8 Mathematics and Science teachers? (§ 6.5)
- What ICT pedagogical practices and barriers can be identified through factor analyses of the SITES 2006 data? (§ 6.6)
- What are practically significant correlations between the variables represented in the questions of the SITES 2006 teacher questionnaires in the combined Mathematics and Science dataset? (§ 6.7)
- Are there any significant differences between the responses of male and female teachers? (§ 6.8)
- Are there any significant differences between the responses of Mathematics and Science teachers? (§ 6.9)

A culmination of the collective syntheses of the results emerging from Chapter 6 will address the main research questions in Chapter 7.

6.2 ICT Pedagogical Practices of Mathematics and Science Teachers

This section addresses the first sub-question that relates to the pedagogical practices of Mathematics and Science teachers. In order to effectively teach with ICT, teachers should have sufficient knowledge of their subject matter; have necessary skills in teaching methods and learner organisation, as well as competency in the use of digital resources. The SITES 2006 data reveals that the majority of South African Mathematics and Science teachers do not have necessary content knowledge, pedagogical knowledge and ICT knowledge; and that most learners (74%) also do not have the necessary ICT skills to effectively learn with ICT. Seventy six percent of schools do not have required digital resources. Mathematics and Science teachers neither have sufficient ICT-related skills (57%) nor have adequate ICT-related pedagogical skills (64%). In addition, 55% of Mathematics and Science teachers do not know how to identify which ICT tools will be useful for their lessons. The *Four in Balance Model* is a conceptual framework based on the *best practices* of ICT in Dutch schools. It suggests that sustainable use of ICT in teaching and learning requires the balanced deployment of four fundamental elements: (i) vision, (ii) expertise, (iii) digital resources, and (iv) ICT infrastructure (Kennis.Net, 2006). However, South Africa should establish the four basic fundamentals before it can consider balancing them, in view of the fact that 77% of schools nationally have no access to computers for teaching and learning (South Africa, 2004). According to SITES 2006 data, only 22% of MTs and 23% of the Science teachers have a basic degree in their discipline. Although teacher qualifications are not, in themselves, an indicator of teaching quality, they are used as a substitute to evaluate teachers' competency (Kraak & Press, 2008).

SITES 2006 presented identical questionnaires to the Mathematics and Science teachers. Although the responses from the Mathematics and Science teachers' were collected separately, in some instances, these teachers were the same person. In this discussion, the data from the Mathematics and Science teachers were combined to describe their ICT pedagogical practices. Six themes address the first sub-question: *What are the ICT pedagogical practices of grade 8 Mathematics and Science teachers?*

Table 6.1: Questionnaire References for Research Sub-question 1

Sections	Themes	SITES 2006 Variables
§ 6.2.1	Curriculum goals	BTG08A1-BTG08M1
§ 6.2.2	Learning opportunities	BTG09A1-BTG09M1
§ 6.2.3	Teacher practices and use of ICT	BTG14A1-BTG14L19
§ 6.2.4	Assessment and use of ICT	BTG15A1-BTG15H1
§ 6.2.5	Learning resources	BTG17A1-BTG17K1
§ 6.2.6	General and pedagogical uses of ICT	BTG21A1-BTG21P1

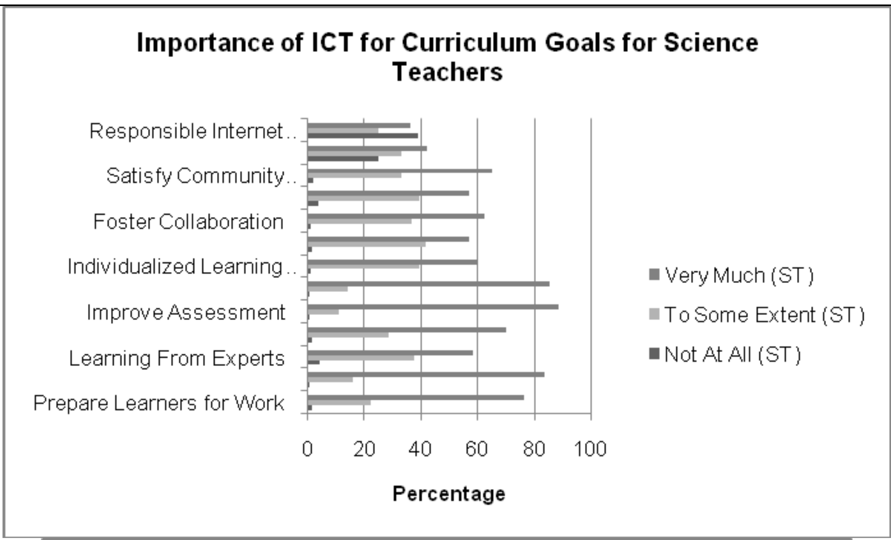
The section references, themes and the corresponding questionnaire identifiers (variables) are indicated in Table 6.1.

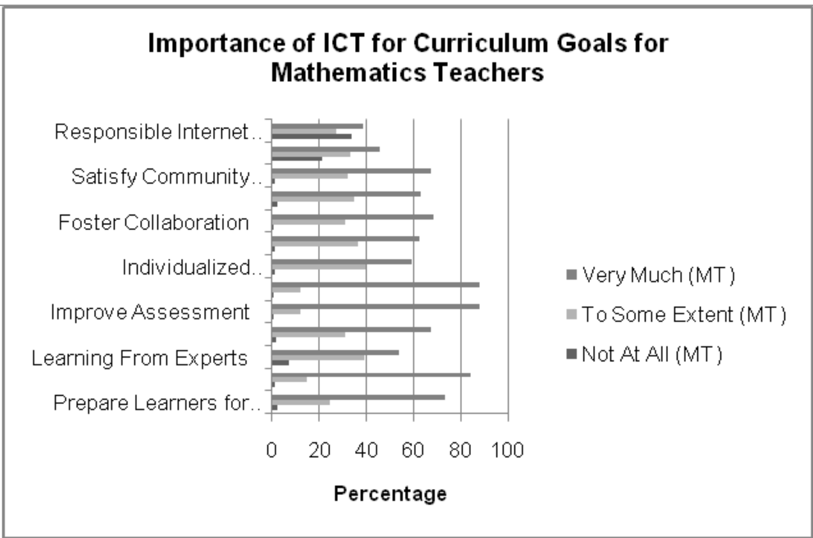
6.2.1 Curriculum Goals

The variable *curriculum goals* relate to the first theme from the teacher questionnaire (Addendum 5.1) pertaining to ICT practices. In general, the concept curriculum refers to a frequently shifting and continually changing body of knowledge, skills and beliefs that reflect the diverse interests of subgroups and alliances over a period of time (O'Donoghue & Clarke, 2010). Curriculum design is influenced by social, economic and political forces. Popular definitions of curriculum can be pinned on a continuum between two extreme viewpoints: (a) specific and prescriptive views, versus (b) broad and general views, as well as other definitions that fall in between these (Lubisi, Parker, & Wedekind, 1998). From a narrow perspective, a curriculum could be regarded as merely a blueprint for teaching activities. From a broad perspective, it could be viewed as including all activities of teaching and learning, in addition to the formal teaching and learning activities taking place inside and outside the classroom (O'Donoghue & Clarke, 2010). Curriculum is the primary source of support and direction for learning and teaching (NDoBE, 2010). It could play the role of equaliser in terms of educational standards. After the first democratic election in 1994, *Curriculum 2005* (an outcomes-based curriculum up to grade 9) was introduced as a policy in 1997 in order to promote the values of the new South African Constitution (South Africa, 1996a). Teacher oriented forms of traditional instruction were replaced with notions of facilitation, learning by discovery and group work. *Curriculum 2005* was never researched nor put into trial. It was found that learners who are passing through C*urriculum 2005* could not read, write or count according to their grade levels. In the year 2000, a Review Committee investigated *Curriculum 2005* and came up with *Revised National Curriculum Statement* for grades R-9 (South Africa, 1996c), which was implemented in 2004. However, there were no clear implementation plan, and once again, the curriculum failed. *Revised National Curriculum Statement* was criticised for teacher over-load, confusion and stress. It also resulted in widespread learner underperformance in national and international assessments. The National Curriculum Statement for Further Education and Training (FET) phase (South Africa, 1996c) was also developed in 2002 after the release of the Curriculum Statement for General Education and Training (GET) phase. Two curriculum documents, one for the GET phase and other for the FET phase were combined, and together came to be known as *National Curriculum Statement* (South Africa, 1996b). *National Curriculum Statement* is currently under review (NDoBE, 2010).

In July 2009, the Minister of Basic Education appointed a committee to study the problems experienced by the short-comings of the *National Curriculum Statement* and to set up recommendations to improve the curriculum. The Department of Basic Education (DBE) envisages that ICT will provide all learners access to quality education, build educators' capacity to teach effectively and enhance logistics and operations. Since 1994, the NDoE increased the number of computers for teaching and learning in schools from 12.3% in 1999 to 26.5% in 2002. In 2008 the DoE reported that 22.59% of schools have computers for teaching and learning, based upon 2005 data. The Department also released the White Paper on e-Education in 2004 for the nationwide implementation and pedagogical use of ICT to attain the prescribed curriculum goals. However, little research is available on how ICT is being implemented and used to reach the curriculum goals. Up to date, the large-scale International SITES 2006 dataset, comparing the use of ICT for pedagogical purposes in 22 educational systems, is the most recent quantitative data available on how ICT is being used in South African schools to reach curriculum goals (South Africa, 2004).

SITES 2006, in order to assign priority to different curriculum goals (Law & Chow, 2008), posed the question: *In your teaching of the target class in this school year, how important is it for you to achieve the following goals?* The curriculum goals ranged from traditional objectives, such as the importance of preparing learners for further education, and fostering learners' ability, to constructivist objectives such as readying learners to plan and set their own learning goals, as well as monitoring and evaluating own progress. SITES 2006 teacher questionnaire required teachers to indicate their choices on a four-point scale: not at all, a little, somewhat, and very much. To narrow down the data ranges, the researcher grouped *a little* and *somewhat* together and replaced it with a single term *to some extent* for a combined analysis, as conceptually they do not differ much.





In your teaching of the target class in this school year, how important is it for you to achieve the following goals?	**Science Teachers (ST)**			**MTs (MT)**		
	Not At All %	To Some Extent %	Very Much %	Not At All %	To Some Extent %	Very Much %
Responsible Internet behaviour	33.84	27.35	38.81	38.97	24.86	36.17
Learners' competent ICT use	21.07	33.12	45.81	24.78	33.10	42.12
Satisfy community expectations	0.87	32.00	67.13	1.86	32.98	65.16
Foster communication skills	1.91	34.77	63.31	3.52	39.42	57.06
Foster collaboration	0.67	30.73	68.60	0.97	36.55	62.48
Foster independent learning	1.15	36.47	62.38	1.46	41.57	56.98
Individualized learning experience	0.98	39.53	59.48	0.69	39.16	60.15
Increase motivation	0.14	12.00	87.85	0.55	13.83	85.62
Improve assessment	0.40	11.81	87.79	0.43	10.95	88.62
Learn from real examples	1.54	31.23	67.24	1.36	28.68	69.95
Learn from experts	7.25	38.89	53.86	4.20	37.38	58.51
Prepare for secondary education	0.93	14.80	84.27	0.44	15.94	83.62
Prepare learners for work	2.18	24.46	73.36	1.50	22.05	76.45

Figure 6.1: Importance of Using ICT to Achieve Curriculum Goals

Figure 6.1 presents curriculum goal variables on a three-point scale. Curriculum goal variables with high or low frequencies, i.e. frequencies that stand out, are shaded and discussed in detail. When variables as a whole are considered together, the whole column is selected and shaded. This procedure is adopted throughout this chapter. Of the thirteen curriculum goals in Figure 6.1, the South African teachers ranked three goals highest: (i) *to increase learning motivation*, (ii) *to prepare students for upper secondary education and beyond*, and (iii) *to improve assessment performance*. This ranking was the same for all 22 participating countries and education systems. The lowest-ranked goal for both teacher populations in all systems except South Africa was *to learn from experts and peers from other schools/countries* (Law & Chow, 2008). South African teachers regard learning from experts and peers from other schools or countries important. This may relate Afro-centric values and the spirit of *Ubuntu* that regard group activities, co-operation, readiness to share with others, compliance, and being available to others important (Van der Walt, 1997). *Ubuntu* refers to values like universal fraternity for humanity, sharing, and treating people with respect (Bhengu, 2006).

As illustrated in Figure 6.1, the majority of South African responding teachers (76.45% of Mathematics and 73.36% Science) considered preparing students for the world of work more important rather than preparing them for 21st century learning skills. Twenty first century learning skills represent the learners' capacity to engage in lifelong learning (self-directed and collaborative inquiry) and connectedness (communication and collaboration with experts and peers around the world) (Wagemaker & Law, 2010). This indicates some teachers' failure to see the connection between world of work and 21st century skills. The international data indicates that 21st century learning skills were more important than to prepare students for upper secondary and further education (84.27% of Mathematics and 83.62% of Science teachers indicated *very much*, while only 0.93% of Mathematics and 0.44% of Science teachers and replied *not at all*) (Law & Chow, 2008).

The pace of change and innovation around the globe continues to escalate (O'Donoghue & Clarke, 2010). Schools can not merely rely on traditional ways of teaching and learning to address evolving issues and trends that learners face in the information age. Learners learn best when they can perceive a purpose in what they are learning (Curriculum Council Western Australia, 1998). DBE prescribes that assessment for learning should actively involve learners with knowledge from real-life contexts (South Africa, 1996c). Learners should connect classroom-learning with real-life learning. The majority of MTs (67.24%) and Science teachers (69.95%) incorporated real-life examples with classroom activities, settings, or applications for student learning. Less than 2% of all teachers indicated that they did not value the integration of real-life examples. Perhaps this small percentage of teachers are reluctant to change their traditional ways of teaching (Bingimlas, 2009).

An assessment of curriculum goals reveals the level of attainment of curriculum goals. Assessment is a process of collecting valid and reliable evidence on the performance of learners on an on-going basis, against clearly defined criteria, using a variety of methods, tools and techniques in different contexts. Assessment methods, tools and techniques should provide a range of opportunities for learners to demonstrate the attainment of knowledge, skills, values and attitudes(South Africa, 2001). Assessment activities should also balance *assessment for learning* and *assessment of learning* (O'Donoghue & Clarke, 2010) to ensure individual growth, development and promotion. The vast majority of Mathematics (87.79%) and Science teachers (88.62%) in South Africa value improved learner performance and provide evidence on the quality of teaching and learning. Also, parents and guardians require information about their children's learning (Wheeler & John, 2008).

Grade 8 teachers (85.62% of Mathematics and 87.85% Science teachers) aim to improve learner motivation and make learning more interesting. Furthermore, grade 8 teachers regard individualising learning experiences to be essential in addressing different learning needs (60.15% of Mathematics and 59.48% Science teachers respectively). Grade 8 teachers also value students' ability and readiness to set their own learning goals, and to plan, monitor and evaluate their own progress (56.98% of Mathematics and 62.38% Science teachers).

Partnerships aimed at common goals fosters the acceptance of differences between learners and promotes teamwork (O'Donoghue & Clarke, 2010). Teaching these principles from early childhood may positively influence learners' social behaviour and encourage them to strive for common goals. The South African Policy on Religion and Education recognises diversity and aims at fostering tolerance, respect and understanding among learners from diverse back grounds. Mathematics (62.48%) and Science (68.8%) teachers encouraged learners' collaborative and organisational skills for teamwork. The partnership between teachers, parents and the community may assist in the successful delivery of the curriculum. The majority of teachers (65.16% of Mathematics and 67.13% Science teachers) aim towards this curriculum goal. Again, 42.12% of Mathematics 45.81% of Science teachers view preparing students for competent use of ICT as important. This goes along with the South African National Human-Resource Development Strategy (NHRDS) (South Africa, 1998). This policy commits, among other things, to overcome the shortage in the supply of people with priority skills such as engineers and natural scientists required (Daniel, 2007) to achieve the much needed economic growth in South Africa.

Some Mathematics (38.98%) and Science (33.84%) teachers do not value preparing learners for responsible Internet behaviour. About the same numbers of teachers (36.17% of Mathematics and 38.81% of Science teachers) value the principle of preparing learners for responsible Internet behaviour. This could be due to teachers' low levels of Internet experience. According to the SITES 2006 data, only 39% of MTs and 30% Science teachers in South Africa use their home computers for connecting to Internet. In order to assist learners to become successful participants in the knowledge economy, teachers should become conscious of the necessity to prepare learners for competent ICT use, and importantly, safe and responsible Internet behaviour. Table 6.2 provides an *Ecological Activity Systems Analysis* of curriculum goals.

Table 6.2: Ecological Activity Systems Analysis of Curriculum Goals

			ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? *Intra-personal* dialogues and reflections on planning of teaching methods to prepare learners to become competent and responsible ICT and Internet users	i. 78.93% of NSTs think it is important to prepare learners for competent ICT use based on the school curriculum, while 21.08% do not; 75.22% of MTs think it is important to prepare learners for competent ICT use based on the school curriculum, while 24.78% do not ii. 66.16% of NSTs think it is important to prepare learners for responsible Internet behaviour based on the school curriculum, while 33.84% do not; 61.03% of MTs think it is important to prepare learners for responsible Internet behaviour based on the school curriculum, while 38.97% do not
	Object(ive)	Why is the activity taking place?	i. To prepare learners for responsible and competent ICT use ii. To prepare learners for responsible Internet behaviour, based on the school curriculum
	Subject(s)	Who is involved in carrying out the activity?	Grade 8 NSTs/MTs
	Tools	By what means are the subjects performing the activity?	Self (teacher's mind), as well as curriculum objectives (competent ICT use and responsible Internet behaviour)
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Personal values, ethics, norms and attitudes
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	No division of labour (only the teacher's inner thoughts and self-reflections are involved)
	Community	What is the environment in which this activ-	Grade 8 NSTs'/MTs' Mind

			ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
		ity is carried out?	
	Outcomes	What is the desired outcome of carrying out this activity?	Learners who are competent ICT users and responsible Internet users
	Recom-mend-ations for the Education System	i. Because 21.08% of NSTs and 24.78% of MTs do not think it is important to prepare learners for competent ICT use based on the school curriculum, this calls for an attitude change in individual teachers concerning ICT use for learners ii. Because 33.84% of NSTs and 38.97% of MTs do not think it is important to prepare learners for responsible Internet behaviour based on the school curriculum, this calls for an attitude change in individual teachers, in order to instil responsible Internet behaviour in learners	

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Teacher's activities, roles, interactions and interpersonal relations using ICT*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the NSTs or MTs interested in? Teacher's activities, roles, interactions and *interpersonal* relations with an individual learner using ICT to prepare him/her to become a competent and responsible ICT and Internet user	i. 78.93% of NSTs take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, while 21.08% do not; 75.22% of MTs take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, while 24.78% do not i. 66.16% of NSTs take on the role of TC and perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, while 33.84% do not; 61.03% of MTs take on the role of TC and perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, while 38.97% do not
	Object(ive)	Why is the activity taking place?	i. To prepare the individual learner for responsible and competent ICT use ii. To prepare the individual learner for responsible Internet behaviour, based on the school curriculum
	Subject(s)	Who is involved in carrying out the activity?	The NSTs/MTs and learners
	Tools	By what means are the subjects performing the activity?	Curriculum objectives, ICT resources and technical support
	Rules and Regulations	Are there any cultural norms/rules/regulations governing the performance of the activity?	▪ Personal values, ethics and norms ▪ School rules and regulations, netiquette (Internet etiquette)
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	Grade 8 NSTs and MTs provide interesting and efficient learning opportunities to an individual learner using ICT according to the school curriculum
	Community	What is the environment in which this activity is carried out?	School computer laboratory, classroom, and library
	Outcomes	What is the desired outcome of carrying out this activity?	An individual learner who is a competent ICT user and a responsible Internet user
	Recommen-	▪ 21.08% of NSTs and 24.78% of MTs do not take on the role of a competent TC	

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Teacher's activities, roles, interactions and interpersonal relations using ICT*
	dations for the Education System	and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum. It is recommended that either the SP or the TC (with the support of the principal) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ▪ 33.84% of NSTs and 38.97% of MTs do not take on the role of TC and do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of TC and who do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, and encourage and support them individually	

			ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between the teacher and two or more of the following Microsystems:* *Teacher and Learner(s)* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? Teacher's activities, roles, interactions and *inter-social* relations with two or more learners using ICT to prepare them to become competent and responsible ICT and Internet users	i. 78.93% of NSTs take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, while 21.08% do not; 75.22% of MTs take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, while 24.78% do not ii. 66.16% of NSTs take on the role of TC and perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, while 33.84% do not; 61.03% of MTs take on the role of TC and perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, while 38.97% do not
	Object(ive)	Why is the activity taking place?	i. To prepare learners for responsible and competent ICT use ii. To prepare learners for responsible Internet behaviour, based on the school curriculum
	Subject(s)	Who is involved in carrying out the activity?	NSTs, MTs and learners
	Tools	By what means are the subjects performing the activity?	Curriculum objectives, ICT resources and technical support
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	▪ Teachers' values, ethics and norms ▪ School rules and regulations, netiquette
	Division of labour	Who is responsible for what when carrying out the activity and how are	▪ Grade 8 NSTs and MTs facilitate, guide and coach ▪ Grade 8 Natural Science and Mathematics learners as trainee

			ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between the teacher and two or more of the following Microsystems:* *Teacher and Learner(s)* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
		these roles organised?	▪ TC as support personnel ▪ Parent as support personnel outside school
	Community	What is the environment in which this activity is carried out?	School computer laboratory, classroom or library
	Outcomes	What is the desired outcome of carrying out this activity?	Learners' effective ICT use and responsible Internet behaviour
	Recommendations for the Education System	▪ 21.08% of NSTs and 24.78% of MTs do not take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum. It is recommended that the SP and the TC identifies a group of teachers in their school who are not taking on the role of competent TCs and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them ▪ 33.84% of NSTs and 38.97% of MTs do not take on the role of TC and do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum. It is recommended that the SP and the TC identifies a group of teachers in their school who are not taking on the role of TCs and who do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, and encourage and support them	

			ECOLOGICAL SYSTEM ***Exosystem (Intrasocial)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the subject interested in? *Intra-social* dialogues, reflections, decisions and actions of SGBs and the NDoE to organise TPD courses to develop and empower teachers to be competent, effective and responsible in ICT pedagogical practices in line with the school curriculum	i. Because 21.07% of NSTs and 24.78% of MTs do not take on the role of competent TC and do not perform other pedagogical practices to prepare learners for competent ICT use, these percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ii. Because 33.84% of NSTs and 38.97% of MTs do not take on the role of competent TC and do not perform other pedagogical practices to prepare learners for competent ICT use, these percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed for instilling responsible Internet behaviour in schools and the school system as a whole
	Object(ive)	Why is the activity taking place?	SGBs and the NDoE organising TPD courses to develop and empower teachers to be competent, effective and responsible in ICT pedagogical practices in line with the school curriculum
	Subject(s)	Who is involved in carrying out the activity?	Members of the NDoE, PDoE,and SGBs
	Tools	By what means are the subjects performing the	ICT hardware and software, TPDs in the pedagogical uses of ICT, TCs, curriculum guidelines, funding for

			ECOLOGICAL SYSTEM ***Exosystem (Intrasocial)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
		activity?	infrastructure
	Rules and Regulations	Are there any cultural norms/rules/regulations governing the performance of the activity?	DoE policies, rules and regulations, the school curriculum, SGBs' rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	The DoE and SGBs organise ICT TPD courses and provide ICT resources and infrastructure
	Community	What is the environment in which this activity is carried out?	All South African schools
	Outcomes	What is the desired outcome from carrying out this activity?	Professionally developed and empowered teachers who are competent, effective and responsible in ICT pedagogical practices in line with school curriculum guidelines
	Recommendations for the Education System	▪ 21.08% of NSTs and 24.78% of MTs do not take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum. It is recommended that the DoE and the SGB identifies teachers who are not taking on the role of competent TCs and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them to complete ICT TPD courses ▪ 33.84% of NSTs and 38.97% of MTs do not take on the role of TC and do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum. It is recommended that the DoE and the SGB identifies teachers who are not taking on the role of TCs and who do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, and encourage and support them to complete ICT TPD courses	

			ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, etc.)*
	Activity	What sort of activity are the subjects interested in? Trans-social improvement and further development of educational policies, as well as curriculum guidelines for more effective ICT integration in schools to organise professional development courses to develop and empower teachers to be competent, effective and re-	i. Because 21.07% of Natural Science Teachers and 24.78% of Mathematics teachers think it is not important to prepare learners for competent ICT use based on school curriculum, these percentages indicate the need for curriculum guidelines and educational policies concerning competent ICT use in the school system ii. Because 33.84% of Natural Science teachers and 38.97% of Mathematics teachers think it is not important to prepare learners for responsible Internet behaviour based on school curriculum, these percentages indicate the need for curriculum guidelines and educational policies concerning responsible Internet behaviour in the school system

		sponsible in ICT pedagogical practices in line with school curriculum	
	Object(ive)	Why is the activity taking place?	Improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and empower teachers to be competent, effective and responsible in ICT pedagogical practices in line with the school curriculum
	Subject(s)	Who is involved in carrying out the activity?	Policy makers (e.g. members of parliament)
	Tools	By what means are the subjects performing the activity?	The constitution of the Republic of South Africa; existing educational policies, acts, white papers and implementation protocols
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	The constitution of the Republic of South Africa, DoE policies, rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	Policy makers (e.g. members of parliament) adopt, amend or repeal policies
	Community	What is the environment in which this activity is carried out?	Parliament of Republic of South Africa
	Outcomes	What is the desired outcome from carrying out this activity?	Effective educational policies and curriculum guidelines which ensure sufficient numbers of teachers competent and effective in ICT pedagogical practices in accordance with South African schools' requirements
	Recom-mend-ations for the Education System	i. 21.07% of NSTs and 24.78% of MTs think it is not important to prepare learners for competent ICT use based on the school curriculum. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ii. 33.84% of NSTs and 38.97% of MTs think it is not important to prepare learners for responsible Internet behaviour based on the school curriculum. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system	

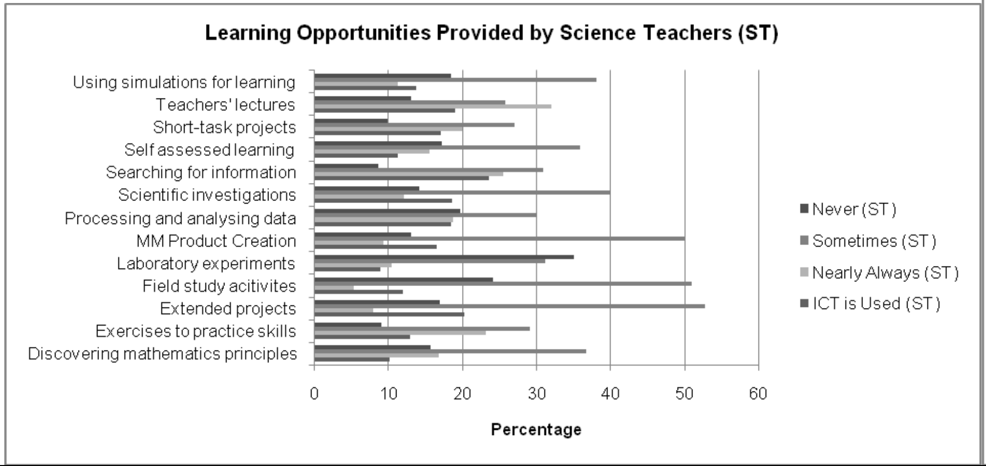
6.2.1.1 Summary on Findings on Curriculum Goals

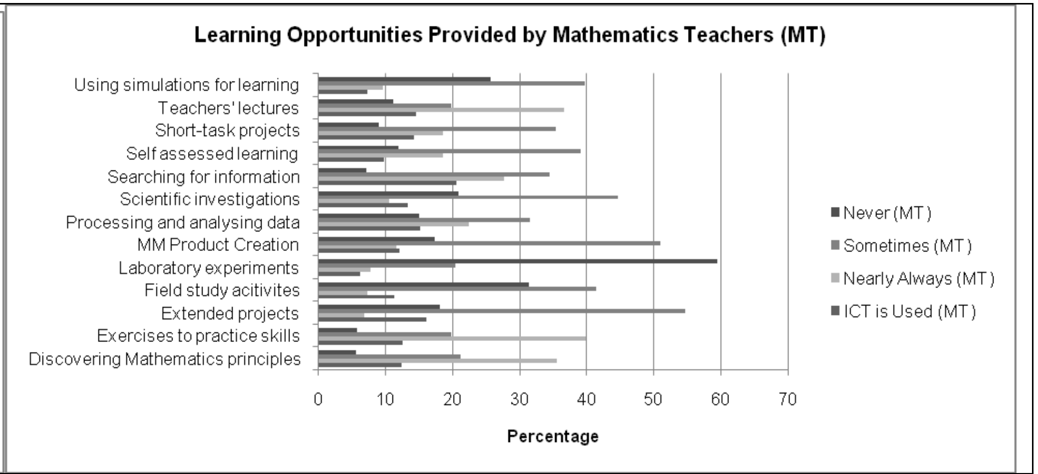
Responses to the SITES 2006 questionnaire on teacher's curriculum goals indicate:

- The most important curriculum goal for grade 8 Mathematics and Science teachers to achieve is to improve learners' performance in assessment and examinations (88.21%)
- 24.78% of Mathematics and 21.08% Science teachers in grade 8 consider preparing students for competent ICT use as *not at all* important. This is in accordance with the in-

ternational finding. Both teacher populations scored below 3.0 on a four-point Likert scale for most of the international educational systems (Law & Chow, 2008)

- The majority (83.95%) of grade 8 Mathematics and Science teachers value preparing learners for tertiary education and world of work. Some of them fail to see the connection between preparing learners for the world of work and training learners for 21st century skills.
- South Africa scored highest (55.68%) out of all participating education systems in both teacher populations for valuing learning *“from experts and peers from other schools or countries”* (Law & Chow, 2008). This is worth further investigation, considering the low level of Internet connectivity available at South African schools.





In your teaching of the target class in this school year: (a) How often is the scheduled learning time used for the following activities? (b) Has ICT been used during these activities?	**Science teachers (ST)**				**MTs (MT)**			
	Nearly Always %	Sometimes %	Never %	ICT is used %	Nearly Always %	Sometimes %	Never %	ICT is used %
Using simulations for learning	11.22	38.10	18.43	13.74	9.59	39.66	25.53	7.21
Teachers' lectures	32.00	25.73	13.01	19.03	36.59	19.80	11.05	14.55
Short-task projects	19.97	27.00	9.89	17.07	18.49	35.25	8.98	14.24
Self assessed learning	15.50	35.83	17.14	11.21	18.51	38.99	11.88	9.73
Searching for information	25.44	30.84	8.58	23.61	27.55	34.43	7.06	20.52
Scientific investigations	12.07	40.07	14.18	18.61	10.44	44.63	20.80	13.28
Processing and analysing data	18.66	30.11	19.70	18.37	22.35	31.42	14.89	15.08
Multimedia product creation	9.34	50.00	12.97	16.46	11.61	50.84	17.25	12.09
Laboratory experiments	10.36	31.23	35.10	8.93	7.71	20.31	59.34	6.23
Field study activities	5.23	51.04	24.13	11.94	7.18	41.36	31.34	11.31
Extended projects	7.83	52.81	16.89	20.23	6.76	54.53	18.03	16.11
Exercises to practice skills	23.14	29.08	9.04	12.84	39.76	19.68	5.66	12.42
Discovering Mathematics principles	16.81	36.76	15.59	10.17	35.49	21.12	5.51	12.33

Figure 6.2: Learning Opportunities Provided by Mathematics and Science Teachers and Their Use of ICT

6.2.2. Learners' Opportunities for Learning

The variable *learners' opportunity for learning* (Figure 6.2) is the second theme from the teacher questionnaire (Addendum 5.1) pertaining to ICT practices. Traditionally, schools assume that knowledge is a collection of facts about the world; procedures are to solve problems; educated people control a large body of memorised facts and procedures; teachers are experts in transmitting facts and procedures to learners; and success in schooling is measured by the amount of facts and procedures learners have acquired (Sawyer, 2006). Sawyers' view of traditional schooling represents teacher-centred pedagogy. Research indicates that in the information age, the benefits of technology for teaching seem generally positive. There is evidence for a shift in teachers' pedagogy from the more traditional approach to a more learner-centred approach (Cradler, 2008). Learner-centred pedagogy involves learners and teachers taking joint responsibility for achieving the outcomes of the lesson. The teacher's role tends to be that of a facilitator.

Teachers' ICT pedagogical practices may range from a small, costly enhancement of traditional methods, such as replacing mechanical overhead projectors with MS PowerPoint™ presentations using computers and data projectors, to income-generating transformational changes where learning includes the design of a software program to run the school's tuck shop. In the information age, ICT provides opportunities for the following:

1. Use of ICT as a tool to support teaching and learning processes. Examples are using word processors, spreadsheets, or databases in Mathematics and Science.
2. Use of ICT in supporting learning through web-based learning environments.
3. Learning about the knowledge, skills and values of ICT (Hadjerrouit, 2009).

The section in the SITES 2006 on teacher practice comprised thirteen items. These items represented learning opportunities, teacher activities and assessment methods. This survey included items relating to both traditional (teacher-centred) and innovative (learner-centred) pedagogical practices. The items also included innovative pedagogical practices only using ICT, such as studying natural phenomena via simulations. There were items about the use of ICT in learner projects involving the creation of products such as a model or a report. The percentage frequencies for these pedagogical activities are presented in Figure 6.2.

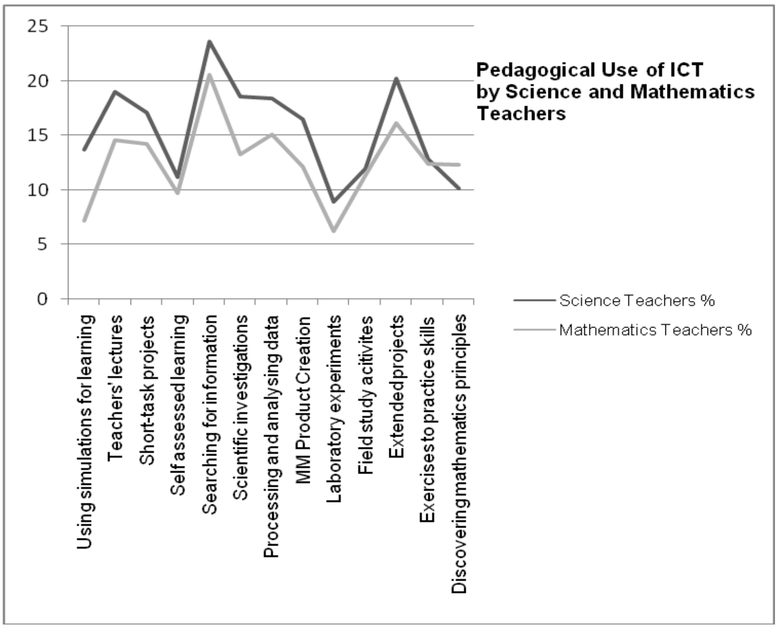


Figure 6.3: Mathematics and Science Teachers' Varying Use of ICT

Responses to question number BTG9A-M in SITES 2006 show a consistent trend in nearly all participating systems. ICT using teacher-practice indicator scores are generally higher for Science teachers compared to the corresponding indicators for MTs within the same system (Law & Chow, 2008). Exceptions were Denmark, Canada, and Thailand. In this case South Africa also followed the international trend. An examination of the ICT uses in classroom activities reveals that Science teachers make slightly more use of ICT both in traditional and innovative classroom activities compared to MTs. The relative use of ICT for the pedagogical purposes of South African Mathematics and Science teachers is presented in the Figure 6.3. It shows that South African learners received more opportunities to use ICT in Science classes. Further research is needed to find the reasons for the different levels of use of ICT by Mathematics and Science teachers.

The more extended use of ICT in Science classes is not unexpected. In comparison with MTs, higher percentages of Science teachers indicated their intention to prepare learners for competent ICT uses in responses to curriculum goals in the questionnaire. SITES 2006 international report indicates large differences of twenty percent and more between pedagogical ICT use of Science and MTs in some countries (Israel, Japan and Slovenia). These may be due to national curriculum policy factors (Law & Chow, 2008). However, the overall percentage of South African teachers that use ICT remains small, in a narrow range of 6.23% to 23.61%. The South African government should implement strategies as indicated in the e-Education White Paper to encourage wider use of ICT. The most frequent activity for Science and MTs is to search for information. Even then, less than a quarter of teachers' use

ICT (20.52% of Mathematics and 23.61% Science teachers) for information searches. This corresponds well to national statistics that only 22.59% of schools had computers available for teaching and learning in 2005 (South Africa, 2004).

The instructive mode of teaching and learning remains a popular pedagogical practice for Mathematics (36.59%) and Science teachers (32%). A substantial number (35.1%) of Science teachers admit that they have never used their scheduled time for laboratory experiments. This may be due to insufficient laboratory resources or to Science teachers being under-skilled in laboratory practices. The responses to the teacher questionnaire partly sheds light on this issue. Three out of four South African Science teachers (77.12%) do not have a basic degree in Science. In a reply to a parliamentary question by the Democratic Alliance on the 3rd of May 2010, Government revealed that more than 1 700 South African Science teachers are not qualified to teach the subject at all. This indicates that at least 50 000 learners do not receive appropriate Science education. This may have contributed towards the poor 2009 South African matriculation examination results where 60% of learners who wrote the Physical Science examination received a mark of less than 40% (Michael, 2010).

The use of ICT for educational purposes is a matter of a well balanced deployment of four building blocks: (i) vision on education, (ii) knowledge and skills, (iii) educational software and content, and (iv) ICT infrastructure (Kennis.Net, 2006). The DBE acknowledges the low use of ICT for teaching and learning. Of the 25 145 schools, 5 761 have no access to Eskom or Municipal power and 2 891 have no water source. In addition, 15 428 schools have no arrangement for sewerage disposal, 8 035 suffer from vandalism and 10 308 have no fences around the schools or are in a poor condition. Furthermore, 5 996 schools have no burglar bars on any of their buildings, and 20 143 schools do not have alarm systems. More than 13 561 schools have no access to landline telephones (South Africa, 2004). Nationally, only 5 778 (22.59%) schools have computers for teaching and learning. In school contexts where learners' basic constitutional rights, such as access to a clean water supply, electricity, sewerage disposal, and security are not satisfactory fulfilled (South Africa, 1996a), many schools do not prioritize ICT.

From the November 2006 medium term budget policy statements (South Africa, 1998), the South African government regarded the National ICT Program as important and positioned it seventh in terms of its national priorities. At this time, the DoE described ICT policy issues in the following terms: (i) ICT is central to improving the competitiveness of South Africa, growing the economy, creating jobs and supporting social development; (ii) ICT learners will be able to participate in the knowledge society before they leave school and be better equipped for workplace and higher education; and (iii) Funding will be used for conducting a feasibility study and researching ICT (Blignaut, 2008). However, since 2009, ICT in education is no longer an educational priority for the Government of South Africa, despite the existence of the White Paper on e-Education (South Africa, 2004). The DBE seems to be focussed more on solving social problems in schools than meeting the academic needs of the learners. Of the nineteen major strides the DoE claims to have made in 2008 academic year, the first five concern learner pregnancy, sexual harassments and violence in schools, building a South African national identity, football and the Soccer World Cup, and social mobilisation campaigns (Hindle, 2008). The DoE's human resources development strategy in ICT is limited in its statements to improve technological and innovation capacity and outcomes within the public and private sector to enhance South Africa's competitiveness in the global economy and to meet South Africa's human development priorities. Table 6.3 provides an *Ecological Activity Systems Analysis* of learning opportunities.

Table 6.3: Ecological Activity Systems Analysis of Learning Opportunities

			ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? *Intra-personal* dialogues and reflections on planning to use of scheduled time for learners to use ICT, search for information on the Internet, and process and analyse data	i. 13.74% of NSTs and 7.21% of MTs use scheduled time to learn to use ICT; 86.26% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations ii. 23.61% of NSTs and 20.52% of MTs use ICT for searching for information, while 76.39% of NSTs and 79.48% of MTs never use ICT for searching for information iii. 18.37% of NSTs and 15.08% of MTs use ICT for processing and analysing data, while 81.63% of NSTs and 84.92% of MTs never use it
	Object(ive)	Why is the activity taking place?	To make use of scheduled time for learners to use ICT, search information on the Internet, and process and analyse data
	Subject(s)	Who is involved in carrying out the activity?	Grade 8 NSTs and MT
	Tools	By what means are the subjects performing the activity?	Self (teacher's mind)
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Personal values, ethics and norms and attitudes
	Division of labour	Who are responsible for what, when carrying out the activity and how are those roles organised?	No division of labour (only the teacher's inner thoughts and self-reflections are involved)
	Community	What is the environ-	Teacher's mind

			ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
		ment in which this activity is carried out?	
	Outcomes	What is the desired outcome from carrying out this activity?	Effective and efficient use of ICT in teaching Natural Science and Mathematics
	Recommendations for the Education System	i. As 86.28% of NSTs and 92.79% of MTs report that learners are not effectively making use of scheduled time to learn to use ICT, for example when studying natural phenomena through simulations, this calls for an attitude change for individual teachers concerning ICT use for learners ii. 76.39% of NSTs and 79.48% of MTs never use ICT for searching for information. This also calls for the attitude change of individual teachers concerning ICT use for learners iii. 81.39% of NSTs and 84.92% of MTs never used ICT for processing and analysing data; these teachers need to identify and correct weaknesses in their ICT-related pedagogical skills	

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Activities, roles, interactions and interpersonal relations using ICT between:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? Teacher's activities, roles, interactions and *Interpersonal* relations with an individual learner, making use of scheduled time for him/her to use ICT, search information on the Internet, and process and analyse data	i. 13.74% of NSTs and 7.21% of MTs are make use of scheduled time for learn to use ICT while 86.26% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations ii. 23.61% of NSTs and 20.52% of MTs use ICT for searching for information, while 76.39% of NSTs and 79.48% of MTs never use it ICT for searching for information iii. 18.37% of NSTs and 15.08% of MTs use ICT for processing and analysing data, while 81.63% of NSTs and 84.92% of MTs never use ICT for processing and analysing data
	Object(ive)	Why is the activity taking place?	To make use of scheduled time for an individual learner to use ICT, search for information on the Internet, and process and analyse data
	Subject(s)	Who is involved in carrying out the activity?	The grade 8 NSTs and MTs and learner
	Tools	By what means are the subjects performing the activity?	ICT resources, school curriculum, technical support, school timetable
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Personal values, ethics and norms and attitudes, school rules and regulations
	Division of	Who is responsible for	The grade 8 NSTs and MTs provide interesting and

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Activities, roles, interactions and interpersonal relations using ICT between:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
	labour	what when carrying out the activity and how are these roles organised?	efficient learning opportunities to an individual learner using ICT according to the school curriculum
	Community	What is the environment in which this activity is carried out?	School computer laboratory, classroom or library
	Outcomes	What is the desired outcome from carrying out this activity?	Effective ICT-using learning opportunities for learners
	Recommendations for the education system	i. 86.28% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example when studying natural phenomena through simulations, It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not effectively make use of learners' scheduled time for learning to use ICT, and encourage and support them individually ii. 76.39% of NSTs and 79.48% of MTs never use ICT to search for information. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not using ICT to search for information, and encourage and support them individually iii. 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not use ICT for processing and analysing data, and encourage and support them individually	

			ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between the teacher and two or more of the following Microsystems:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? Teacher's activities, roles, interactions and *Intersocial* relations with two or more learners, making use of scheduled time for them to use ICT, search for information on the Internet, and process and analyse data	i. 13.74% of NSTs and 7.21% of MTs are make use of scheduled time to learn to use ICT while 86.26% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations ii. 23.61% of NSTs and 20.52% of MTs use ICT in searching for information, while 76.39% of NSTs and 79.48% of MTs never use ICT in searching for information iii. 18.37% of NSTs and 15.08% of MTs use ICT for processing and analysing data, while 81.63% of NSTs and 84.92% of MTs never use ICT for processing and analysing data
	Object(ive)	Why is the activity tak-	To make use of scheduled time for learners to use ICT,

			ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between the teacher and two or more of the following Microsystems:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
		ing place?	search for information on the Internet, and process and analyse data
	Subject(s)	Who is involved in carrying out the activity?	Grade 8 Natural Science and MTs and learners
	Tools	By what means are the subjects performing the activity?	ICT resources, school curriculum, technical support, school timetable
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Teachers' values, ethics and norms and attitudes, school rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	• Teacher to provide interesting and efficient learning opportunities according to curriculum guidelines • SP to provide sufficient resources and pedagogical freedom to teachers • TC to provide sustained support
	Community	What is the environment in which this activity is carried out?	School computer laboratory, classroom and library
	Outcomes	What is the desired outcome from carrying out this activity?	Effective ICT-using learning opportunities for learners
	Recommendations for the education system	i. 86.28% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations, it is recommended that either the SP or the TC (with the support of the SP) identify a group of teachers in their school who do not make use of scheduled time for learning to use ICT, and encourage and support them ii. 76.39% of NSTs and 79.48% of MTs never use ICT to searching for information. It is recommended that either the SP or the TC (with the support of the SP) identify a group of teachers in their school who never use ICT for searching information, and encourage and support them ii. 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. It is recommended that either the SP or the TC (with the support of the SP) encourage and support groups of teachers in their school who do not use ICT for processing and analysing data	

			ECOLOGICAL SYSTEM ***Exosystem (Intrasocial)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the subject interested in? *Intra-social* dialogues, reflections, decisions and actions of SGBs and the NDoE to organise TPD courses. These would	i. 86.28% of NSTs and 92.79% of MTs report that learners do not effectively making use of scheduled time to learn to use ICT. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ii. 76.39% of NSTs and 79.48% of MTs never use ICT

			ECOLOGICAL SYSTEM ***Exosystem (Intrasocial)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
		develop and enable teachers to provide learners with scheduled time to use ICT, search for information on the Internet, and process and analyse data	in searching for information. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole iii. 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
	Object(ive)	Why is the activity taking place?	To encourage SGBs and the NDoE to organise TPD courses which would develop and enable teachers to provide learners with scheduled time to use ICT, in order to search for information on the Internet, and process and analyse data
	Subject(s)	Who is involved in carrying out the activity?	Members of the NDoE and SGBs
	Tools	By what means are the subjects performing the activity?	ICT hardware and software, TPDs in the pedagogical uses of ICT, TCs, technical support personnel, curriculum guidelines, funding for infrastructure
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	DoE policies, rules and regulations, school curriculum, school governing body rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	DoE and SGBs organise professional ICT development courses for teachers and provide ICT resources and infrastructure
	Community	What is the environment in which this activity is carried out?	All South African schools
	Outcomes	What is the desired outcome from carrying out this activity?	Professionally developed and empowered teachers who are competent, effective and responsible in ICT pedagogical practices in line with school curriculum guidelines
	Recommendations for the education system	i. 86.28% of NSTs and 92.79% of MTs report that learners do not effectively making use of scheduled time to learn to use ICT, for example when studying natural phenomena through simulations. It is recommended that the DoE and the SGB identify teachers who do not use scheduled time for learning to use ICT, and encourage and support them to complete ICT TPD courses ii. 76.39% of NSTs and 79.48% of MTs never use ICT in searching for information It is recommended that the DoE and the SGB identify teachers who never use ICT in searching for information and encourage and support them to complete ICT TPD courses iii. 81.39% of NSTs and 84.92% of MTs never uses ICT for processing and analysing data. It is recommended that the DoE and the SGB identify teachers who do not use ICT for processing and analysing data, and encourage and support them to complete ICT TPD courses	

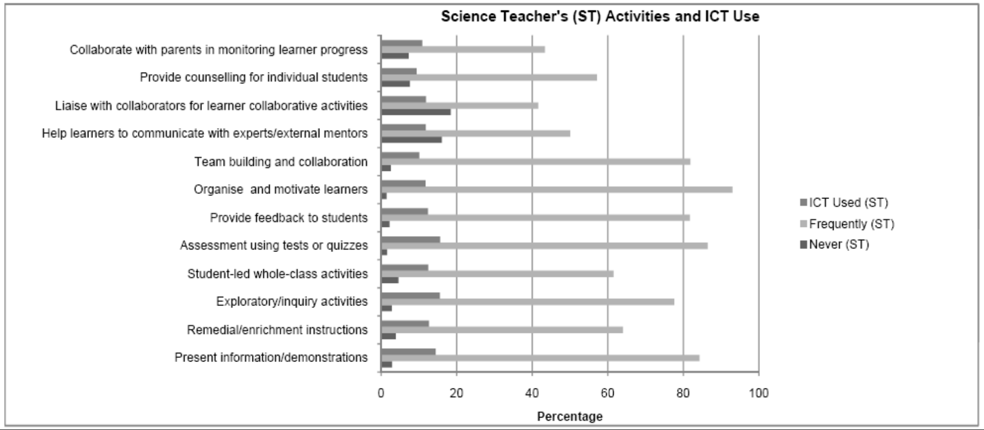
			ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the subject(s) interested in? *Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and enable teachers to provide learners with scheduled time to use ICT, search for information on the Internet, and process and analyse data.	i. 86.28% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ii. 76.39% of NSTs and 79.48% of MTs never use ICT in searching for information. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole iii. 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
	Object(ive)	Why is the activity taking place?	Improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and enable teachers to provide learners with scheduled time to use ICT, search for information on the Internet, and process and analyse data
	Subject(s)	Who is involved in carrying out the activity?	Policy Makers (e.g. members of parliament)
	Tools	By what means are the subjects performing the activity?	Policy and implementation protocol
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	The constitution of the Republic of South Africa, DoE policies, rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	Policy makers (e.g. members of parliament) adopt, amend or repeal policies
	Community	What is the environment in which this activity is carried out?	National parliament of the Republic of South Africa
	Outcomes	What is the desired outcome from carrying out this activity?	Effective educational policies and curriculum guidelines which ensure sufficient numbers of teachers competent and effective in ICT pedagogical practices in accordance with South African schools' requirements
	Recommendations for the Education System	▪ 86.28% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations. These percentages call for clearer curriculum guidelines and a more effective implementation of educational policies concerning competent ICT use in the school system ▪ 76.39% of NSTs and 79.48% of MTs never use ICT in searching information. These percentages call for clearer curriculum guidelines and a more effective	

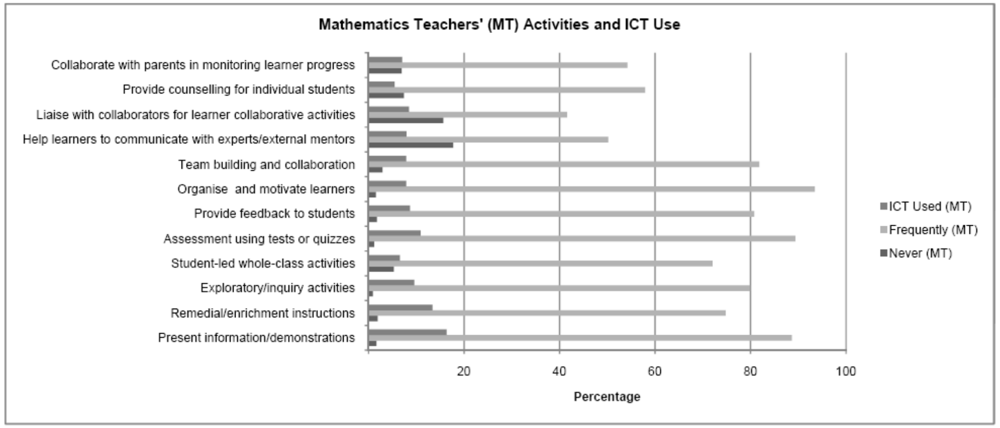
		implementation of educational policies concerning competent ICT use in the school system ▪ 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. These percentages call for clearer curriculum guidelines and a more effective implementation of educational policies concerning competent ICT use in the school system

6.2.2.1 Summary of Findings on Learners' Opportunities for Learning

Responses to the SITES 2006 South African survey questionnaire on learners' opportunities for learning indicate:

- The percentage of Mathematics and Science teachers using ICT is small (between 6.23% to 23.61%—depending on different activities)
- Compared to MTs, Science teachers use more ICT in their pedagogical practices in almost all teaching activities
- SITES 2006 found South Africa to be the country with the lowest teacher ICT use amongst the 22 education systems which participated (Law & Chow, 2008)
- In South African classrooms, the pedagogical potential of ICT remains largely untapped
- Empowering teachers to use ICT for teaching and learning could significantly help the DBE to realise its vision (South Africa, 2004) to improve the quality of the teaching and learning it currently provides
- The DBE should investigate the situation of large numbers of Science teachers (35.10%) who admit that they *never use* the scheduled time for learners' Science laboratory practices in spite of each learner's Constitutional right to equal education, and the objectives of the White Paper on e-Education. The DBE values maintaining high standards of performance and professionalism by aiming for excellence in everything they do, including being fair, ethical, and trustworthy in all matters (South Africa, 2004)
- More than 75% of South African Science teachers do not have a basic degree in Science.





In your teaching of the target class in this school year: (a) How often do you conduct the following? (b) Do you use ICT in these activities?	**Science teachers (ST)**			**MTs (MT)**		
	Never %	Frequently %	ICT Used %	Never %	Frequently %	ICT Used %
Collaborate with parents in monitoring learner progress	7.27	43.36	10.90	6.92	54.19	7.03
Provide counselling for individual students	7.62	57.10	9.40	7.38	57.92	5.45
Liaise with collaborators for learner collaborative activities	18.45	41.54	11.84	15.66	41.56	8.48
Help learners to communicate with experts/external mentors	16.05	50.05	11.80	17.72	50.17	7.96
Team building and collaboration	2.52	81.79	10.09	2.88	81.80	7.89
Organise and motivate learners	1.44	92.94	11.72	1.52	93.47	7.90
Provide feedback to students	2.22	81.70	12.39	1.74	80.74	8.70
Assessment using tests or quizzes	1.58	86.40	15.59	1.13	89.38	10.87
Student-led whole-class activities	4.63	61.51	12.47	5.29	72.03	6.57
Exploratory/inquiry activities	2.83	77.56	15.58	0.88	79.91	9.57
Remedial/enrichment instructions	3.88	63.97	12.66	1.93	74.76	13.37
Present information/demonstrations	2.88	84.29	14.41	1.62	88.61	16.35

Figure 6.4: Mathematics and Science teachers' pedagogical practices and their ICT use

6.2.3 Teacher Practices and Use of ICT

Teacher practices and use of ICT (Figure 6.4) is the third theme from the teacher questionnaire (Addendum 5.1) indicating ICT practices. The World Bank's *Science, Mathematics, and ICT in Secondary Education (SMICT) Programme* conducted thematic studies in ten Sub-Saharan countries: Botswana, Burkina Faso, Ghana, Namibia, Nigeria, Senegal, South Africa, Uganda, Tanzania and Zimbabwe (Ottevanger, Akker, & Feiter, 2007). This study revealed the following main challenges for SMICT education in Sub-Saharan Africa: (i) poorly resourced schools; (ii) large classes; (iii) irrelevant curriculum; (iv) insufficient qualified teachers, and (v) inadequate teacher education programmes. The SMICT report found that many teachers seem qualified on record, however, in practice they demonstrated limited understanding of SMICT subjects (Ottevanger *et al.*, 2007). Some of these findings matched the SITES 2006 findings.

The SITES 2006 determined the use of ICT in the pedagogical practices of Mathematics and Science teachers by asking: *In your teaching of the target class in this school year: (a) How often do you conduct the following; (b) Do you use ICT for these activities?* The twelve pedagogical practices (Figure 5.4) were broadly categorised into (i) traditionally important orientations and (ii) 21st century orientations (Law & Chow, 2008). The former refers to teacher centred pedagogical practices where all learners carry out the same activities at the same time. The latter refers to learner-initiated and learner-sustained activities involving the uses of appropriate digital technology where teachers provide guidance and support whenever and wherever needed. The SITES 2006 questionnaire (BTG14A-L) required grade 8 Mathematics and Science teachers to indicate their frequency of specific pedagogical practices on a four-point Likert type scale (*never, sometimes, often, nearly* and *always*) and their ICT use on those pedagogical practices on a two-point scale (*no* and *yes*). To narrow down the data ranges, the researcher omitted the responses *sometimes*, and grouped *often and always* together and replaced it with a single term *frequently* for a combined analysis, as conceptually *often* and *always* do not differ much. Similarly the option *no* to responses to whether ICT was used in those pedagogical practices is also omitted. The adapted results are presented in Figure 6.4.

Responses to the twelve variables revealed the three most important Mathematics and Science teachers' roles. These roles are related to the traditionally important orientation: (i) *classroom management,* (ii) *present information or demonstration or give class instruction, and* (iii) *assess learners' learning.* The teacher practices with lowest frequencies of occurrences were *to organise or mediate communication with experts/external mentors* and *to* *liaise with collaborators* (Law & Chow, 2008). SITES 2006 revealed that educational systems with highest reported technical ICT-competence do not coincide with those with the highest reported pedagogical ICT-competence. Grade 8 Mathematics and Science teachers were generally more confident about using ICT in everyday situations than in teaching and learning situations (Law *et al.*, 2008b).

The majority of Science teachers (85.59%) do not use ICT for *presenting lessons or demonstrations*. Similarly, 87.34% of Science teachers do not use ICT *for remedial or enrichment opportunities*. The corresponding scores for MTs are 83.65% and 86.63% respectively. It is interesting to note that these are the only two pedagogical practices where the Science teachers score less in comparison with MTs. The literature review indicates that these two ICT pedagogical practices are the ones which are more frequently used by teachers where there is a higher level of ICT use in classrooms (Cox et al., 2003).

ICT is used to support cooperation among learners within and beyond school and a more interactive relationship between students and teachers. It can support team-based project work. In addition, ICT can support cooperative and collaborative learning, and is used to support more individualised learning programmes, tailored to individual needs. ICT is used to provide motivating and challenging learning experiences that encourage learners to be more engaged with their learning (Newhouse & Clarkson, 2008). Grade 8 Mathematics and Science teachers in South Africa do not use ICT to its full potential in their classrooms. Only 8.48% of MTs and 11.84% of Science teachers indicate that they use ICT for learning activities involving learner collaboration. Similarly, only 5.45% of MTs and 9.40% of Science teachers indicate that they use ICT to provide counselling for individual learners. Again, just 9.46% of MTs and 11.80% of Science teachers use ICT to help learners to communicate with experts or external mentors. Assessment using tests or quizzes is easy if appropriate software is available. However, only 10.87% of MTs and 15.59% of Science teachers make use of this capability of ICT.

An alternative pedagogical tool for South African teachers could be learners' e-portfolios. E-portfolios represent a learner's individual background and should reflect that learner's knowledge and skills (Shelly, Gunter, & Gunter, 2010). It has the advantage of being able to store large volumes of different kinds of information, easy access, portability, and suitability to a constructivist learning environment (Kok & Blignaut, 2010). However, the socio-economic realities of South Africa may act as strong barrier in making learners' e-portfolios a country-wide reality. Table 6.4 provides an *Ecological Activity Systems Analysis* of teachers' pedagogical practices using ICT.

Table 6.4: Ecological Activity Systems Analysis of Teachers' Pedagogical Practices Using ICT

			ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? *Intra-personal* dialogues and reflections on planning to use ICT to organise and/or mediate communication between learners and mentors, to provide enrichment/ remedial instructions, and to demonstrate or present information	i. 11.80% of NSTs and 7.96% of MTs use ICT to organise and/or mediate communication between learners and experts/external mentors while 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between learners and experts/external mentors ii. 12.66% of NSTs and 13.37% of MTs use ICT to provide enrichment/remedial instructions while 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions iii. 14.41% of NSTs and 16.35% of MTs use ICT for demonstrations/presenting information while 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information
	Object(ive)	Why is the activity taking place?	To make use of ICT to organise and/or mediate communication between learners and mentors; to provide enrichment or remedial instructions; and to demonstrate or present information
	Subject(s)	Who is involved in carrying out the activity?	The grade 8 NSTs and MTs
	Tools	By what means are the subjects performing the activity?	Self (teacher's mind)
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Personal values, ethics and norms and attitudes
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	No division of labour (only the teacher's inner thoughts and self-reflections are involved)
	Community	What is the environment in which this activity is carried out?	Teacher's mind
	Outcomes	What is the desired outcome from carrying out this activity?	Effective ICT pedagogical practices
	Recommendations to the education system	i. 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentors. This calls for an attitude change in individual teachers concerning ICT use for learners ii. 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. This also calls for an attitude change in individual teachers concerning ICT use for learners iii. 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. This calls for an attitude change in individual teachers concerning ICT use for learners. These teachers need to take serious effort to effectively use ICT for teaching and learning	

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Activities, roles, interactions and interpersonal relations (with or without ICT) between:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? Teacher's activities, roles, interactions and *Interpersonal* relations with an individual learner, making use of ICT to organise and/or mediate communication between the learner and mentors, to provide enrichment/remedial instructions, and to demonstrate or present information	i. 11.80% of NSTs and 7.96% of MTs use ICT to organise and/or mediate communication between learners and experts/external mentors while 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between learners and experts/external mentors ii. 12.66% of NSTs and 13.37% of MTs use ICT to provide enrichment/remedial instructions while 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions iii. 14.41% of NSTs and 16.35% of MTs use ICT for demonstrations/presenting information while 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information
	Object(ive)	Why is the activity taking place?	To make use of ICT to organise or mediate communication between the individual learner and mentors; to provide enrichment/ remedial instructions; and to demonstrate or present information
	Subject(s)	Who is involved in carrying out the activity?	The grade 8 NSTs and MTs, and learner
	Tools	By what means are the subjects performing the activity?	ICT resources, school curriculum, technical support, school timetable
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Personal values, ethics, norms and attitudes, school rules and regulations, Netiquette
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	The grade 8 NSTs and MTs provides interesting and efficient learning opportunities to an individual learner using ICT according to the school curriculum
	Community	What is the environment in which this activity is carried out?	School computer laboratory, classroom or library
	Outcomes	What is the desired outcome from carrying out this activity?	Effective ICT pedagogical practices
	Recommendations to the education system	i. 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentors. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ii. 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the	

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Activities, roles, interactions and interpersonal relations (with or without ICT) between:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
		school curriculum, and encourage and support them individually iii. 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually	

			ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between die teacher and two or more of the following Microsystems:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? Teacher's activities, roles, interactions and *Inter-social* relations with two or more learners, making use of ICT to organise and/or mediate communication between them and mentors, to provide enrichment/ remedial instructions, and to demonstrate or present information	i. 11.80% of NSTs and 7.96% of MTs use ICT to organise and/or mediate communication between learners and experts/external mentors while 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between learners and experts/external mentors ii. 12.66% of NSTs and 13.37% of MTs use ICT to provide enrichment/remedial instructions while 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions iii. 14.41% of NSTs and 16.35% of MTs use ICT for demonstrations/presenting information while 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information
	Object(ive)	Why is the activity taking place?	To make use of ICT to organise and mediate communication between learners and mentors; to provide enrichment/ remedial instructions; and to demonstrate or present information
	Subject(s)	Who is involved in carrying out the activity?	Grade 8 Natural Science and MTs and learners
	Tools	By what means are the subjects performing the activity?	ICT resources, school curriculum, technical support, school timetable
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Personal values, ethics and norms and attitudes, school rules and regulations, Netiquette
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	▪ Teacher to provide interesting and efficient learning opportunities according to curriculum guidelines ▪ SP to provide sufficient resources and pedagogical freedom to teachers ▪ Technical coordinator to provide sustained support
	Community	What is the environ-	School computer laboratory, classroom and library

			ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between die teacher and two or more of the following Microsystems:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
		ment in which this activity is carried out?	
	Outcomes	What is the desired outcome from carrying out this activity?	Effective ICT pedagogical practices
	Recommendations to the education system	▪ 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentors. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who do not use ICT to organise and mediate communication between the learners and experts or external mentors in their school ▪ 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who never use ICT to provide enrichment/remedial instructions in their school ▪ 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who never use ICT for demonstrations/presenting information in their school	

			ECOLOGICAL SYSTEM ***Exosystem (Intrasocial)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the subject interested in? *Intra-social* dialogues, reflections, decisions and actions of SGBs and the NDoE to organise TPD courses. These would develop and empower teachers to make use of ICT to organise and/or mediate communication between learners and mentors; to provide enrichment or remedial instructions; and to demonstrate or present information	i. 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentors. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ii. 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole iii. 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
	Object(ive)	Why is the activity taking place?	SGBs and the NDoE organise TPD courses to develop and empower teachers to make use of ICT to organise or mediate communication between learners and mentors; to provide enrichment/ remedial instructions; and to demonstrate or present information

	Subject(s)	Who is involved in carrying out the activity?	Members of the National and Provincial Departments of Education and SGBs
	Tools	By what means are the subjects performing the activity?	ICT hardware and software, TPDs in pedagogical uses of ICT, TCs, technical support personnel, curriculum guidelines, funding for infrastructure
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	DoE policies, rules and regulations, school curriculum, school rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	The DoE and SGBs organise teacher professional ICT development courses and provide ICT resources and infrastructure
	Community	What is the environment in which this activity is carried out?	All South African schools
	Outcomes	What is the desired outcome from carrying out this activity?	Professionally developed and empowered teachers who are competent, effective and responsible in ICT pedagogical practices in line with school curriculum guidelines
	Recommendations to the education system	i. 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and mediate communication between learners and experts/external mentors. It is recommended that the DoE and the SGB identify teachers who never use ICT to organise and/or mediate communication between learners and experts or external mentors, and encourage support them to complete ICT TPD courses ii. 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. It is recommended that the DoE and the SGB identify teachers who never use ICT to provide enrichment/remedial instructions, and encourage and support them to complete ICT TPD courses iii. 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. It is recommended that the DoE and the SGB identify teachers who have never used ICT for demonstrations/presenting information, and encourage and support them to complete ICT TPD courses	

			ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
ACTIVITY SYSTEM	**Activity**	What sort of activity are the subjects interested in? *Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses to develop and empower teachers to make use of ICT to organise and/or mediate communication between	i. 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between learners and experts/external mentors. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ii. 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole iii. 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information These

			ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
		learners and mentors; to provide enrichment/ remedial instructions; and to demonstrate or present information	percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
	Object(ive)	Why is the activity taking place?	Improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and empower teachers to make use of ICT to organise and/or mediate communication between learners and mentors; provide enrichment/remedial instructions; and demonstrate or present information
	Subject(s)	Who is involved in carrying out the activity?	Policy makers (e.g. members of parliament)
	Tools	By what means are the subjects performing the activity?	Policy and implementation protocol
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	The constitution of the Republic of South Africa, DoE policies, SGB rules and regulations, school curriculum, school rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	Policy makers (e.g. members of parliament) adopt, amend or repeal policies
	Community	What is the environment in which this activity is carried out?	Parliament of the Republic of South Africa
	Outcomes	What is the desired outcome from carrying out this activity?	Effective educational policies and curriculum guidelines which ensure sufficient numbers of teachers competent and effective in ICT pedagogical practices in accordance with South African schools' requirements
	Recommendations to the eduction system	▪ 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentor. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system	

6.2.3.1 Summary of Teacher Activity and Use of ICT Findings

Responses to the SITES 2006 questionnaire on teacher activity and the use of ICT indicate:

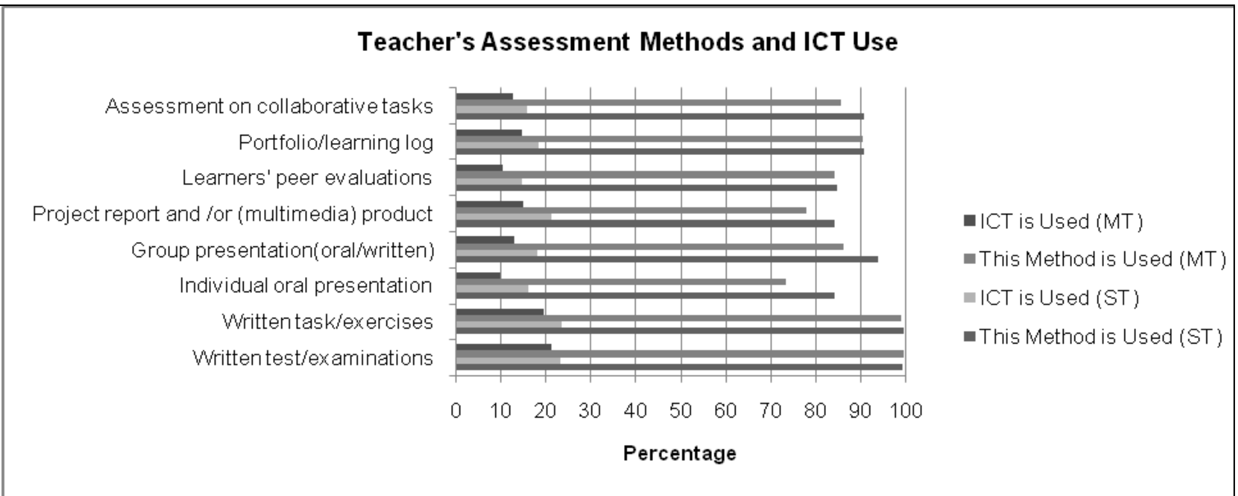
- South African Mathematics and Science teachers prefer pedagogical practices which are *traditionally oriented*, such as teachers giving instructions and learners responding to quizzes and tests
- Only a small percentage of Mathematics and Science teachers (5.45%-16.35% depending on the pedagogical practices) make use of ICT. The World Bank study (SMICT) also notes that the focus of ICT as a means to enhance the quality of education in Sub-Saharan Africa is often very vague, except in a few isolated cases (Ottevanger *et al.*, 2007)
- Grade 8 Mathematics and Science teachers in South Africa and the Russian Federation reported the lowest levels of competence in both general and pedagogical ICT-use (Law *et al.*, 2008b)
- Assessment using quizzes or tests is easy with appropriate software. Yet a vast majority of teachers are not utilising this means. Teachers may not have the appropriate software or the confidence to use it
- Providing remedial and enrichment activities and presenting information are two of the most widely practiced pedagogical routines in the class rooms where ICT is more frequently used. Grade 8 Mathematics and Science teachers do not make full use of these pedagogical practices.

6.2.4 Teacher Assessment Practices and Use of ICT

Assessment and use of ICT is the fourth theme from the teacher questionnaire concerning teacher practices. Assessment such as formal tests and examinations remain the major driving force for most teaching and learning activities in classrooms (O'Donoghue & Clarke, 2010). Much time and effort goes into the classroom and home preparation of learners for formal assessments. Black and William (1998), and Earl (2005) point out the need for a balance between *assessment of learning* and *assessment for learning.* In the life-long learning era, as with *apprenticeship*, summative and formative assessments begin to converge (Collins & Halverson, 2009). This is particularly true in computer-based learning environments. Here, assessment occurs as the learner progresses through learning tasks. Learning is ongoing and tightly coupled with assessment. When the learner needs help, the computer may provide hints or suggestions as to how to proceed. When the learner makes a mistake, the computer might point out the error or guide them towards the correct answer. Assessment is embedded into the learning process. Appropriate computer-based assessment could help learners succeed at their own chosen level (Collins & Halverson, 2009).

The assessment of learners is important. It is used for monitoring the learners' progress, informing parents, curriculum evaluation, research and legal requirements (Wheeler & John, 2008). Traditional assessment tools such as multiple choice tests are not necessarily easier to create than ICT-created tools. ICT is also helpful in 21st century assessment practices involving learners' *product creation, reflection or collaboration*. ICT can be used for assessing specific skills or competencies in simple and complicated procedures (e.g. typing skills, spelling, numerical calculations and simulated training). The online resources could provide each learner with an individual learning plan and offer teachers clear indicators of each child's learning gains within each specific core-curriculum subject (Wheeler & John, 2008).

The following section discusses the South African results of SITES 2006 on the teachers' assessment practices and the use of ICT in those practices. The survey questions were grouped into three categories; *traditionally important* (written tests or examinations and written task and exercises), *learning products* (individual oral presentations, group presentations, project reports or multimedia products), and *reflection or collaboration* (learners' peer evaluations, portfolio or learning log, and assessment of group performance on collaborative tasks). SITES 2006 presented a list of eight assessment methods (Figure 6.5) to grade 8 Mathematics and Science teachers. The list asked whether they had used any of the methods (yes or no) in their teaching of the target class during the year and whether they had used ICT (yes or no) to carry out these assessments (Law & Chow, 2008). Figure 6.5 indicates only two choices each, for MTs and Science teachers. The frequency percentages for *no* choices are not presented.



In your teaching of the target class in this school year: (a) *Do you use the following methods of assessing student performance?* (b) *Do you use ICT to carry out these assessments?*	**Science teachers (ST)**		**MTs (MT)**	
	This method is used %	ICT is used %	This method is used %	ICT is used %
Assessment on collaborative tasks	90.66	15.62	85.55	12.55
Portfolio/learning log	90.68	18.36	90.42	14.55
Learners' peer evaluations	84.51	14.45	84.11	10.35
Project report or (multimedia) product or both	84.17	21.08	77.78	14.92
Group presentation(oral/written)	93.69	18.01	86	12.92
Individual oral presentation	84.04	15.86	73.17	9.76
Written task/exercises	99.34	23.42	98.95	19.24
Written test/examinations	99.17	23.15	99.33	21.18

Figure 6.5: Mathematics and Science teachers' use of ICT in assessment activities

An analysis of the SITES 2006 responses of the teacher assessment questionnaire reveals that almost all teachers in all educational systems surveyed prefer traditional assessment practices. In addition, Mathematics and Science teachers within the same system showed greater similarity in their assessment practices than did teachers of the same subject across different systems. This may be attributed to the common curriculum guidelines for the assessment of Mathematics and Science in each of the educational systems that participated in the SITES 2006. Furthermore, compared to MTs, Science teachers across all systems made more use of the assessment methods based on *learning products* and *reflection or collaboration*. As illustrated by Figure 6.5, South African grade 8 teachers (99.33% of Mathematics and 99.17% of Science teachers) use written tests or examinations as their preferred assessment method. In addition, Mathematics (98.95%) and Science (99.34%) teachers use written tasks or exercises as another favourite method of assessment. It is encouraging to note that more than 80% of South African Mathematics and Science teachers use 21st century pedagogic assessment practices such as group presentations, multimedia projects, e-portfolios and group performance on collaborative tasks for assessment (Law & Chow, 2008). Table 6.5 provides an *Ecological Activity Systems Analysis* of teachers' assessment activities using ICT.

Table 6.5: Ecological Activity Systems Analysis of Teachers' Assessment Activities Using ICT

<table>
<tr><th colspan="3"></th><th>ECOLOGICAL SYSTEM</th></tr>
<tr><th colspan="3"></th><th>Self (Intrapersonal)
Dialogues and Reflections</th></tr>
<tr><td rowspan="9">ACTIVITY SYSTEM</td><td>Activity</td><td>What sort of activity is the teacher interested in?

Intra-personal dialogues and reflections on planning to make use of ICT to assess learners' project reports and/or multimedia projects, and to assess learners' written work or exercises</td><td>i. 21.08% of NSTs and 14.92% of MTs made use of ICT to assess learners' project reports and/or multimedia products while 78.92% of NSTs and 85.08% of MTs did not make use of ICT to assess learners' project reports and/or multimedia products
ii. 23.15% of NSTs and 21.185 of MTs made use of ICT to assess learners' written work or exercises while 76.58% of NSTs and 80.76% of MTs did not make use of ICT to assess learners' written work or exercises</td></tr>
<tr><td>Object(ive)</td><td>Why is the activity taking place?</td><td>To make use of ICT to assess learners' project reports and/or multimedia projects, and for the assessment of learners' written work or exercises</td></tr>
<tr><td>Subject(s)</td><td>Who is involved in carrying out the activity?</td><td>The grade 8 NSTs and MTs</td></tr>
<tr><td>Tools</td><td>By what means are the subjects performing the activity?</td><td>Self (teacher's mind)</td></tr>
<tr><td>Rules and Regulations</td><td>Are there any cultural norms, rules or regulations governing the performance of the activity?</td><td>Personal values, ethics and norms and attitudes</td></tr>
<tr><td>Division of labour</td><td>Who is responsible for what when carrying out the activity and how are these roles organised?</td><td>No division of labour (only the teacher's inner thoughts and self-reflections are involved)</td></tr>
<tr><td>Community</td><td>What is the environment in which this activity is carried out?</td><td>Teacher's mind</td></tr>
<tr><td>Outcomes</td><td>What is the desired outcome from carrying out this activity?</td><td>Effective assessment of learners' projects and multimedia products using ICT</td></tr>
<tr><td>Recommendations to the education system</td><td colspan="2">i. 78.92% of NSTs and 85.08% of MTs do not make use of ICT to assess learners' project reports and/or multimedia product, this calls for an attitude change for individual teachers concerning ICT use for learners
ii. 76.58%NSTs and 80.76% of MTs do not make use of ICT for assessing learners written work or exercises, this also calls for an attitude change for individual teachers concerning ICT use for learners</td></tr>
</table>

<table>
<tr><td colspan="3"></td><td>ECOLOGICAL SYSTEM</td></tr>
<tr><td colspan="3"></td><td>Microsystem (Interpersonal & Bi-directional)
Activities, roles, interactions and interpersonal relations (with or without ICT) between:
Teacher and Learner
Teacher and Principal
Teacher and Teacher
Teacher and TC
Teacher and Parent</td></tr>
<tr><td rowspan="9">ACTIVITY SYSTEM</td><td>Activity</td><td>What sort of activity is the teacher interested in?

Teacher’s activities, roles, interactions and Interpersonal relations with an individual learner, making use of ICT to assess his/her project report and/or multimedia project, and to assess his/her written work or exercises.</td><td>i. 21.08% of NSTs and 14.92% of MTs made use of ICT to assess learners’ project reports and/or multimedia products while 78.92% of NSTs and 85.08% of MTs did not make use of ICT to assess learners’ project reports and/or multimedia products
ii. 23.15% of NSTs and 21.18% of MTs made use of ICT to assess learners’ written work or exercises while 76.58% of NSTs and 80.76% of MTs did not make use of ICT to assess learners’ written work or exercises</td></tr>
<tr><td>Object(ive)</td><td>Why is the activity taking place?</td><td>To make use of ICT to assess the individual learner’s project report and/or multimedia project, and to assess the learner’s written work or exercises</td></tr>
<tr><td>Subject(s)</td><td>Who is involved in carrying out the activity?</td><td>The grade 8 NSTs and MTs and learner</td></tr>
<tr><td>Tools</td><td>By what means are the subjects performing the activity?</td><td>ICT resources, school curriculum, technical support, school timetable,</td></tr>
<tr><td>Rules and Regulations</td><td>Are there any cultural norms, rules or regulations governing the performance of the activity?</td><td>Personal values, ethics and norms and attitudes, school rules and regulations, Netiquette</td></tr>
<tr><td>Division of labour</td><td>Who is responsible for what when carrying out the activity and how are these roles organised?</td><td>The grade 8 NSTs and MTs provides interesting and efficient learning opportunities to individual learner using ICT according to the school curriculum</td></tr>
<tr><td>Community</td><td>What is the environment in which this activity is carried out?</td><td>School computer laboratory, classroom and library</td></tr>
<tr><td>Outcomes</td><td>What is the desired outcome from carrying out this activity?</td><td>Teachers’ efficient assessment of learners’ projects and multimedia products using ICT</td></tr>
<tr><td>Recommendations to the education system</td><td colspan="2">i. 78.92% of NSTs and 85.08% of MTs do not make use of ICT to assess learners’ project reports and/or multimedia products. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually
ii. 76.58% of NSTs and 80.76% of MTs do not make use of ICT to assess learners’ written work or exercises. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not take on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually</td></tr>
</table>

			ECOLOGICAL SYSTEM ***Mesosystem (Inter-social)*** *Interrelationship, roles and activities between die teacher and two or more of the following Microsystems:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? Teacher's activities, roles, interactions and *Inter-social* relations with two or more learners, making use of ICT to assess their project reports and multi-media projects, and to assess their written work or exercises	i. 21.08% of NSTs and 14.92% of MTs made use of ICT to assess learners' project reports and/or multi-media products while 78.92% of NSTs and 85.08% of MTs did not make use of ICT to assess learners' project reports and/or multimedia products ii. 23.15% of NSTs and 21.18% of MTs made use of ICT to assess learners' written work or exercises while 76.58% of NSTs and 80.76% of MTs did not make use of ICT to assess learners' written work or exercises
	Object(ive)	Why is the activity taking place?	To make use of ICT to assess learners' project reports and/or multimedia projects and to assess their written work or exercises
	Subject(s)	Who is involved in carrying out the activity?	Grade 8 NSTs and MTs and learners
	Tools	By what means are the subjects performing the activity?	ICT resources, school curriculum, technical support, school timetable
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Teachers' values, ethics and norms and attitudes, school rules and regulations, Netiquette
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	▪ Teacher to provide interesting and efficient learning opportunities according to curriculum guidelines ▪ SP to provide sufficient resources and pedagogical freedom to teachers ▪ Technical Coordinator to provide sustained support
	Community	What is the environment in which this activity is carried out?	Teachers, learners, parents, heads of departments, principal, TCs
	Outcomes	What is the desired outcome from carrying out this activity?	School computer laboratory, classroom and library
	Recommendations to the education system	i. 78.92% of NSTs and 85.08% of MTs did not make use of ICT to assess learners' project reports and/or multimedia products. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who not make use of ICT to assess learners' project reports and/or multimedia products in their school ii. 76.58% of NSTs and 80.76% of MTs did not make use of ICT for to assess learners' written work or exercises. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who did not make use of ICT to assess learners written work or exercises in their school	

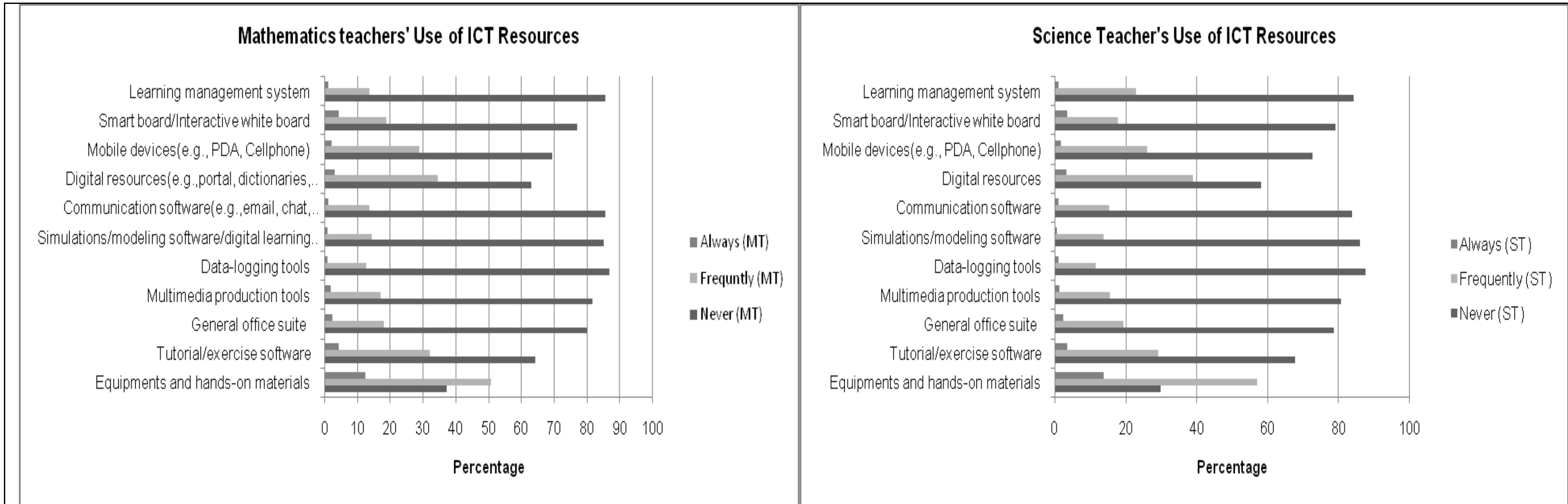
			ECOLOGICAL SYSTEM ***Exosystem (Intra-social)*** *Dialogue, reflections, decisions and actions between different systems / settings that affect the teacher without being an active participant*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the subject interested in? *Intra-social* dialogues, reflections, decisions and actions of SGBs and the NDoE to organise TPD courses. These would develop and empower teachers to make use of ICT to assess learners' project reports and multimedia projects and assess their written work or exercises	i. 78.92% of NSTs and 85.08% of MTs do not make use of ICT to assess learners' project reports and/or multimedia products. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ii. 76.58% of NSTs and 80.76% of MTs do not make use of ICT to assess learners' written work or exercises. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
	Object(ive)	Why is the activity taking place?	SGBs and the NDoE organise TPD courses to develop and empower teachers to make use of ICT for assessing learners' project reports and/or multimedia projects, and for the assessment of their written work or exercises
	Subject(s)	Who is involved in carrying out the activity?	Members of the NDoE, PDoEs and SGBs
	Tools	By what means are the subjects performing the activity?	ICT hardware and software, TPDs in the pedagogical uses of ICT, TCs, technical support personnel, curriculum guidelines, funding for hardware, software and training
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	DoE policies, rules and regulations, school curriculum, school rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	The DoE and SGBs organise teacher professional ICT development courses and provide ICT resources and infrastructure
	Community	What is the environment in which this activity is carried out?	All South African schools
	Outcomes	What is the desired outcome from carrying out this activity?	Professionally developed and empowered teachers who are competent, effective and responsible in ICT pedagogical practices in line with school curriculum guidelines
	Recommendations to the education system	i. 78.92% of NSTs and 85.08% of MTs do not use ICT to assess learners' project reports and/or multimedia products. It is recommended that the DoE and the SGB identify teachers who never use ICT to assess learners' project reports and/or multimedia products, and encourage and support them to complete ICT TPD courses ii. 76.58% of NSTs and 80.76% of MTs do not use ICT to assess learners' written work or exercises. It is recommended that the DoE and the SGB identify teachers who never use ICT to assess learners' written work or exercises, and encourage and support them to complete ICT TPD courses	

			ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
ACTIVITY SYSTEM	**Activity**	What sort of activity are the subjects interested in *Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and empower teachers to use ICT to assess learners' project reports and/or multimedia projects, and to assess their written work or exercises	i. 78.92% of NSTs and 85.08% of MTs do not use ICT to assess learners' project reports and/or multimedia products. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ii. 76.58% of NSTs and 80.76% of MTs do not make use of ICT to assess learners' written work or exercises. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
	Object(ive)	Why is the activity taking place?	Improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and empower teachers to use ICT to assess learners' project reports and multimedia projects, and to assess their written work or exercises
	Subject(s)	Who is involved in carrying out the activity?	Policy makers (e.g. members of parliament)
	Tools	By what means are the subjects performing the activity?	Policy and implementation protocol
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	The constitution of the Republic of South Africa, DoE policies, SGB rules and regulations, school curriculum, school rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are those roles organised?	Policy makers (e.g. members of parliament) adopt, amend or repeal policies
	Community	What is the environment in which this activity is carried out?	Parliament of the Republic of South Africa
	Outcomes	What is the desired outcome from carrying out this activity?	Effective educational policies and curriculum guidelines which ensure sufficient numbers of teachers competent and effective in ICT pedagogical practices in accordance with South African schools' requirements
	Recommendations to the education system	i. 78.92% of NSTs and 85.08% of MTs did not use ICT to assess learners' project reports and/or multimedia products. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system. ii. 76.58% of NSTs and 80.76% of MTs did not use ICT to assess learners' written work or exercises. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system.	

6.2.4.1 Summary of Findings on Teacher Assessment Practices and the Use of ICT

Responses to the SITES 2006 questionnaire on teacher assessment and the use of ICT indicate:

- South African Mathematics and Science and teachers mostly (99%) use traditional assessment practices in their classroom.
- Compared to their international counterparts, they make more use of *learning products* and *reflection or collaboration* in assessment.
- When South African teachers use ICT for assessment, they use it for traditional assessment activities.
- Low level use of ICT in assessment is comprehensible when the low number of computers available for teaching and learning are considered. According to *The need for e-Education Initiative in South Africa* (2005 data), only 22.59% of South African schools have computers for teaching and learning (South Africa, 2004). There is little motivation from the South African National Curriculum Statement (NCS) to use ICT for the assessment of learning. However, the choice of Mathematics and Science teachers to use *learning products* and *reflection or collaboration* in assessment may have been encouraged by the guidelines for assessment provided in the South African NCS (South Africa, 2005).
- Revisiting the South African national curriculum guidelines for assessment is required so that ICT can be naturally integrated into teaching, learning and assessment (South Africa, 2005).



How often do you incorporate the following in your teaching of the target class in this school year?	**Science teachers (ST)**			**MTs (MT)**		
	Always %	Frequently %	Never %	Always %	Frequently %	Never %
Learning management system	0.86	22.83	84.08	1.1	13.45	85.46
Smart board/Interactive white board	3.35	17.59	79.06	4.17	18.62	76.81
Mobile devices(e.g., PDA, Cell phone)	1.53	26.00	72.46	1.96	28.68	69.36
Digital resources (e.g., portal, dictionaries, encyclopaedias)	3.02	38.88	58.10	2.88	34.30	62.82
Communication software	0.94	15.25	83.81	1.10	13.50	85.40
Simulations/modelling software	0.46	13.51	86.03	0.71	14.26	85.03
Data-logging tools	1.00	11.40	87.60	0.83	12.49	86.69
Multimedia production tools	1.04	15.38	80.59	1.63	16.88	81.49
General Office Suite	2.21	19.14	78.65	2.19	18.02	79.79
Tutorial/exercise software	3.27	29.02	67.71	4.06	31.87	64.08
Equipment and hands-on material	13.51	56.91	29.58	12.23	50.70	37.08

Figure 6.6: Mathematics and Science teachers' use of ICT resources

6.2.5 ICT Resources and Tools Teachers Use

Learning resources and tools used by teachers (Figure 6.6) is the fifth theme in the teachers' questionnaire (Addendum 5.1) indicating their practices. Research studies often list learner to computer ratios as an indication of the extent of learner use of computers for learning. However, very high levels of use of ICT could result in a poorer learning experiences, even when compared to absolutely no use of ICT (Kennis.Net, 2006). The calculation of a realistic number of computers for optimal use remains elusive. Combining ICT and learning activities calls for expertise on the part of teachers.

To the question *How do teachers integrate ICT in their classes?,* Mathematics and Science teachers were required to indicate either never, sometimes, often or nearly always to their choice of eleven different learning resources or tools. Examples of learning resources and tools include: personal digital assistants, multimedia production tools, generic and subject specific software, interactive white boards and learning management systems. International analysis indicated that teachers were more likely to use conventional *equipment and hands-on material* than any of the digital tools or resources (Law & Chow, 2008). The *Microsoft Office Suite*™ was the second most frequently used (1.91 on a 4 point Likert-type scale) learning resource and *learning management systems* were used least (1.35 on a 4 point Likert-type scale). Results of the survey for South African Science teachers are presented in Figure 6.6. MTs have a frequency distribution similar to that of Science teachers'. Two teachers' response choices for questionnaire, *sometimes* and *often,* are combined and replaced with a single term *frequently*; as they are sufficiently similar in meaning (Figure 6.6).

A high percentage of Mathematics (79.79%) and Science (78.65%) teachers have never used the general Office Suite in their teaching. Only 2.19% of Mathematics and 2.21% of Science teachers responded that they made general use of the productivity tools. In contrast, 4.06% of Mathematics and 3.27% of Science teachers always use tutorial or exercise software. This implies that teachers made better use of subject specific software, than the general productivity tools that are usually more easily available to teachers.

One of the unique strengths of using computers in teaching Mathematics and Science education is the possibility of simulations and modelling. Difficult or dangerous experiments can be performed using simulations and abstract concepts in Mathematics and/or Science can be made visible and repeated as often as needed, by modelling software. However, 86.03% of Science and 85.03% of MTs are not making use of this unique ability of computers. Very few (1.1% and 0.94% respectively) Mathematics and Science teachers make use of the communication software available, such as emails, chat functions and discussion forums. As a result they also do not share such electronic resources with each other. Mathematics (35.93%) teachers make better use of tutorial or exercise software compared to their Science (32.29%) counterparts. Mathematics (36.91%) and Science (41.90%) teachers also more often use general digital resources and tools such as multimedia production tools more frequently than they use specialised digital tools such as data-logging tools (13.53% of Mathematics and 12.45% of Science teachers) and simulation/modelling/digital games (14.96% of Mathematics and 13.97% of Science teachers).

The Interactive White Board (IWB) is piece of modern pedagogical equipment that allows the output of a computer screen to be displayed on a touch-sensitive white board. The computer can save content on the whiteboard written using a special digital pen (Shelly *et al.*, 2010). Once saved, the writing can be edited and printed. IWBs on different locations can be linked over a phone-line so that the writing in one location shows up in the other locations simultaneously (Lever-Duffy & McDonald, 2008). The strength of the IWB is its support for shared cognition. It may be used for co-construction of new knowledge and collective evaluation. IWB has great potential in distance education. Grade 8 Mathematics and Science teachers make low use of IWBs. At the time of the SITES 2006, 76.81% of MTs and 79.06% of Science teachers were not making use of IWBs.

Learning Management Systems (LMS) are software instructional tools. LMS provide interactive and participatory learning. They make use of examples, observations, discussions, experiences, situations, rules, interactive games and content-based concepts for continuous learning (Shelly *et al.*, 2010) (e.g., Blackboard, WebCT, Moodle, and Drupal). A high majority of South African grade 8 teachers (85.46% of Mathematics and 84.08% of Science) do not make use of LMSs.

Mobile devices are mini-computing gadgets small enough to hold in one's hand, e.g. the iPad, Samsung Galaxy Tab and smart phones) (Shelly *et al.*, 2010). A significant number of South African grade 8 teachers (30.64% of Mathematics and 27.53% of Science), despite their level of the use of ICT, claim to be incorporating mobile devices in their teaching during the year 2006. Table 6.6 provides an *Ecological Activity Systems Analysis* of teachers' use of ICT resources.

Table 6.6: Ecological Activity Systems Analysis of Teachers' Use of ICT Resources

			ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? *Intra-personal* dialogues and reflections on planning to make use of tutorial/ exercise software, the Office Suite and simulations or modelling software in teaching	i. 32.29% of NSTs and 35.92% of MTs made use of tutorial/exercise software in their teaching while 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching ii. 21.35% of NSTs and 20.21% of MTs made use of the Office suite for teaching while 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching iii. 13.97% of NSTs and 14.97% of MTs made use of simulations or modelling software for teaching while 86.03% of NSTs and 85.03% of MTs never made use of simulations or modelling software for teaching
	Object(ive)	Why is the activity taking place?	To make use of tutorial/ exercise software, Office suite and simulations or modelling software in teaching
	Subject(s)	Who is involved in carrying out the activity?	Grade 8 NSTs and MTs
	Tools	By what means are the subjects performing the activity?	Self (teacher's mind)
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Personal values, ethics and norms and attitudes
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	No division of labour (only the teacher's inner thoughts and self-reflections are involved)
	Community	What is the environment in which this activity is carried out?	Teacher's mind
	Outcomes	What is the desired outcome from carrying out this activity?	Effective use of tutorial/exercise software in teaching of Natural Science and Mathematics lessons
	Recommendations to the education system	i. 67.71% of NSTs and 64.08% of MTs never use tutorial/exercise software in their teaching. This calls for an attitude change in individual teachers concerning ICT use for learners ii. 78.65% of NSTs and 79.79% of MTs never use the Office Suite for teaching. This also calls for an attitude change in individual teachers concerning ICT use for learners iii. 86.03% of NSTs and 85.03% of MTs never use simulations/modelling software for teaching; this calls for an attitude change in individual teachers concerning ICT use for learners	

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Activities, roles, interactions and interpersonal relations (with or without ICT) between:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and Technical Coordinator* *Teacher and Parent*
	Activity	What sort of activity is the teacher interested	i. 32.29% of NSTs and 35.92% of MTs made use of tutorial/exercise software in their teaching while

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Activities, roles, interactions and interpersonal relations (with or without ICT) between:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and Technical Coordinator* *Teacher and Parent*
		in? Teacher's activities, roles, interactions and *Inter-personal* relations with an individual learner, making use of tutorial/exercise software, the Office Suite and simulations or modelling software in teaching	67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching ii. 21.35% of NSTs and 20.21% of MTs made use of the Office Suite for teaching while 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching iii. 13.97% of NSTs and 14.97% of MTs made use of simulations/modelling software for teaching while 86.03% of NSTs and 85.03% of MTs never made use of simulations/modelling software for teaching
	Object(ive)	Why is the activity taking place?	To make use of tutorial/ exercise software, the Office Suite and simulations or modelling software in teaching
	Subject(s)	Who is involved in carrying out the activity?	The grade 8 NSTs and MTs and learner
	Tools	By what means are the subjects performing the activity?	ICT resources, school curriculum, technical support, school timetable
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Personal values, ethics and norms and attitudes, school rules and regulations, Netiquette
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	The grade 8 NSTs and MTs provide interesting and efficient learning opportunities to an individual learner using ICT according to school curriculum.
	Community	What is the environment in which this activity is carried out?	School computer laboratory, classroom and library
	Outcomes	What is the desired outcome from carrying out this activity?	Effective use of tutorial and exercise software in the teaching of NSTs and Mathematics lessons
	Recommendations to the education system	i. 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not take on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ii. 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not take on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually iii. 86.03% of NSTs and 85.03% of MTs never made use of simulations/modelling software for teaching. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not take on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually	

<table>
<tr><td></td><td></td><td></td><td>ECOLOGICAL SYSTEM</td></tr>
<tr><td></td><td></td><td></td><td>Mesosystem (Intersocial)
Interrelationship, roles and activities between die teacher and two or more of the following Microsystems:
Teacher and Learner
Teacher and Principal
Teacher and Teacher
Teacher and TC
Teacher and Parent</td></tr>
<tr><td></td><td>Activity</td><td>What sort of activity is the teacher interested in?

Teacher’s activities, roles, interactions and Inter-social relations with two or more learners, making use of tutorial or exercise software, the Office Suite and simulations or modelling software in teaching</td><td>i. 32.29% of NSTs and 35.92% of MTs made use of tutorial/exercise software in their teaching while 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching
ii. 21.35% of NSTs and 20.21% of MTs made use of the Office Suite for teaching while 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching
iii. 13.97% of NSTs and 14.97% of MTs made use of simulations/modelling software for teaching while 86.03% of NSTs and 85.03% of MTs never made use of simulations/modelling software for teaching</td></tr>
<tr><td></td><td>Object(ive)</td><td>Why is the activity taking place?</td><td>To make use of tutorial/ exercise software, the Office Suite and simulations or modelling software in teaching</td></tr>
<tr><td></td><td>Subject(s)</td><td>Who is involved in carrying out the activity?</td><td>Grade 8 Natural Science and MTs and learners</td></tr>
<tr><td></td><td>Tools</td><td>By what means are the subjects performing the activity?</td><td>ICT resources, school curriculum, technical support, school timetable</td></tr>
<tr><td></td><td>Rules and Regulations</td><td>Are there any cultural norms, rules or regulations governing the performance of the activity?</td><td>Teachers’ values, ethics and norms and attitudes, school rules and regulations, Netiquette</td></tr>
<tr><td></td><td>Division of labour</td><td>Who is responsible for what when carrying out the activity and how are these roles organised?</td><td>▪ Teacher to provide interesting and efficient learning opportunities according to curriculum guidelines
▪ SP to provide sufficient resources and pedagogical freedom to teachers
▪ TC to provide sustained support</td></tr>
<tr><td></td><td>Community</td><td>What is the environment in which this activity is carried out?</td><td>School computer laboratory, classroom and library</td></tr>
<tr><td></td><td>Outcomes</td><td>What is the desired outcome from carrying out this activity?</td><td>The effective use of tutorial/exercise software in the teaching of Natural Science and Mathematics lessons</td></tr>
<tr><td></td><td>Recommendations to the education system</td><td colspan="2">i. 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching and It is recommended that either the SP or the TC (with the support of the SP) encourage and support group of teachers (who never made use of tutorial/exercise software in their teaching) in their school
ii. 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who never made use of Office suite for teaching in their school
iii. 86.03% of NSTs and 85.03% of MTs never made use of simulations and modelling software for teaching. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who never made use of simulations/modelling software for teaching in their school</td></tr>
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<tr><td colspan="3"></td><td>ECOLOGICAL SYSTEM</td></tr>
<tr><td colspan="3"></td><td>Exosystem (Intrasocial)
Dialogue, reflections, decisions and actions between different systems / settings that affect the teacher without being an active participant</td></tr>
<tr><td rowspan="9">ACTIVITY SYSTEM</td><td>Activity</td><td>What sort of activity is the subject interested in?

Intra-social dialogues, reflections, decisions and actions of SGBs and the NDoE to organise TPD courses. These would develop and empower teachers to make use of tutorial or exercise software, the Office Suite and simulations or modelling software in teaching</td><td>i. 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
ii. 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
iii. 86.03% of NSTs and 85.03% of MTs never made use of simulations/modelling software for teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole</td></tr>
<tr><td>Object(ive)</td><td>Why is the activity taking place?</td><td>SGBs and the NDoE organise TPD courses. These would develop and empower teachers to make use of tutorial or exercise software, the Office Suite and simulations or modelling software in teaching</td></tr>
<tr><td>Subject(s)</td><td>Who is involved in carrying out the activity?</td><td>Members of the NDoE and PDoEs, and SGBs</td></tr>
<tr><td>Tools</td><td>By what means are the subjects performing the activity?</td><td>ICT hardware and software, TPDs in pedagogical uses of ICT, TCs, curriculum guidelines, funding for hardware, software and training</td></tr>
<tr><td>Rules and Regulations</td><td>Are there any cultural norms, rules or regulations governing the performance of the activity?</td><td>DoE policies, rules and regulations, school curriculum, school rules and regulations</td></tr>
<tr><td>Division of labour</td><td>Who is responsible for what when carrying out the activity and how are these roles organised?</td><td>DoE and SGBs organise ICT TPD courses and provide ICT resources and infrastructure</td></tr>
<tr><td>Community</td><td>What is the environment in which this activity is carried out?</td><td>All South African schools</td></tr>
<tr><td>Outcomes</td><td>What is the desired outcome from carrying out this activity?</td><td>Professionally developed and empowered teachers who are competent, effective and responsible in ICT pedagogical practices in line with school curriculum guidelines</td></tr>
<tr><td>Recommendations to the education system</td><td colspan="2">i. 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching. It is recommended that the DoE and the SGB identify teachers who never used ICT for tutorial/exercise software in their teaching, and encourage and support them to complete ICT TPD courses
i. 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. It is recommended that the DoE and the SGB identify teachers who never use the Office Suite for teaching, and encourage and support them to complete ICT TPD courses
i. 86.03% of NSTs and 85.03% of MTs never use simulations/modelling software for teaching. It is recommended that the DoE and the SGB identify teachers who never use simulations/modelling software for teaching, and encourage and support them to complete ICT TPD courses</td></tr>
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Macrosystem (Trans-social)
Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)</th></tr>
<tr><td rowspan="9">ACTIVITY SYSTEM</td><td>Activity</td><td>What sort of activity is the subject interested in?

Trans-social improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and empower teachers to make use of tutorial/ exercise software, the Office Suite and simulations or modelling software in teaching</td><td>i. 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
ii. 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
iii. 86.03% of NSTs and 85.03% of MTs never made use of simulations/modelling software for teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole</td></tr>
<tr><td>Object(ive)</td><td>Why is the activity taking place?</td><td>Improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and empower teachers to make use of tutorial or exercise software, the Office Suite and simulations or modelling software in teaching</td></tr>
<tr><td>Subject(s)</td><td>Who is involved in carrying out the activity?</td><td>Policy makers (e.g. members of parliament)</td></tr>
<tr><td>Tools</td><td>By what means are the subjects performing the activity?</td><td>Policy and implementation protocol</td></tr>
<tr><td>Rules and Regulations</td><td>Are there any cultural norms, rules or regulations governing the performance of the activity?</td><td>The constitution of the Republic of South Africa, DoE policies, SBG rules and regulations, and school curriculum</td></tr>
<tr><td>Division of labour</td><td>Who is responsible for what when carrying out the activity and how are these roles organised?</td><td>Policy makers (e.g. Members of Parliament) adopt, amend or repeal policies</td></tr>
<tr><td>Community</td><td>What is the environment in which this activity is carried out?</td><td>The National Parliament of the Republic of South Africa</td></tr>
<tr><td>Outcomes</td><td>What is the desired outcome from carrying out this activity?</td><td>Effective educational policies and curriculum guidelines which ensure sufficient numbers of teachers competent and effective in ICT pedagogical practices in accordance with South African schools' requirements</td></tr>
<tr><td>Recommendations to the education system</td><td colspan="2">i. 67.71% of NSTs and 64.08% of MTs never made use of tutorial or exercise software in their teaching. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system
ii. 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system</td></tr>
</table>

		ECOLOGICAL SYSTEM
		Macrosystem (Trans-social) *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
		iii. 86.03% of NSTs and 85.03% of MTs never made use of simulations or modelling software for teaching. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system

6.2.5.1 Summary of Findings on Learning Resources or Tools

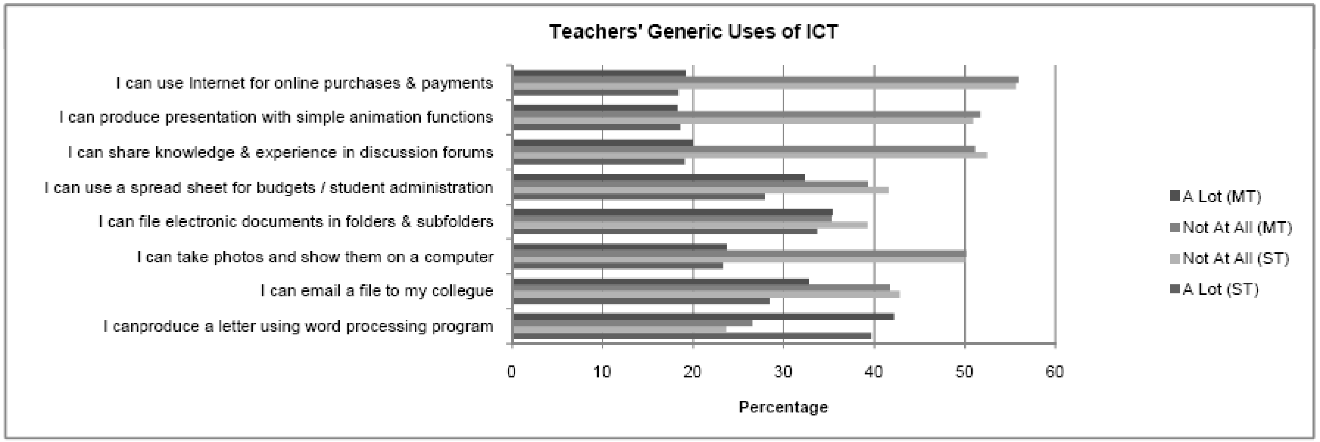
Responses to the SITES 2006 questionnaire on learning resources or tools indicate:

- South African teachers generally follow the trend observed for the international Mathematics and Science teacher population in their use of different learning resources and tools.
- A high majority (79.22%) of South African (Mathematics and Science combined) teachers never make use of the *general Office Suite* in their teaching, however, they claim to have the highest levels of use for *smart board or interactive white board* compared to *all the twenty one other educational systems participated* in SITES 2006 (Law & Chow, 2008).
- Considering the low level use of ICT for teaching and learning (South Africa, 2004), some of the South African Science and MTs participants in the SITES 2006 survey might have misinterpreted the *smart board or interactive white board* for the traditional blackboard. This needs to be further investigated.

6.2.6. Teachers' Confidence in the General and Pedagogical Use of ICT

Teachers' confidence in the general and pedagogical use of ICT forms the sixth theme in the teachers' questionnaire (Addendum 5.1) pertaining to teachers' practices. Teachers were asked eight questions each about their *confidence in the general and pedagogical uses of ICT.* They responded by giving information on their proficiency with the *Office Suite* software, and their competency in the use of *Internet and other digital resources* for teaching and learning purposes. Teachers' use of ICT in their teaching is influenced by personal, organisational, and system level factors (Law *et al.*, 2008b). In most educational systems Mathematics and Science teachers' self-perceived competence had a higher mean for general ICT-use than for pedagogical ICT-use (Law *et al.*, 2008b). This indicates that Mathematics and Science teachers are generally more confident about using ICT in everyday situations than in teaching and learning. According to the SITES 2006, Mathematics and Science teachers considered themselves to be most competent in word processing, electronic filing, and emailing. These teachers were least confident about sharing knowledge in online discussions (Law *et al.*, 2008b).

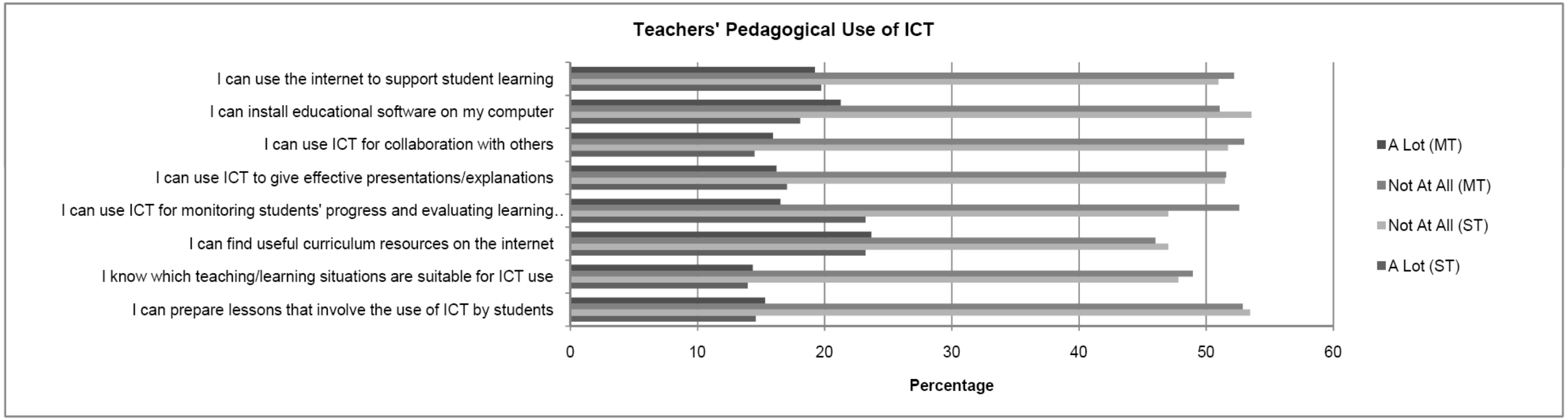
The SITES 2006 requested Mathematics and Science teachers to respond on a 4-point Likert scale (Not at all, a little, sometimes, a lot) on sixteen questions on general and pedagogical uses of ICT. Only two teacher options were chosen for plotting the graph (Figure 6.7): *not at all* and *a lot*. The options *a little* and *somewhat* were not plotted.



To what extent are you confident in accomplishing the following?	**Science teachers (ST)**		**MTs (MT)**	
	A Lot %	Not At All %	A Lot %	Not At All %
I can use the Internet for online purchases and payments	18.43	55.64	19.19	55.91
I can produce presentations with simple animation functions	18.59	50.96	18.34	51.74
I can share knowledge and experience in a discussion forum on the Internet	19.13	52.42	19.98	51.15
I can use a spreadsheet program for budgeting or student administration	27.98	41.6	32.35	39.36
I can file electronic documents in folders and subfolders in a computer	33.7	39.28	35.42	35.29
I can take photos and show them on a computer	23.3	50	23.72	50.16
I can e-mail a file to a colleague	28.42	42.8	32.82	41.75
I can produce a letter using a word-processing program	39.72	23.65	42.22	26.55

Figure 6.7: Mathematics and Science teachers' Confidence in the General Use of ICT

Using a word processor and sending an e-mail are considered basic skills of any computer literacy programs, yet 23.65% of Science teachers and 26.55% of MTs admit that they cannot use a word processor program. Furthermore, 41.75% of Mathematics and 42.8% of Science teachers are unable to send an e-mail. These findings have significant importance for policy makers regarding the urgent need for organising computer literacy training for teachers. These computer literacy training programs should empower teachers to effectively use computer, network and Internet resources for personnel and pedagogical uses. Figure 6.8 represents teachers' confidence in using ICT for pedagogical purposes. Once again, only two teachers' choices were used in the table and to plot the graph.



To what extent you are confident in accomplishing the following?	**Science teachers (ST)**		**MTs (MT)**	
	A Lot %	Not At All %	Not At All %	A Lot %
I can use the Internet to support student learning	19.73	50.96	52.21	19.23
I can install educational software on my computer	18.09	53.58	51.06	21.27
I can use ICT in collaboration with others	14.51	51.73	53	15.93
I can use ICT to give effective presentations/explanations	17.05	51.49	51.58	16.22
I can use ICT for monitoring students' progress and learning outcomes	23.21	47.03	52.59	16.54
I can find useful curriculum resources on the Internet	23.21	47.03	46.02	23.67
I know which teaching/learning situations are suitable for ICT use	13.95	47.83	48.96	14.37
I can prepare lessons that involve the use of ICT by students	14.58	53.46	52.87	15.31

Figure 6.8: Mathematics and Science teachers’ confidence in the pedagogical use of ICT

As illustrated by Figure 6.8, when the pedagogical uses of ICT are examined, it is found that only 15.31% of MTs and 14.58% of Science teachers are confident that they can prepare lessons which involve the use of ICT by their learners. It is very concerning to note that within this small percentage, only 14.37% of MTs and 13.95% of Science teachers know which teaching or learning situations are suitable for ICT use. According to literature, one of the most common pedagogical uses of ICT is to give effective presentations and explanations (Cox *et al.*, 2003), yet the majority of South African Mathematics (51.58%) and Science (51.49%) teachers are not confident in doing so. Only 19.23% of Mathematics and 19.73% Science teachers feel confident using the Internet to support student learning. Again, these findings point towards the necessity of widespread and sustained in-service professional training programs for teachers.

The low level of ICT use in the pedagogical practices of grade 8 Mathematics and Science teachers is not surprising considering the huge challenges presented in the Mathematics and Science classrooms: poorly-resourced schools, large classes, curriculum hardly relevant to the daily life of students, an inadequate number of competent teachers and sub-standard teacher education programmes (Ottevanger *et al.*, 2007).

It is encouraging to note that there are some, though not enough, attempts made to improve the use of ICT in the South African classrooms. The Eastern Cape DoE has introduced interactive educational software to be used to compliment the teaching of Mathematics, music, technical subjects and Science. Schools with computer laboratories have been provided with drill and practice Mathematics software to aid learners in practicing problem solving with instant assessment. Science software enables teachers to electronically simulate practical experiments in Physical and Life Sciences in the classroom, and is believed to address the shortage of practical resources in schools (BuaNews, 2010). Evoh (2007) studied the collaborative partnership that use ICT to promote secondary education in South Africa, namely: the Mindset Network organisation (a non-governmental organisation based in Johannesburg) and the Khanya Education Technology Project (an initiative of the Western Cape Education Department). He came to the conclusion that the training of teachers and the close monitoring of the use of ICT are two critical factors in the use if ICT for curriculum delivery in South Africa. Cox *et al* (2003) observed that the majority of teachers use ICT to add or enhance their existing practices, as a ‘servant’ to reinforce their teaching approaches. It would, however, be more desirable to use ICT as a “partner” to change the way teachers and learners interact with each other and with learning tasks. As a ‘servant’ ICT plays the role of a tool, while as a ‘partner’, ICT plays the role of a colleague with a mainly complimentary role. Table 6.7 provides an *Ecological Activity Systems Analysis* of teachers' confidence in the general and pedagogical use of ICT.

Table 6.7: Ecological Activity Systems Analysis of Teachers' Confidence in the General and Pedagogical Use of ICT

			ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the teacher interested in? *Intra-personal* dialogues and reflections on planning to prepare lessons that involve the use of ICT by learners; planning to know which learning or teaching situations are suitable for ICT use; and planning to use ICT in collaboration with others	i. 14.58% of NSTs and 15.31% of MTs prepare lessons that involve the use of ICT by learners while 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners ii. 13.95% of NSTs and 14.37% of MTs know which learning/teaching situations are suitable for ICT use while 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use iii. 14.51% of NSTs and 15.93% of MTs use ICT in collaboration with others while 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others
	Object(ive)	Why is the activity taking place?	To prepare lessons that involve the use of ICT by learners, to know which learning or teaching situations are suitable for ICT use, and to use ICT in collaboration with others
	Subject(s)	Who is involved in carrying out the activity?	The grade 8 NSTs and MTs
	Tools	By what means are the subjects performing the activity?	Self (teacher's mind)
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Personal values, ethics and norms and attitudes
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	No division of labour (only the teacher's inner thoughts and self-reflections are involved)
	Community	What is the environment in which this activity is carried out?	Teacher's mind
	Outcomes	What is the desired outcome from carrying out this activity?	53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners
	Recommendations to the education system	i. 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. This calls for an attitude change in individual teachers concerning ICT use for learners ii. 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use and this calls for an attitude change in individual teachers concerning ICT use for learners iii. 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. This calls for an attitude change in individual teachers concerning ICT use for learners	

<table>
<tr><td colspan="3" rowspan="2"></td><td>ECOLOGICAL SYSTEM</td></tr>
<tr><td>Microsystem (Interpersonal & Bi-directional)
Activities, roles, interactions and interpersonal relations (with or without ICT) between:
Teacher and Learner
Teacher and Principal
Teacher and Teacher
Teacher and TC
Teacher and Parent</td></tr>
<tr><td rowspan="9">ACTIVITY SYSTEM</td><td>Activity</td><td>What sort of activity is the teacher interested in?

Teacher’s activities, roles, interactions and Interpersonal relations with an individual learner by preparing lessons that involve the use of ICT by the learner; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others</td><td>i. 14.58% of NSTs and 15.31% of MTs prepare lessons that involve the use of ICT by learners while 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners
ii. 13.95% of NSTs and 14.37% of MTs know which learning or teaching situations are suitable for ICT use while 47.83% of NSTs and 52.87% of MTs do not know which learning or teaching situations are suitable for ICT use
iii. 14.51% of NSTs and 15.93% of MTs use ICT in collaboration with others while 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others</td></tr>
<tr><td>Object(ive)</td><td>Why is the activity taking place?</td><td>To prepare lessons that involve the use of ICT by the individual learner; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others</td></tr>
<tr><td>Subject(s)</td><td>Who is involved in carrying out the activity?</td><td>The grade 8 NSTs and MTs and learner</td></tr>
<tr><td>Tools</td><td>By what means are the subjects performing the activity?</td><td>ICT resources, school curriculum, technical support, school timetable</td></tr>
<tr><td>Rules and Regulations</td><td>Are there any cultural norms, rules or regulations governing the performance of the activity?</td><td>Personal values, ethics and norms and attitudes, school rules and regulations, Netiquette</td></tr>
<tr><td>Division of labour</td><td>Who is responsible for what when carrying out the activity and how are these roles organised?</td><td>The grade 8 NSTs and MTs provides interesting and efficient learning opportunities to an individual learner using ICT according to school curriculum</td></tr>
<tr><td>Community</td><td>What is the environment in which this activity is carried out?</td><td>School computer laboratory, classroom and library</td></tr>
<tr><td>Outcomes</td><td>What is the desired outcome from carrying out this activity?</td><td>The effective facilitation of Natural Science and Mathematics lessons that involve the use of ICT by learners</td></tr>
<tr><td>Recommendations to the education system</td><td colspan="2">i. 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually
ii. 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually.
iii. 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others.</td></tr>
</table>

		It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually.

			ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between die teacher and two or more of the following Microsystems:* *Teacher and Learner* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
ACTIVITY SYSTEM	**Activity**	What sort of activity the teacher is interested in? Teacher's activities, roles, interactions and *Inter-social* relations with two or more learners by preparing lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	i. 14.58% of NSTs and 15.31% of MTs prepare lessons that involve the use of ICT by learners while 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. ii. 13.95% of NSTs and 14.37% of MTs know which learning/teaching situations are suitable for ICT use while 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. iii. 14.51% of NSTs and 15.93% of MTs use ICT in collaboration with others while 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others.
	Object(ive)	Why is the activity taking place?	To prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others
	Subject(s)	Who is involved in carrying out the activity?	Grade 8 Natural Science and MTs and learners
	Tools	By what means are the subjects performing the activity?	ICT resources, school curriculum, technical support, school timetable
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Teachers' values, ethics and norms and attitudes, school rules and regulations, Netiquette
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	▪ Teacher to provide interesting and efficient learning opportunities according to curriculum guidelines ▪ SP to provide sufficient resources and pedagogical freedom to teachers ▪ Technical coordinator to provide sustained support
	Community	What is the environment in which this activity is carried out?	Teachers, learners, parents, HoDs, principal, TCs
	Outcomes	What is the desired outcome from carrying out this activity?	Effective facilitation of Natural Science and Mathematics lessons that involve the use of ICT by learners
	Recommendations to the education system	i. 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. It is recommended that either the SP or the TC (with the support of the SP) encourage and support this group of teachers in their school ii. 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. It is recommended that either the SP or the	

			TC (with the support of the SP) encourage and support this group of teachers in their school iii. 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. It is recommended that either the SP or the TC (with the support of the SP) encourage and support this group of teachers in their school

			ECOLOGICAL SYSTEM
			Exosystem (Intrasocial) *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
ACTIVITY SYSTEM	**Activity**	What sort of activity is the subject interested in? *Intra-social* dialogues, reflections, decisions and actions of SGBs and the NDoE to organise TPD courses. These would develop and enable teachers to prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	i. 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ii. 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use; these percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole iii. Because 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
	Object(ive)	Why is the activity taking place?	SGBs and the NDoE organise TPD courses to develop and enable teachers to prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others
	Subject(s)	Who is involved in carrying out the activity?	Members of the National and Provincial Departments of Education, SGBs
	Tools	By what means are the subjects performing the activity?	ICT hardware and software, TPDs in the pedagogical uses of ICT, TCs, technical support personnel, curriculum guidelines, funding for hardware, software and training
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	DoE policies, rules and regulations, school curriculum, school rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are these roles organised?	The DoE and SGBs organise teacher professional ICT development courses, provide ICT resources and infrastructure
	Community	What is the environment in which this activity is carried out?	All South African schools
	Outcomes	What is the desired outcome from carrying out this activity?	Professionally developed and empowered teachers who are competent, effective and responsible in ICT pedagogical practices in line with school curriculum guidelines
	Recommendations to the education system	i. 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. It is recommended that the DoE and the SGB identify teachers who cannot prepare lessons that involve the use of ICT by learners, and encourage and support them to complete ICT TPD courses.	

			ECOLOGICAL SYSTEM ***Exosystem (Intrasocial)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
		ii. 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. It is recommended that the DoE and the SGB identify teachers who do not know which learning/teaching situations are suitable for ICT use, and encourage and support them to complete ICT TPD courses. iii. 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. The DoE and the SGB should identify teachers who cannot use ICT in collaboration with others, and encourage and support them to complete ICT TPD courses	

			ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
ACTIVITY SYSTEM	**Activity**	What sort of activity the subjects interested in? *Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and enable teachers to prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others	i. 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ii. 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole iii. 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole
	Object(ive)	Why is the activity taking place?	Improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and enable teachers to prepare lessons that involve the use of ICT by learners; to know which learning or teaching situations are suitable for ICT use; and to use ICT in collaboration with others
	Subject(s)	Who is involved in carrying out the activity?	Policy makers (e.g. members of parliament)
	Tools	By what means are the subjects performing the activity?	Policy and implementation protocol
	Rules and Regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	The constitution of the Republic of South Africa, DoE policies, rules and regulations
	Division of labour	Who is responsible for what when carrying out the activity and how are	Policy Makers (e.g. Members of Parliament) create new policy or amend or repeal existing policy

			ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
		these roles organised?	
	Community	What is the environment in which this activity is carried out?	National parliament of the Republic of South Africa
	Outcomes	What is the desired outcome from carrying out this activity?	Effective educational policies and curriculum guidelines which ensure sufficient numbers of teachers competent and effective in ICT pedagogical practices in accordance with South African schools' requirements
	Recommendations to the education system	i. 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ii. 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system iii. 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others with efficient use of ICT resources. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system	

6.2.6.1 Summary of Findings on Teachers' Generic and Pedagogical Uses of ICT

Responses to the SITES 2006 questionnaire on the pedagogical use of ICT indicate that:

- Uses of ICT by grade 8 Science and MTs are anything but satisfactory. A quarter of the teachers cannot produce a letter using a word-processing program, and more than half of the teachers admit that they cannot prepare lessons that involve the uses of ICT by their students
- Policy and decision makers need to take the necessary steps to provide sustained training and support to teachers in the general and pedagogical uses of ICT
- Increased use of ICT need not necessarily reduce the importance of a teacher; teachers are still needed for their leadership roles in the planning, preparation, and follow-up of lessons
- There is a significant difference in the frequency of ICT use between Mathematics and Science teachers. The reason for this difference is a subject for further research. This finding is in accordance with the findings of the SITES 2006 which revealed the higher use of ICT by Science teachers in comparison with MTs (with only three exceptions) (Wagemaker & Law, 2010).

The following sections address the second research question: *How do the barriers that Grade 8 Mathematics and Science teachers encounter, as well as the support they receive, impact on their pedagogical practices?*

6.3 Support for Mathematics and Science Teachers

The requirement to provide quality education for all learners has motivated countries to develop plans focussed on the use of ICT for teaching and learning (South Africa, 2004). However the goal of fully integrating ICT in educational, administrative and pedagogical practices will continue to be constrained by a number of barriers such as a lack of access to ICT infrastructure, affordable connectivity with sufficient bandwidth, and reliable supply of electricity, as well as lack of technical support (Farrel & Issacs, 2007). Any support systems for teachers should take into account the various barriers currently facing teachers and learners.

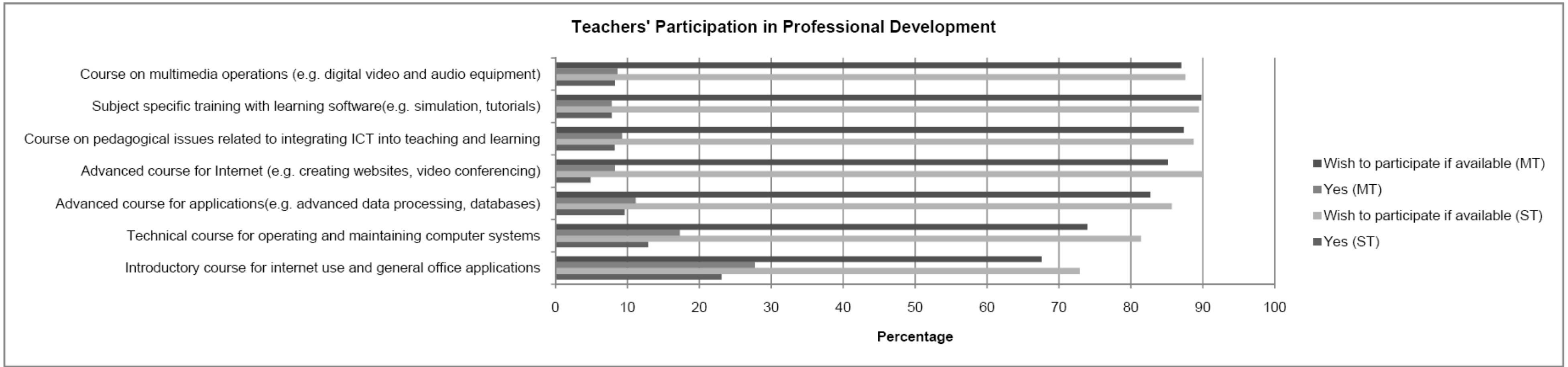
Support for grade 8 Mathematics and Science teachers are analysed on the basis of responses to selected questions in the teacher questionnaire, principal questionnaire, and technical questionnaire of the SITES 2006. The teacher questionnaire sheds light on TPD needs; the principal questionnaire on pedagogical support needs; and the technical questionnaire on the technical support needs for teachers. Questionnaire section references and themes and variables related to teacher support are presented according to Table 6.8.

Table 6.8: Questionnaire References for Research Sub-question 2

Sections	Themes	SITES 2006 Variable References
§ 6.3.1	Professional support	BTG24A-BTG24G
§ 6.3.2	Pedagogical support	BCP15A-BCP15F
§ 6.3.3	Technical support	BCT16A-BCT16K

6.3.1 Professional Support

In order to understand kinds of professional support for teachers, the SITES 2006 asked seven questions. Five questions enquired about the teachers' general ICT skills and two questions about their ICT pedagogical skills. To the question*, have you participated in any of the following TPD activities? If no, would you wish to attend*? The Mathematics and Science teachers were to respond to three choices*: No, I do not wish to attend, No, I would like to attend if available, and, Yes, I have.* The questions and responses are presented in Figure 6.9. The response *No, I do not wish to attend* is not plotted as it represents less than 8% of the sample.



Have you participated in any of the following TPD activities?	% Yes (ST)	% of No, but wish to participate if available (ST)	% Yes (MT)	% of No, but wish to participate if available (MT)
Course on multimedia operations(e.g. digital video and audio equipment)	8.26	87.55	8.62	87.01
Subject specific training with learning software (e.g., simulation, tutorials)	7.83	89.43	7.83	89.81
Pedagogical issues related to integrating ICT into teaching and learning	8.24	88.70	9.29	87.36
Advanced course on the Internet (e.g., creating websites, video conferencing)	4.86	89.99	8.26	85.13
Advanced course for applications (e.g., advanced data processing, databases)	9.64	85.68	11.15	82.68
Technical course for operating and maintaining computer systems	12.91	81.40	17.28	73.95
Introductory course for Internet use and general office applications	23.09	72.89	27.72	67.58

Figure 6.9: Professional support available for teachers

Professional support is one of the most consistent positive predictors of teachers adopting ICT for their pedagogical activities (Law *et al.*, 2008b). Teachers are more likely to use ICT in their teaching if they feel that they and their learners will receive technical and pedagogical support when needed. Teachers have a strong desire to attend training courses related to generic ICT skills and courses related to ICT pedagogical skills. This is natural when we consider that less than 10% of South African Mathematics and Science teachers (7.83% to 9.29%) were able to participate in any TPD programmes aimed at integrating ICT into teaching and learning. Participation in various generic ICT training was also low (4.86% to 27.72%).

Grade 8 Mathematics and Science teachers were asked whether they receive sufficient technical support at school (e.g., by having a technician in their class), to support in teaching and learning. The percentage frequencies from the responses to this question for Science and MTs are presented in Figure 6.10.

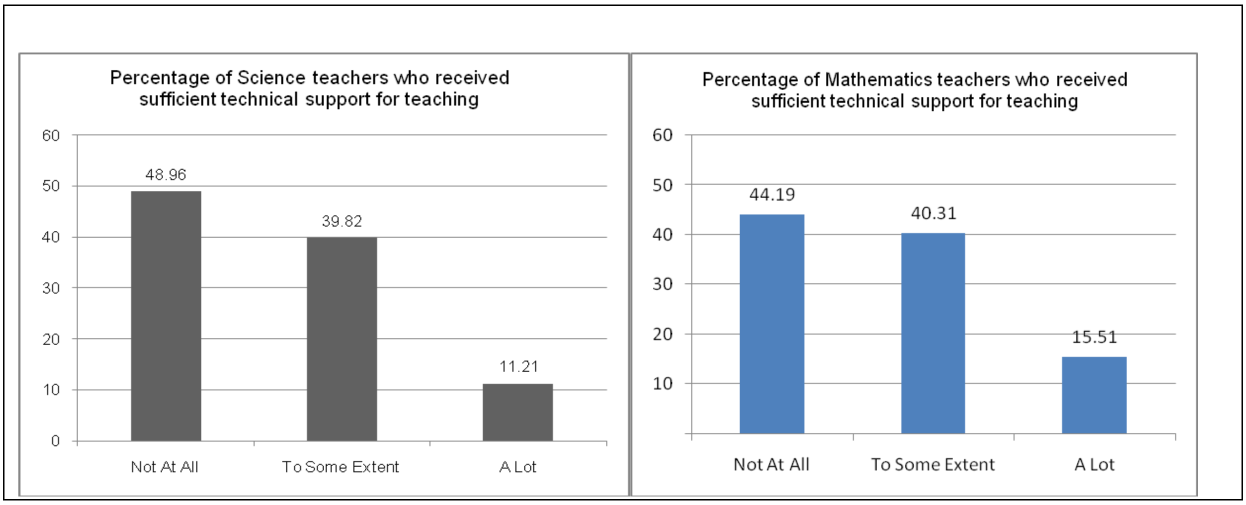
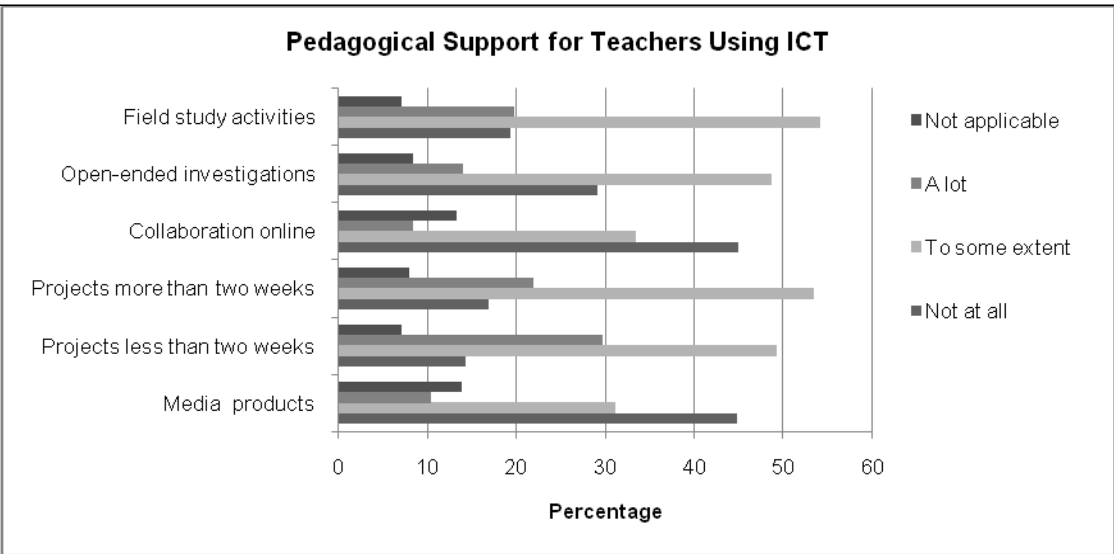


Figure 6.10: Percentage frequencies of teachers' claimed technical support

This researcher is sceptical about the validity of the response to this survey question (BTG28A) because of the finding that the majority of South African Mathematics (55.82%) and Science (51.03%) teachers claim to have received technical support from their schools in the form of a technician to assist teaching. Perhaps the Mathematics and Science teachers might have misunderstood 'ICT technical support' for 'any kind of support' from their school.

The SITES 2006 also requested SPs to respond to questions relating to pedagogical support for teachers when using ICT in the classroom. Questions ranged from traditional pedagogical practices such as short projects and field study practices, to innovative pedagogical practices such as the production of multimedia products and online collaboration with others. The principals were required to answer to the question; *to what extent is pedagogical support available for grade 8 teachers for the listed activities?* They had to choose one of the following answers: *Not at all, A little, Somewhat, A lot, and Not Applicable*. The responses are presented in Figure 6.11. The choices *A little and somewhat* are combined and replaced with *to some extent* in the Figure 6.11.

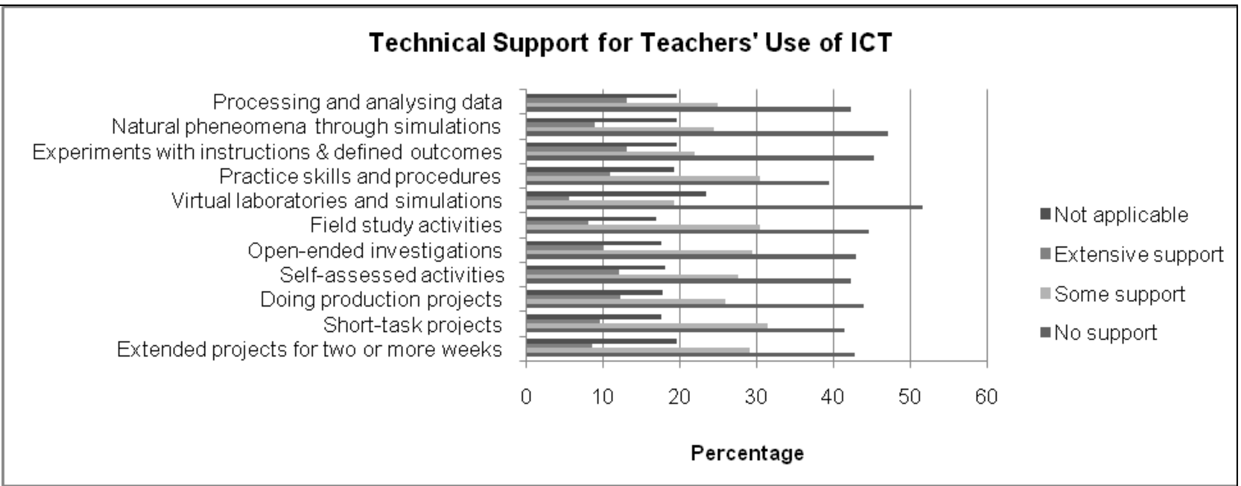


To what extent is pedagogical support available for teachers in grade 8?	**Not at All %**	**To Some Extent %**	**A Lot %**	**Not Applicable %**
Field study activities	19.21	54.11	19.67	7.01
Open-ended investigations	29.00	48.58	14.02	8.40
Collaboration online	44.91	33.44	8.39	13.26
Projects more than two weeks	16.81	53.36	21.86	7.97
Projects less than two weeks	14.23	49.16	29.62	6.99
Media products	44.76	31.01	10.42	13.81

Figure 6.11: Pedagogical support for teachers using ICT

Responses to the questions regarding support indicate that just 17% of the teachers, on average, receive adequate pedagogical support when using ICT for teaching and learning. Much less pedagogical support is available for innovative pedagogical practices such as open-ended investigations (29%), online collaboration (44.91%), and creating multimedia products (44.76%). On average, 28% of teachers receive no pedagogic support at all when they wish to make use of ICT. This strongly implies the urgency in establishing adequate pedagogical support services for grade 8 Mathematics and Science teachers in their schools.

The SITES 2006 technical questionnaire asked the ICT co-ordinator in the school eleven questions about technical support available when teachers want make use of ICT. The questions and responses are presented in the Figure 6.12.



To what extent is technical support available in your school if teachers want to use ICT for the following activities?	No Support %	Some Support %	Extensive Support %	Not Applicable %
Processing and analysing data	42.19	24.99	13.21	19.61
Natural phenomena through simulations	47.11	24.40	8.93	19.55
Experiments with instructions and defined outcomes	45.25	22.00	13.10	19.64
Practice skills and procedures	39.39	30.39	10.99	19.23
Virtual laboratories and simulations	51.56	19.25	5.69	23.50
Field study activities	44.47	30.34	8.20	16.98
Open-ended investigations	42.82	29.50	10.02	17.66
Self-assessed activities	42.17	27.61	12.14	18.09
Conducting production projects	43.92	25.88	12.35	17.85
Short-task projects	41.46	31.37	9.62	17.54
Extended projects for two or more weeks	42.71	29.06	8.64	19.59

Figure 6.12: Technical support available to Grade 8 Mathematics and Science teachers when using ICT

Figure 6.12 indicates that on average, 44% of teachers do not receive any support at all when they want to make use of ICT. Only 10% of teachers say they receive adequate support. A substantial number (19%) of teachers did not make use of learning opportunities involving ICT. South African grade 8 Mathematics and Science teachers received the *lowest level of technical and pedagogical support*, compared to all the other 22 participating educational systems (Law *et al.*, 2008b).

6.3.2 Summary of Findings on Professional Support Received by Grade 8 Mathematics and Science teachers

Responses to the SITES 2006 survey questionnaire on support received by grade 8 Mathematics and Science teachers indicate that:

- teachers' participation in ICT TPD is a personal response to its availability as a contextual factor
- a high majority of South African Mathematics and Science teachers have not received ICT professional training
- teachers have a strong desire to participate in professional training if the opportunity for such is available
- less than 30% of teachers receive pedagogical support when they want to use ICT.

On average, 44% of teachers do not receive any technical support when they want to use ICT. A large degree of variation was observed between education systems investigated in the SITES 2006 with regards to indicators of the availability of pedagogical and technical support for teachers (Pelgrum, 2008).

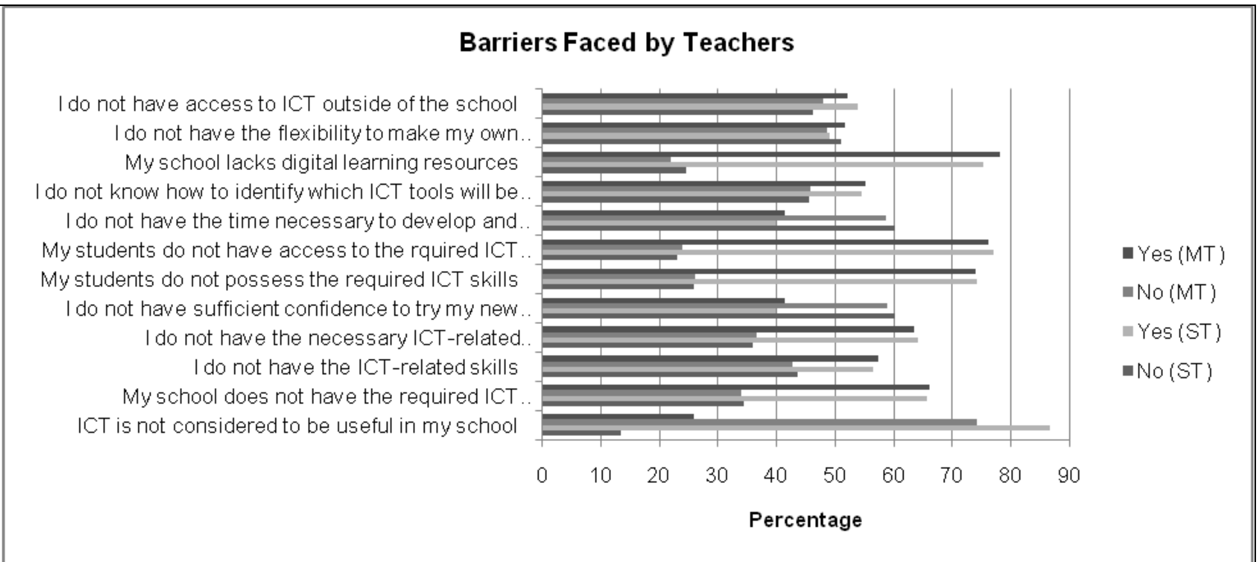
The following sections address the second research question: *How do the barriers that grade 8 Mathematics and Science teachers encounter, as well as the support they receive, impact on their pedagogical practices?*

6.4 Barriers Teachers Face in the Pedagogical Uses of ICT

A barrier is a condition that makes it difficult to make progress or to achieve an objective (Hornby, 1997). Barriers in ICT pedagogical practices refer to various difficulties or constrains experienced by teachers in using ICT in teaching. Literature about ICT integration in education classifies barriers into different categories: intrinsic and extrinsic barriers (Ertmer, 1999); teacher-level barriers and school-level barriers (Becta, 2004); micro-level barriers, meso-level barriers and macro-level barriers (Balanskat, Blamire, & Kefela, 2006); as well as material and non-material barriers (Pelgrum, 2001).

Barriers for teachers in integrating ICT into teaching and learning includes (i) insufficient access to computer hardware, software and networks, (ii) a resistance to change, (iii) insufficient time to prepare and present ICT-using lessons, (iv) insufficient training or lack of training in the use of technology resources for pedagogical purposes, and (v) lack of (or insufficient) technical support when needed (Bingimlas, 2009).

The following sections present findings from the SITES 2006 about the barriers faced by Mathematics and Science and teachers in integrating ICT into teaching and learning. Analysis is conducted based on the data from the teachers' questionnaire, the principals' questionnaire and technical coordinators' questionnaire. South African Mathematics and Science teachers' responses to the twelve questions related to the barriers are presented in the Figure 6.13.



Do you experience the following barriers in using ICT in your teaching?	**Science teachers (ST)**		**Mathematics teachers (MT)**	
	No %	Yes %	No %	Yes %
I do not have access to ICT outside of the school	46.18	53.82	47.87	52.13
I do not have the flexibility to make my own decisions when using ICT	51.06	48.94	48.59	51.54
My school lacks digital learning resources	24.73	75.27	22.09	77.91
I do not know how to identify which ICT tools will be useful	45.58	54.42	45.80	55.20
I do not have the time necessary to develop and implement activities	60.10	39.90	58.70	41.30
My students do not have access to the required ICT tools, outside school	23.11	76.89	23.94	76.06
My students do not possess the required ICT skills	25.83	74.17	26.06	73.94
I do not have sufficient confidence to try my new approaches alone	60.18	39.82	58.75	41.42
I do not have the necessary ICT-related pedagogical skills	36.03	63.97	36.60	63.40
I do not have the ICT-related skills	43.48	56.52	42.77	57.23
My school does not have the required ICT infrastructure	34.51	65.49	34.05	65.95
ICT is not considered to be useful in my school	68.60	22.00	74.17	25.83

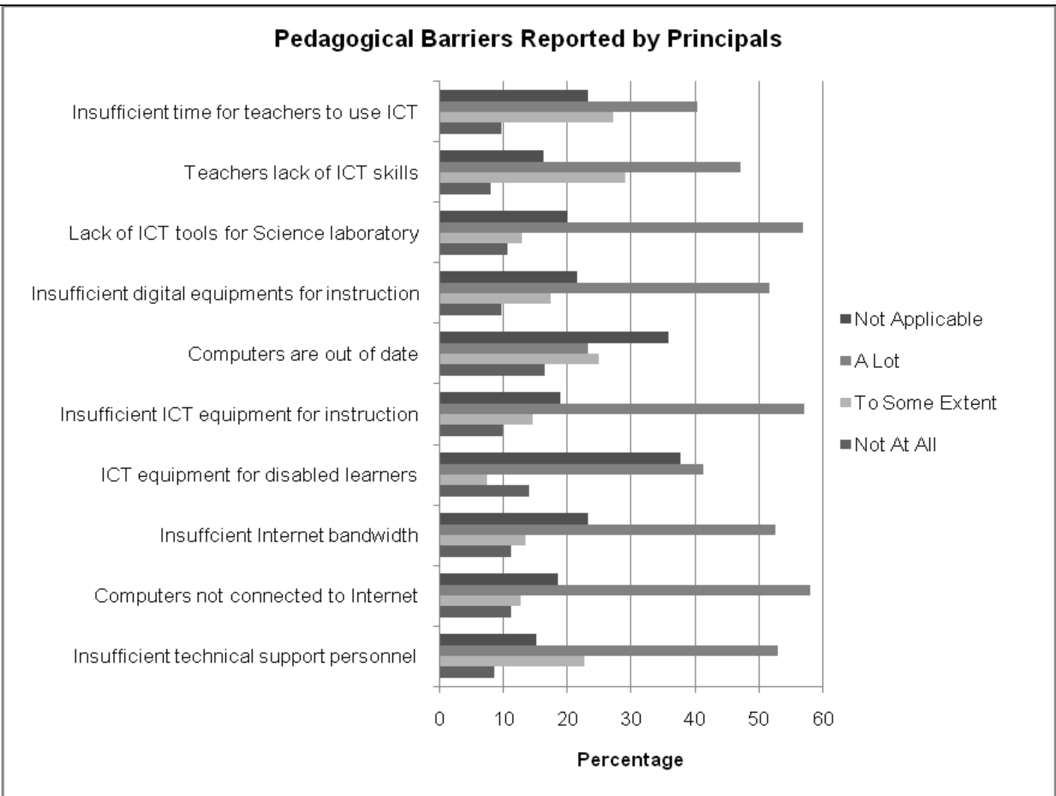
Figure 6.13: Barriers indicated by Grade 8 Mathematics and Science teachers

The majority of Mathematics (65.95%) and Science (65.49%) teachers indicated that their schools do not have the required ICT infrastructure. Similarly, Mathematics (63.40%) and Science (63.97%) teachers agree that they do not have the necessary ICT-related pedagogical skills. They also report low levels of digital learning resources in their schools. These findings are in line with findings in the review of international literature (Bingimlas, 2009) about barriers present when teachers use ICT for teaching and learning. The majority of Mathematics (55.20%) and Science (54.42%) teachers do not know how to identify which ICT tools will be useful, though they have sufficient confidence (Mathematics 58.75% and Science 60.18%) to try new approaches alone. Interestingly, South African Mathematics (58.70%) and Science (60.10%) teachers have sufficient time to develop and implement activities using ICT in their teaching, while lack of time is listed as one of the major barriers revealed in the meta-analysis of Bingimlas (2009) on literature related to barriers to the successful integration of ICT in teaching and learning environments. This finding demands further investigation. A high majority of Mathematics (73.94%) and Science (74.17%) learners do not have the necessary ICT skills. In addition, the learners (77%) also do not have access to required ICT tools outside school. South Africa was identified as an outliner in the SITES 2006 in school-level, teacher-level and learner-level reported barriers when using ICT for teaching and learning (Law *et al.*, 2008b). South Africa scored *highest of all other twenty one participating educational systems* for the mean-percentage of school-related, teacher-related, and learner-related barriers experienced by grade 8 Mathematics and Science teachers.

The SITES 2006 teacher questionnaire (BTG 23A-23L) asked Mathematics and Science teachers to indicate barriers they had experienced (Figure 6.13) to ICT-use in their teaching. These barriers were grouped into three categories: (i) school-related factors pertaining to school culture or ICT resources available; (ii) teacher-related factors pertaining to competence and time availability; and (iii) student-related factors pertaining to students' level of ICT skills and access to ICT outside school. An international comparison of the results obtained by Mathematics and Science teachers shows a strong consistency within each educational system across the two teacher populations (Law *et al.*, 2008b). This indicates that the presence of these barriers, including the student-related ones, has a strong association with the school context. It is also found that higher mean percentages of experienced barriers were associated with a lower level of ICT-use by teachers with their target class.

6.4.1 Barriers Indicated by Principals

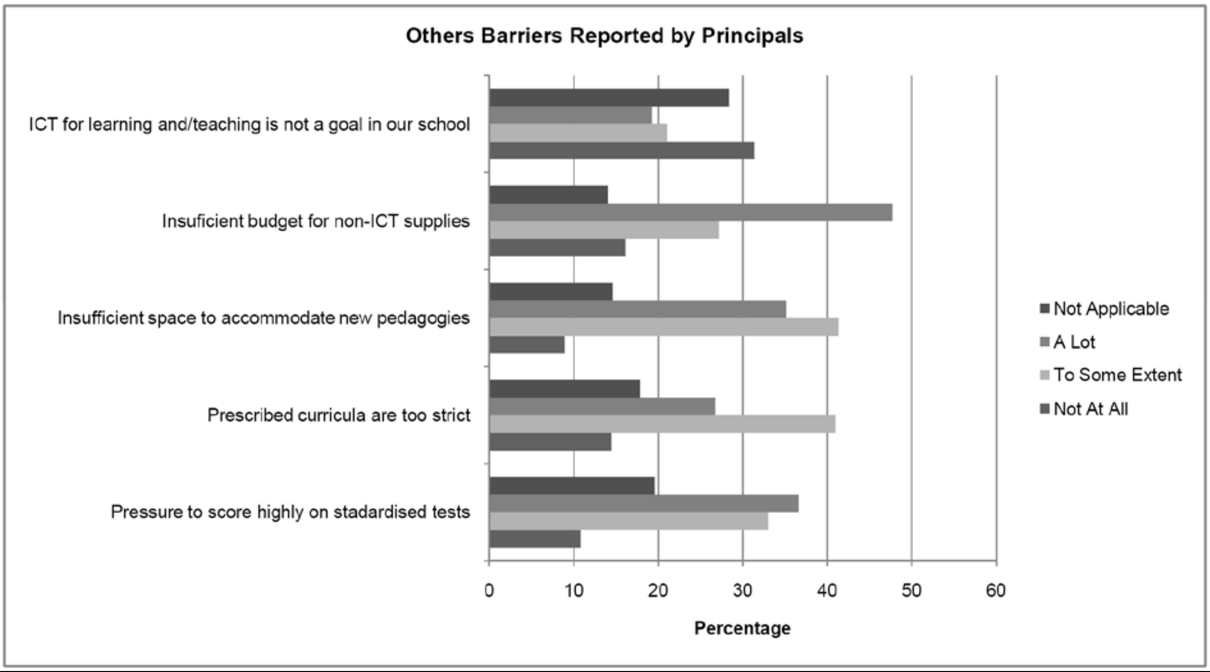
This section presents the responses of SPs to the question: *To what extent is your school's capacity to realise its pedagogical roles hindered by each of the following obstacles?* The word barrier is used here in synonymous with the word obstacles. There were 10 questions related to obstacles when using ICT for pedagogical purposes and five questions related to obstacles not directly related to the use of ICT. The principals were required to indicate their choices on a 5-point Likert like scale*: Not at all, a little, somewhat, a lot* and *not applicable*. The choices *a little* and *somewhat* are combined and replaced with *to some extent*. The results are presented in Figure 6.14.



To what extent is your schools capacity to realize its pedagogical goals hindered by each of the following obstacles?	**Not At All %**	**To Some Extent %**	**A Lot %**	**Not Applicable %**
Insufficient time for teachers to use ICT	9.51	27.16	40.26	23.07
Teachers lack of ICT skills	7.85	28.97	47.01	16.18
Lack of ICT tools for Science laboratory	10.57	12.72	56.76	19.95
Insufficient digital equipment for instruction	9.61	17.30	51.58	21.41
Computers are out of date	16.32	24.83	23.20	35.65
Insufficient ICT equipment for instruction	9.75	14.43	56.98	18.89
Insufficient ICT equipment for disabled learners	13.90	7.39	41.12	37.59
Insufficient Internet bandwidth	11.11	13.29	52.51	23.10
Computers not connected to the Internet	11.04	12.65	57.87	18.44
Insufficient technical personnel to support	8.43	22.64	52.90	15.04

Figure 6.14: Barriers to pedagogical goals reported by principals

On average, 48% of principals indicate that their school's capacity to realize its pedagogical goals is hindered by various barriers listed in Figure 6.14. Only 11% of principals indicate that their school's capacity to realize its pedagogical goals is not hindered by various barriers listed in Figure 6.14. Principals also reported on barriers related to budget, school ICT policies and curriculum. These are presented in Figure 6.15.



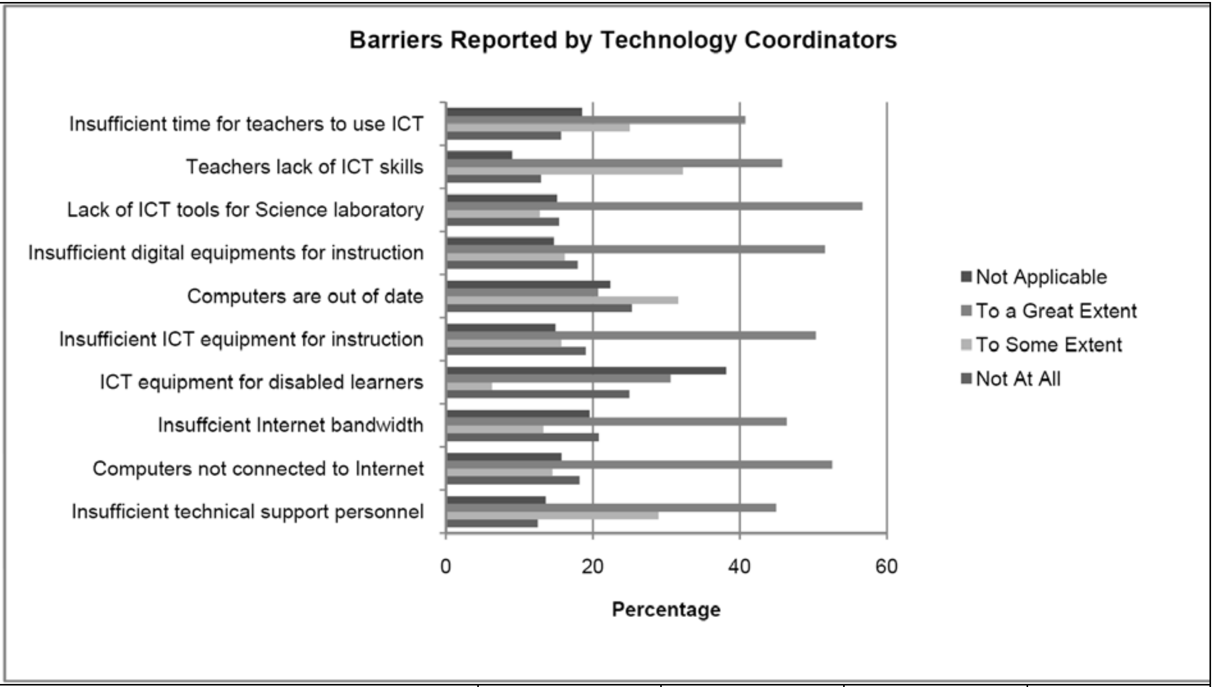
Other barriers according to school principals	Not At All %	To Some Extent %	A Lot %	Not Applicable %
ICT for learning and/or teaching is not a goal in our school	31.35	21.04	19.25	28.36
Insufficient budget for non-ICT supplies	16.13	27.16	47.71	14.01
Insufficient space to accommodate new pedagogies	8.92	41.35	35.12	14.61
Prescribed curricula are too strict	14.49	40.93	26.74	17.84
Pressure to score highly on standardised tests	10.81	32.99	36.65	19.56

Figure 6.15: Other Barriers Reported by Principals

On average, 16% of principals indicated that various barriers listed in Figure 6.15 are "not at all" hindering the school's capacity to realize its pedagogical goals. More than double that number (33%) indicated that barriers listed in Figure 6. 15 constitute "a lot." Thirty-one percent of principals acknowledge their school's goals of using ICT for teaching and learning, while 28% indicate "not applicable."

6.4.2 Barriers Reported by TCs

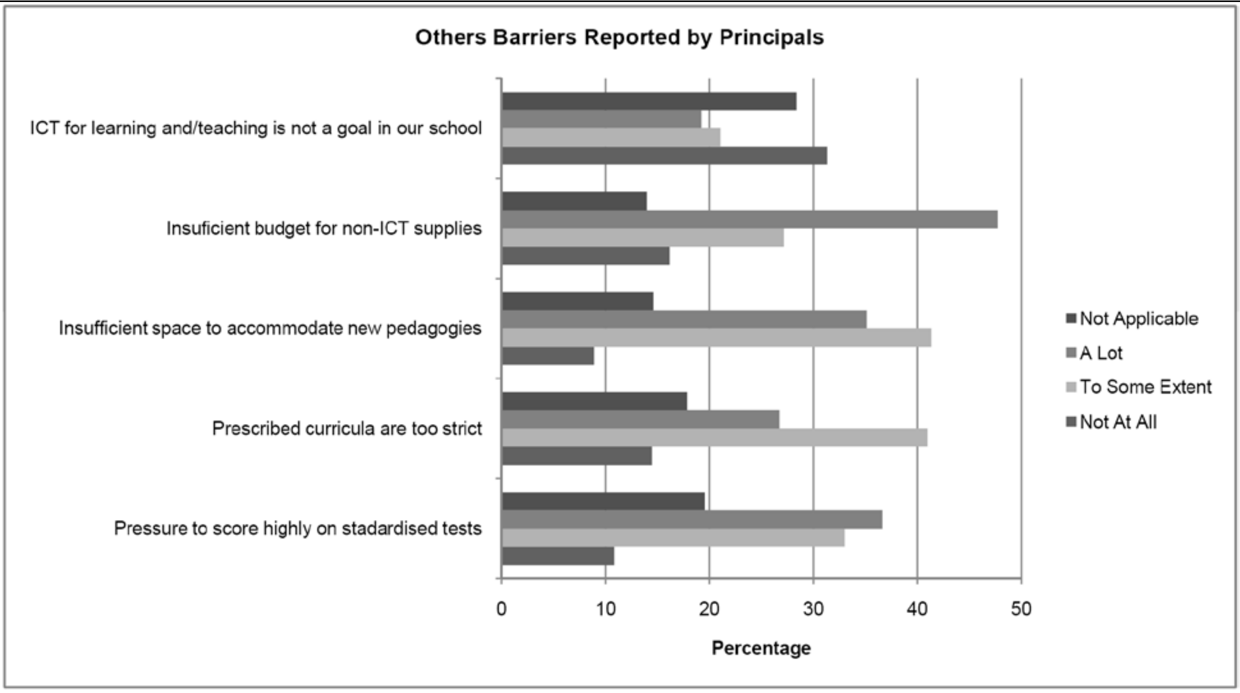
Regarding barriers, TCs answered identical questions as the principals. The results are presented in Figure 6.16.



Barriers reported by TCs	Not At All %	To Some Extent %	To a Great Extent %	Not Applicable %
Insufficient time for teachers to use ICT	15.68	25.02	40.74	18.55
Teachers lack of ICT skills	12.95	32.25	45.76	9.04
Lack of ICT tools for Science laboratory	15.40	12.79	56.68	15.13
Insufficient digital equipment for instruction	17.94	16.18	51.57	14.72
Computers are out of date	25.30	31.61	20.71	22.39
Insufficient ICT equipment for instruction	19.03	15.72	50.33	14.92
ICT equipment for disabled learners	24.98	6.30	30.58	38.14
Insufficient Internet bandwidth	20.80	13.27	46.37	19.57
Computers not connected to Internet	18.20	14.51	52.55	15.74
Insufficient technical support personnel	12.52	28.94	44.94	13.60

Figure 6.16: Pedagogical Barriers Reported by Technology Coordinators

On average, 44% of TCs indicated that their school's capacity to realize its pedagogical goals is hindered by the barriers listed in Figure 6.16. Only 18% of TCs indicated that their school's capacity to realize its pedagogical goals is not hindered by the barriers listed in Figure 6.16. TCs also responded on barriers related to budget, school policies and curriculum. Their responses are presented in Figure 5.17 as other barriers reported by TCs.



Other barriers according to TCs	Not At All %	To Some Extent %	A Lot %	Not Applica-ble %
ICT for learning and/or teaching is not a goal in our school	36.22	19.42	22.29	22.06
Insufficient budget for non-ICT supplies	19.03	28.99	39.00	12.98
Insufficient space to accommodate new pedagogies	17.86	34.74	32.77	14.63
Prescribed curricula are too strict	22.51	38.23	23.76	15.50
Pressure to score highly on standardised tests	17.44	36.49	30.86	15.21

Figure 6.17: Other Barriers Reported by TCs

School TCs choose *insufficient budget for non-ICT supplies* as the largest barrier for realising the pedagogical goals of the school. Thirty six percent of the school TCs answered *Not at all* when asked whether using ICT for teaching and learning is not a goal in their school. On average, 30% of TCs, in the school, acknowledge that barriers listed in Figure 6.17 hinder the realization pedagogical goals of their school “a lot,” while 23% indicate “not at all.”

6.4.3 Summary of Findings on Barriers Faced by Grade 8 Mathematics and Science teachers

Grade 8 Mathematics and ST’s; SPs’ and TCs’ responses to the SITES 2006 questionnaire, on barriers indicate that:

- South African schools require adequate ICT infrastructure, digital learning resources, and training for teachers if they want to use ICT for teaching and learning.

- South African teachers need to be open-minded towards the use of ICT for teaching and learning. They need to acquire skills of time management and be able to solve technical problems in their use of ICT.
- Grade 8 Mathematics and Science learners in South Africa have neither sufficient access nor enough ICT skills necessary for using ICT in teaching and learning.
- The majority of principals (58%) indicated that their school's capacity to realize its pedagogical role is hindered by an insufficient number of computers connected to the Internet.
- Seventy-six percent of teachers acknowledge that their learners do not have access to computers outside school.
- Fifty seven percent of TCs indicate serious shortage of appropriate ICT resources in their school.

The following session addresses the research question: what are the principals' influences on teachers' pedagogical uses of ICT?

6.5 Principals' Influences on Teachers' Pedagogical Use of ICT

Constraining and enabling factors in the use of ICT were discussed in § 6.3 and 6.4. The following sections present how SPs influence teachers' pedagogical uses of ICT in their schools. The principals' potential influences are discussed based on: i) the TCs', principals' and Mathematics and Science teachers' responses to the SITES 2006 questionnaires on barriers faced and ii) the TCs', principals' and Mathematics and Science teachers' responses to the SITES 2006 questionnaire on support received by teachers.

The constrains faced by grade 8 Mathematics and Science teachers, according to the SITES 2006, are presented (Figure 6.12) as if they are independent of each other; in reality, there are complex relationships among barriers (Bingimlas, 2009). For example, the confidence of teachers to use ICT for pedagogical purposes possibly is related to their competence in generic ICT skills, which in turn may be related to the access to ICT resources at school and/or home. Similarly, there may be complex relationships among support available to teachers. These issues need to be further investigated.

Table 6.9: Potential Roles of Principals to Reduce Barriers

Questionnaire item	Barriers	Principals' Potential Roles
BTGO8L BTGOM BCT17O BCP16O	The majority of teachers do not consider preparing learners for competent ICT use and responsible Internet behaviour to be curriculum goals	Develop a common ICT vision and policy statement for the school. Help teachers and learners to formulate rules and procedures for the efficient use of ICT resources
BTG09A-M BCT3A1-B1 BCP16M	Teachers do not make due use of scheduled learning time in teaching activities. ICT integration is scarce	Monitor school activities in relation to the timetable and make changes in order to make efficient use ICT resources in teaching and learning
BTG14A-L BCP2A-I	Teaching activities are mainly traditionally oriented. More importance should be placed on a connectedness orientation	Help teachers and learners liaison with collaborators for learner collaborative activities. Mediate communication between learners and experts/external mentors. Collaborate with parents in monitoring learners' progress in using ICT
BTG15A-H BCP12E	Low use of ICT in assessing learner performance	Help teachers and learners make use of ICT in assessment activities.
BTG16A-L BTG17A-K BCT2A-E BCP3A-J BCP6A-D BCP8G BCP8J	Low use of ICT by learners in their learning activities	Investigate the learner-related, teacher-related, and school-related reasons for the low use of ICT in learning activities. Take necessary and sufficient remedial actions
BTG21A-P BCP16I	Teachers have low levels of confidence in the general use of ICT and have lower levels of confidence in pedagogical uses of ICT	Organise TPD workshops on generic and pedagogical uses of ICT and the Internet. Allow flexibility in timetables so teachers have sufficient time to prepare lessons using ICT
BTG23A-L BCT4A-M BTG5 BTG12A-G BTG17A-O BCP7A-K BCP12A-J	Insufficient ICT resources, the ICT incompetence of teachers and learners, an inflexible curriculum	Find different sources for funding ICT resources and organise ICT training sessions for teachers. Adjust the school timetable in order to make efficient use of ICT resources available in the school
BTG24A-G BCT11A-J BCT12A-G	Inadequate TPD in the general and pedagogical use of ICT	Organise TPD courses in the generic and pedagogical uses of ICT for teachers

The majority of teachers do not consider preparing learners for competent ICT use and responsible Internet behaviour as their curriculum goals (BTG08L, BTG08M, BCT17O, BCP16O). On a strategic level, principals need to take initiative to develop a common ICT vision and policy statement for the school, if they do not already have one. On an implementation level, principals can help teachers and learners to formulate rules and procedures for the efficient use of ICT resources. Principals can change the school time-table to fit the requirements for access to ICT facilities for all teachers and learners.

Evidence shows that teachers do not make efficient use of the scheduled learning time in teaching activities and that ICT integration is scarce (BTG09A-M, BCT3A1-B1, BCP16M).

Principals have to monitor the school activities according to the school timetable, account for reasons for the non-use of ICT resources, and amend the situation.

Mathematics and Science teachers' pedagogical activities are mainly teacher-oriented (BTG14A-L, BCP2A-I). More importance is placed on connectedness orientation. Principals can help teachers and learners liaise with collaborators for learner collaborative activities. They can also mediate communication between learners and experts or external mentors. In addition, principals can collaborate with parents in monitoring learners' progress using ICT.

Evidence shows that there is low use of ICT in assessing learner performance (BTG15A-BTG15H, BCP12E). Principals can help teachers and learners use ICT in assessment activities by making changes in the school assessment policies allowed by the curriculum requirements.

Teachers have low levels of confidence in the general use of ICT and even lower levels of confidence in its pedagogical uses (BTG21A-P, BCP16I). Principals could organise TPD workshops on the generic and pedagogical use of ICT and on using the Internet. They can also create flexibility in the school timetable so that teachers have sufficient time to prepare lessons using ICT.

There is evidence for learners' low use of ICT in their learning activities (BTG16A-L, BTG17A-K, BCT2A-E, BCP3A-J, BCP6A-D, and BTG21A-P). Principals could find different sources for funding ICT resources and organise ICT training sessions for teachers. Changes in the school timetable can be made in order to efficiently use the ICT resources available to learners in school, possibly after usual work hours.

The following section presents problems and the potential roles that SPs can play to improve ICT support for teachers. Evidence shows that Mathematics and Science teachers are not competent in Internet use (BTG24A, BCT2D, BCT2E). They need to learn about the security issues and the responsible use of the Internet (BCP5A-BCP5L, BCT17A- BCT17O). They also lack training in the integration of ICT in teaching and learning (BTG24E, BCT11A-BCT11J), as well as in subject-specific training. Mathematics and Science teachers do not make efficient use of ICT resources. They need incentives to integrate ICT. There is also a need to increase the number of ICT capable teachers (BCP6A-BCP6K), and increase the level of co-operation and collaboration with other teachers in the pedagogical use of ICT (BCP10A- BCP10D). A lack of common vision for the use of ICT in many schools is evident.

There is a failure on the part of principals to lead teachers in innovative pedagogical practices (BCP13A-BCP13J).

To help overcome this, principals can arrange meetings with teachers to discuss problems and solutions in integrating ICT in teaching and learning. Teachers would be encouraged to attend workshops on using the Internet if they were also offered flexibility in their work schedule. Principals need to agree with teachers on incentives for integrating ICT in teaching and learning (e.g. adjusting time-tables, buying subject-specific software and providing training). This is one way of many in which principals should provide leadership in innovative ICT pedagogical uses. Another would be to establish rules and procedures for using ICT resources, which should in place before starting the use of ICT. Effective technical support procedures should also be ensured. ICT resources are expensive and ought to be kept secure, both physically and logically.

Principals can also create opportunities for teachers from other schools who have successfully integrated ICT in their school to visit and share their experiences. Hearing of *best practices* in other schools can inspire similar practices in their own. This, and inviting experts to come demonstrate how best ICT can be used in different subjects, could lead to the development of a common ICT vision for the school.

Table 6.10: Principals' potential roles to improve support

Questionnaire	Support Required	Principals' Potential Roles
BTG24A BCT2D BCT2E	Competent Internet use	Encourage teachers to attend ICT training courses. Invite experts to visit the school and demonstrate best practices in ICT-using pedagogy
BTG24E BCT11A-J	Training in the integration of ICT in teaching and learning	Create opportunities for teachers to visit and observe how ICT is successfully integrated in other schools
BTG24F BCT12E BCT12F	Subject-specific training in the use of ICT	Invite experts to come to the school and demonstrate how ICT can be used in different subjects
BCP5A-L BCT17A-O	Security, access and responsible ICT use	ICT resources are expensive and should be kept secure. There should be physical and logical protection. Rules and procedures should in place before starting the use of ICT
BCP6A-K	Efficient use of ICT resources, incentives to integrate ICT, increasing the number of ICT capable teachers	Provide sufficient flexibility to make efficient use of ICT resources. Agree with teachers on incentives for integrating ICT in teaching and learning, e.g., buying subject-specific software and training
BCP10A-D	Co-operation and collaboration with other teachers in ICT use	Organise meetings to discuss problems and solutions in integrating ICT in teaching and learning. Invite teachers who have successfully integrated ICT in their schools to share their experiences
BCP13A-J	Developing a common vision	Develop a common ICT vision for the school.

Questionnaire	Support Required	Principals' Potential Roles
	and leading teachers in innovative pedagogical practices	Establish rules and procedures for using ICT resources. Provide leadership in innovative ICT pedagogical uses. Establish effective technical support procedures

6.5.1 Summary on Principals' Influences to Teachers' ICT Pedagogical practices

The role principals could play in reducing constrains in the use of ICT in teaching and learning (Table 6.10) was presented based on the responses of the SITES 2006 questionnaire. The general findings are in line with common barriers and needs for support found in literature reviews. These include principals' initiatives in solving critical problems such as insufficient ICT resources, a lack of teacher confidence, a lack of teacher and learner competence in the use of ICT, inadequate time available, a lack of effective training in the use of ICT resources, and insufficient technical support (Becta, 2004; Bingimlas, 2009; Cox *et al.*, 2003; Pelgrum, 2001). In addition to the general findings, there is some unique information regarding the potential roles principals could play as revealed by the SITES 2006:

- Principals together with teachers should prepare learners for responsible Internet behaviour
- Principals should specify the compulsory computer related basic knowledge and skills that teachers and learners need
- Principals can use computers for monitoring learners' progress
- Principals ought to identify best ICT pedagogical practices that exist in other schools, regarding the integration of ICT in teaching and learning, and create opportunities for own teachers to become familiar with such practices
- Principals can help teachers to use virtual laboratories and simulations
- Principals should improve security measures while increasing access to teachers, learners, and the local community to ICT facilities at school.

The following section presents a statistical analysis of selected South African grade 8 Mathematics and Science teachers' responses to the SITES 2006 questionnaire.

6.6 Factor Analyses and Correlations

Factor analysis and correlation analysis were conducted on selected grade 8 Mathematics and Science teachers' responses on the SITES 2006 questionnaire. These specific questionnaire responses were selected in order to enable the researcher to answer the following research questions:

- What ICT pedagogical practices and barriers can be identified through factor analysis of the SITES 2006 teachers' data set?
- What are the practically significant correlations among variables represented in the SITES 2006 teachers' dataset?
- Are there significant differences between the responses of Mathematics and Science teachers?
- Are there significant differences between the responses of male and female teachers?

Responses to selected questionnaires in the SITES 2006 data set were analysed with the help of the software Statistical Program for Social Sciences (SPSS, 2011).

6.6.1 Results of Factor Analysis of ICT Pedagogical Practices and Barriers

A Principal axis factor analysis, with oblimin rotation, was conducted on selected items (BTG9, BTG14, BTG15 and BTG 23) of the teacher questionnaire in order to unearth themes of pedagogical practices and barriers present among the variables represented by questionnaires. These specific teacher questionnaire items were selected as they fairly represent the teachers' pedagogical activities (management of learning-assessment activities and management of learners) and barriers present in the classroom. The pedagogical practices (teacher roles, learner roles and assessment methods) are presented in Figures 6.15-6.17 and barriers in Figure 6.16.

Table 6.11: Teacher Roles

Question number	In your teaching of the target class in this school year, how often do you conduct the following?	Factor Analysis		Communalities Extracted
		Factor 1 *Conventional Role*	Factor 2 *Mediating Role*	
BTG14G	Use classroom management to ensure an orderly, attentive classroom	0.696		0.699
BTG14A	Present information, demonstrations and/or give class instructions	0.693		0.548
BTG14E	Assess students' learning through tests or quizzes	0.590		0.549
BTG14F	Provide feedback to individuals and/or small groups of students	0.543		0.719
BTG14C	Help or advise students in exploratory and inquiry activities	0.528		0.591
BTG14B	Provide remedial or enrichment instruction to individual students and or small groups of students	0.454		0.588
BTG14H	Organise, monitor and support team building and collaboration among students	0.407	0.405	0.754
BTG14D	Organise, observe or monitor student-led whole-class discussions, demonstrations and presentations	0.406	0.376	0.710

Question number	In your teaching of the target class in this school year, how often do you conduct the following?	Factor Analysis		Communalities Extracted
		Factor 1 *Conventional Role*	Factor 2 *Mediating Role*	
BTG14J	Liaise with collaborators for student collaborative activities		0.830	0.627
BTG14I	Organise or mediate communication between students and experts or external mentors		0.776	0.709
BTG14K	Provide counselling to individual students		0.640	0.719
BTG14L	Collaborate with parents/guardians/caretakers in supporting or monitoring students' learning and/or providing counselling		0.608	0.587
	Cronbach Alpha	0.847	0.814	
	Mean	25.858	10.327	
	Standard Deviation	4.434	3.007	

Variables in BTG14 questionnaire fitted into two factors (Table 6.11) representing teacher roles. Six variables fitted neatly into factor 1, four fitted into factor 2, and two variables fitted weakly into both, factor 1 and factor 2. A close examination reveals that factor 1 represents the conventional role of a teacher in the classroom, while factor 2 represents teachers' mediating role of the teacher in the classroom, characteristic of constructivist learning. Variables with double loadings were classified in the factor with best interpretability. Factor scores were calculated as the mean of all items contributing to the factor so that the score could be interpreted on the original measurement scale.

Table 6.12: Learner Roles

Question number	In your teaching of the class in this year, how often is the scheduled learning time of the class used for the following activities?	Factor analysis results			
		Factor 1 *Structured Inquiry*	Factor 2 *Conventional Practice*	Factor 3 *Guided Inquiry*	Communalities Extracted Values
BTG9L	Looking up ideas and information	0.760			0.625
BTG9M	Analysing data	0.656			0.501
BTG9K	Studying natural phenomena through simulations	0.624			0.535
BTG9I	Laboratory experiments with clear instructions and well-defined outcomes	0.496			0.279
BTG9F	Field study activities	0.415		0.307	0.396
BTG9H	Exercises to practice skills and procedures		0.733		0.610
BTG9J	Discovering mathematics principles and concepts	0.403	0493		0.508
BTG9G	Teacher's lectures		0.453		0.262
BTG9A	Extended projects			0.639	0.457
BTG9B	Short task project		0.214	0.603	0.449
BTG9C	Multimedia product creation	0.245		0.550	0.507
BTG9E	Scientific investigation	0.389		0.413	0.505
BTG9D	Self-assessed courses and/or learning activities			0.389	0.388
	Cronbach Alpha	0.796	0.682	0.793	
	Mean	11.589	8.616	12.011	
	Standard Deviation	3.487	2.261	3.198	

An examination of the factor analysis results (Table 6.12) indicate that the activities chosen by teachers represent three factors of pedagogical practices. Four variables slightly overlap. Factor 1 mainly represents *structured inquiry based* pedagogical orientation. In *structured inquiry*, teachers provide learners with a hands-on problem to investigate. Teachers also provide the procedures and materials. This is like a cookbook activity. Learners conduct previously established procedures in order to discover relationships between variables, such as proving a theorem in Mathematics or verifying a law in Natural Science, or otherwise generalise from data collected (Colburn, 2000). Here, the emphasis is on the *processes of science*. The focus is on *how we know* and follows generally accepted scientific research procedures, such as identifying and posing questions, designing and conducting investigations, analysing data and evidence, using models and explanations, and communicating the findings.

Factor 2 mainly represents *conventional* pedagogical orientation, where all learners receive a *one size fits all* presentation and every learner does the same thing at the same time such as completing a worksheet or taking a test. Here, the activities are teacher oriented. Pedagogy is aimed at helping learners to pass tests and achieve high scores in examinations. *Conventional* pedagogical orientation emphasises the *products of science*. Learners have to remember facts, figures, rules and procedures and apply them in tests and examinations. The focus is on *what we know*.

Factor 3 mainly represents *guided inquiry* pedagogical orientation (Colburn, 2000). Here, the teacher provides only the problems to investigate and needed, requested resources will be supplied. Learners devise their own procedure to solve the problem. Activities involve learners in self-initiated, self-sustained learning activities. Learners participate in scientific investigations to solve a problem and create a product. Learners often collaboratively participate in short task projects or extended projects. Problem- and inquiry-based learning emphasizes learners' own activities and aims to enhance social interaction among learners by creating a framework for collaboration (Salovaara, 2005). There is some evidence that minimal guidance during instruction does not work (Kirschner, Sweller, & Clark, 2006). Inquiry-based instruction uses the research process of the discipline as the pedagogy for learning. This does not make a distinction between the behaviours of a researcher who is an expert practicing a profession and learners who are new to the discipline and who are thus, essentially, novices. Unguided instruction is less effective and learners may acquire misconceptions or incomplete or disorganised knowledge. It may be a mistake to assume that pedagogic content of the learning experience is identical to the methods and processes (i.e., the epistemology) of the discipline being studied. Both *products* and *processes* are important in instruction (Kirschner *et al.*, 2006).

Table 6.13: Methods of Assessing Learner Performance

Question number	In your teaching of the target class in this school year: (a) how often do you conduct the following? (b) do you use ICT for these activities?	Factor Analysis		Communalities Extracted factors
		Factor 1 *Conventional*	Factor 2 *Constructivist*	
BTG15A	Written test or examination	0.933		0.862
BTG15B	Written task/exercises	0.938		0.853
BTG15C	Individual oral presentation		0.656	0.408
BTG15D	Group presentation(oral or written)		0.764	0.583
BTG15E	Project report and or MM product		0.603	0.367
BTG15F	Student's peer evaluations		0.671	0.439
BTG15G	Portfolio or learning log	0.364	0.323	0.308
BTG15H	Assessment on collaborative tasks		0.730	0.545
	Cronbach's alpha	0.534	0.738	
	Mean	5.891	11.093	
	Standard deviation	0.406	1.141	

Table 6.13 represents the factor analysis of teacher questionnaire BTG15. It represents the methods of assessing learner performances. The total variance explained by the extracted factors is 54.57%. An examination of the results of a factor analysis of BTG15 reveals that BTG15A and BTG15B fit neatly into factor 1 and BTG15C to BTG15H fit into factor 2. BTG15G fits poorly into both factors 1 and 2. BTG15A and BTG15B represent written tests or examinations and written tasks or exercises, respectively. These are conventional assessment practices where all learners take part in identical tasks, exercises, tests and examinations. BTG15C to BTG15H represent constructivist assessment practices such as creating learning products, collaborative tasks and peer assessment.

A factor analysis of teacher questionnaire items BTG9, BTG14 and BTG15 (representing pedagogical practices) reveals that South African grade 8 Mathematics and Science teachers engage in both conventional and constructivist pedagogical practices. There is a strong emphasis on group work, collaborative tasks, peer evaluations, project works and product creation. However, conventional practices such as whole class presentations, practicing skills and procedures and written tests and exams dominate the classroom. This may be due to the lack of resources in the school, a lack of competence in teachers, or both.

Table 6.14: Correlation between identified factors and ICT use (Spearman's rho)

	BTG9 *Conven-tional learning*	**BTG9** *Guided inquiry learning*	**BTG9** *Structured inquiry learning*	***BTG14*** *Conven-tional role of teacher*	**BTG14** *Mediating role of teacher*	**BTG15** *Conventional assessment practices*	**BTG15** *Constructivist assessment practices*
ICT Used	0.06224	0.11648	0.24259	0.01579	0.16676	0.051315	0.12909

Spearman rank-order correlations were determined (Table 6.14) between factors identified on the A-part (variables) and B-part (whether ICT was used or not) on questionnaire items BTG9, BTG14 and BTG15. This was done to examine the extent of ICT use in each of the identified factors. The results show that there is little correlation between identified factors and ICT use. This is probably due to the very low level ICT-use (less than 24%) of teachers.

Factor analysis was also conducted on teacher questionnaire items BTG23A to BTG23L in order to find out common themes in the barriers faced by teachers when using ICT for teaching and learning.

Table 6.15: Pedagogical barriers

Question number	Do you experience the following obstacles in using ICT in your teaching?	Factor analysis results			Communalities Extracted Factors
		Factor 1 *Teacher Level Barriers*	Factor 2 *School Level Barriers*	Factor 3 *Curriculum Related Barriers*	
BTG23C	I do not have the required ICT-related skills	0.915			0.795
BTG23D	I do not have the required ICT-related pedagogical skills	0.748			0.657
BTG23L	I do not have access to ICT outside school	0.237		0.229	0.437
BTG23F	My learners do not possess the required ICT skills		0.654		0.470
BTG23B	My school does not have the required ICT infrastructure		0.644		0.383
BTG23J	My school lacks digital learning resources		0.640		0.416
BTG23G	My school does not have access to the required ICT tools outside of the school premises		0.630		0.247
BTG23A	ICT is not considered to be useful in my school		0.242	0.231	0.136
BTG23H	I do not have the time necessary to develop and implement the activities			0.573	0.292
BTG23K	I do not have the flexibility to make my own decisions when planning lessons with ICT			0.515	0.464
BTG23I	I do not know how to identify which ICT tools will be useful	0.388		0.448	0.517
BTG23E	I do not have the sufficient confidence to try new approaches alone	0.282		0.406	0.333
	Cronbach's alpha	0.724	0.714	0.696	
	Mean	4.686	8.108	5.831	
	Standard deviation	1.191	1.526	1.434	

An examination of the results of the factor analysis (Table 6.15) indicates that variables under factor 1 mainly represent teacher level barriers, variables under factor 2 mainly represent school level barriers and variables under factor 3, BTG23H and BTG23K specifically, represent barriers related to the curriculum. Four variables fall weakly into two factor groups because they partly share these characteristics. Factor 1 represents teachers' inadequacy in knowledge, skills, confidence and access in the use of ICT. Factor 2 represents barriers related to the school and learners. Factor 3 mainly represents curriculum related barriers. The common themes represented by these factors are in congruence with the literature review regarding barriers faced by teachers when using ICT for teaching and learning (Bingimlas, 2009). The following section presents the results of correlation analysis conducted on the factors identified through factor analyses.

6.7 Correlations Found Among Factors Identified Through Factor Analysis

Spearman's Rank Order Correlations (r_s) were calculated for the factors identified from teacher questionnaire items BTG 9 (Table 6.12), BTG 14 (Table 6.11), BTG 15 (Table 6.13) and BTG 23 (Table 6.15). The results are presented in Table 6.10. Only instances of $r_s \geq 0.3$ are presented in the table. Values of approximately 0.3 are medium effects, which tend towards practically significant correlations. Values r_s of approximately 0.5 or larger are large effects, indicative of practically significant correlations. Each of the meaningful correlations in Table 6.16 is described (§ 6.7.1-6.7.15).

Table 6.16: Spearman Rank Order Correlations ($r_s \geq 0.3$) among factors identified through factor analysis of BTG9 (Table 5.5), **BTG14** (Table 5.6), **BTG15** (Table 5.7) **and BTG23** (Table 5.9)*

Factors	**BTG9 Structured Inquiry**	**BTG9 Guided Inquiry**	**BTG9 Conventional Pedagogy**	**BTG14 Conventional Teacher's Role**	**BTG14 Mediating Teacher's Role**	**BTG15 Conventional Assessment**	**BTG15 Constructivist Assessment**	**BTG23 Teacher level Barriers**	**BTG23 School level Barriers**	**BTG23 Curriculum barriers**
BTG9 Structured Inquiry		0.629	0.459	0.383	0.448		0.351			
BTG9 Guided Inquiry	0.629		0.425	0.390	0.397		0.325			
BTG9 Conventional Pedagogy	0.459	0.425		0.359						
BTG14 Conventional Teacher's Role	0.383	0.390	0.359		0.535					
BTG14 Mediating Teacher's Role	0.448	0.397		0.535			0.347			
BTG15 Conventional Assessment										
BTG15 Constructivist Assessment	0.351	0.325			0.347					
BTG23 Teacher level Barriers									0.405	0.561
BTG23 School level Barriers								0.405		0.350
BTG23 Curriculum barriers								0.561	0.350	

* Only Spearman Correlations (r_s) ≥ 0.3, indicative of medium and large effects are listed

6.7.1 Correlation between BTG9 (Structured Inquiry) and BTG9 (Guided Inquiry) → r_s = 0.629

A large effect size (r_s = 0.629), indicative of a practically significant correlation, was found between BTG9 (Structured Inquiry) and BTG9 (Guided Inquiry). This kind of correlation is expected since structured inquiry and guided inquiry both incorporate *active learner participation* in learning activities. Activities are learner centred and teacher acts as a facilitator (Colburn, 2000). Structured inquiry and guided inquiry both promote *how* we know, rather than *what* we know. The emphasis is on the epistemology of the discipline. In South Africa, school teachers need to promote guided inquiry approach in the classroom where possible. Guided inquiry approach is possible where learners are capable of self-initiated and self-sustained problem solving skills.

6.7.2 Correlation between BTG9 (Structured Inquiry) and BTG9 (Conventional Pedagogy) → r_s = 0.459

A medium effect size (r_s = 0.459), which tends towards a practically significant correlation, was found between *BTG9 structured inquiry pedagogical practices* and *BTG9 conventional pedagogical practices*. In structured inquiry and conventional pedagogical practices, the learners strictly follow the directions of the teacher. The teachers initiate, manage and assess learners' actions. Typically, all learners engage in identical activities synchronously. The main objective of these activities is to help learners to get high marks on tests and examinations (SITES, 2008). ICT could help South African classrooms move teaching and learning from teacher centeredness to learner centeredness.

6.7.3 Correlation between BTG9 (Structured Inquiry) and BTG14 (Conventional Teacher's Role) → r_s = 0.383

A medium effect size (r_s = 0.383), which tends towards a practically significant correlation, was found between BTG9 Structured Inquiry and BTG14 Conventional Teacher's Role. Conventional teachers' roles are habitually associated with teachers' lectures, learners practicing laboratory skills and procedures, and learners rediscovering mathematical principles and concepts (SITES, 2008). Structured inquiry is characterised by the typical *cook book activity,* where all resources and instructions are supplied by the teacher. Learners simply follow instructions and achieve outcomes predetermined by the teacher (Colburn, 2000). Thus structured inquiry appears to be complementary to the conventional role of the teacher.

ICT could help South African learners to use their creativity and critical thinking skills to become independent learners.

6.7.4 Correlation between BTG9 (Structured Inquiry) and BTG14 (Mediating Teacher's Role) → $r_s = 0.448$

A medium effect size ($r_s = 0.448$), which tends towards a practically significant correlation, was found between BTG9 structured inquiry and BTG14 mediating teacher's role. The teacher, in a mediating role, skilfully helps learners understand their common objectives and plan how to achieve the common objectives. The teacher in a mediating role also helps learners to codify the purpose, scope and deliverables. A mediating teacher plays multiple roles: mentor, tutor, guide, manager, interpreter, and consultant or expert. It is natural that a teacher in a mediating role has a medium sized effect with structured inquiry activities. South African teachers can inspire and add energy to learners' activities by providing meaningful experiences in a stimulating ICT enabled environment while playing a mediating role.

6.7.5 Correlation between BTG9 (Structured Inquiry) and BTG15 (Constructivist Assessment Practices) → $r_s = 0.351$

A medium effect size ($r_s = 0.351$), which tends towards a practically significant correlation, was found between BTG9 structured inquiry and BTG15 constructivist assessment practices. Constructivist assessment practices are associated with learning products, learners' reflection and collaboration. It makes use of individual and group presentations, project reports, multimedia products, peer evaluations, portfolios, and assessment of group performance on collaborative tasks. Structured inquiry makes use of the epistemological skills of a discipline which is useful for teachers to effectively make use of it in constructivist assessment practices, and this explains the correlation. South African teachers could make use of constructivist assessment practices, where learners could apply their knowledge and skills to practical, real-life situations using ICT.

6.7.6 Correlation between BTG9 (Guided Inquiry) and BTG15 (Conventional Pedagogical Practices) → $r_s = 0.425$

A medium effect size ($r_s = 0.425$), which tends towards a practically significant correlation, was found between BTG9 guided inquiry and BTG15 conventional pedagogical practices. It is interesting to note the medium effect size between guided inquiry and conventional pedagogical practices because, ideally, learners are expected to have very different experiences in these two contexts. This researcher has the following explanation for the observed correlation. Conventional pedagogical practices are teacher-centred while guided inquiry practices are learner centred (Colburn, 2000). Where the teachers are not fully competent in conventional pedagogical practices, they may present the problems (or learning activity) to the learners but may fail to satisfactorily help them to solve the problem. The learners may be forced to resort to guided inquiry practices such as group work and peer evaluations in order to solve the problem. South African teachers could use ICT and Internet resources to improve their subject knowledge and skills.

6.7.7 Correlation between BTG9 (Guided Inquiry) and BTG14 (Conventional Teachers' Role) →r_s = 0.390

A medium effect size (r_s = 0.390), which tends towards a practically significant correlation, was found between BTG9 guided inquiry and BTG14 conventional teachers' roles. Conventional pedagogical practices form a subset of the practices associated with the conventional role of the teacher. In a conventional role, teachers typically: use classroom management to ensure an orderly, attentive classroom; present information, demonstrations, instructions or a combination of these; assess achievement through quizzes or tests; and provide remedial or enrichment activities according to the contexts. Once again the correlation points towards incompetency in the part of the conventional role (or conventional pedagogical practices) of the teacher (§ 5.7.6). ICT could help South African teachers and learners improve their knowledge and skills in their subject areas.

6.7.8 Correlation between BTG9 (Guided Inquiry) and BTG14 (Mediating Teachers' Role)→r_s = 0.397

A medium effect size (r_s = 0.397), which tends towards a practically significant correlation, was found between BTG9 guided inquiry and BTG14 mediating teachers' roles. The observed medium sized effect is justified by the complementary relationship between guided inquiry and the mediating role of teachers. In guided inquiry, teachers provide the problems and requested resources to the learner (Colburn, 2000). In a mediating role, teachers: provide encouraging environments; encourage and accept learner initiatives; ask learners to use their knowledge and skills to solve problems; and ask open-ended questions to stimulate critical thinking. South African teachers in a mediating role need to see learners' unsatisfactory performance as an opportunity for timely intervention and effective help.

6.7.9 Correlation between BTG9 (Guided Inquiry) and BTG15 (Constructivist Assessment Practices) →$r_s = 0.325$

A medium effect size ($r_s = 0.325$), which tends towards a practically significant correlation, was found between BTG9 guided inquiry and BTG15 constructivist assessment practices. This researcher expected such a correlation. There is a complimentary relationship between guided inquiry and constructivist assessment practices. The concept of guided inquiry is explained in § 5.7.1. Constructivist assessment practices are explained in 5.7.5. Constructivist assessment practices are tools with which guided inquiry activities are evaluated. Learning products, project reports, and portfolios are common examples. South African teachers need to make more use of guided inquiry and constructivist assessment practices.

6.7.10 Correlation between BTG9 (Conventional pedagogy) and BTG14 (Conventional teachers' Role) →$r_s = 0.359$

A medium effect size ($r_s = 0.359$), which tends towards a practically significant correlation, was found between BTG9 conventional pedagogy and BTG14 conventional teachers' role. This researcher expected such a correlation. Conventional pedagogical practices are a subset of the conventional role of the teacher. ICT could help South African teachers change their conventional pedagogical practices.

6.7.11 Correlation between BTG14 (Conventional Teacher's Role) and BTG14 (Mediating Teachers' Role) →$r_s = 0.535$

A large effect size ($r_s = 0.535$), indicative of a practically significant correlation, was found between BTG14 (Conventional Teachers' Role) and BTG9 (Mediating Teachers' Role). This researcher expected a correlation of this value. In a conventional role, teachers present information, demonstrations, class instructions or a combination of these. They ensure an orderly attentive classroom, and use tests or quizzes to assess learners' achievement. The conventional role of the teacher shares common objectives with the mediating role of the teacher when the teacher acts as a manager and interpreter of the learning events. Both these roles also help learners to prioritise activities that are most important and highly relevant. In addition, these roles also have the common strategy of intervening when learners present less-than-expected standards of work. ICT can help South African teachers either in a conventional teachers role or a mediating teachers role.

6.7.12 Correlation between BTG14 (Mediating Teachers Role) and BTG15 (Conventional Assessment practices) →r_s = 0.347

A medium effect size (r_s = 0.347), which tends towards a practically significant correlation, was found between BTG14 mediating teachers' role and BTG15 conventional assessment practices. A mediating teacher's role is explained in § 5.7.7. Conventional assessment practices involve learners taking written tests and examinations, written tasks and exercises, or a combination of these. Conventional assessment practices require the managerial skill and subject expertise of the mediating teachers' role. ICT can help South African teachers in their mediating roles and also in carrying out conventional assessment practices.

6.7.13 Correlation between BTG23 (Teachers Level Barrier) and BTG23 (School Level Barrier) →r_s = 0.405

A medium effect size (r_s = 0.405), which tends towards a practically significant correlation, was found between BTG23 Teachers Level Barrier and BTG23 School Level Barrier. The teacher level barrier mainly represents: teachers' lack of ICT related skills, ICT related pedagogical skills and their inability to choose the most suitable ICT tools for teaching and learning. School level barriers mainly represent: learners' insufficient ICT skills, schools' insufficient ICT infrastructure, insufficient digital resources, and inadequate access to ICT tools outside of the school premises. Teachers' insufficient ICT skills and insufficient ICT pedagogical skills can easily be related to the insufficient ICT infrastructure and inadequate digital resources in the school. The DBE urgently needs to take necessary and sufficient steps to alleviate school level and teacher level barriers regarding ICT.

6.7.14 Correlation between BTG23 (Teachers Level Barrier) and BTG23 (Curriculum Related Barriers) →r_s = 0.561

A large effect size (r_s = 0.561), indicative of a practically significant correlation, was found between BTG23 (Teachers Level Barrier) and BTG9 (Curriculum Barrier). The teacher level barrier is explained in § 5.7.13. Curriculum related barriers for teachers mainly represent: insufficient time, insufficient flexibility in decision making, and a lack of confidence in using ICT for teaching and learning. The lack of teacher-confidence correlates with the teacher level barriers listed in § 5.7.13. The DBE needs to note that without adequate ICT resources and thorough experience using these ICT resources, teachers may not feel confident to use ICT for teaching and learning.

6.7.15 Correlation between BTG23 (School Level Barriers) and BTG23 (Curriculum Related Barriers) →r_s = 0.350

A medium effect size (r_s = 0.350), which tends towards a practically significant correlation, was found between BTG23 School Level Barriers BTG23 Curriculum Related Barriers. School level barriers are explained in § 5.7.13 and curriculum related barriers are explained in § 5.7.14. A lack of time and the inflexibility of the school curriculum negatively affect the school in efficiently using the ICT resources available. South African school curricula do not encourage using ICT for assessment purposes in school subjects other than *Information Technology* and *Computer Applications*. The DBE needs to recognise the rightful role of ICT in the curriculum if it wants to fully integrate ICT into teaching and learning.

6.7.16 Summary of Significant Correlations Found Among Factors Identified Through Factor Analyses

The large and medium effect sizes (Spearman's Rank Order Correlations - r_s) calculated between the factors identified from teacher questionnaire items BTG 9 (Table 6.12), BTG 14 (Table 6.11), BTG 15 (Table 6.13) and BTG 23 (Table 6.15) are summarized in Table 6.17.

Table 6.17: Summary of Significant Correlations

Large effect sizes indicative of Practically Significant Correlations		
Factor 1	**Factor 2**	r_s
BTG 9 Structured inquiry	BTG 9 Guided inquiry	0.629
BTG23 Teachers level barrier	BTG9 Curriculum barrier	0.561
BTG14 Conventional teachers' role	BTG9 Mediating teachers' role	0.535
Medium effect Sizes tending towards Practically Significant Correlations		
Factor 1	**Factor 2**	r_s
Conventional role of the teacher	Guided inquiry role of the learner	0.390
Conventional role of the teacher	Structured inquiry role of the learner	0.383
Conventional role of the teacher	Conventional role of the learner	0.357
Mediating role of the teacher	Guided inquiry role of the learner	0.397
Mediating role of the teacher	Structured inquiry role of the learner	0.448
Mediating role of the teacher	Constructivist assessment practices	0.347
Constructivist assessment practices	Guided inquiry role of the learner	0.325
Constructivist assessment practices	Structured inquiry role of the learner	0.351
Conventional role of the learner	Structured inquiry role of the learner	0.459
Conventional role of the learner	Guided inquiry role of the learner	0.425
Teacher level barriers	School level barriers	0.405
School level barriers	Curriculum barriers	0.351

A large effect size (r_s = 0.629), indicative of a practically significant correlation, was found between BTG9 (Structured Inquiry) and BTG9 (Guided Inquiry). Another large effect size (r_s =

0.561), indicative of a practically significant correlation, was found between BTG23 (Teacher Level Barrier) and BTG9 (Curriculum Barrier). A large effect size ($r_s = 0.535$), indicative of a practically significant correlation, was also found between BTG14 (Conventional Teachers' Role) and BTG9 (Mediating Teachers' Role). The practically significant correlation between structured inquiry and guided inquiry is indicative of the common strategy (of using the processes of discipline as pedagogy) present in both of them. The practically significant correlation between teacher level barriers and curriculum barriers is understandable because without removing the curriculum barriers, (such as the insufficient use of ICT for assessment in all school subjects), teacher level barriers (such as a lack of time and insufficient confidence in using ICT for pedagogical purposes) will remain in effect. The practically significant correlation between Conventional Teachers' Role and Mediating Teachers' Role reveals the common role shared between them; the role of a learners' manager. Medium level correlations, which tend towards practical significance, were found between various factors.

6.8 Mathematics and Natural Science Teachers' Preference to the Conventional use of ICT

Table 6.18 presents the Spearman's Correlations with and without ICT for teachers' pedagogical practices.

Table 6.18: Spearman's Correlations with and without ICT for Teachers' Pedagogical practices

Roles of the teacher (Variables)	Correlations without ICT (r_s)	Correlations with ICT (r_s)	Mediating role of teacher, roles of learners, and assessment practices (other variables)
Conventional role of teachers	0.535	0.0876	Mediating role of the teachers
	0.390	0.641	Guided inquiry roles of the learners
	0.359	0.656	Conventional roles of the learners
	0.383	0.673	Structured inquiry roles of the learners
	0.232	0.703	Constructivist assessment practices
	0.108	0.687	Conventional assessment practices
Mediating role of teachers	0.397	0.529	Guided inquiry roles of the learners
	0.237	0.552	Conventional roles of the learners
	0.448	0.567	Structured inquiry roles of the learners
	0.347	0.605	Constructivist assessment practices
	0.062	0.522	Conventional assessment practices

When using ICT, pedagogical practices consistently shows that, teachers' conventional role makes more use of ICT than teachers' mediating role. ICT has more potential use in the teachers' mediating role.

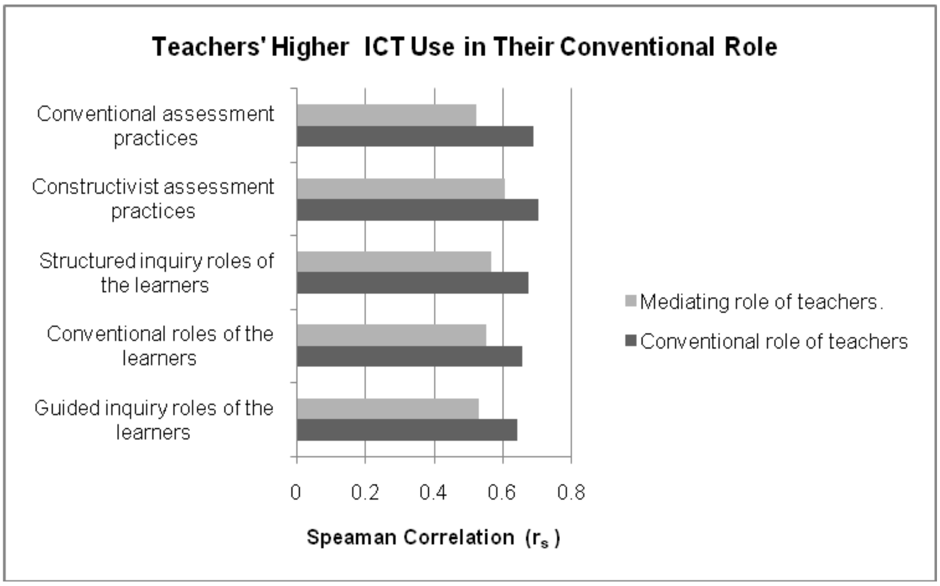


Figure 6.18: Teachers' Higher Pedagogical use of ICT in their Conventional Role

This finding indicates that when teachers use ICT, they still use it for conventional pedagogical practices. This is in accordance with literature reviews about the pedagogical uses of ICT (Cox et al., 2003). Spearman's correlations without ICT do not show any specific trends between the conventional and mediating roles of the teacher.

6.9 Difference between the Responses of Male and Female Teachers

A T-Test was conducted to find the differences between the responses of male and female teachers in the SITES 2006. It was found that there is no practical difference between the responses of male and female teachers for the South African dataset of the SITES 2006. Effect size was also calculated and found to be less than 0.24.

6.10 Difference between the Responses of Mathematics and Science teachers

A T-Test to find out the differences between MTs and Science teachers indicated that there is a statistically significant difference between Mathematics and Science teachers, however this is not practically important (effect size < 0.3).

6.11 Short Overview of Data Analysis

Chapter 6 presented answers to the research questions listed in Chapter 1. South Africa's Grade 8 Mathematics and Science teachers' ICT pedagogical practices are not satisfactory. They face barriers similar to their international counterparts. They do not get the required support for sustainable ICT pedagogical use. SPs can provide a significant level of support for the teachers. Statistical analyses were able to identify common themes among teachers' responses. Correlation analysis revealed the interrelationships between the identified factors in factor analyses. There is an urgent need to address teacher level and curriculum level barriers. There is no significant difference between the practices of Mathematics and Science teachers. In addition there are no significant differences between male and female teachers' pedagogical practices. A full summary of the *Ecological Activity Systems Analyses* and other findings is presented in Chapter 7.

Chapter 7

Summary and Recommendations

7.1 Introduction

Chapter 7 provides short summaries of the prior chapters of this research report, which comprises an outline of the thesis, the conceptual framework, literature reviews, the findings of the SDA, i.e. descriptive statistics relevant to the different ecological systems of the South African Education System based upon the Ecological Activity Systems Analysis, as well as correlations found between factors identified through factor analyses. Holistic interpretations are presented of the correlations pertaining to the conventional, mediating, and structured inquiry roles of grade 8 Natural Science teachers (NST) and Mathematics teachers (MT), the guided inquiry and conventional roles of grade 8 Natural Science and Mathematics learners, constructive assessment practices, ICT pedagogical barriers, as well as the ICT pedagogical practices of grade 8 Natural Science and Mathematics teachers. The chapter provides a Chronosystem analysis in which the findings of Chapter 6 are used to evaluate the evolution of the education system with regard to ICT implementation and use, as well as the ICT development of NST and MT over a period of time (2004-2013), according to the objectives of the White Paper on e-Education (South Africa, 2004). The Ecological Activity Systems Analysis is then makes recommendations for the different ecological systems of the South African education system, as well as for the further implementation and management of the White Paper on e-Education. The chapter concludes with limitations of this study and questions put forth for future research.

7.2 Summary of Chapters

Sections 7.2.1 to 7.2.6 present short summaries of the preceding chapters.

7.2.1 Summary of Chapter 1: Orientation of the Study

Chapter 1 presents the detailed plan for this study, including the context of the research, a short literature review, the research questions and aims, a general indication of the research design and methodology, as well as an outline of this thesis.

7.2.2 Summary of Chapter 2: Ecological Activity Systems Theory as Conceptual Framework)

Chapter 2 presents the Ecological Activity Systems Theory Conceptual Research Framework that was used in Chapter 6 for the SDA. Table 7.1 provides an overview of the conceptual framework.

Table 7.1: Ecological Activity Systems Theory as Conceptual Research Framework for the Secondary Data Analysis

	BRONFENBRENNER'S ECOLOGICAL SYSTEMS THEORY					
	Self	***Microsystem***	***Mesosystem***	***Exosystem***	***Macrosystem***	***Chronosystem***
ENGESTRÖM'S HUMAN ACTIVITY SYSTEMS THEORY	*Curriculum goals* *Learning opportunities* *Teacher practices and the use of ICT* *Assessment and use of ICT* *Learning resources* *General and pedagogical use of ICT*	*Curriculum goals* *Learning opportunities* *Teacher practices and the use of ICT* *Assessment and use of ICT* *Learning resources* *General and pedagogical use of ICT*	*Curriculum goals* *Learning opportunities* *Teacher practices and the use of ICT* *Assessment and use of ICT* *Learning resources* *General and pedagogical use of ICT*	*Curriculum goals* *Learning opportunities* *Teacher practices and the use of ICT* *Assessment and use of ICT* *Learning resources* *General and pedagogical use of ICT*	*Curriculum goals* *Learning opportunities* *Teacher practices and the use of ICT* *Assessment and use of ICT* *Learning resources* *General and pedagogical uses of ICT*	The evolution of the education system and the development of teachers over a period of time (2004-2013) according to the objectives of the 2004 White Paper on e-Education (§ 7.4)

The conceptual framework (abridged in Table 7.1) is a fusion of Bromfenbrenner's Ecological Systems Theory (Bronfenbrenner, 1979b; Bronfenbrenner, 1986) and Engeström's Human Activity Systems Theory (1987a; 2009; Vygotsky, 1978). Table 2.3 2 provides an extended summary of the conceptual framework that was used in Chapter 6 as a guide for the SDA. The conceptual framework in the current chapter also makes recommendations for the different ecological systems of the South African Education System (§ 7.5.1).

7.2.3 Summary of Chapter 3 (Literature Review)

Chapter 3 constitutes the literature review for this study, which includes an overview of the history of computers in education, the use of ICT in school education, the need for change in pedagogy in the information age, stages of ICT integration, different roles of computers in education, barriers to effective ICT pedagogical practices, trends and issues in ICT pedagogical practices, as well as an overview of Mathematics and Science education in South

Africa, and the potential contributions of ICT in Mathematics and Science education. Chapter 3 concludes that the installation of computers in the schools, by itself, is not going to solve the problem of transforming teachers' pedagogical practices in the classroom. NST and MT should become confident in the use of ICT, and they must develop the ability to choose and make use of appropriate ICT tools for pedagogical practices in their classrooms.

7.2.4 Summary of Chapter 4 (Overview of the Secondary Information Technology in Education Studies)

Chapter 4 provides an overview of SITES module 1 and module 2, followed by a detailed description of module 3 (SITES 2006), on which South African dataset (Addenda 5.4-5.6), the current research conducted a SDA. Chapter 4 explores the conceptual frameworks for SITES 2006, the research questions that guided the original research, the administered questionnaires (Addenda 5.1-5.3), the research sample, as well as other methodological issues and general findings related to the original SITES 2006.

7.2.5 Summary of Chapter 5 (Research Design and Methodology)

Chapter 5 presents the research design and methodology of the current SDA. The chapter begins by anchoring the SDA within the *radical functionalist* research paradigm (Burrel & Morgan, 1979), followed by a description of the study population and the secondary data analysis (SDA) performed on the main variables of this investigation. The SDA was conducted on the South African dataset (Addenda 5.4-5.6) of SITES 2006, collected with a questionnaire to NSTs and MTs (Addendum 5.1), a questionnaire to SP (Addendum 5.2) and a questionnaire to TC (Addendum 5.3). Chapter 5 furthermore explains the statistical procedures used in the SDA, addresses issues related to the reliability and validity of the findings, ethical considerations, as well as the limitations of the research.

7.2.6 Summary of Chapter 6 (Findings from the Secondary Data Analysis)

Chapter 6 reports on the findings derived from the SDA. Table 7.2 provides the section division of the descriptive statistics, calculated as part of the SDA, into ICT related themes, as well as the corresponding SITES 2006 questionnaire items.

Table 7.2: Descriptive Statistics Section Division

Sections	Themes	SITES 2006 Questionnaire Items*
§ 6.2.1	Curriculum goals	BTG8A1-BTG8M1
§ 6.2.2	Learning opportunities	BTG9A1-BTG9M1
§ 6.2.3	Teacher practice and use of ICT	BTG14A1-BTG14L19
§ 6.2.4	Assessment and use of ICT	BTG15A1-BTG15H1
§ 6.2.5	Learning resources	BTG17A1-BTG17K1
§ 6.2.6	General and pedagogical uses of ICT	BTG21A1-BTG21P1
§ 6.3.1	Professional support	BTG24A-BTG24G
§ 6.3.2	Pedagogical support	BCP15A-BCP15F
§ 6.3.3	Technical support	BCT16A-BCT16K
§ 6.4.3	Barriers reported by teachers and principals	BTG 23A-BTG23L
§ 6.5.3	Principals' influences on the teachers' pedagogical use of ICT	BTG23A-BTG23L BCT4A-BCT4M BTG5K BTG12A-BTG12G BTG17A-BTG17O BCP7A-BCP7K BCP12A-BCP12J

***** Table Keys
BTG = Teacher Questionnaire (Addendum 5.1)
BCP = Principal Questionnaire (Addendum 5.2)
BCT = Technology Coordinator Questionnaire (Addendum 5.3)

The subsequent sections provide short summaries of the main findings of the SDA.

7.2.6.1 Summary of Descriptive Statistics

Table 7.3 provides the Ecological Activity Systems analysis of descriptive statistics relevant to the different ecological systems of the South African education system. Table 7.3 is self-explanatory; therefore no discussion follows the table.

Table 7.3: Ecological Activity Systems Analysis of Descriptive Statistics

			ECOLOGICAL SYSTEM
			Self (Intrapersonal) *Dialogues and Reflections*
ACTIVITY SYSTEM	**Activity**	*Intra-personal* dialogues and reflections on planning of teaching methods to prepare learners to become competent and responsible ICT and Internet users	**Curriculum Goals** ▪ 78.93% of NSTs think it is important to prepare learners for competent ICT use based on the school curriculum, while 21.08% do not; 75.22% of MTs think it is important to prepare learners for competent ICT use based on the school curriculum, while 24.78% do not ▪ 66.16% of NSTs think it is important to prepare learners for responsible Internet behaviour based on the school curriculum, while 33.84% do not; 61.03% of MTs think it is important to prepare learners for responsible Internet behaviour based on the school curriculum, while 38.97% do not **Learning Opportunities** ▪ 13.74% of NSTs and 7.21% of MTs use scheduled time to learn to use ICT; 86.26% of NSTs and 92.79% of MTs report that learners do not effectively use sched-

			ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
			uled time to learn to use ICT, for example, when studying natural phenomena through simulations ▪ 23.61% of NSTs and 20.52% of MTs use ICT for searching for information, while 76.39% of NSTs and 79.48% of MTs never use ICT for searching for information ▪ 18.37% of NSTs and 15.08% of MTs use ICT for processing and analysing data, while 81.63% of NSTs and 84.92% of MTs never use it **Teachers' Pedagogical Practices Using ICT** ▪ 11.80% of NSTs and 7.96% of MTs use ICT to organise and/or mediate communication between learners and experts/external mentors while 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between learners and experts/external mentors ▪ 12.66% of NSTs and 13.37% of MTs use ICT to provide enrichment/remedial instructions while 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions ▪ 14.41% of NSTs and 16.35% of MTs use ICT for demonstrations/presenting information while 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information **Teachers' Assessment Activities Using ICT** ▪ 21.08% of NSTs and 14.92% of MTs made use of ICT to assess learners' project reports and/or multimedia products while 78.92% of NSTs and 85.08% of MTs did not make use of ICT to assess learners' project reports and/or multimedia products ▪ 23.15% of NSTs and 21.185 of MTs made use of ICT to assess learners' written work or exercises while 76.58% of NSTs and 80.76% of MTs did not make use of ICT to assess learners' written work or exercises **Teachers' Use of ICT Resources** ▪ 32.29% of NSTs and 35.92% of MTs made use of tutorial/exercise software in their teaching while 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching ▪ 21.35% of NSTs and 20.21% of MTs made use of the Office suite for teaching while 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching ▪ 13.97% of NSTs and 14.97% of MTs made use of simulations or modelling software for teaching while 86.03% of NSTs and 85.03% of MTs never made use of simulations or modelling software for teaching **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪ 14.58% of NSTs and 15.31% of MTs prepare lessons that involve the use of ICT by learners while 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners ▪ 13.95% of NSTs and 14.37% of MTs know which learning/teaching situations are suitable for ICT use while 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT

			ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
			use ▪ 14.51% of NSTs and 15.93% of MTs use ICT in collaboration with others while 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Teacher's activities, roles, interactions and interpersonal relations using ICT*
ACTIVITY SYSTEM	**Activity**	Teacher's activities, roles, interactions and *inter-personal* relations with an individual learner using ICT to prepare him/her to become a competent and responsible ICT and Internet user	**Curriculum Goals** ▪ 78.93% of NSTs take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, while 21.08% do not; 75.22% of MTs take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, while 24.78% do not ▪ 66.16% of NSTs take on the role of TC and perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, while 33.84% do not; 61.03% of MTs take on the role of TC and perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, while 38.97% do not **Learning Opportunities** ▪ 13.74% of NSTs and 7.21% of MTs are make use of scheduled time for learn to use ICT while 86.26% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations ▪ 23.61% of NSTs and 20.52% of MTs use ICT for searching for information, while 76.39% of NSTs and 79.48% of MTs never use it ICT for searching for information ▪ 18.37% of NSTs and 15.08% of MTs use ICT for processing and analysing data, while 81.63% of NSTs and 84.92% of MTs never use ICT for processing and analysing data **Teachers' Pedagogical Practices Using ICT** ▪ 11.80% of NSTs and 7.96% of MTs use ICT to organise and/or mediate communication between learners and experts/external mentors while 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between learners and experts/external mentors ▪ 12.66% of NSTs and 13.37% of MTs use ICT to provide enrichment/remedial instructions while 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions ▪ 14.41% of NSTs and 16.35% of MTs use ICT for demonstrations/presenting information while 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information **Teachers' Assessment Activities Using ICT**

			ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Teacher's activities, roles, interactions and interpersonal relations using ICT*
			▪ 21.08% of NSTs and 14.92% of MTs made use of ICT to assess learners' project reports and/or multimedia products while 78.92% of NSTs and 85.08% of MTs did not make use of ICT to assess learners' project reports and/or multimedia products ▪ 23.15% of NSTs and 21.18% of MTs made use of ICT to assess learners' written work or exercises while 76.58% of NSTs and 80.76% of MTs did not make use of ICT to assess learners' written work or exercises **Teachers' Use of ICT Resources** ▪ 32.29% of NSTs and 35.92% of MTs make use of tutorial/exercise software in their teaching while 67.71% of NSTs and 64.08% of MTs never make use of tutorial/exercise software in their teaching ▪ 21.35% of NSTs and 20.21% of MTs make use of the Office Suite for teaching while 78.65% of NSTs and 79.79% of MTs never make use of the Office Suite for teaching ▪ 13.97% of NSTs and 14.97% of MTs make use of simulations/modelling software for teaching while 86.03% of NSTs and 85.03% of MTs never make use of simulations/modelling software for teaching **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪ 14.58% of NSTs and 15.31% of MTs prepare lessons that involve the use of ICT by learners while 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners ▪ 13.95% of NSTs and 14.37% of MTs know which learning or teaching situations are suitable for ICT use while 47.83% of NSTs and 52.87% of MTs do not know which learning or teaching situations are suitable for ICT use ▪ 14.51% of NSTs and 15.93% of MTs use ICT in collaboration with others while 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others

			ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between the teacher and two or more of the following Microsystems:* *Teacher and Learner(s)* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
ACTIVITY SYSTEM	**Activity**	Teacher's activities, roles, interactions and *inter-social* relations with two or more learners using ICT to prepare them to become competent and responsible ICT and Internet users	**Curriculum Goals** ▪ 78.93% of NSTs take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, while 21.08% do not; 75.22% of MTs take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, while 24.78% do not

			ECOLOGICAL SYSTEM
			Mesosystem (Intersocial) *Interrelationship, roles and activities between the teacher and two or more of the following Microsystems:* *Teacher and Learner(s)* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
			▪ 66.16% of NSTs take on the role of TC and perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, while 33.84% do not; 61.03% of MTs take on the role of TC and perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, while 38.97% do not **Learning Opportunities** ▪ 13.74% of NSTs and 7.21% of MTs are make use of scheduled time to learn to use ICT while 86.26% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations ▪ 23.61% of NSTs and 20.52% of MTs use ICT in searching for information, while 76.39% of NSTs and 79.48% of MTs never use ICT in searching for information ▪ 18.37% of NSTs and 15.08% of MTs use ICT for processing and analysing data, while 81.63% of NSTs and 84.92% of MTs never use ICT for processing and analysing data **Teachers' Pedagogical Practices Using ICT** ▪ 11.80% of NSTs and 7.96% of MTs use ICT to organise and/or mediate communication between learners and experts/external mentors while 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between learners and experts/external mentors ▪ 12.66% of NSTs and 13.37% of MTs use ICT to provide enrichment/remedial instructions while 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions ▪ 14.41% of NSTs and 16.35% of MTs use ICT for demonstrations/presenting information while 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information **Teachers' Assessment Activities Using ICT** ▪ 21.08% of NSTs and 14.92% of MTs made use of ICT to assess learners' project reports and/or multimedia products while 78.92% of NSTs and 85.08% of MTs did not make use of ICT to assess learners' project reports and/or multimedia products ▪ 23.15% of NSTs and 21.18% of MTs made use of ICT to assess learners' written work or exercises while 76.58% of NSTs and 80.76% of MTs did not make use of ICT to assess learners' written work or exercises **Teachers' Use of ICT Resources** ▪ 32.29% of NSTs and 35.92% of MTs made use of tutorial/exercise software in their teaching while 67.71% of

			ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between the teacher and two or more of the following Microsystems:* *Teacher and Learner(s)* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
			NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching ▪ 21.35% of NSTs and 20.21% of MTs made use of the Office Suite for teaching while 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching ▪ 13.97% of NSTs and 14.97% of MTs made use of simulations or modelling software for teaching while 86.03% of NSTs and 85.03% of MTs never made use of simulations or modelling software for teaching **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪ 14.58% of NSTs and 15.31% of MTs prepare lessons that involve the use of ICT by learners while 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. ▪ 13.95% of NSTs and 14.37% of MTs know which learning/teaching situations are suitable for ICT use while 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use ▪ 14.51% of NSTs and 15.93% of MTs use ICT in collaboration with others while 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others

			ECOLOGICAL SYSTEM ***Exosystem (Intra-social)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
ACTIVITY SYSTEM	**Activity**	*Intra-social* dialogues, reflections, decisions and actions of SGBs and the NDoE to organise TPD courses to develop and empower teachers to be competent, effective and responsible in ICT pedagogical practices in line with the school curriculum	**Curriculum Goals** ▪ Because 21.07% of NSTs and 24.78% of MTs do not take on the role of competent TC and do not perform other pedagogical practices to prepare learners for competent ICT use, these percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ Because 33.84% of NSTs and 38.97% of MTs do not take on the role of competent TC and do not perform other pedagogical practices to prepare learners for competent ICT use, these percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed for instilling responsible Internet behaviour in schools and the school system as a whole **Learning Opportunities** ▪ 86.28% of NSTs and 92.79% of MTs report that learners do not effectively making use of scheduled time to learn to use ICT. These percentages can be used by

			ECOLOGICAL SYSTEM ***Exosystem (Intra-social)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
			the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 76.39% of NSTs and 79.48% of MTs never use ICT in searching for information. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole **Teachers' Pedagogical Practices Using ICT** ▪ 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentors. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ Teachers' Assessment Activities Using ICT ▪ 78.92% of NSTs and 85.08% of MTs do not make use of ICT to assess learners' project reports and/or multimedia products. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 76.58% of NSTs and 80.76% of MTs do not make use of ICT to assess learners' written work or exercises. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole **Teachers' Use of ICT Resources** ▪ 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 78.65% of NSTs and 79.79% of MTs never made use of

			ECOLOGICAL SYSTEM ***Exosystem (Intra-social)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
			the Office Suite for teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 86.03% of NSTs and 85.03% of MTs never made use of simulations/modeling software for teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪ 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use; these percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ Because 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole

			ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
ACTIVITY SYSTEM	**Activity**	*Trans-social* improvement and further development of educational policies, as well as clearer curriculum guidelines for more effective ICT integration in schools to organise TPD courses. These would develop and enable teachers to provide learners with scheduled time to use ICT, search for information on the Internet, and process and analyse data	**Curriculum Goals** ▪ Because 21.07% of Natural Science teachers and 24.78% of Mathematics teachers think it is not important to prepare learners for competent ICT use based on the school curriculum, these percentages indicate the need for clearer curriculum guidelines and educational policies concerning competent ICT use in the school system ▪ Because 33.84% of Natural Science teachers and 38.97% of Mathematics teachers think it is not important to prepare learners for responsible Internet behaviour based on the school curriculum, these percentages indicate the need for clearer curriculum guidelines and educational policies concerning responsible Internet behaviour in the school system **Learning Opportunities** ▪ 86.28% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena

			through simulations. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 76.39% of NSTs and 79.48% of MTs never use ICT in searching for information. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole **Teachers' Pedagogical Practices Using ICT** ▪ 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between learners and experts/external mentors. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole **Teachers' Assessment Activities Using ICT** ▪ 78.92% of NSTs and 85.08% of MTs do not use ICT to assess learners' project reports and/or multimedia products. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 76.58% of NSTs and 80.76% of MTs do not make use of ICT to assess learners' written work or exercises. These percentages can be used by the NDoE and the SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole **Teachers' Use of ICT Resources** ▪ 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪ 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole

			▪86.03% of NSTs and 85.03% of MTs never made use of simulations/modeling software for teaching. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole ▪51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. These percentages can be used by the NDoE and SGBs as indicators of the amount of effort needed to organise TPD in ICT use in schools and the school system as a whole

Table 7.4 presents a combined summary of the descriptive statistics found by the SDA in Chapter 6.

Table 7.4: Combined Summary of Descriptive Statistics

ICT Pedagogical Practices of Grade 8 NST and MT	Findings
Curriculum Goals	• The most important curriculum goal for grade 8 NST and MT is to improve learners' performance in assessment and examinations (88.21%) • A least important curriculum goal for grade 8 NST and MT is to prepare students for responsible Internet behavior and/or to cope with cyber-crime (36.41%)
Learning Opportunities	• The percentage of NST and MT using ICT is small (6.23% to 23.61% depending on different activities) • NST use more ICT in their pedagogical practices in comparison with MT in almost all teaching activities • SITES 2006 found South Africa as the country with the lowest ICT use by teachers amongst the 22 education systems which participated (Law & Chow, 2008)
NST and MT Pedagogical Practices Using ICT	• South African NST and MT prefer pedagogical practices which are *traditionally oriented*, such as teachers giving instructions and learners responding to quizzes and tests • Only a small percentage of NST and MT (5.45%-16.35% depending on the pedagogical practices) make use of ICT. Grade 8 NST and MT in South Africa and the Russian Federation reported the lowest levels of competence in both general and pedagogical ICT-use (Law *et al.*, 2008b)
NST and MT Assessment Activities Using ICT	• 99% of South African NST and MT use traditional assessment practices in their classroom. • Compared to International counterparts they make more use of *learning products* and *reflection or collaboration* in assessment

ICT Pedagogical Practices of Grade 8 NST and MT	Findings
NST and MT Use of ICT Resources	• South African teachers generally follow the trend observed for the international NST and MT populations with regard to their use of different learning resources and tools • A high majority (79.22%) of South African NST and MT, combined, never made use of *general office suite* in their teaching, however, they claim to be having the highest levels of use for *smart board or interactive white board* compared to *all the twenty one other educational systems participated* in SITES 2006 (Law & Chow, 2008)
NST and MT Confidence in the General and Pedagogical Use of ICT	• Uses of ICT by grade 8 NST and MT are anything but satisfactory. A quarter of the teachers cannot produce a letter using a word-processing program, and more than half of the teachers admit that they cannot prepare lessons that involve the uses of ICT by their students. • There is a significant difference in the use of ICT between NST and MT. The reason for this difference is a subject for further research. This finding is in accordance with the findings of the SITES 2006 which revealed the higher use of ICT by NST in comparison with MT (with only three exceptions, i.e. Thailand; Ontario, Canada; and Denmark (Wagemaker & Law, 2010)
Professional ICT Support Received by grade 8 NST and MT	• teachers' participation in ICT professional development is a personal response to the availability as a contextual factor • a high majority of South African NST and MT have not received ICT professional training • NST and MT have a strong desire to participate in professional training if the opportunity for such is available
Barriers NST and MT Face in the Pedagogical Use of ICT	• Grade 8 NST and MT have, neither sufficient access, nor enough ICT skills, necessary for using ICT in their teaching and learning practices • Majority of SP (58%) indicated that their school's capacity to realize its pedagogical role is hindered by insufficient number of computers connected to the Internet • 76% of NST and MT acknowledge that their learners do not have access to computers outside school
Principals' Influence on NST and MT Pedagogical Use of ICT	• SP need to monitor the school activities in relation to the timetable and make changes in order to make efficient use ICT resources in teaching and learning • SP need to investigate learner-related, teacher-related, and school-related reasons for low use of ICT for learning activities and take necessary and sufficient remedial actions • SP need to organise effective professional development courses in generic and pedagogical uses of ICT for teachers

Table 7.5 provides eight strategies, derived from the descriptive statistics, for SP to overcome the barriers that prevent the integration and use of ICT for pedagogical practices in most South African schools.

Table 7.5: Eight Strategies for School Principals to Overcome Barriers Preventing the Integration and Use of ICT for Pedagogical Practices

Eight Strategies for SP to Overcome ICT Barriers	
1	Develop a common ICT vision and policy statement for the school. Help teachers and learners to formulate rules and procedures for the efficient use of ICT resources
2	Monitor school activities in relation to the timetable and make changes in order to make efficient use ICT resources in teaching and learning
3	Help teachers and learners liaison with collaborators for learner collaborative activities. Mediate communication between learners and experts/external mentors. Collaborate with parents in monitoring learners' progress in using ICT
4	Help teachers and learners make use of ICT in assessment activities
5	Investigate the learner-related, teacher-related, and school-related reasons for the low use of ICT in learning activities. Take necessary and sufficient remedial actions
6	Organise TPD workshops on generic and pedagogical uses of ICT and the Internet. Allow flexibility in timetables so teachers have sufficient time to prepare lessons using ICT
7	Find different sources for funding ICT resources and organise ICT training sessions for teachers. Adjust the school timetable in order to make efficient use of ICT resources available in the school
8	Organise TPD courses in the generic and pedagogical uses of ICT for teachers

Table 7.6 also provides seven strategies, derived from the descriptive statistics, for SP to improve the ICT support in their schools for NST and MT so that they can integrate and use ICT in their pedagogical practices.

Table 7.6: Seven Strategies for School Principals to Improve ICT Support for NST and MT

Seven Strategies for SP to Improve ICT Support	
1	Encourage teachers to attend ICT training courses. Invite experts to visit the school and demonstrate best practices in ICT-using pedagogy
2	Create opportunities for teachers to visit and observe how ICT is successfully integrated in other schools
3	Invite experts to come to the school and demonstrate how ICT can be used in different subjects
4	ICT resources are expensive and should be kept secure. There should be physical and logical protection. Rules and procedures should in place before starting the use of ICT
5	Provide sufficient flexibility to make efficient use of ICT resources. Agree with teachers on incentives for integrating ICT in teaching and learning, e.g., buying subject-specific software and training
6	Organise meetings to discuss problems and solutions in integrating ICT in teaching and learning. Invite teachers who have successfully integrated ICT in their schools to share their experiences
7	Develop a common ICT vision for the school. Establish rules and procedures for using ICT resources. Provide leadership in innovative ICT pedagogical uses. Establish effective technical support procedures

7.2.6.2 Summary of Correlations Found Between Factors Identified Through Factor Analysis

Factor analysis was conducted on selected scales of the teachers' questionnaire, i.e. curriculum goals (BTG 8), learning opportunities (BTG 9), teachers' pedagogical practices using ICT (BTG 14), and teachers' assessment activities using ICT (BTG 15), in order to identify underlying themes (Table 7.7).

Table 7.7: Factor Themes Identified through the Factor Analysis

Items	Factor Themes
BTG9	Structured Inquiry
BTG9	Guided Inquiry
BTG9	Conventional Pedagogy
BTG14	Conventional Teacher's Role
BTG14	Mediating Teacher's Role
BTG15	Conventional Assessment
BTG15	Constructivist Assessment
BTG23	Teacher level Barriers
BTG23	School level Barriers
BTG23	Curriculum barriers

Spearman's Rank Order Correlations (r_s) were then calculated between the factors (Table 7.7) identified through the factor analysis. Table 7.8 shows the large effect sizes (indicative of practically significant correlations), as well as the medium effect sizes (which tends towards practically significant correlations), that were found between the factors (Table 7.7).

Table 7.8: Summary of Significant Spearman Rank Order Correlations

Large Effect Sizes (Spearman's Rank Order Correlations) Indicative of Practically Significant Correlations		
Factor 1	*Factor 2*	$\mathbf{r_s}$
BTG 9 Structured inquiry	BTG 9 Guided inquiry	0.629
BTG23 Teachers level barrier	BTG9 Curriculum barrier	0.561
BTG14 Conventional teachers' role	BTG9 Mediating teachers' role	0.535

Medium Effect Sizes (Spearman's Rank Order Correlations) Tending Towards Practically Significant Correlations		
Factor 1	*Factor 2*	$\mathbf{r_s}$
Conventional role of the teacher	Guided inquiry role of the learner	0.390
Conventional role of the teacher	Structured inquiry role of the learner	0.383
Conventional role of the teacher	Conventional role of the learner	0.357
Mediating role of the teacher	Guided Inquiry role of the learner	0.397
Mediating role of the teacher	Structured inquiry role of the learner	0.448
Mediating role of the teacher	Constructivist assessment practices	0.347
Constructivist assessment practices	Guided Inquiry role of the learner	0.325
Constructivist assessment practices	Structured inquiry role of the learner	0.351

Medium Effect Sizes (Spearman's Rank Order Correlations) Tending Towards Practically Significant Correlations		
Conventional role of the learner	Structured inquiry role of the learner	0.459
Conventional role of the learner	Guided inquiry role of the learner	0.425
Teacher level barriers	School level barriers	0.405
School level barriers	Curriculum barriers	0.351

Spearman's rank order correlations were also calculated with and without ICT for pedagogical practices (Table 7.9).

Table 7.9: Spearman's Rank Order Correlations with and without ICT for Pedagogical Practices

Roles of the teacher (Variables)	Correlations without ICT (r_s)	Correlations with ICT (r_s)	Mediating role of teacher, roles of learners, and assessment practices (other variables)
Conventional role of teachers	0.535	0.0876	Mediating role of the teachers
	0.390	0.641	Guided inquiry roles of the learners
	0.359	0.656	Conventional roles of the learners
	0.383	0.673	Structured inquiry roles of the learners
	0.232	0.703	Constructivist assessment practices
	0.108	0.687	Conventional assessment practices
Mediating role of teachers	0.397	0.529	Guided inquiry roles of the learners
	0.237	0.552	Conventional roles of the learners
	0.448	0.567	Structured inquiry roles of the learners
	0.347	0.605	Constructivist assessment practices
	0.062	0.522	Conventional assessment practices

These findings indicate that when teachers use ICT, they still rather use it for conventional pedagogical practices, than for mediating practices. This is in accordance with literature reviews about the pedagogical uses of ICT (Cox et al., 2003). Spearman's correlations without ICT do not show any specific trends between the conventional and mediating roles of the teacher.

Furthermore, no significant differences were found between grade 8 NST and MT ICT pedagogical practices. Also, there is no significant difference between the ICT pedagogical practices of female and male grade 8 NST and MT.

7.3 Holistic Interpretation of Correlations Found Between Factors Identified Through Factor Analysis

This section provides a holistic interpretation of the Spearman Rank Order correlations (Table 7.8) found between the factors (Table 7.7) identified through the factor analysis.

7.3.1 Correlations with the Conventional Role of NST and MT

Figure 7.1 presents correlations with the conventional role of NST and MT.

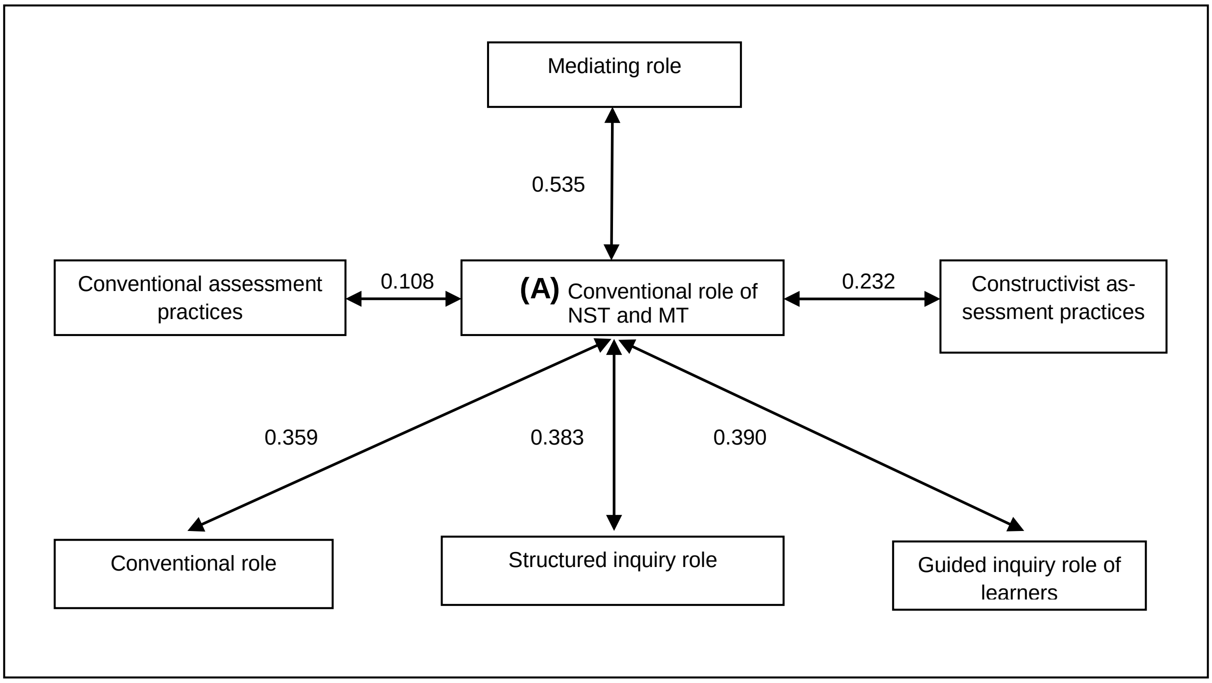


Figure 7.1: Spearman's Rank Order Correlations with the Conventional Role of NST and MT

Conventional role of NSTs and MTs shows a strong correlation (r_s=0.535) with the mediating role of the teacher. Conventional role of a teacher is commonly characterized by strong classroom discipline, teacher centered presentations and learners' engagement with written tasks, exercises, written tests or examinations. However, the conventional role of the teacher shares other (teacher organized) activities with mediating role of the teacher. Organizing team building and collaboration activities, managing whole-class discussions, and giving presentations. The conventional role of the teacher also shows medium correlations (r_s=0.359 to 0.390) with the conventional, structured and guided inquiry roles of the learners. These medium effects tend towards practically significant correlations. Strangely, the conventional role of teachers indicated a medium correlation (r_s=0.359) with the conventional role of learners, as well as a small correlation (r_s=0.108) with conventional assessment practices, which is opposite findings to that which one could expect. In a conventional role, the common factor is the passive role of the learner. These finding therefore is worth further research.

7.3.2 Correlations with the Mediating Role of NST and MT

Figure 7.2 shows correlations with the mediating role of NST and MT.

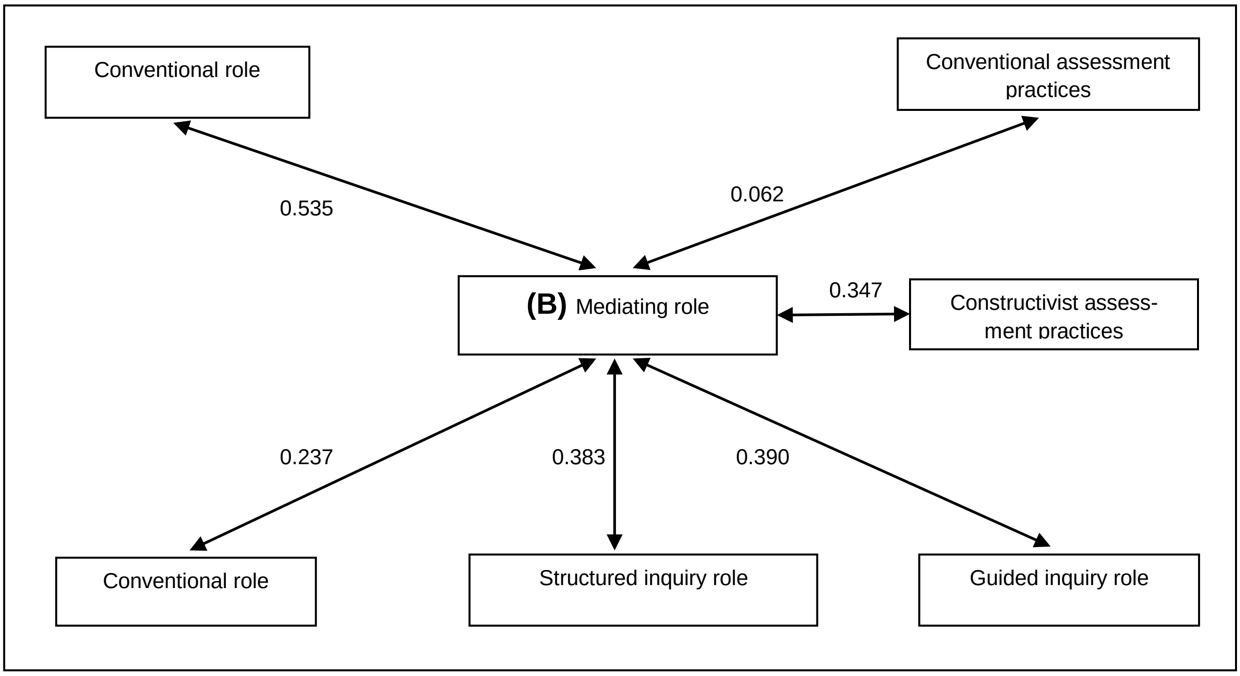


Figure 7.2: Spearman's Rank Order Correlations with the Mediating Role of NST and MT

The mediating role of NST and MT is commonly characterized by learners' collaborative activities, communications with experts, and external mentors. Teachers also provide guidance and counselling to individual learners or small groups and communicate with parents or caretakers. The correlation between the mediating and conventional roles of NST and MT was already discussed in § 7.3.1. The SDA found no correlation between the mediating role of NST and MT, either with conventional role of learners, or with conventional assessment practices. This result is expected. Conventional role of the learners and conventional assessment practices involve all learners engaged in the identical activities synchronized in time. The mediating role of teachers assumes the position of *designers of the learning environment* where learning activities are self-initiated, self-motivated and self-sustained by the learner, under the guidance of the teacher. Teachers are no longer the *sages on the stage, but the guide on the side*. The mediating role of NST and MT is correlated to structured inquiry role of learners (r_s=0.383), and guided inquiry role of learners (r_s=0.390). Both structured inquiry and guided inquiry roles are characterized by active learner participation in the learning activities which compliment with the mediating role of the teacher. Mediating role of the teacher is correlated to constructivist assessment practices (r_s=0.347). Constructivist assessment practices involve learning products (e.g. individual or group presentations, project reports, or multimedia products) or reflection-collaboration (e.g. portfolios, peer evaluations or assessment on collaborative tasks). Once again, the common factors are the opportunities for the learners (i) to become independent thinkers, (ii) to exercise their creative talents, and (iii) to promote cooperation.

7.3.3 Correlations with the Structured Inquiry Role of Learners

Figure 7.3 presents correlations that were found with the structured inquiry role of learners.

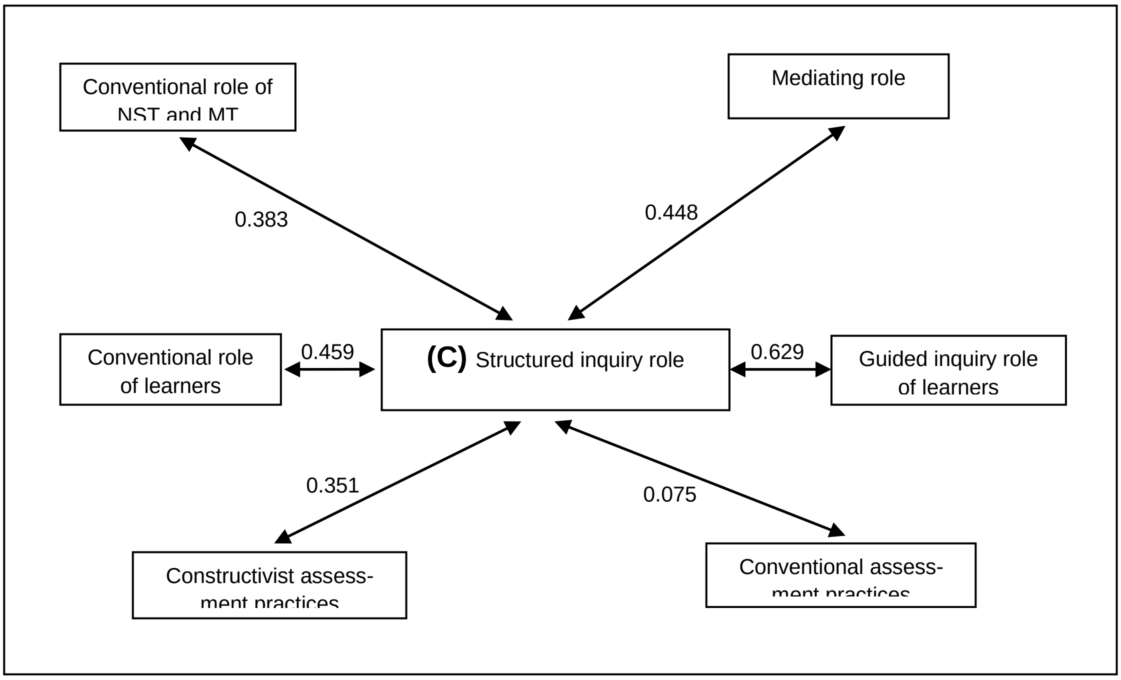


Figure 7.3: Spearman's Rank Order Correlations with the Structured Inquiry Role of Learners

Structured inquiry involves, amongst other things, looking up ideas and information, analyzing data, studying natural phenomena using simulations, etc. The structured inquiry role of Grade 8 Natural Science and Mathematics learners has a large correlation (r_s=0.629) with the guided inquiry role of learners. This result is expected, as the structured inquiry role of learners and the guided inquiry role of learners both share the *learner centered*, active role of the learner in a learning situation. The guided inquiry role of learners promotes learning through collaborative problem solving, projects, and product creation. Within the field of the guided inquiry role of learners there is space for original scientific investigation. Structured inquiry role of learners shows a stronger correlation (r_s=0.448) with the mediating role of NST and MT, in comparison with the conventional role of NST and MT (r_s=0.383). This finding could possibly be explained by the fact that the conventional role of teachers represents *passive* learners' roles, while both the mediating role of teachers and the structured inquiry role of learners represent *active* roles from learners. Similarly, the structured inquiry role of learners shows a stronger correlation (r_s=0.351) with constructivist assessment practices, compared to conventional assessment practices (r_s=0.075). Conventional assessment practices involve that all learners engage at the same time in identical assessment activities, e.g. writing a test or doing an exercise.

7.3.4 Correlations with the Guided Inquiry Role of Learners

Figure 7.4 shows correlations with the guided inquiry role of learners.

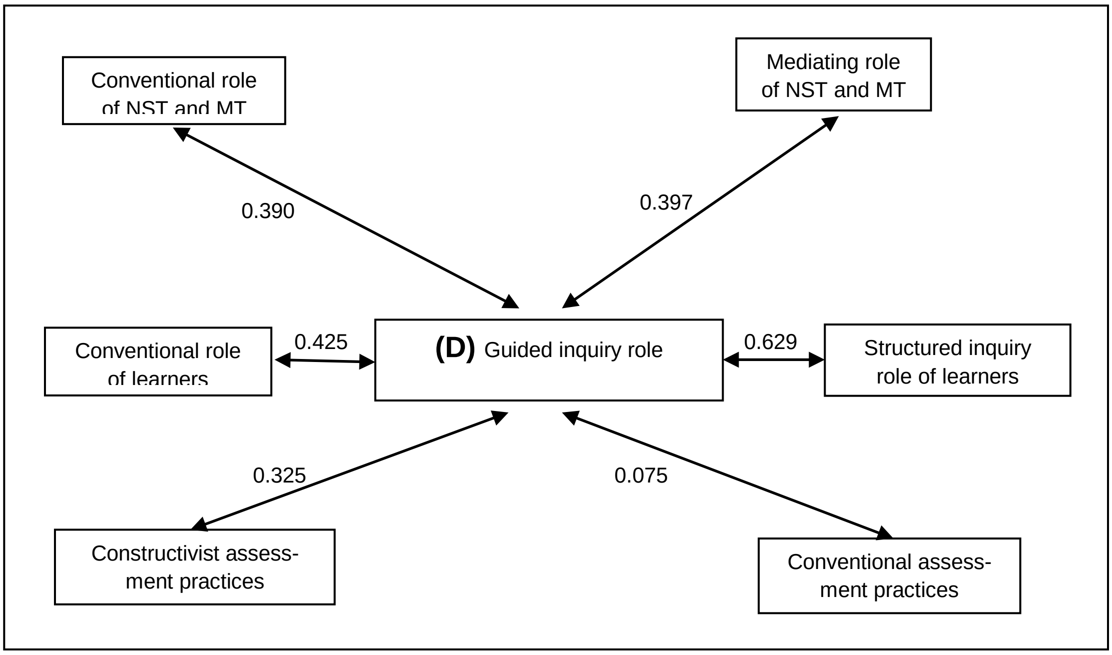


Figure 7.4: Spearman's Rank Order Correlations with the Guided Inquiry Role of Learners

The guided inquiry role of learners represents active learner participation in learning environments. As can be seen in Figure 7.4, the active role learners is evident in the finding that the guided inquiry role of learners correlates with the mediating role of NST and MT (r_s=0.397), as well as with constructivist assessment practices (r_s=0.325). Guided inquiry role of learners shows a medium correlation with the conventional role NST and MT (r_s=0.390), as well as a small correlation with conventional assessment practices (r_s=0.075).

7.3.5 Correlations with the Conventional Role of Learners

Figure 7.5 presents correlations with the conventional role of Natural Science and Mathematics learners.

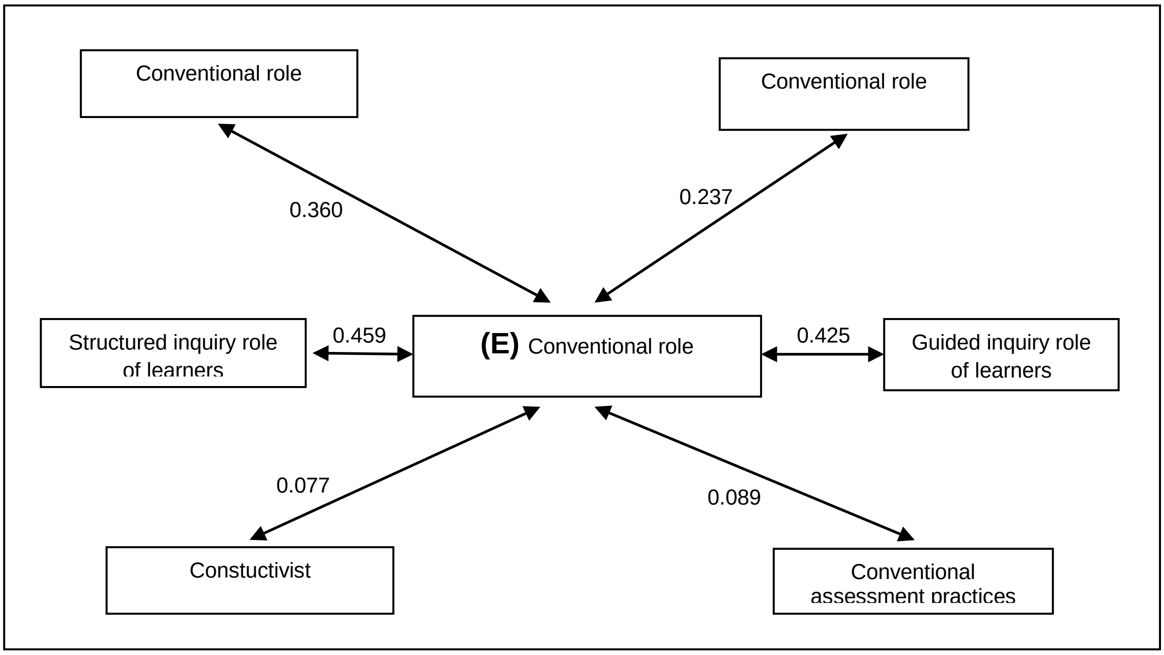


Figure 7.5: Spearman's Rank Order Correlations with the Conventional Role of Learners

The conventional role of learners usually involves exercises to practice skills and procedures, rediscovering scientific principles, listening to teachers' lectures, etc., while conventional assessment practices usually involve written tests or examinations, or written tasks or assignments. It is strange to notice that the conventional role of learners shows a small correlation with conventional assessment practices (r_s=0.089), as well as with the conventional role of NST and MT (r_s=0.237). This can be a subject for future research.

7.3.6 Constructivist Assessment Practices

Figure 7.6 shows the correlations that were found with constructivist assessment practices.

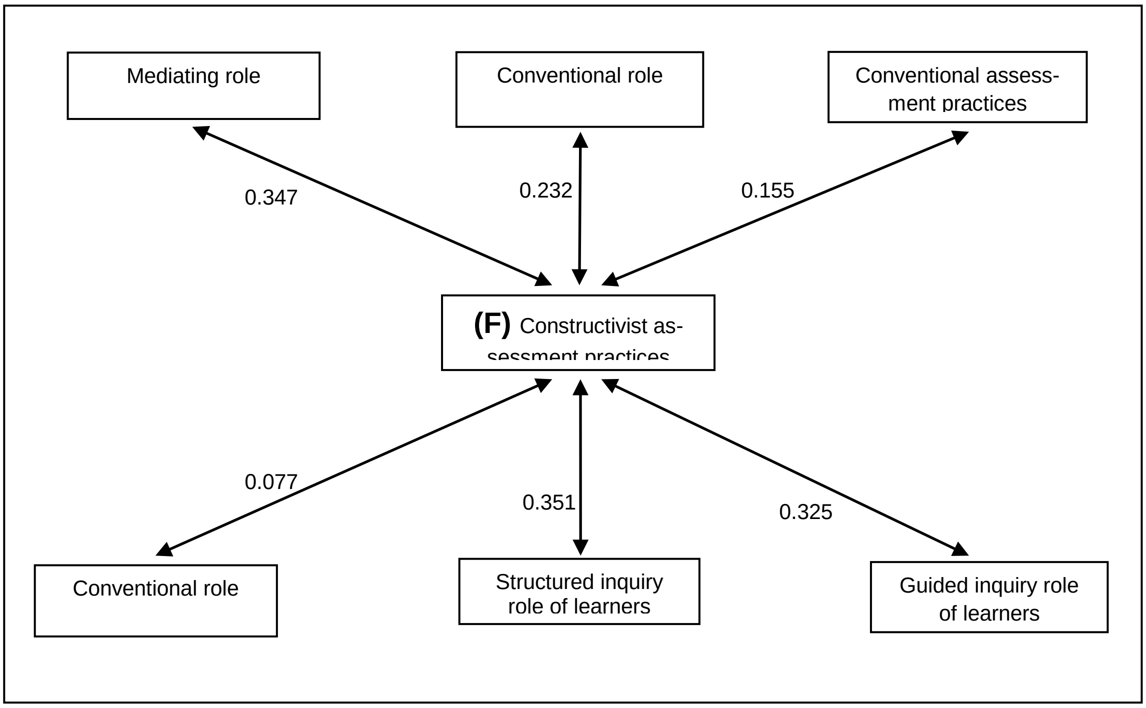


Figure 7.6: Spearman's Rank Order Correlations with Constructivist Assessment Practices

Constructivist assessment practices, as expected, show small correlations with conventional assessment practices (r_s=0.155), as well as the conventional role of NST and MT (r_s=0.077). Constructivist assessment practices show strong correlations with the mediating role of NST and MT (r_s=0.347), with the structured enquiry role of learner (r_s=0.351), as well as with the guided enquiry role of learners (r_s=0.325).

7.3.7 Pedagogical Barriers

Figure 7.7 provides a visual representation of the Spearman Rank Order correlations (r_s) that were found between the three main groups of ICT pedagogical barriers.

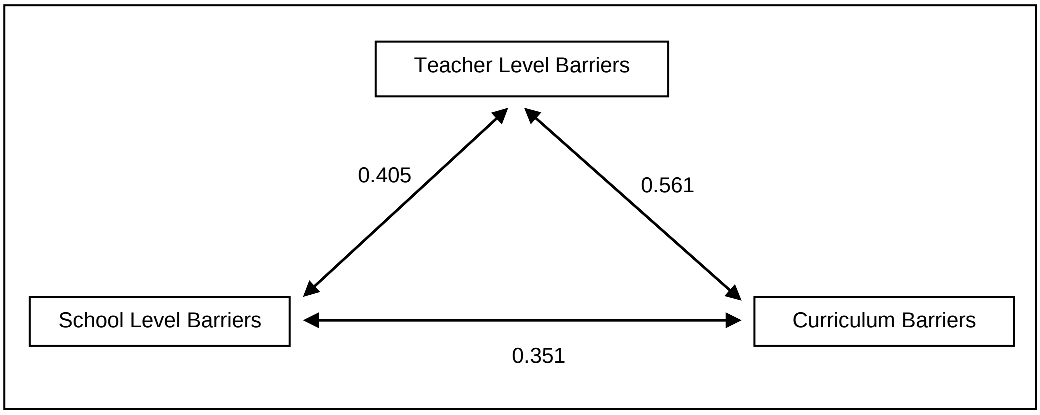


Figure 7.7: Spearman's Rank Order Correlations between the Main Groups of ICT Pedagogical Barriers

As can be seen in Figure 7.7, teacher level barriers are, to a large extend, connected to curriculum barriers, and to a lesser extent to school level barriers.

7.3.8 ICT Pedagogical Practices of Grade 8 NST and MT

Figure 7.8 shows a holistic visual interpretation of the various Spearman Rank Order correlations reported in Figures 7.1 to 7.6 between the factors identified through the factor analysis (Table 7.7).

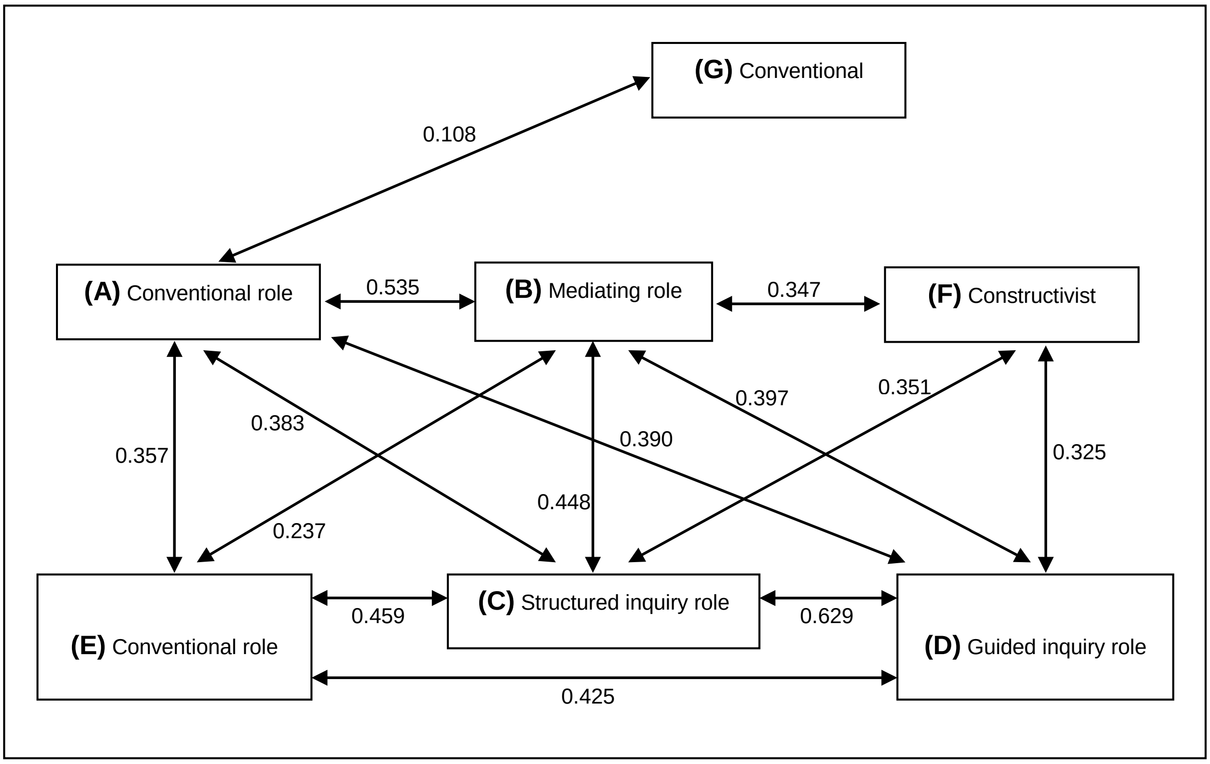


Figure 7.8: Spearman Correlations among Factors Identified through Factor Analysis of BTG 9, BTG 14, and BTG 15

SITES 2006 Teacher Questionnaire (Addendum 5.1) scale BTG14 represents two teacher roles, i.e. (A) conventional role, and (B) mediating role; while scale BTG9 represents three types of learner roles, i.e. (C) structured inquiry, (D) guided inquiry, and (E) conventional role of learners. Scale BTG15 represents two assessment methods, i.e. (F) constructivist assessment practices, and (G) conventional assessment practices.

7.4 Chronosystem Analysis

The findings of Chapter 6 are used in this section to conduct the final part of the Ecological Activity Systems analysis concerning the Chronosystem, i.e. to evaluate the evolution of the South African education system with regard to ICT implementation and use, as well as the ICT development of NST and MT over a period of time (2004-2013), in line with the objectives of the White Paper on e-Education (South Africa, 2004).

According to the White Paper on e-Education (South Africa, 2004), all South African education managers, teachers and learners in the general and further education and training band should be able to use ICTs confidently and creatively for the promotion of lifelong learning by

2013. This policy aims to empower all stakeholders to meet educational the challenges and move from an industrial to an information society. It seeks to resolve the issues of access, equity, quality and redress in educational opportunities. Three critical factors that will determine the effectiveness of ICT as a tool in education are identified; cost, sustainability and efficient utilization.

The White Paper on e-Education presents the expectation of ICT compliance according to three main phases (South Africa, 2004). Phase 1 outlines the execution period (2004-2006/2007) and it envisaged *system-wide and institutional readiness to use ICT for teaching and learning* by (i) supplying ICT hardware and appropriate educational software; (ii) establishing connectivity to schools at subsidized rates; (iii) creating a competency framework for teacher development in ICT integration; (iv) building confidence in the use of ICT; and (v) seeking community support for ICT facilities.

Phase 2 outlines the execution period (2007-2010) and it envisaged *system-wide ICT integration:* (i) 50% of teachers should be trained in basic ICT integration for teaching and learning; (ii) 80% of institution managers should integrate ICT-based management and administration systems; (iii) 80% of schools should have access to networked computer facilities for teaching and learning; (iv) dedicated teachers should be assigned at schools to manage and champion the use of ICT; (v) educational portals, e.g. *Thuthong* should be used by school staff to communicate, collaborate and access quality content; (vi) schools should have Internet connectivity at subsidized rates; and (vii) sustained community support should be provided for ICT facilities in terms of maintenance and technical assistance.

Phase 3 outlines the execution period (2010-2013) and it envisages full *integration* of ICT at all levels of the education system, i.e. for management, teaching, learning and administration. All Departments of Education will be seamlessly using ICTs. All learners and teachers will be ICT capable and are able to enjoy the fruits of full ICT integration of the curriculum using high quality software. There will be full community participation, and ICT interventions will be informed by research.

Table 7.10 evaluates the percentage attainment of the White Paper on e-Education’s Phase 1 and Phase 2 sub-objectives pertaining to the implementation of ICTs in schools. Table 7.10 is self-explanatory, therefore no further discussion is provided.

Table 7.10: Evaluation of the Implementation of ICTs in Schools

PHASE 1: ESTABLISH ICT PRESENCE IN SCHOOLS		
ICT Policy Sub-Objectives	**SITES 2006 Findings**	**% Attainment of Policy Sub-Objectives**
All schools (100%) have computer hardware and software for administration	75.79% (382/504) of schools have computer hardware and software for administration purposes (with an average of 2.71 computers per school)	75.79% attainment of Policy objective
50% of schools have access to networked computer facility for teaching and learning	18.2% of schools have sufficient number of networked computers for teaching and learning	36.4% attainment of Policy objective
All schools (100%) use educational software	9.7% schools have tutorial or exercise software	9.7% attainment of Policy objective
ICT facilities are safe and effective to facilitate ICT integration into teaching and learning (100%)	22.19% of schools do not have constraints for integrating ICT into teaching and learning	22.19% attainment of Policy objective
PHASE 2: ICTs COMMONLY PRESENT IN SCHOOLS		
ICT Policy Sub-Objectives	**SITES 2006 Findings**	**% Attainment of Policy Sub-Objectives**
All schools (100%) have computer hardware & software for administration	75.79% (382/504) of schools have computer hardware and software for admin purposes (with an average of 2.71 computers per school)	75.79% attainment of Policy objective
80% of schools have access to networked computer facility for teaching and learning	18.2% of schools have sufficient number of networked computers for teaching and learning	36.4% attainment of Policy objective
All schools (100%) use legal software	9.7% schools have tutorial or exercise software	9.7% attainment of Policy objective
ICT facilities are safe, in a working condition and effective to facilitate ICT integration into teaching and learning (100%)	22.19% of schools do not have constraints for integrating ICT into teaching and learning	22.19% attainment of Policy objective
ICT facilities are safe, in a working condition and effective to facilitate ICT integration into teaching and learning (100%)	22.19% of schools do not have constraints for integrating ICT into teaching and learning	22.19% attainment of Policy objective
Every school has a dedicated teacher to manage ICT facilities and champions the use of ICTs (100%)	According to Technology Coordinators, 12.52% of schools have sufficient qualified personnel to manage the use of ICT; while according to School Principals it is 8.43%	10.48% attainment of Policy objective

Table 7.11 evaluates the percentage attainment of the White Paper on e-Education's Phase 2 sub-objectives pertaining to building an Education and Training System to support ICT integration in teaching and learning. Again, Table 7.11 is self-explanatory.

Table 7.11: Evaluation of an Education and Training System to Support ICT Integration in Teaching and Learning

PHASE 1: BUILDING AN EDUCATION AND TRAINING SYSTEM TO SUPPORT ICT INTEGRATION IN TEACHING AND LEARNING		
ICT Policy Sub-Objectives	**SITES 2006 Findings**	**% Attainment of Policy Sub-Objectives**
Appoint and develop dedicated expertise (e.g. technical coordinators and ICT pedagogical support) to plan, manage, support, monitor and evaluate ICTs (100%) Ongoing support to school principals (100%)	41.77% of own school staff is responsible for ICT maintenance; while 1.64% of staff from other schools also provides maintenance. The change for schools to hire external companies to provide ICT maintenance is 33.54%; while the change for schools to receive ICT maintenance from the DoE is 11.17% 71.06% of experienced teaching colleagues support principal and others teachers with ICT pedagogical use; while 61.58% of technology coordinators, 76.92 staff from other schools, and 60.49 experts from outside, support principals and teachers with pedagogical use of ICTs	22.13% attainment of policy sub-objective 68.23% attainment of sub-objective

Table 7.12 evaluates the percentage attainment of the White Paper on e-Education's Phase 2 sub-objectives pertaining to the integration of ICT into school management and the curriculum by SP, NST and MT. Table 7.12 is self-explanatory.

Table 7.12: Evaluation of the Integration of ICT into Management and the Curriculum by the SP, NST and MT

PHASE 2: INTEGRATION OF ICT INTO MANAGEMENT AND THE CURRICULUM BY SP, NST AND MT		
ICT Policy Sub-Objectives	**SITES 2006 Findings**	**% Attainment of Policy Sub-Objectives**
50% of teachers are trained in basic ICT integration into teaching and learning All teachers have access to ICT technical support training (100%)	8.77% of teachers completed professional training related to integrating ICT into teaching and learning. 7.83% of teachers completed professional subject-specific training with learning software for specific content goals 15.1% of teachers have attended a course on ICT technical support training	16.6% attainment of policy sub-objectives 15.1% attainment of Policy sub-objective
80% of school Principals integrate ICT in management and	80.25% of Principals use ICT for writing documents; 52.94% for	69.51% attainment of sub-objective (55.61% / 80%)

PHASE 2: INTEGRATION OF ICT INTO MANAGEMENT AND THE CURRICULUM BY SP, NST AND MT		
ICT Policy Sub-Objectives	**SITES 2006 Findings**	**% Attainment of Policy Sub-Objectives**
administration	budgeting and accounting; 63.1% for planning; 47.49% for communication with parents & 41.32% with teachers; 55.07% for information searches; and 49.12% for composing presentations	
Research and evaluation guide the development of ICT integration (100%)	No evidence available from SITES data	No evidence available from SITES data

Table 7.13 evaluates the percentage attainment of the White Paper on e-Education's Phase 1 sub-objectives pertaining to building the confidence of SP, NST and MT to use ICT for management and pedagogical purposes. Table 7.13 is also self-explanatory.

Table 7.13: Evaluation of the Building of Confidence amongst SP, NST and MT for the Use of ICTs for Management and Pedagogical Purposes

PHASE 1: CONFIDENCE BUILDING AMONGST SP, NST AND MT FOR ICT USE		
ICT Policy Sub-Objectives	**SITES 2006 Findings**	**% Attainment of Policy Sub-Objectives**
Every teacher and manager must have access to computers (100%)	56.16% of teachers, 91.24% principals and 84.61% technology coordinators have access to computers at home	77.33% overall attainment
Every teacher and manager must have training in ICT integration (100%)	8.76% of teachers and 31.53% technology coordinators reported having training in ICT integration	20.15% overall attainment
Every teacher and manager must have technology incentives (100%)	29.8% of principals reported having incentive schemes for teachers for integration of ICT in teaching and learning	29.8% attainment
Every teacher and manager must have availability of examples of best practices (100%)	46.2% of principals reported having organised workshops for demonstrating best practices of ICT-supported teaching and learning	46.2% attainment

Finally, Table 7.14 evaluates the percentage attainment of the White Paper on e-Education's Phase 1 and 2 sub-objectives pertaining to the promotion of community support for ICT use in schools. Table 7.14 is self-explanatory.

Table 7.14: Evaluation of the Promotion of Community Support for ICT Use in Schools

PHASES 1 AND 2: PROMOTION OF COMMUNITY SUPPORT FOR ICT USE IN SCHOOLS		
ICT Policy Sub-Objectives	**SITES 2006 Findings**	**% Attainment of Policy Sub-Objectives**
Small and Medium Scale Enterprises are developed and trained to provide technical support to institutions	No evidence from SITES 2006 data	No evidence from SITES 2006 data
Communities have access to school ICT facilities and in turn provide maintenance and security of ICT facility (100%)	21.03% of principals reported that they provided access for local communities to school ICT facilities	21.03% attainment

Table 7.15 provides an analysis of the overall attainment of the White Paper on e-Education's objectives within the Chronosystem

Table 7.15: Overall Attainment of the White Paper on e-Education's Objectives within the Chronosystem

Main e-Education Policy Objectives	Average Attainment of Main e-Education Policy Objectives
Establish ICT Presence in Schools (Phase 1)	36.02%
ICTs Commonly Present in Schools (Phase 2)	29.46%
Building an Education and Training System to Support ICT Integration in Teaching and Learning (Phase 1)	45.18%
SP, NST and MT Integration of ICT into Management and the Curriculum (Phase 2)	33.74%
Internet Access and Electronic Communication (Phase 1)	35.37%
Internet Access and Electronic Communication (Phase 2)	30.25%
Confidence amongst SP, NST and MT ICT use for Management and Pedagogical Purposes (Phase 1)	43.37%
Community Support for ICT Use in Schools (Phases 1 and 2)	21.03%
Overall Attainment of e-Education Policy Phase 1 Objectives	**36.19%**
Overall Attainment of e-Education Policy Phase 2 Objectives	**28.66%**

SITES 2006 was conducted precisely at the end of the White paper on e-Education's Phase 1 (the period 2004 to the end of 2006). As seen in Table 7.15, the overall attainment for Phases 1 (2004 to 2006/2007) during SITES 2006 was 36.19%. The overall attainment of Phase 2 (2007 to 2010) was already at 28.66% during 2006, which indicates that while the implementation of the e-Education policy was far behind in terms of Phase 1 (2004 to 2006/2007), nevertheless, it was 28.66% ahead in terms of Phase 2 (2007 to 2010). At the time of the current investigation (2011), no other large scale quantitative data, besides SITES 2006, is available on the implementation and use of ICT in the South African Education System. Further quantitative research is recommended on the evaluation of the progress of both

Phases 1 and 2 with ended in 2010. Phase 3 (ICTs integrated at all levels of the Education System in the year 2013) could not be evaluated using the SITES 2006 dataset (Addendums 5.4-5.6), therefore, further Chronosystem research is also required at the end of 2013.

7.5 Recommendations

This section provides specific recommendations derived from the Ecological Activity Systems Analysis for the South African Education System on five levels, i.e. Self, Microsystem, Mesosystem, Exosystem, and Macrosystem; followed by recommendations for the implementation and management of the White Paper on e-Education (2004) on the Chronosystem level.

7.5.1 Recommendations from the Ecological Activity Systems Analysis for the South African Education System (Self, Micro-, Meso-, Exo- and Macrosystems)

In this section, recommendations are made for the South African Education System in accordance with the findings of the Ecological Activity Systems Analysis conducted as part of Chapter 6. Specific recommendations are made for each ecological system, as illustrated by Table

Table 7.16: Recommendations for the Various Ecological Systems of the South African Education System According to the Ecological Activity Systems Analysis

	ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
Recommendations for the Education System	**Curriculum Goals** ▪ Because 21.08% of NSTs and 24.78% of MTs do not think it is important to prepare learners for competent ICT use based on the school curriculum, this calls for an attitude change in individual teachers concerning ICT use for learners ▪ Because 33.84% of NSTs and 38.97% of MTs do not think it is important to prepare learners for responsible Internet behaviour based on the school curriculum, this calls for an attitude change in individual teachers, in order to instil responsible Internet behaviour in learners **Learning Opportunities** ▪ As 86.28% of NSTs and 92.79% of MTs report that learners are not effectively making use of scheduled time to learn to use ICT, for example when studying natural phenomena through simulations, this calls for an attitude change for individual teachers concerning ICT use for learners ▪ 76.39% of NSTs and 79.48% of MTs never use ICT for searching for information. This also calls for the attitude change of individual teachers concerning ICT use for learners

	ECOLOGICAL SYSTEM ***Self (Intrapersonal)*** *Dialogues and Reflections*
	▪ 81.39% of NSTs and 84.92% of MTs never used ICT for processing and analysing data; these teachers need to identify and correct weaknesses in their ICT-related pedagogical skills **Teachers' Pedagogical Practices Using ICT** ▪ 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentors. This calls for an attitude change in individual teachers concerning ICT use for learners ▪ 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. This also calls for an attitude change in individual teachers concerning ICT use for learners ▪ 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. This calls for an attitude change in individual teachers concerning ICT use for learners. These teachers need to take serious effort to effectively use ICT for teaching and learning **Teachers' Assessment Activities Using ICT** ▪ 78.92% of NSTs and 85.08% of MTs do not make use of ICT to assess learners' project reports and/or multimedia product, this calls for an attitude change for individual teachers concerning ICT use for learners ▪ 76.58%NSTs and 80.76% of MTs do not make use of ICT for assessing learners written work or exercises, this also calls for an attitude change for individual teachers concerning ICT use for learners **Teachers' Use of ICT Resources** ▪ 67.71% of NSTs and 64.08% of MTs never use tutorial/exercise software in their teaching. This calls for an attitude change in individual teachers concerning ICT use for learners ▪ 78.65% of NSTs and 79.79% of MTs never use the Office Suite for teaching. This also calls for an attitude change in individual teachers concerning ICT use for learners ▪ 86.03% of NSTs and 85.03% of MTs never use simulations/modeling software for teaching; this calls for an attitude change in individual teachers concerning ICT use for learners **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪ 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. This calls for an attitude change in individual teachers concerning ICT use for learners ▪ 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use and this calls for an attitude change in individual teachers concerning ICT use for learners ▪ 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. This calls for an attitude change in individual teachers concerning ICT use for learners

	ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Teacher's activities, roles, interactions and interpersonal relations using ICT*
Recommendations for the Education System	**Curriculum Goals** ▪ 21.08% of NSTs and 24.78% of MTs do not take on the role of a competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum. It is recommended that either the SP or the TC (with the support of the principal) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support

	ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Teacher's activities, roles, interactions and interpersonal relations using ICT*
	them individually ▪ 33.84% of NSTs and 38.97% of MTs do not take on the role of TC and do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of TC and who do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, and encourage and support them individually **Learning Opportunities** ▪ 86.28% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example when studying natural phenomena through simulations, It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not effectively make use of learners' scheduled time for learning to use ICT, and encourage and support them individually ▪ 76.39% of NSTs and 79.48% of MTs never use ICT to search for information. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not using ICT to search for information, and encourage and support them individually ▪ 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not use ICT for processing and analysing data, and encourage and support them individually **Teachers' Pedagogical Practices Using ICT** ▪ 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentors. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ▪ 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ▪ 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations or presenting information. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually **Teachers' Assessment Activities Using ICT** ▪ 78.92% of NSTs and 85.08% of MTs do not make use of ICT to assess learners' project reports and/or multimedia products. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ▪ 76.58% of NSTs and 80.76% of MTs do not make use of ICT to assess learners' written work or exercises. It is recommended that either the SP or

	ECOLOGICAL SYSTEM ***Microsystem (Interpersonal & Bi-directional)*** *Teacher's activities, roles, interactions and interpersonal relations using ICT*
	the TC (with the support of the SP) identify individual teachers in their school who do not take on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually **Teachers' Use of ICT Resources** ▪ 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not take on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ▪ 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not take on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ▪ 86.03% of NSTs and 85.03% of MTs never made use of simulations/modeling software for teaching. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who do not take on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪ 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ▪ 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually ▪ 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. It is recommended that either the SP or the TC (with the support of the SP) identify individual teachers in their school who are not taking on the role of competent TC and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them individually

		ECOLOGICAL SYSTEM
		Mesosystem (Intersocial) *Interrelationship, roles and activities between the teacher and two or more of the following Microsystems:* *Teacher and Learner(s)* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
Recommendations for the Education System	**Curriculum Goals** ▪ 21.08% of NSTs and 24.78% of MTs do not take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum. It is recommended that the SP and the TC identifies a group of teachers in their school who are not taking on the role of competent TCs and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them ▪ 33.84% of NSTs and 38.97% of MTs do not take on the role of TC and do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum. It is recommended that the SP and the TC identifies a group of teachers in their school who are not taking on the role of TCs and who do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, and encourage and support them **Learning Opportunities** ▪ 86.28% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations, it is recommended that either the SP or the TC (with the support of the SP) identify a group of teachers in their school who do not make use of scheduled time for learning to use ICT, and encourage and support them ▪ 76.39% of NSTs and 79.48% of MTs never use ICT to searching for information. It is recommended that either the SP or the TC (with the support of the SP) identify a group of teachers in their school who never use ICT for searching information, and encourage and support them ▪ 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. It is recommended that either the SP or the TC (with the support of the SP) encourage and support groups of teachers in their school who do not use ICT for processing and analysing data **Teachers' Pedagogical Practices Using ICT** ▪ 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentors. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who do not use ICT to organise and mediate communication between the learners and experts or external mentors in their school ▪ 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who never use ICT to provide enrichment/remedial instructions in their school ▪ 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who never use ICT for demonstrations/presenting information in their school **Teachers' Assessment Activities Using ICT** ▪ 78.92% of NSTs and 85.08% of MTs did not make use of ICT to assess learners' project reports and/or multimedia products. It is recommended	

		ECOLOGICAL SYSTEM ***Mesosystem (Intersocial)*** *Interrelationship, roles and activities between the teacher and two or more of the following Microsystems:* *Teacher and Learner(s)* *Teacher and Principal* *Teacher and Teacher* *Teacher and TC* *Teacher and Parent*
	that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who not make use of ICT to assess learners' project reports and/or multimedia products in their school ▪ 76.58% of NSTs and 80.76% of MTs did not make use of ICT for to assess learners' written work or exercises. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who did not make use of ICT to assess learners written work or exercises in their school **Teachers' Use of ICT Resources** ▪ 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching and It is recommended that either the SP or the TC (with the support of the SP) encourage and support group of teachers (who never made use of tutorial/exercise software in their teaching) in their school ▪ 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who never made use of Office suite for teaching in their school ▪ 86.03% of NSTs and 85.03% of MTs never made use of simulations and modelling software for teaching. It is recommended that either the SP or the TC (with the support of the SP) encourage and support the group of teachers who never made use of simulations and modelling software for teaching in their school **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪ 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. It is recommended that either the SP or the TC (with the support of the SP) encourage and support this group of teachers in their school ▪ 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. It is recommended that either the SP or the TC (with the support of the SP) encourage and support this group of teachers in their school ▪ 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. It is recommended that either the SP or the TC (with the support of the SP) encourage and support this group of teachers in their school	

	ECOLOGICAL SYSTEM ***Exosystem (Intrasocial)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
Recommendations for the Education System	**Curriculum Goals** ▪ 21.08% of NSTs and 24.78% of MTs do not take on the role of competent TC and perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum. It is recommended that the DoE and the SGB identifies teachers who are not taking on the role of competent TCs and who do not perform other pedagogical practices to prepare learners for competent ICT use based on the school curriculum, and encourage and support them to complete ICT TPD courses ▪ 33.84% of NSTs and 38.97% of MTs do not take on the role of TC and do

	ECOLOGICAL SYSTEM ***Exosystem (Intrasocial)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
	not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum. It is recommended that the DoE and the SGB identifies teachers who are not taking on the role of TCs and who do not perform other pedagogical practices to prepare learners for responsible Internet behaviour based on the school curriculum, and encourage and support them to complete ICT TPD courses **Learning Opportunities** ▪ 86.28% of NSTs and 92.79% of MTs report that learners do not effectively making use of scheduled time to learn to use ICT, for example when studying natural phenomena through simulations. It is recommended that the DoE and the SGB identify teachers who do not use scheduled time for learning to use ICT, and encourage and support them to complete ICT TPD courses ▪ 76.39% of NSTs and 79.48% of MTs never use ICT in searching for information It is recommended that the DoE and the SGB identify teachers who never use ICT in searching for information and encourage and support them to complete ICT TPD courses ▪ 81.39% of NSTs and 84.92% of MTs never uses ICT for processing and analysing data. It is recommended that the DoE and the SGB identify teachers who do not use ICT for processing and analysing data, and encourage and support them to complete ICT TPD courses **Teachers' Pedagogical Practices Using ICT** ▪ 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and mediate communication between learners and experts/external mentors. It is recommended that the DoE and the SGB identify teachers who never use ICT to organise and/or mediate communication between learners and experts or external mentors, and encourage support them to complete ICT TPD courses ▪ 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. It is recommended that the DoE and the SGB identify teachers who never use ICT to provide enrichment/remedial instructions, and encourage and support them to complete ICT TPD courses ▪ 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. It is recommended that the DoE and the SGB identify teachers who have never used ICT for demonstrations/presenting information, and encourage and support them to complete ICT TPD courses **Teachers' Assessment Activities Using ICT** ▪ 78.92% of NSTs and 85.08% of MTs do not use ICT to assess learners' project reports and/or multimedia products. It is recommended that the DoE and the SGB identify teachers who never use ICT to assess learners' project reports and/or multimedia products, and encourage and support them to complete ICT TPD courses ▪ 76.58% of NSTs and 80.76% of MTs do not use ICT to assess learners' written work or exercises. It is recommended that the DoE and the SGB identify teachers who never use ICT to assess learners' written work or exercises, and encourage and support them to complete ICT TPD courses **Teachers' Use of ICT Resources** ▪ 67.71% of NSTs and 64.08% of MTs never made use of tutorial/exercise software in their teaching. It is recommended that the DoE and the SGB identify teachers who never used ICT for tutorial/exercise software in their teaching, and encourage and support them to complete ICT TPD courses ▪ 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for

		ECOLOGICAL SYSTEM ***Exosystem (Intrasocial)*** *Dialogue, reflections, decisions and actions between different systems/settings that affect the teacher without being an active participant*
	teaching. It is recommended that the DoE and the SGB identify teachers who never use the Office Suite for teaching, and encourage and support them to complete ICT TPD courses ▪ 86.03% of NSTs and 85.03% of MTs never use simulations/modelling software for teaching. It is recommended that the DoE and the SGB identify teachers who never use simulations/modeling software for teaching, and encourage and support them to complete ICT TPD courses **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪ 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. It is recommended that the DoE and the SGB identify teachers who cannot prepare lessons that involve the use of ICT by learners, and encourage and support them to complete ICT TPD courses. ▪ 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. It is recommended that the DoE and the SGB identify teachers who do not know which learning/teaching situations are suitable for ICT use, and encourage and support them to complete ICT TPD courses ▪ 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others. The DoE and the SGB should identify teachers who cannot use ICT in collaboration with others, and encourage and support them to complete ICT TPD courses	

		ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
Recommendations for the Education System	**Curriculum Goals** ▪ 21.07% of NSTs and 24.78% of MTs think it is not important to prepare learners for competent ICT use based on the school curriculum. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 33.84% of NSTs and 38.97% of MTs think it is not important to prepare learners for responsible Internet behaviour based on the school curriculum. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system **Learning Opportunities** ▪ 86.28% of NSTs and 92.79% of MTs report that learners do not effectively use scheduled time to learn to use ICT, for example, when studying natural phenomena through simulations. These percentages call for clearer curriculum guidelines and a more effective implementation of educational policies concerning competent ICT use in the school system ▪ 76.39% of NSTs and 79.48% of MTs never use ICT in searching information. These percentages call for clearer curriculum guidelines and a more effective implementation of educational policies concerning competent ICT use in the school system ▪ 81.39% of NSTs and 84.92% of MTs never use ICT for processing and analysing data. These percentages call for clearer curriculum guidelines and a more effective implementation of educational policies concerning competent ICT use in the school system **Teachers' Pedagogical Practices Using ICT**	

	ECOLOGICAL SYSTEM ***Macrosystem (Trans-social)*** *Blueprints (e.g. legislation, educational policies, National Curriculum Statements, Assessment Standards, school rules, etc.)*
	▪ 88.20% of NSTs and 92.04% of MTs do not use ICT to organise and/or mediate communication between the learners and experts/external mentor. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 87.54% of NSTs and 86.63% of MTs never use ICT to provide enrichment/remedial instructions. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 85.59% of NSTs and 83.65% of MTs never use ICT for demonstrations/presenting information. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system **Teachers' Assessment Activities Using ICT** ▪ 78.92% of NSTs and 85.08% of MTs did not use ICT to assess learners' project reports and/or multimedia products. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 76.58% of NSTs and 80.76% of MTs did not use ICT to assess learners' written work or exercises. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system **Teachers' Use of ICT Resources** ▪ 67.71% of NSTs and 64.08% of MTs never made use of tutorial or exercise software in their teaching. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 78.65% of NSTs and 79.79% of MTs never made use of the Office Suite for teaching. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 86.03% of NSTs and 85.03% of MTs never made use of simulations or modeling software for teaching. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system **Teachers' Confidence in the General and Pedagogical Use of ICT** ▪ 53.46% of NSTs and 52.87% of MTs cannot prepare lessons that involve the use of ICT by learners. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 47.83% of NSTs and 52.87% of MTs do not know which learning/teaching situations are suitable for ICT use. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system ▪ 51.73% of NSTs and 53% of MTs cannot use ICT in collaboration with others with efficient use of ICT resources. These percentages call for clearer curriculum guidelines and more effective implementation of educational policies concerning competent ICT use in the school system

7.5.2 Recommendations for the Implementation and Management of the White Paper on e-Education (2004) on the Chronosystem Level

Table 7.17 provides a summary of the average backlog at the time of SITES 2006 in the attainment of the White Paper on e-Education objectives within the Chronosystem.

Table 7.17: Overall Backlog in the Attainment of the White Paper on e-Education's Objectives within the Chronosystem

Main e-Education Policy Objectives	Average Backlog in the Attainment of the e-Education Policy Objectives
Establish ICT presence in schools (Phase 1)	63.98%
ICTs commonly present in schools (Phase 2)	70.54%
Building an education and training system to support ICT integration in teaching and learning (Phase 1)	54.82%
SP, NST and MT integration of ICT into management and the curriculum (Phase 2)	66.26%
Internet access and electronic communication (Phase 1)	64.63%
Internet access and electronic communication (Phase 2)	69.75%
Confidence amongst SP, NST and MT ICT use for management and pedagogical purposes (Phase 1)	56.63%
Community support for ICT use in schools (Phases 1 and 2)	78.97%
Overall backlog in the attainment of the e-Education Policy Phase 1 objectives	63.81%
Overall backlog in the attainment of e-Education Policy Phase 2 objectives	71.38%

As illustrated by Table 7.17, the overall backlog in the attainment of the e-Education policy objectives for Phases 1 (2004 to 2006/2007) was 63.81% during the data collection of SITES 2006. While the backlog for Phase 2 (2004 to 2010) was 71.38% during SITES 2006, it must be remembered that the full attainment of the main objectives of Phase 2 is projected by the White Paper on e-Education for the end of 2010, while 2006 data was used for this SDA. Phase 3 (ICTs integrated at all levels of the Education System in the year 2013) could not be evaluated using the SITES 2006 dataset (Addendums 5.4-5.6), therefore, further Chronosystem research on ICT backlog in the South African Education System is required at the end of 2013.

7.6 Conclusions

With South Africa becoming a newly industrialised country, the growing socio-economical, educational and political environment demands the progressive use of Information and Communication Technology (ICT) to take the country forward. ICT is also a catalyst for change in business, education policy and economic development (Pelgrum, 2001; South Africa, 2004; Watson, 2001). National governments all over the world invest in ICT infrastructure with the notion that computers will significantly enhance education (Cowe et al., 2010; Cuban, 2001). Internationally, governments envisage that ICT can provide quality education for all (Reynolds, Treharne, & Tripp, 2003). The changing nature of work in this information age makes digital literacy an essential skill for teachers and learners. The modern work place in the information age is characterised by team work, global collaboration and a risk-taking culture. The South African Government is aware of the need to level the playing field in the educational opportunities of its teachers and learners by using ICTs to: increase access, provide equity and redress imbalances (South Africa, 2004). The government believes that ICTs have the potential to improve the quality of education and training, while the Department of Education views ICTs as tools for: management and administration; communication and collaboration; curriculum integration; and for creating constructivist learning environments. However, active participation in the information society requires practical competencies in the use of digital technologies. Parents have the expectation that the education system will provide digital literacy to their children. Parents and educators believe that learning with technology will improve the quality of education. Nevertheless, the provision of ICT equipment to schools will not create the expected panacea in teaching and learning. It is the judicious pedagogical use of ICT that can ensure a positive difference in the lives of many disadvantaged learners (UNESCO, 2008; Wood & Ashfield, 2008). The skills and professional competencies of teachers are critical to effectively interact and communicate with learners (Wood & Ashfield, 2008). Large governmental investments in ICT infrastructure and an increased emphasis on the use of ICT in teaching and learning oblige teachers to become competent and effective in making efficient use of ICTs to improve pedagogy in the classroom (South Africa, 2004; Theng Lau, 2008). The objective of this study was to investigate the ICT pedagogic challenges and enablers of grade 8 Mathematics and Natural Science teachers in South African classrooms.

Section 7.5.1 presents the summary of findings from the statistical analysis of the SITES 2006 dataset (Addendum 5.4-Addendum 5.6). This section answers all the research questions listed in Chapter 1. Section 7.5.2 presents the findings of evaluating the attainment of the objectives of the White Paper on e-Education policy (2004) with reference to the SITES 2006 dataset (Addendum 5.4-5.6).

7.6.1 Summary of Findings from the Statistical Analysis of the SITES 2006 Dataset

- The South African Mathematics and Natural Science teachers' level of ICT use is small; when do they use ICT, it is for enhancing traditional pedagogical practices. This is in accordance with findings from the international literature review about teachers' ICT pedagogical practices
- Grade 8 Mathematics and Natural Science teachers' ICT pedagogical practices are not satisfactory. They face barriers similar to their international counter parts. They do not get the required support for sustainable ICT pedagogical use
- The most important curriculum goal for grade 8 Mathematics and Natural Science teachers to achieve is to improve learners' performance in assessment and examinations. Teachers need to be advised not to focus too much on *teaching to the test* Learners need to be motivated to engage in self-initiated and self-sustained problem solving in collaborative learning in realistic environments
- Significant numbers of teachers consider preparing learners for competent ICT use not at all important. Teachers need to be made aware of the connection between field of work and ICT skills for their learners
- Teachers need to prepare learners in ethical and responsible internet behaviour and teach them how to deal with cyber-crime
- South Africa is the country with the lowest teacher ICT use amongst the 22 education systems which participated. Teachers need to be encouraged to use more ICT in their pedagogical practices
- More than 75% of South African Science teachers do not have a basic degree in Science. Unqualified and under-qualified teachers must be given opportunities for upgrading their knowledge and skills
- South African grade 8 Mathematics and Science teachers prefer traditional pedagogical practices where all learners engage in identical activities simultaneously. Teachers should create opportunities for learners to become critical thinkers and problem solvers where their creativity can be nourished
- A revisiting of the South African National curriculum guidelines for assessment is required so that ICT can be naturally integrated in teaching, learning and assessment
- Policy and decision makers need to take the necessary steps to provide sustained training and support in general uses of ICT, as well as in pedagogical uses of ICT, for teachers

- South African schools require adequate ICT infrastructure, digital learning resources and continuous professional teacher training in computers if they wish to make effective use of ICT for teaching and learning
- Principals and teachers should prepare learners for responsible and ethical Internet behaviour. Schools should specify compulsory, basic computer-related knowledge and skills that teachers and learners must achieve
- Schools should improve the security measures of its ICT facilities, while increasing access to teachers, learners and surrounding community
- There is no significant difference between the practices of Mathematics and Science teachers
- There is no significant difference between male and female teachers' pedagogical practices
- School Principals can provide a significant level of support by organising ICT training for teachers and providing flexibility in the school time table for this.

7.6.2 Summary of Findings from the Use of Ecological Activity Systems Theory of the Attainment of the Objectives of the White Paper on e-Education Policy (2004)

As seen in Table 7.15, the overall attainment for Phases 1 (2004 to 2006/2007) during the SITES 2006 was 36.19%. The overall attainment of Phase 2 (2007 to 2010) was already at 28.66% during 2006, which indicates that while the implementation of the e-Education policy was far behind in terms of Phase 1 (2004 to 2006/2007), it was nevertheless 28.66% ahead in terms of Phase 2 (2007 to 2010). At the time of the current investigation (2011), no other large scale quantitative data, besides the SITES 2006, is available on the implementation and use of ICT in the South African Education System. Further quantitative research is recommended on the evaluation of the progress of both Phases 1 and 2, which ended in 2010.

As illustrated by Table 7.17, the overall backlog in the attainment of the e-Education policy objectives for Phase 1 (2004 to 2006/2007) was 63.81% during the data collection of the SITES 2006. While the backlog for Phase 2 (2004 to 2010) was 71.38% during the SITES 2006, it must be noted that the full attainment of the main objectives of Phase 2 is projected by the White Paper on e-Education for the end of 2010, while 2006 data was used for this SDA. Phase 3 (ICTs integrated at all levels of the Education System in the year 2013) could not be evaluated using the SITES 2006 dataset (Addendums 5.4-5.6), therefore, further Chronosystem research on ICT backlog in the South African Education System is required at the end of 2013.

7.7 Limitations of this Study

This was an SDA of the South African dataset of the SITES 2006 and is therefore limited by the original objectives of the SITES 2006. There is some evidence that teachers did not fully understand the research questions. For example, South African teachers claimed the highest level of use for Interactive White Boards (IWB) out of all 22 participating educational systems. Teachers might have misunderstood IWB to mean an ordinary blackboard. Similarly, South African teachers claimed that more than 50% of them received help in the form of a technical assistant in the classroom while using ICT for pedagogical purposes. In fact, computers are used only in 23% of schools for teaching and learning. Perhaps teachers might have misunderstood *help from technical assistant* for *any kind of help from anyone*. South Africa scored the highest (55.68%) out of all participating education systems for both teacher populations for learning *'from experts and peers from other schools or countries'*. Considering the low level of Internet connectivity available at South African schools, this finding seems to be a result of teachers' misunderstanding of the research question. A high majority (79.22%) of South African (Mathematics and Science combined) teachers never made use of the *general Office Suite* in their teaching, however, they claim to be having the highest levels of use for *smart board or interactive white board* compared to *all the twenty one other educational systems* that participated in the SITES 2006 (Law & Chow, 2008).

7.8 Questions for Future Research

This researcher proposes the following questions for further research emanating from this study:

1. Why do Natural Science teachers make more use of ICT than Mathematics teachers?
2. Why do large numbers of Natural Science teachers not make use of Science laboratories?
3. When ICT is used for teaching and learning, why is it mostly used for supporting traditional roles and less for facilitating roles?
4. Do teachers experience barriers in correctly interpreting research questionnaires? What are these barriers?

- It is strange to notice that the conventional role of learners shows a small correlation with conventional assessment practices (r_s=0.089), as well as with the conventional role of NSTs and MTs (r_s=0.237). This can be a subject for future research.
- Once again, the conventional role of teachers indicated a small correlation (r_s=0.108) with conventional assessment practices, which is opposite to that one would naturally

expect. In a conventional role, the common factor is the passive role of the learner. This finding is worth further research.

Bibliography

Ajam, K., & Bailey, C. (2009). School computer thefts are inside jobs. Retrieved 1 October, 2011, from http://www.iol.co.za/news/south-africa/school-computer-thefts-are-inside-jobs-1.433679

Alexander, R. (1992). *Policy and practice in primary education*. London: Routledge.

Anderson, J. (2005). Information and communication technologies in schools: A handbook for teachers. Retrieved 17 November, 2011, from http://unesdoc.unesco.org/images/0013/001390/139028e.pdf

Anderson, R. E., & Plomp, T. (2008). National contexts. In W. Pelgrum & N. Law (Eds.), *Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 study* (pp. 37-66). Hong Kong: Springer.

Balanskat, A., Blamir, R., & Kefalla, S. (2007). The ICT impact report. Retrieved 2 January, 2008, from http://ec.europa.eu/education/pdf/doc254_en.pdf

Balanskat, A., Blamire, R., & Kefela, S. (2006). *A review of studies of ICT impact on schools in Europe*. London: European Schoolnet.

Bannon, L. (1997). Activity theory. Retrieved 17 November, 2011, from http://www.irit.fr/ACTIVITES/GRIC/cotcos/pjs/TheoreticalApproaches/Actvity/ActivitypaperBannon.htm

Becta. (2004). A review of research literature on barriers to the uptake of ICT by teachers. Retrieved 10th May 2010, from http://www.becta.org.uk

Becta. (2006). Framework for ICT technical support. Retrieved 11 November, 2011, from http://www.teachfind.com/becta/becta-schools-leadership-and-management-introduction-framework-ict-technical-support

Becta. (2007). Learning in the 21st Century: The case of harnessing technology. Retrieved 17 November, 2011, from http://www.teachfind.com/becta/about-becta-harnessing-technology-learning-21st-century-call-action-becta

Becta. (2008). Analysis of emerging trends affecting the use of technology in education. Retrieved 4 November, 2011, from http://www.e-learningcentre.co.uk/Resource/CMS/Assets/5c10130e-6a9f-102c-a0be-003005bbceb4/form_uploads/Analysis_of_emerging_trends_affecting_the_use_of_technology_in_education___BECTA.pdf

Bedny, G. Z. (2005). The systemic-structural theory of activity: Applications to the study of human work. *Mind, Culture, and Activity, 12*(2), 128-147.

Bedny, G. Z., Seglin, M. H., & Miester, D. (2000). Activity theory: history, research and application. *Theoretical Issues in Ergonomics Science, 1*(2), 168-206.

Beetham, H., & Sharpe, R. (2007). *Rethinking pedagogy for a digital age*. New York: Routledge.

Betne, P., & Castonguay, R. (2007). On the role of Mathematics educators and librarians in constructivist pedagogy. *Education, 129*(1), 56-66.

Bhengu, M. J. (2006). *Ubuntu the global philosophy for humankind*. Cape Town: Lotsha Publications.

Bialobrzeska, M., & Cohen, S. (2005). *Managing ICTs in South African schools: a guide for school principals*. Pretoria: SAIDE.

Bingimlas, K. A. (2009). Barriers to successful integration of ICT in teaching and learning environments: A review of literature. *Eurasia Journal of Mathematics, Science & Technology Education, 5*(3), 235-245.

Black, P., & William, D. (1998). Inside the black box. *Phi Delta Kappan, 80*(2), 139-301.

Blanpied, W. A., & Ratchford, J. T. (2008). Path to the future for science and technology in China, India, and the United States. *Technology in Society, 30*(2008), 211-233.

Blignaut, A. S. (2008). *Towards a Research Framework for ICT Use in Developing Contexts*. Paper presented at the Faculty of Educational Sciences (Prestige Lecture) on 25 February 2008.

Blignaut, A. S., & Els, C. (2010). Towards a research framework for ICT use in developing contexts. *Journal of Systemics, Cybernetics and Informatics, 1*(1), 25-33.

Blurton, C. (1999). New directions of ICT-use in education. Retrieved 17 November, 2011, from http://www.unesco.org/education/educprog/lwf/dl/edict.pdf

Bohren, J. L. (1993). Sience learning and interactive videodisc technology. Retrieved 4 November, 2011, from http://catalogue.nla.gov.au/Record/5563235

Bos, K. T., Pelgrum, W. J., Visscher, A. J., & Voogt, J. M. (1999). Summary and reflections. In W. J. Pelgrum & R. E. Anderson (Eds.), *ICT and the emerging paradigm for life long learning: A worldwide assessment of infrastructure, goals and practices* (pp. 217-224). Amsterdam: International Association of the Evaluation of Educational Achievement.

Boslaugh, S. (2009). An introduction to secondary data analysis. Retrieved 28 November 2009, from http://sfcs.cals.arizona.edu/azsearch/sites/sfcs.cals.arizona.edu.azsearch/files/Boslaugh,%202007.pdf

Bradley, G., & Russel, G. (1997). Computer experience, school support and computer anxieties. *Educational Psychology, 17*(3), 267-284.

Bradley, J., & Schreiber, J. (2010). Universalising maths and science competence. *The Jounal of the Helen Suzman Foundation* Retrieved 4 November 2011, from http://www.hsf.org.za/resource-centre/focus/issues-51-60/Focus59web.pdf

Brese, F., & Carstens, R. (2009). SITES 2006 user guide for the international database. Retrieved 17 November, 2011, from http://www.iea.nl/fileadmin/user_upload/Publications/Electronic_versions/SITES_2006_IDB_User_Guide.pdf

Bronfenbrenner, U. (1979a). *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge: Harward University Press.

Bronfenbrenner, U. (1979b). *The ecology of human development: Experiments by nature and design*. Cambridge: Harvard University Press.

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: research perspectives. *Developmental Psychology, 22*(1), 723-742.

Brooks, C. (2009). SA hit by service-delivery protests. Retrieved 1 November, 2011, from http://mg.co.za/article/2009-07-22-sa-hit-servicedelivery-protests

BuaNews. (2010). New software to help Mathematics lessons. Retrieved 17th March, 2010, from http:\\allafrica.com/stories/printable/201003161020.html

Burrel, G., & Morgan, G. (1979). *Sociological Paradigms and Organisational Analysis*. London: Heinemann.

Byrne, B. M. (1989). *A primer of LISREL: basic applications and programming for confirmatory factor analytic models*. New York: Springer.

Castells, M. (2000a). Materials for an exploratory theory of the network society. *British Journal Sociology, 51*(1), 5-24.

Castells, M. (2000b). The rise of the fourth world. In D. Held & M. A (Eds.), *The global transformations reader: An introduction to the globalization debate* (pp. 348-354). Cambridge: Polity Press.

Castells, M. (2000c). *The rise of the network society*. New York: Blackwell.

Castens, R., & Pelgrum, W. J. (2009). *Second Information Technology in Education Study: SITES 2006 Technical Report*. Amsterdam: IEA.

Clark, R. E. (1994). Media will never influence learning. *Educational Technology, Research and Development, 42*(2), 21-29.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6 ed.). New York: Routledge Falmer.

Cohen, M. (2010). South African Teachers' Strike Shuts Schools, Compounds Educational Crisis. Retrieved 1 November, 2011, from http://www.bloomberg.com/news/2010-08-31/south-african-teachers-strike-shuts-schools-compounds-educational-crisis.html

Colburn, A. (2000). An Inquiry Primer. *Science Scope, Special Issue,* 42-44.

Collins, A., & Halverson, R. (2009). *Rethinking Education in the Age of Technology*. New York: Teachers College.

Cowe, B., Jones, A., Harlow, A., McGee, C., Cooper, B., Forret, M., et al. (2010). TELA; Laptop for Teachers Evaluation-Final Report Years 9-13. Retrieved 11 May, 2010, from http://www.educationcounts.govt.nz/publications/ict/27370/3

Cox, M., Preston, C., & Cox, K. (1999). What Factors Support or Prevent Teachers from Using ICT in their Classrooms? Retrieved 10 November, 2011, from http://www.leeds.ac.uk/educol/documents/00001304.htm

Cox, M., Webb, M., Chris, A., Blakeley, B., Beauchamp, T., & Rhodes, V. (2003). *ICT and pedagogy: A review of research literature* (No. 3). London: DfES.

Cradler, J. (2008). Summary of current research and evaluation findings on technology in education. Retrieved 25 February, 2008, from http://www.wested.org/techpolicy/refind.html

Cradler, J., & Bridgeforth, E. (2006). Recent research on the effect of technology on teaching and learning. Retrieved 7 July, 2006, from http://www.wested.org/techpolicy/research.html

Cramer, D., & Howitt, D. (2004). *The Sage Dictionary of Statistics* (Vol. 1). London: Sage Publications.

Creswell, J. W. (2009). *Research design: Quantitative, qualitative, and mixed methods approaches* (3 ed.). Thousand Oaks, CA: SAGE.

Cuban, L. (1999). The Technology Puzzle 18 (43). Retrieved 10 November, 2011, from http://www.edweek.org/ew/articles/1999/08/04/43cuban.h18.html

Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.

Curriculum Council Western Australia. (1998). Curriculum Framework. Retrieved 17 November, 2011, from http://www.curriculum.wa.edu.au/internet/Years_K10/Curriculum_Framework

Daniel, C. R. (2007). Skills shortage in South Africa: A literature review. Retrieved 4 April, 2008, from http://uct.academia.edu/RezaDaniels/Papers/525522/Skills_shortages_in_South_Africa_A_literature_review

Dede, C. (1998). The scaling-up process for technology-based educational innovations. In C. Dede (Ed.), *Learning with technology: 1998 Yearbook for the Association for Supervision and Curriculum Development* (pp. 199-215). Alexandria, VA: ASCD.

Demiraslan, Y., & Usluel, Y. (2008). ICT Integration in Turkish schools: Using activity theory to study issues and contradictions. *Australasian Journal of Educational Technology, 24*(4), 458-474.

Earl L. (2005). *Thinking about purpose in classroom assessment: Australian Curriculum Studies Association: Canberra*. Canberra: Australian Curriculum Studies Association.

Edwards, A. (2005). Let's get beyond community and practice: The many meanings of learning by participating. *The Curriculum Journal, 16*(1), 49-65.

Edwards, A. (2007). An interesting remblance: Vygotsky, Mead and American pragmatism. In H. Daniels, M. Cole & J. Wertsch (Eds.), *The Cambridge Companion to Vygotsky* (pp. 77-100). Cambridge: Cambridge University press.

Elliot, C. A., & Woodward, A. W. (2007). *Statistical Analysis Quick Reference Guide Book*. California: SAGE.

Engestrom, Y. (1987). *Learning by Expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Kunsultit.

Engeström, Y. (1987a). *Learning by Expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Kunsultit.

Engeström, Y. (1987b). *Learning by Expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Kunsultit.

Engeström, Y. (1996). Developmental work research as educational research. *Journal of Nordic Educational Research, 16*(1), 131-143.

Engeström, Y. (1999a). Expansive visibilization of work: An Activity-theoretical perspective. *Computer Supported Cooperative Work, 1*(8), 63-93.

Engeström, Y. (1999b). Innovative learning in work teams--analysing cycles of knowledge creation in practice. In Y. Engeström, R. Miettinen & R. L. Punamaki (Eds.), *Perspectives on Activity Theory*. New York: Cambridge University Press.

Engeström, Y. (2009). Expansive learning: Toward an activity-theoretical reconceptualisation. In I. Knud (Ed.), *Contemporary Theories of Learning* (pp. 53-73). London: Routlege.

Ertmer, P. (1999). Addressing first-and second-order barriers to change: Strategies for Technology Integration. *Educational Technology, Research and Development, 47*(4), 47-61.

European Round Table of Industrialists. (1997). *Investing in knowledge: the integration of technology in European education*. Brussels: ERT.

Evoh, C. J. (2007). Collaborative partnerships and the transformation of secondary education through ICTs in South Africa. *Education Media International, 44*(2), 81-98.

Farrel, G., & Issacs, S. (2007). *Survey of ICT and education in Africa: A summary report, based on 53 country surveys* (Vol. 1). Washington, DC: Infodev.

Foot, K. A. (2001). Cultural-historical activity theory as practical theory: Illuminating the development of a conflict monitoring network. *Communication Theory, 11*(1), 56-83.

Fowler, C. J. H., & Mayes, J. T. (1999). Learning relationships: From theory to design. *Association for Learning Technology Journal, 7*(3), 6-16.

Freud, S., Strachey, J., & Gay, P. (1990). *New introductory lectures on Psycho-analysis: Complete Psychological works of Sigmund Freud* (Vol. 1). New York: W.W. Norton & Company.

Futures Channel. (2011). Algebra in the real world. Retrieved 7 November, 2011, from http://www.thefutureschannel.com/algebra_real_world.php

Gibson, J. J. (1979). *The ecological approach to visual perception*. Boston, MA: Houghton Miffin.

Gillespie, H. (2006). *Unlocking teaching and learning with ICT*. London: David Fulton Publishers.

Gordon, M. (2009). Toward a pragmatic discourse of constructivism: Reflections on lessons from practice. *Educational Studies, 45*, 39-58.

Granic, A., Mifsud, C., & Cukusic, M. (2009). Design, implementation and validation of a Europe-wide pedagogical framework for e-Learning. *Computers and Education, 53*(4), 1052-1081.

Hadjerrouit, S. (2009). Didactics of ICT in secondary education: Conceptual issues and practical perspectives. *Issues in Informing Science and Information Technology, 6*(1), 152-178.

Harris, S., & Kington, A. (2002). *Innovative classroom practices using ICT in England: The Second Information Technology in Education Study*. London: National Foundation for Educational Research.

Hayes, D. N. A. (2007). ICT and learning: Lessons from Australian classrooms. *Computers and Education, 49*(2007), 385-395.

Hazelhurst, E. (2011). South Africa takes a dive in global competitiveness ranking. *Business Report* Retrieved 4 November, 2011, from http://www.iol.co.za/business/business-news/sa-takes-a-dive-in-global-competitiveness-ranking-1.1070789

Hennessy, S., Wishart, J., Whitelock, D., Deaney, R., Brawn, R., la Velle, L., et al. (2007). Pedagogical approaches for technology-integrated science teaching. *Computers and Education, 48*(2007), 137-152.

Hindle, D. (2008). Director General, Duncan Hindle and Department of Education officials briefing to the media regarding department of educations programmes, priorities and state of readiness for 2009. Retrieved 17 November, 2011, from http://www.info.gov.za/speeches/2008/08120514151001.htm

Hitchcock, G., & Hughes D. (1995). *Research and the teacher* (2 ed.). London: Routledge.

Hjalmarson M A. (2008). Mathematics Curriculum Systems: Models for Analysis of Curricular Innovation and Development. *Peabody Journal of Education, 83*, 592-610.

Holtman, L., Mukwada, G., & Du Plooy, L. (2009). Education and challenges for change status quo. Retrieved 17 March, 2010, from http://www.mendeley.com/research/education-challenges-change-status-quo/

Holzman, L. (2006). What kind of theory is activity theory? *Theory and Psychology, 16*(1), 5-11.

Hornby, A. S. (1997). *Oxford Advanced Learner's Dictionary* (7 ed.). New York: Oxford University Press.

Howie, S. J. (1999). Third International Mathematics and Science Study-Repeat (TIMSS-R): What has changed in South African pupils' performance in mathematics between 1995-1998? Retrieved 20 July, 2009, from http://academic.sun.ac.za/mathed/amesa/TIMSSR.htm

Howie, S. J., & Blignaut, A. S. (2009). South Africa's readiness to integrate ICT into mathematics and science pedagogy in secondary schools. *Education and Information Technologies, 14*(4), 345-363.

IEA. (2006). *SITES 2006 Main Study: Teacher Questionnaire*.Unpublished manuscript, Twente, Netherlands.

Ihde, D. (1991). *Instrumental Realism: The interface between philosophy of science and philosophy of technology*. Bloomington: IN: Indiana Press.

IICD. (2008). ICTs for education: Impact and lessons learned from IICD-supported activities. Retrieved 3 January, 2008, from http://www.iicd.org/articles/icts-for-education

Illeris, K. (Ed.). (2009). *Contemporary theories of learning*. New York: Routledge.

Jarvis, P. (2006). *Towards a comprehensive theory of human learning*. New York: Routledge.

Jarzabkowski, P. (2003). Strategic practices: An activity theory perspective on continuity and change. *Journal of Management Studies, 40*, 23-55.

John, P. D., & Sutherland, R. (2004). Teaching and learning with ICT: new technology, new pedagogy? *Education, Communication & Information, 4*(1), 101-107.

Johnson, M. (2010). Review of 'Educational Dialogues' - by Karen Littleton & Christine Howe. *Journal, 42*(2), E46. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8535.2011.01173_6.x/abstract. doi:10.1111/j.1467-8535.2011.01173_6.x

Jones, A. (2004). *A review of research literature on barriers to the uptake of ICT by teachers*. London: BECTA.

Jones, R. M. (2003). Local and national ICT policies. In R. B. Kozma (Ed.), *Technology, innovation, and educational change: A global perspective* (pp. 163-193). Eugene, OR: ISTE.

Kanbul, S., & Tezer, M. (2009). Opinions of teachers about computer aided mathematics education who work at special school centres. *Procedia Social and Behavioural Sciences 1*(2009), 390-394.

Kaptelinin, V., & Nardi, B. A. (2009). Activity theory: Basic concepts and applications. Retrieved 17 March, 2009, from http://www.sigchi.org/chi97/proceedings/tutorial/bn.htm

Karasavvidis, I. (2009). Activity theory as a conceptual framework for understanding teacher approaches to information and communication technologies. *Computers and Education, 53*(2009), 436-444.

Kennis.Net. (2006). *Four in Balance Monitor*. Zoetermeer: Stichting Kennisnet Ict op School.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experimental, and inquiry-based teaching. *Educational Psychologist*(41), 2.

Koehler, M. (2011). What is TPCK. Retrieved 12 July, 2011, from http://mkoehler.educ.msu.edu/tpck/what-is-tpck/

Kok, I., & Blignaut, S. (2010). Towards using e-portfolios in an ODL development state. *Progressio, 32*(1), 94-110.

Korpela, M., Soriyan, H. A., & Olufokunbi, K. C. (2000). Activity analysis as method for information systems development. *Scandinavian Journal of Information Systems, 12*(1-2), 191-210.

Kozma, R. B. (1991). Learning with media. *Review of Educational Research, 61*(2), 179-211.

Kozma, R. B. (2003a). ICT and educational change. In R. B. Kozma (Ed.), *Technology, innovation, and educational change: A global perspective* (pp. 1-18). Eugene, OR: ISTE.

Kozma, R. B. (2003b). Study procedures and first look at the data. In R. B. Kozma (Ed.), *Technology, innovation, and educational change: A global perspective* (pp. 19-41). Eugene, OR: ISTE.

Kozma, R. B. (2003c). Summary and implications of ICT-based educational change. In R. B. Kozma (Ed.), *Technology, innovation, and educational change: A global perspective* (pp. 217-239). Eugene, OR: ISTE.

Kozma, R. B. (2003d). Technology and Classroom practices: An International Study. *Journal of Research on Technology in Education, 36*(1), 14.

Kozma, R. B. (Ed.). (2003e). *Technology, innovation, and educational change: A global perspective*. Eugene, OR: ISTE.

Kozma, R. B., & McGhee, R. (2003). ICT an innovation classroom practices. In R. B. Kozma (Ed.), *Technology, innovation, and educational change: A global perspective* (pp. 43-80). Eugene, OR: ISTE.

Kraak, A., & Press, K. (Eds.). (2008). *Human resources development review 2008: Education, employment and skills in South Africa*. Cape Town: HSRC Press.

Kritt, W. D., & Winegar, L. T. (Eds.). (2007). *Education and technology, critical perspectives, possible futures*. New York: Lexington Books.

Kuuti, K. (1996). Activity theory as a potential framework for human-computer interaction research. In B. Nardi (Ed.), *Context and Consciousness: activity theory and human-computer interaction* (pp. 17-44). Cambridge: MIT Press.

Law, N. (2008a). In search of explanations. In N. Law, W. J. Pelgrum & T. Plomp (Eds.), *Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 Study* (pp. 251-262). Hong Kong: Springer.

Law, N. (2008b). Summary and reflection. In W. Pelgrum & N. Law (Eds.), *Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 study* (pp. 264-277). Hong Kong: Springer.

Law, N., & Chow, A. (2008). Pedagogical orientations of mathematics and science teachers around the world. In W. Pelgrum & N. Law (Eds.), *Pedagogy and ICT use: Findings from the IEA SITES 2006 study* (pp. 122-136). Hong Kong: Springer.

Law, N., Pelgrum, W., Monseur, C., Brese, F., Carstens, R., Voogt, J., et al. (2008a). Study design and methodology. In N. Law, W. J. Pelgrum & T. Plomp (Eds.), *Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 Study* (pp. 16-37). Hong Kong: Springer.

Law, N., Pelgrum, W. J., & Plomp, T. (Eds.). (2008b). *Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 study*. Hong Kong: Springer.

Lee, D. (1997). Factors influencing the success of computer skills learning among in-service teachers. *British Journal of Educational Technology, 28*(2), 139-141.

Leedy, P. D., & Ormrod, J. E. (2005). *Practical Research* (8 ed.). New Jersey: Pearson Merril Prentice Hall.

Lektorosky, A. V. (2009). Mediation as means of collective activity. In A. Sannino, H. Daniels & K. D. Gutierrez (Eds.), *Learning and expanding with activity theory* (Vol. 1, pp. 75-87). Cambridge: Cambridge University Press.

Leont'ev, A. N. (1977). Activity and Consciousness. Retrieved 21 October, 2011, from http://www.marxists.org/archive/leontev/works/1977/leon1977.htm

Leshner, A. I. (2009). A wake-up call for science education. Retrieved 11 September, 2009, from http://www.boston.com/news/politics/2008/articles/2009/01/12/a_wake_up_call_for_science_education/

Lever-Duffy, J., & McDonald, J. B. (2008). *Teaching and learning with technology* (3 ed.). Boston: Pearson Education, Inc.

Lim, C. P., & Chai, C. (2008). Teachers' pedagogical beliefs and their planning and conduct of computer-mediated classroom lessons. *British Journal of Educational Technology, 39*(5), 807-828.

Lubisi, C., Parker, B., & Wedekind, V. (1998). *Understanding outcome-based education*. Cape Town: Oxford University Press.

Luria, A. R. (1928). The problem of the cultural development of the child. *Journal of Genetic Psychology* Retrieved 17 November, 2011, from http://www.marxists.org/archive/vygotsky/works/reader/p046.pdf

Luria, A. R. (1962). *Higher cortical functions in man*. Moscow: Moscow University Press.

Maddux, C. D., Johnson, D. L., & Willis, J. W. (1997). *Educational computing: Learning with tomorrows technologies* (2 ed.). London: Allyn and Bacon.

Mail & Guardian Online. (2008). South Africa disappoints in global literacy study. 28 November 2007. Retrieved 23 May, 2008, from http://www.mg.co.za/articlePage.aspx?articleid=326287&area=/breaking_news/breaking_news__national/

Mail & Guardian Online. (2009). Making maths and science a must. Retrieved 11th September, 2009, from http://www.mg.co.za/article/2009-06-02-making-maths-and-science-a-must

Martin, D., & Peim, N. (2009). Critical perspectives on activity theory. *Educational Review, 61*(2), 131-138.

Martin, L. M., Halstead, A., & Taylor, J. (2001). Learning in rural communities: Fear of Information Communications Technology leading to life long learning? *Research in Post-Compulsory Education, 6*(3), 261-276.

Matzen, N. J., & Edmunds, J. A. (2007). Technology as a catalyst for change: The role of professional development. *Journal of Research on Technology in Education, 39*(4), 417-430.

McFarlane, A., & Sakellariou, S. (2002). The role of ICT in science education. *Cambridge Journal of Education, 32*(2), 219-232.

McKinsey & Company. (2007). How the world's best-performing schools come out on top. Retrieved 4 November 2011, from http://mckinseyonsociety.com/how-the-worlds-best-performing-schools-come-out-on-top/

McLoughlin, C., & Oliver, R. (1999). Pedagogic roles and dynamics in Telematics environments. In M. Selinger & J. Pearson (Eds.), *Telematics in education: Trends and issues* (pp. 32-50). Oxford: Elsevier Science.

McMillan, J. H., & Schumacher, S. (2001). *Research in education: A conceptual introduction* (5 ed.). New York: Longman.

Merril, P. F., Hammons, K., Vincent, B. R., Reynolds, P. L., Cristensen, L., & Tolman, M. N. (1996). *Computers in Education*. London: Simon & Shuster.

Michael, H. (2010). Science teacher shock for South Africa. Retrieved 5 May, 2010, from http://www.news24.com/SouthAfrica/News/Science-teacher-shock-for-SA-20100503

Molenda, M. (2008). Historical foundations. In J. M. Spector, M. D. Merril, J. Van Merrienboer & M. P. Drisscoll (Eds.), *Handbook of research educational communications and technology* (3rd ed., pp. 14-20). New York: Erlbaum.

Mouton, J. (2006). *How to Succeed in Your Masters' and Doctoral Studies*. Pretoria: Van Schaik.

Murphy, E., & Rodriquez-Manzanares, M. (2008). Using Activity theory and its principles of contradictions to guide research in educational technology. *Australasian Journal of Educational Technology, 24*(4), 442-457.

Mwanza, D., & Engeström, Y. (2003). Pedagogical adeptness in the design of e-learning environments: Experiences from Lab@Future project. Retrieved 17 November, 2011, from http://www.google.co.za/url?sa=t&rct=j&q=Pedagogical%2Badeptness%2Bin%2Bthe%2Bdesign%2Bof%2Be-learning%2Benvironments%3A%2BExperiences%2Bfrom%2BLab%2540Future%2Bproject%2BMwanza&source=web&cd=1&ved=0CBoQFjAA&url=http%3A%2F%2Fciteseerx.ist.psu.edu%2Fviewdoc%2Fdownload%3Fdoi%3D10.1.1.110.6435%26rep%3Drep1%26type%3Dpdf&ei=y_LETszcN8Gp8AOpw9iqCw&usg=AFQjCNHufj38Ms6NydSLQ8T9yLLvzybuGw

NCRTEC. (2008). How will you use technology to support your vision of learning? Retrieved 4 April, 2008, from http://rsdweb.k12.ar.us/departments/tech/Technology%20Committee/Tech%20Planning/howwill.pdf

NDoBE. (2010). The national curriculum and assessment policy statements for all subjects listed in the national curriculum statement grades R-12. Retrieved 4 November, 2011, from http://greengazette.co.za/documents/national-gazette-33528-of-03-sep-2010-vol-543_20100903-GGN-33528.pdf

NDoBE. (2011). Report on the Annual National Assessments of 2011. Retrieved 4 November, 2011, from http://www.education.gov.za/LinkClick.aspx?fileticket=1U5igeVjiqg%3D&tabid=358&mid=1325

Newhouse, C. P., & Clarkson, B. (2008). Creating contexts for learning with ICT in schools. In N. Yelland, A. G. Neal & E. Dakich (Eds.), *Rethinking Education with ICT*. Rotterdam: Sense Publishers.

Ngcuka, P. M. (2008). *Address by H.E. Ms. Phumzile Mlambo-Ngcuka, Deputy President of the Republic of South Africa, at the NEPAD e-Schools Stakeholders Conference, Gauteng*. Paper presented at the NEPAD e-schools Stakeholders' Conference. from http://dev.absol.co.za/Presidency/deputy/sp/2008/sp0416916.htm

Nicola, Y., Greg, A. N., & Eva, D. (2008). *Rethinking education with ICT*. Rotterdam: Sense Publishers.

Nicole, A. A. M., & Pexman, P. M. (2000). *Presenting Your Findings A Practical Guide for Creating Tables* (6 ed. Vol. 1). Washington: American Psychological Association.

Norton, S. J. (2007). The use of design practice to teach mathematics. *International Journal In Technology Design and Education, 18*(1), 19-44.

O'Donoghue, T., & Clarke, S. (2010). *Leading learning: process, themes and issues in international contexts*. New York: Routledge.

Ofsted. (2004). ICT in schools: Effect of government initiatives: Implementation in primary schools and effect on literacy. Retrieved 4 April 2008, from http://www.callscotland.org.uk/Services/Bibliography/Item-Details/index.php?recid=3089

Ogunlade, D., & Mwakasonda, S. A. (2009). Electricity access to the poor: A study of South Africa and Zimbabwe. Retrieved 1 November, 2011, from http://www.afrepren.org/project/gnesd/esdsi/erc.pdf

Ortega, M., Redondo, M. A., Paredes, M., Sanches-Villalon, P. P., Bravo, C., & Bravo, J. (1999). *Ubiquitous computing and collaboration.* Paper presented at the 2nd International Conference on Computers and Education (SAIIE) 2000, Puertolloano (Spain).

Osborne, J., & Hennessy, S. (2006, 2006). Literature review in science education and the role of ICT: Promise, problems, and future directions Retrieved 17 November, 2011, from http://hal.archives-ouvertes.fr/docs/00/19/04/41/PDF/osborne-j-2003-r6.pdf

Osden, M. (2007). Problems with science and technology education in Turkey. *Eurasia Journal of mathematics, Science & Technology Education, 3*(2), 157-161.

Ottevanger, W., Akker, J., & Feiter, L. (2007, March 2007). Developing Science, Mathematics, and ICT education in Sub-Saharan Africa: Patterns and promising practices. from http://siteresources.worldbank.org/INTAFRREGTOPSEIA/Resources/No.7SMICT.pdf

Owston, R. D. (2003). School context, sustainability and transferability, of innovation. In R. B. Kozma (Ed.), *Technology, innovation, and educational change: A global perspective* (pp. 125-161). Eugene, OR: ISTE.

Paraskeva, F., Bouta, H., & Papagianni, A. (2008). Individual characteristics and computer self efficacy in secondary education teachers to integrate technology in educational practice. *Computers and Education, 50*(2008), 1084-1091.

Paulston, R. G., & Liebman, M. (1996). *Social cartography; mapping ways of seeing social and educational change*. New York: Garland.

Pedro, H., Enrique, H. S., Ernesto, L. M., & Lucio, R. F. (2004). *Technology in schools: Education, ICT and the knowledge society*. Temuco: Universidad de La Frontera.

Pelgrum, H., & Voogt, J. M. (2005). ICT and Curriculum Change. *Human Technology, 1*(2), 157-175.

Pelgrum, W. (2008). School practices and conditions for pedagogy and ICT. In N. Law, W. Pelgrum & T. Plomp (Eds.), *Pedagogy and ICT use in schools around the World: findings from the IEA SITES 2006 study* (pp. 67-120). Hong Kong: Springer.

Pelgrum, W. J. (1999). Staff development. In W. J. Pelgrum & R. E. Anderson (Eds.), *ICT and the emerging paradigm for life-long learning: A worldwide assessment of infrastructure, goals and practices* (pp. 155-172). Amsterdam: International Association of the Evaluation of Educational Achievement.

Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers and Education, 37*(1), 163-178.

Pelgrum, W. J., & Anderson, R. E. (1999a). Study background and design. In W. J. Pelgrum & R. E. Anderson (Eds.), *ICT and the emerging paradigm for life-long learning: A worldwide assessment of infrastructure, goals and practices* (pp. 1-19). Amsterdam: International Association of the Evaluation of Educational Achievement.

Pelgrum, W. J., & Anderson, R. E. (Eds.). (1999b). *ICT and emerging paradigm for life-long learning: A world-wide educational assessment of infrastructure, goals and practices*. Amsterdam: International Association for the Evaluation of Educational Achievement.

Pelgrum, W. J., & Law, N. (2008). Introduction to SITES2006. In N. Law, W. J. Pelgrum & T. Plomp (Eds.), *Pedagogy and ICT use In schools around the world: Findings from the IEA Sites 2006 study* (pp. 2-15). Hong Kong: Springer.

Peter, D. J., & Steve, W. (2008). *The digital classroom*. Oxon: Routledge.

Piaget, J. (1954). *The construction of reality in the child* (Vol. 1). London: Routledge.

Plomp, T., Anderson, R. E., Law, N., & Quale, A. (Eds.). (2009). *Cross-national information and communication technology* (2 ed.). Charlotte, NC: Information Age Publishing.

Pong, S., & Pallas, A. (2001). Class size and eighth-grade Math achievement in the United States and abroad. *Educational Evaluation and Policy Analysis, 23*(3), 251-273.

Power School. (2011). School Information Systems. Retrieved 7 October, 2011, from http://www.rsd.edu/powerschool/

Pritchard, A. (2007). *Effective teaching with Internet technologies*. London: Paul Chapman Publishing.

Pritchard, A. (2008). *Ways of Learning*. New York: Routledge.

Rachel, E. (2007). Discipline-based designs for learning: The example of professional and vocational education. In H. Beetham & R. Sharp (Eds.), *Rethinking pedagogy for the digital age* (pp. 153-165). New York: Routledge.

Reddy, V. (2006). *Mathematics and Science achievement at South African schools in TIMSS 2003*. Cape Town: Human Sciences Research Council Press.

Resnick, M. (2009). Rethinking learning in the Digital Age. *Journal*, 37. Retrieved from http://llk.media.mit.edu/papers/mres-wef.pdf

Reynolds, D., Treharne, D., & Tripp, H. (2003). ICT-the hopes and reality. *British Journal of Educational Technology, 34*(2), 151-167.

Rivero, V. (2006). Let technology be your guide. *American School Board Journal, 11*(2006), 52-53.

Rogers, C. (1951). *Client-centred therapy: Its current practice, implications and theory* (Vol. 1). London: Houghton Mifflin.

Russel, G. (2000). School education in the age of the ubiquitous networked computer. *Technolgy In Society, 22*(2000), 389-400.

Ryder, M. (2009). What is activity theory? Retrieved 17 March, 2009, from http://carbon.ucdenver.edu/~mryder/itc/act_dff.html

Säljö, R. (1995). Mental and physical artefacts in cognitive practices. In P. Reimann & H. Spada (Eds.), *Learning in Humans and Machines: Towards an Interdisciplinary Learning Science* (pp. 83-96). Oxford: Pergamon.

Salovaara, H. (2005). An exploration of student's strategy use in inquiry-based computer supported collaborative learning. *Journal of Computer Assisted Learning, 21*(1), 39-52.

Sanchez, J., & Salinas, A. (2008). ICT and learning in Chilean schools: Lessons learned. *Computers and Education, 51*(2008), 1621-1633.

Sannino, A., Daniels, H., & Gutierrez, K. D. (2009). Activity theory between historical engagement and future-making practice. In A. Sannino, H. Daniels & K. D. Gutierrez (Eds.), *Learning and Expanding with Activity Theory* (Vol. 1, pp. 1-18). New York: Cambridge University Press.

Satre, J. P. (1958). *Being and nothingness: An essay on phenomenological ontology*. London: Routledge.

Sawyer, R. K. (Ed.). (2006). *The new science of learning*. New York: Cambridge University Press.

Schmidt, W. (2000). Researchers find systemic problems in U.S. mathematics and science education Retrieved 11 September, 2009, from http://www.educ.msu.edu/neweducator/Fall00/Timms.htm

Schuh, K., & Barab, S. A. (2008). Philosophical perspectives. In J. M. Spector, M. D. Merril, J. Van Merrienboer & M. P. Drisscoll (Eds.), *Handbook of research on educational communications and technology* (3 ed., pp. 67-84). New York: Lawrence Erlbaum.

Schutt, R. K. (2007). Secondary Data Analysis. Retrieved 27 November, 2009, from http://www.sagepub.com/upm-data/24111_Pages_469_478.pdf

Shaffer, D. W., & Kaput, J. J. (1999). Mathematics and virtual culture: An Evolutionary Perspective on Technology and Mathematics Education. *Educational Studies in Mathematics, 37*(2), 97-119.

Sharp, V. F. (2009). *Computer education for teachers: Integrating technology into classroom teaching* (6 ed.). Thousand Oaks, CA: John Wiley.

Shelly, G. B., Gunter, G. A., & Gunter, R. E. (2010). *Teachers discovering computers: Integrating technology and digital media in the classroom* (6 ed.). Boston: Course Technology.

SITES. (2008). Findings from Second Information Technology in Education Study 2006. Retrieved 17 November, 2011, from http://rms.iea-dpc.org/

Smith, E. (2006). *Using secondary data in educational and social research*. Glasgow: McGraw-Hill Education.

Software, L. (2011). Earth Browser. Retrieved 10 November, 2011, from http://www.earthbrowser.com/

South Africa. (1996a). Constitution of the Republic of South Africa No. 108 of 1996. Retrieved 17 November, 2011, from http://www.info.gov.za/documents/constitution/1996/a108-96.pdf

South Africa. (1996b). National Education Policy Act 27 of 1996. Retrieved 4 November, 2011, from http://www.info.gov.za/acts/1996/a27-96.pdf

South Africa. (1996c). South African Schools Act 84 of 1996 Retrieved 4 November, 2011, from http://www.info.gov.za/acts/1996/a84-96.pdf

South Africa. (1998). Employment of Educators Act 76 of 1998 Retrieved 4 November, 2011, from www.info.gov.za/view/DownloadFileAction?id=86579

South Africa. (2001). The General and Further Education and Quality Assurance Act of 2001 Retrieved 4 November, 2011, from www.info.gov.za/view/DownloadFileAction?id=77484

South Africa. (2004). White Paper on e-Education. Retrieved 4 November, 2011, from http://www.education.gpg.gov.za/Legislation/White%20paper%207%20on%20e-Education.pdf

South Africa. (2005). Revised National Curriculum Statement Grades R-9 (Schools). Retrieved 18 November, 2011, from http://www.info.gov.za/view/DownloadFileAction?id=70257

South Africa. (2008). Education for All Country Report: South Africa. Retrieved 4 November, 2011, from http://www.info.gov.za/view/DownloadFileAction?id=124570

SouthAfrica.info. (2007). Maths, science teachers a priority. Retrieved 11 September, 2009, from http://www.southafrica.info/about/education/education-260307.htm

SPSS. (2011). Statistical Package for Social Sciences (SPSS®). Retrieved 21 June, 2011, from http://www.spss-sa.com/

SRI. (2008). Overview of technology and education reform. Retrieved 3 April, 2008, from http://www.ed.gov/pubs/EdReformStudies/EdTech/overview.html

Surty, E. (2010). DBE's ICT Plans revealed. Retrieved 2 November, 2010, from http://www.mg.co.za/printformat/single/2010-11-01-dbes-ict-plans-revealed

Taylor, R. P. (1980). *The computer in school: Tutor, tool, tutee*. New York: Teachers College Press.

Theng Lau, B. (2008). Exploring the Extend of ICT Adoption Among Secondary School Teachers in Malaysia. *International Journal of Computing and ICT Research, 2*(2), 19-36.

UNESCO. (2007). The UNESCO ICT in Education Programme. Retrieved 17June, 2009, from http://www.unescobkk.org/education/ict

UNESCO. (2008). A study on the use of ICT in Mathematics teaching. Retrieved 31/03/2008, from http://www.unescobkk.org/index.php?id=6800&tx_wecknowledgebase_pi1[tt_news]=963&tx_wecknowledgebase_pi1[backPid]=6771&cHash=c525a81c5c

University of Tasmania. (2009). Activity theory. Retrieved 17 March, 2009, from http://www.educ.utas.edu.au/users/ilwebb/Research/activity_theory.htm

Usun, S. (2009). Information and communication technologies (ICT) in teacher education (ITE) programs in the world and Turkey. *Procedia Social and Behavioural Sciences, 1*(2009), 331-334.

Valanides, N., & Angeli, C. (2008). Learning and teaching about scientific models with a computer modeling tool. *Computers in Human Behaviour, 24*(2008), 220-233.

Valente, J. A. (1997). The role of computers in education: Achievement and comprehension. *Prospects, 27*(3), 403-414.

Van der Walt, B. J. (1997). *Afrocentric or Eurocentric*. Potchefstroom: Potchefstroom University for Christian Higher Education.

Veen, W. (1993). The role of beliefs in the use of information technology: implications for teacher education, or teaching the right thing at the right time. *Journal of Information Technology for Teacher Education, 2*(2), 139-153.

Voogt, J. (2008). Satisfying pedagogical practices using ICT. In N. Law, W. J. Pelgrum & T. Plomp (Eds.), *Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 Study* (pp. 221-250). Hong Kong: Springer.

Voogt, J. M., & Pelgrum, W. J. (2003). ICT and the curriculum. In R. B. Kozma (Ed.), *Technology, innovation, and educational change: A global perspective* (pp. 81-124). Eugene, OR: ISTE.

Voogt, W. P. (2007). *Quantitative research methods for professionals*. New York: Pearson.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological process*. Cambridge: Harward University Press.

Wagemaker, H., & Law, N. (2010). Highlights of finding from major international study on pedagogy and ICT use in schools. Retrieved 4th May, 2010, from http://www.udir.no/Upload/Forskning/Internasjonale_undersokelser/5/sites2006_presentasjon.pdf

Watson, D. M. (2001). Pedagogy before Technology: Re-thinking the Relationship between ICT and Teaching. *Education and Information Technologies, 6*(4), 251-266.

Wertsch, J. (1998). Mediated action. In W. Bechtel & G. Graham (Eds.), *Companion to cognitive science*. Oxford: Blackwell.

Wheeler, S., & John, P. D. (2008). *The digital classroom*. New York: Routledge.

Wilson, T. D. (2006). A re-examination of information seeking behaviour in the context of activity theory. *Information Research, 11*(4), 1-15.

Wood, R., & Ashfield, J. (2008). The use of interactive whiteboard for creative teaching and learning in literacy and Mathematics: A case study. *British Journal of Educational Technology, 39*(1), 84-96.

World Bank. (1998). Latin America and the Caribbean: Education and technology at the crossroads. Retrieved 17 November, 2011, from http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&siteName=WDS&entityID=000094946_99101605302560

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SITES 2006

Second Information Technology in Education Study
--- Main Study ---

Teacher Questionnaire

[International English Version]

This questionnaire comprises the following parts:

Part I:	Information about the Target Class
Part II:	Curriculum Goals
Part III:	Teacher Practice
Part IV:	Student Practice
Part V:	Learning Resources and Technology Infrastructure
Part VI:	Impact of ICT Use
Part VII:	Information about You and Your School
Part VIII:	Specific Pedagogical Practice that Uses ICT

International Association for the Evaluation of
Educational Achievement

[Put national center logo, references and credit here]

Instructions for NRCs

- Please check the introduction carefully for changes, insertions and deletions if you want to re-use parts of the FT translation.
- Refer to the accompanied list of changes from FT → MS to identify changed and adapted questions if you want to re-use parts of the FT translation.
- Text passages that are highlighted in yellow and enclosed in these [brackets] need to be adapted for your country in this document, but do not require documentation on NAF.
- Some areas (text passages highlighted in yellow without brackets) require special attention. We expect slightly different terms to be used in national contexts. Adapt the following terms to your cultural context – if necessary – and document on the corresponding National Adaptation Form (NAF).
    - Question 7, dimension I: “Data-logging tools”;
    - Question 14, dimension L: “guardians/caretakers”;
    - Question 17, dimension E: “Data-logging tools”;
    - Question 17, dimension I: “cell phone”;
    - Question 17, dimension K: “web-based learning environments”;
    - Section VIII Heading, Question 37-41: “pedagogical practice”;
- Question 33. Remove category “Post-secondary education (e.g., teachers college)” (international option) if not applicable in your context. Adapt if necessary and document on NAF!
- Section 8 (VIII) is an international option. If you do not want to use this option remove questions 37 to 41, including the section heading VIII AND the “Part VIII…” line on the cover page. Retain the passage “This is the end of the questionnaire…” and ensure that it appears directly after question 36.
- Page breaks in this document have been inserted to ensure that no question/table breaks across pages. After translation you may need to adjust page breaks again. Retain section headings as first element on new pages. Do not change order of questions.
- Remove all highlights from questionnaire after adaptation/translation.
- Delete this page including the page break after adaptation/translation.

Introduction

The Second Information Technology in Education Study (SITES 2006) is an international assessment of teaching and learning practices and of how Information and Communication Technologies (ICT) support these in secondary schools around the world. Approximately 20 countries will provide information from representative samples of teachers on how they organize their teaching and learning, the ICT facilities they have available at school, how they use ICT for teaching and learning, and the obstacles or difficulties they experience in relation to these technologies. This information will give better insight into the current state of pedagogical approaches and of how technologies support them. It will also allow educational practitioners and policy-makers to gain a better understanding of areas needing intervention and additional support.

[Name of country], along with about 20 other countries, is taking part in this international study of pedagogical practices and the way that ICT supports these. This questionnaire is being administered to representative samples of teachers in these countries. The study is being conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA).

We are asking you for your help in order to determine the current state of pedagogical approaches to and the use of ICT in [Name of country]. Please try to answer each question as accurately as you can.

Confidentiality

All information that is collected in this study will be treated confidentially. At no time will the name of any school or individual be identified. While results will be made available by country and by type of school within a country, you are guaranteed that neither your school nor any of its personnel will be identified in any report of the results of the study. [*For countries which have ethical survey guidelines which emphasize voluntary participation:* Participation in this survey is voluntary and any individual may withdraw at any time.]

About this Questionnaire

- This questionnaire asks for information from teachers about education and policy matters related to pedagogical practices and computers. The questionnaire will take you approximately 30 minutes to complete.
- The words computers and ICT (Information and Communication Technologies) are used interchangeably in this questionnaire.
- Guidelines for answering the questions are typed in *italics*.
- Most questions can be answered by marking the one most appropriate answer. A few questions (9, 14, 15, and 16) require responses to two parts, (a) and (b). Mark one most appropriate answer for each of the two parts in each row.
- If you are completing a paper version of this questionnaire, please use a writing pen or ballpoint to write your answers.
- When you have completed this questionnaire, please [National Return Procedures and Return Date].

Further information

- When in doubt about any aspect of the questionnaire, or if you would like more information about it or the study, you can reach us by phone at the following numbers: [National Center Contact Information]

Thank you very much for your cooperation!

Subject and Target Class References

When a question refers to the "target class", please think only about the class / course you are teaching in this school year that is specified on the cover page. You will answer all questions with reference to the teaching of the subject (domain) that is specified on the cover page in this class.

Part I: Information about the Target Class

1. How many students are there in the target class?

|__|__|__|

2. What is the gender mix of this class?

All boys	All girls	Both boys and girls
☐	☐	☐

3. Which curriculum track is the target class in?

Academic	Vocational	No tracking
☐	☐	☐

4. Approximately what percentage of students are absent in the target class on a typical school day?

Less than 5%	5–10%	11–20%	More than 20%
☐	☐	☐	☐

5. Approximately what percentage of students in the target class are native speakers of the language of instruction?

More than 90%	76–90%	50–75%	Less than 50%
☐	☐	☐	☐

6. How many hours of scheduled class time do you spend with the target class on Mathematics/Science lessons per week?

Please answer this questions with reference to the subject (domain) that is specified on the cover page.

Less than two hours	2– 4 hrs	5– 6 hrs	7– 8 hrs	More than 8 hrs
☐	☐	☐	☐	☐

7. What proportion of students in your class has competence in the following?

Please mark only one choice in each row.

Operation skills	Nearly none	Some students	Majority of students	Nearly all students	Don't know
A Word-processing	☐	☐	☐	☐	☐
B Database software	☐	☐	☐	☐	☐
C Spreadsheet	☐	☐	☐	☐	☐
D Presentation software	☐	☐	☐	☐	☐
E Application of multimedia	☐	☐	☐	☐	☐
F E-mail	☐	☐	☐	☐	☐
G Internet	☐	☐	☐	☐	☐
H Graphic calculator	☐	☐	☐	☐	☐
I Data-logging tools	☐	☐	☐	☐	☐

Part II: Curriculum Goals

8. In your teaching of the target class in this school year, how important is it for you to achieve the following goals?

Please mark only one choice in each row.

		Not at all	A little	Somewhat	Very much
A	To prepare students for the world of work	☐	☐	☐	☐
B	To prepare students for upper secondary education and beyond	☐	☐	☐	☐
C	To provide opportunities for students to learn from experts and peers from other schools/countries	☐	☐	☐	☐
D	To provide activities which incorporate real-world examples/settings/applications for student learning	☐	☐	☐	☐
E	To improve students' performance in assessments/examinations	☐	☐	☐	☐
F	To increase learning motivation and make learning more interesting	☐	☐	☐	☐
G	To individualize student learning experiences in order to address different learning needs..............	☐	☐	☐	☐
H	To foster students' ability and readiness to set their own learning goals and to plan, monitor and evaluate their own progress	☐	☐	☐	☐
I	To foster students' collaborative and organizational skills for working in teams	☐	☐	☐	☐
J	To foster students' communication skills in face-to-face and/or online situations	☐	☐	☐	☐
K	To satisfy parents' and the community's expectations	☐	☐	☐	☐
L	To prepare students for competent ICT use	☐	☐	☐	☐
M	To prepare students for responsible Internet behavior (e.g., not to commit mail-bombing, etc.) and/or to cope with cybercrime (e.g., Internet fraud, illegal access to secure information, etc.)	☐	☐	☐	☐

Part III: Teacher Practice

9. In your teaching of the target class in this school year,

(a) How often is the scheduled learning time of the class used for the following activities?

(b) Has ICT been used when these activities took place?

Please mark only one choice for each of the two parts in each row.

		(a) How often is the scheduled learning time used for the following activities?				(b) ICT used?	
		Never	Sometimes	Often	Nearly always	No	Yes
A	Extended projects (2 weeks or longer) ...	☐	☐	☐	☐	☐	☐
B	Short-task projects	☐	☐	☐	☐	☐	☐
C	Product creation (e.g., making a model or a report)	☐	☐	☐	☐	☐	☐
D	Self-accessed courses and/or learning activities	☐	☐	☐	☐	☐	☐
E	Scientific investigations (open-ended)	☐	☐	☐	☐	☐	☐
F	Field study activities	☐	☐	☐	☐	☐	☐
G	Teacher's lectures	☐	☐	☐	☐	☐	☐
H	Exercises to practice skills and procedures	☐	☐	☐	☐	☐	☐
I	Laboratory experiments with clear instructions and well-defined outcomes ..	☐	☐	☐	☐	☐	☐
J	Discovering mathematics principles and concepts	☐	☐	☐	☐	☐	☐
K	Studying natural phenomena through simulations	☐	☐	☐	☐	☐	☐
L	Looking up ideas and information	☐	☐	☐	☐	☐	☐
M	Processing and analyzing data	☐	☐	☐	☐	☐	☐

10. When I am instructing students in the target class (excluding field trips), they are:

Please mark only one choice.

Always in the same location with me	Sometimes in locations away from me	Often in locations away from me	Always in locations away from me
☐	☐	☐	☐

11. When students in the target class participate in planned learning activities, they:

Please mark only one choice.

Always work in the same location	Sometimes work in different locations	Often work in different locations	Always work in different locations
☐	☐	☐	☐

12. The learning activities for students in the target class are planned so that these take place:

Please mark only one choice.

Always during scheduled school hours	Sometimes outside scheduled school hours	Often outside scheduled school hours	At any time (no scheduled school hours)
☐	☐	☐	☐

13. I provide feedback to students in the target class:

Please mark only one choice.

Always during school hours	Sometimes outside scheduled school hours	Often outside scheduled school hours	At any time (no scheduled school hours)
☐	☐	☐	☐

14. In your teaching of the target class in this school year:

(a) How often do you conduct the following?

(b) Do you use ICT for these activities?

Please mark only one choice for each of the two parts in each row.

		(a) How often do you conduct the following?				(b) ICT used?	
		Never	Sometimes	Often	Nearly always	No	Yes
A	Present information/demonstrations and/or give class instructions	☐	☐	☐	☐	☐	☐
B	Provide remedial or enrichment instruction to individual students and/or small groups of students	☐	☐	☐	☐	☐	☐
C	Help/advise students in exploratory and inquiry activities	☐	☐	☐	☐	☐	☐
D	Organize, observe or monitor student-led whole-class discussions, demonstrations, presentations	☐	☐	☐	☐	☐	☐
E	Assess students' learning through tests/quizzes	☐	☐	☐	☐	☐	☐
F	Provide feedback to individuals and/or small groups of students	☐	☐	☐	☐	☐	☐
G	Use classroom management to ensure an orderly, attentive classroom	☐	☐	☐	☐	☐	☐
H	Organize, monitor and support team-building and collaboration among students	☐	☐	☐	☐	☐	☐
I	Organize and/or mediate communication between students and experts/external mentors	☐	☐	☐	☐	☐	☐
J	Liaise with collaborators (within or outside school) for student collaborative activities	☐	☐	☐	☐	☐	☐
K	Provide counseling to individual students	☐	☐	☐	☐	☐	☐
L	Collaborate with parents/guardians/ caretakers in supporting/monitoring students' learning and/or in providing counseling	☐	☐	☐	☐	☐	☐

15. In your teaching of the target class in this school year:

(a) Do you use the following methods of assessing student performance?

(b) Do you use ICT to carry out these assessments?

Please mark only one choice for each of the two parts in each row.

		(a) Assessment method used?		(b) ICT used?	
		No	Yes	No	Yes
A	Written test/examination	☐	☐	☐	☐
B	Written task/exercise	☐	☐	☐	☐
C	Individual oral presentation	☐	☐	☐	☐
D	Group presentation (oral/written)	☐	☐	☐	☐
E	Project report and/or (multimedia) product	☐	☐	☐	☐
F	Students' peer evaluations	☐	☐	☐	☐
G	Portfolio/learning log	☐	☐	☐	☐
H	Assessment of group performance on collaborative tasks	☐	☐	☐	☐

Part IV: Student Practice

16. In your teaching of the target class in this school year

(a) How often do your students engage in the following activities?

(b) Do your students use ICT for these activities?

Please mark only one choice for each of the two parts in each row.

Students' Activities		(a) How often do your students engage in the following?				(b) ICT used?	
		Never	Sometimes	Often	Nearly always	No	Yes
A	Students working on the same learning materials at the same pace and/or sequence	☐	☐	☐	☐	☐	☐
B	Students learning and/or working during lessons at their own pace	☐	☐	☐	☐	☐	☐
C	Complete worksheets, exercises	☐	☐	☐	☐	☐	☐
D	Give presentations	☐	☐	☐	☐	☐	☐
E	Determine own content goals for learning (e.g., theme/topic for project)	☐	☐	☐	☐	☐	☐
F	Explain and discuss own ideas with teacher and peers	☐	☐	☐	☐	☐	☐
G	Collaborate with peers from other schools within and/or outside the country	☐	☐	☐	☐	☐	☐
H	Answer tests or respond to evaluations	☐	☐	☐	☐	☐	☐
I	Self and/or peer evaluation	☐	☐	☐	☐	☐	☐
J	Reflect on own learning experience review (e.g., writing a learning log) and adjust own learning strategy	☐	☐	☐	☐	☐	☐
K	Communicate with outside parties (e.g., with experts)	☐	☐	☐	☐	☐	☐
L	Contribute to the community through their own learning activities (e.g., by conducting an environmental protection project)	☐	☐	☐	☐	☐	☐

Part V: Learning Resources and Tools

17. How often do you incorporate the following in your teaching of the target class in this school year?

Please mark only one choice in each row.

		Never	Sometimes	Often	Nearly always
A	Equipment and hands-on materials (e.g., laboratory equipment, musical instruments, art materials, overhead projectors, slide projectors, electronic calculators)	☐	☐	☐	☐
B	Tutorial/exercise software	☐	☐	☐	☐
C	General office suite (e.g., word-processing, database, spreadsheet, presentation software) ..	☐	☐	☐	☐
D	Multimedia production tools (e.g., media capture and editing equipment, drawing programs, webpage/multimedia production tools)	☐	☐	☐	☐
E	Data-logging tools	☐	☐	☐	☐
F	Simulations/modeling software/digital learning games	☐	☐	☐	☐
G	Communication software (e.g., e-mail, chat, discussion forum)	☐	☐	☐	☐
H	Digital resources (e.g., portal, dictionaries, encyclopedia)	☐	☐	☐	☐
I	Mobile devices (e.g., Personal Digital Assistant (PDA), cell phone)	☐	☐	☐	☐
J	Smart board/interactive whiteboard	☐	☐	☐	☐
K	Learning management system (e.g., web-based learning environments)	☐	☐	☐	☐

Part VI: Impact of ICT Use

18. Do you use ICT in the teaching and learning activities of the target class?

☐ No → ***Please go to question 21.***

☐ Yes → ***Please continue.***

19. To what extent do you agree that the use of ICT has had the following impacts on you?

Please mark only one choice in each row.

		Not at all	A little	Somewhat	A lot
A	My ICT skills have improved.	☐	☐	☐	☐
B	I incorporate new teaching methods.	☐	☐	☐	☐
C	I provide more individualized feedback to students.	☐	☐	☐	☐
D	I incorporate new ways of organizing student learning.	☐	☐	☐	☐
E	I monitor more easily students' learning progress. .	☐	☐	☐	☐
F	I access more diverse/higher quality learning resources.	☐	☐	☐	☐
G	I collaborate more with colleagues within my school.	☐	☐	☐	☐
H	I collaborate more with peers and experts outside my school.	☐	☐	☐	☐
I	I complete my administrative tasks more easily.	☐	☐	☐	☐
J	My workload has increased.	☐	☐	☐	☐
K	There is increased work pressure.	☐	☐	☐	☐
L	I have become less effective as a teacher.	☐	☐	☐	☐

20. To what extent has the use of ICT impacted your students in the target class in the following areas?

Please mark only one choice in each row.

		Decreased a lot	Decreased a little	No impact	Increased a little	Increased a lot
A	Subject matter knowledge	☐	☐	☐	☐	☐
B	Learning motivation	☐	☐	☐	☐	☐
C	Information-handling skills	☐	☐	☐	☐	☐
D	Problem-solving skills	☐	☐	☐	☐	☐
E	Self-directed learning skills	☐	☐	☐	☐	☐
F	Collaborative skills	☐	☐	☐	☐	☐
G	Communication skills	☐	☐	☐	☐	☐
H	ICT skills	☐	☐	☐	☐	☐
I	Ability to learn at their own pace	☐	☐	☐	☐	☐
J	Self esteem	☐	☐	☐	☐	☐
K	Achievement gap among students	☐	☐	☐	☐	☐
L	Time spent on learning	☐	☐	☐	☐	☐
M	School attendance	☐	☐	☐	☐	☐
N	Assessment results	☐	☐	☐	☐	☐
O	Digital divide (i.e., inequity between students from different socioeconomic backgrounds)	☐	☐	☐	☐	☐

Part VII: Information about You and Your School

21. To what extent are you confident in accomplishing the following?

Please mark only one choice in each row.

	General use of ICT	Not at all	A little	Somewhat	A lot
A	I can produce a letter using a word-processing program.	☐	☐	☐	☐
B	I can e-mail a file (e.g., the notes of a meeting) to a colleague.	☐	☐	☐	☐
C	I can take photos and show them on the computer.	☐	☐	☐	☐
D	I can file electronic documents in folders and sub-folders on the computer.	☐	☐	☐	☐
E	I can use a spreadsheet program for budgeting or student administration.	☐	☐	☐	☐
F	I can share knowledge and experiences with others in a discussion forum/user group on the Internet.	☐	☐	☐	☐
G	I can produce presentations with simple animation functions.	☐	☐	☐	☐
H	I can use the Internet for online purchases and payments.	☐	☐	☐	☐
	Pedagogical Use of ICT				
I	I can prepare lessons that involve the use of ICT by students.	☐	☐	☐	☐
J	I know which teaching/learning situations are suitable for ICT use.	☐	☐	☐	☐
K	I can find useful curriculum resources on the Internet.	☐	☐	☐	☐
L	I can use ICT for monitoring students' progress and evaluating learning outcomes.	☐	☐	☐	☐
M	I can use ICT to give effective presentations/ explanations.	☐	☐	☐	☐
N	I can use ICT for collaboration with others.	☐	☐	☐	☐
O	I can install educational software on my computer.	☐	☐	☐	☐
P	I can use the Internet (e.g., select suitable websites, user groups/discussion forums) to support student learning.	☐	☐	☐	☐

22. Looking ahead to the coming two years, what priority will you give to the use of ICT in enhancing your teaching practice in the following areas?

Please mark only one choice in each row.

		Not at all	Low priority	Medium priority	High priority
A	To monitor more effectively the progress of my students	☐	☐	☐	☐
B	To provide exercises to students in order to practice skills and procedures	☐	☐	☐	☐
C	To provide better and more interesting lectures/presentations to my students	☐	☐	☐	☐
D	To engage students in multimedia production projects	☐	☐	☐	☐
E	To provide more activities that address the individual differences among my students	☐	☐	☐	☐
F	To involve students in collaborative, short projects (2 weeks or shorter)	☐	☐	☐	☐
G	To involve students in extended collaborative projects (longer than 2 weeks)	☐	☐	☐	☐
H	To involve my students in scientific investigations (involving laboratory work)	☐	☐	☐	☐
I	To provide more opportunities for my students to collaborate with or learn from people outside of their classroom, including peers and external experts	☐	☐	☐	☐
J	To collaborate more with fellow teachers and others within and outside my school	☐	☐	☐	☐
K	To provide more opportunities for my students to collaborate with their classmates	☐	☐	☐	☐
L	To arrange self-accessed activities for my students	☐	☐	☐	☐

23. Do you experience the following obstacles in using ICT in your teaching?

Please mark only one choice in each row.

		No	Yes
A	ICT is not considered to be useful in my school.	☐	☐
B	My school does not have the required ICT infrastructure.	☐	☐
C	I do not have the required ICT-related skills.	☐	☐
D	I do not have the necessary ICT-related pedagogical skills.	☐	☐
E	I do not have sufficient confidence to try new approaches alone.	☐	☐
F	My students do not possess the required ICT skills.	☐	☐
G	My students do not have access to the required ICT tools outside of the school premises.	☐	☐
H	I do not have the time necessary to develop and implement the activities.	☐	☐
I	I do not know how to identify which ICT tools will be useful.	☐	☐
J	My school lacks digital learning resources.	☐	☐
K	I do not have the flexibility to make my own decisions when planning lessons with ICT.	☐	☐
L	I do not have access to ICT outside of the school.	☐	☐

24. Have you participated in any of the following professional development activities? If no, would you wish to attend?

Please mark only one choice in each row.

		No, I do not wish to attend	No, I would like to attend if available	Yes, I have
A	Introductory course for Internet use and general applications (e.g., basic word-processing, spreadsheets, databases, etc.)	☐	☐	☐
B	Technical course for operating and maintaining computer systems	☐	☐	☐
C	Advanced course for applications/standard tools (e.g., advanced word-processing, complex relational databases)	☐	☐	☐
D	Advanced course for Internet use (e.g., creating websites/developing a home page, advanced use of the Internet, video conferencing)	☐	☐	☐
E	Course on pedagogical issues related to integrating ICT into teaching and learning	☐	☐	☐
F	Subject-specific training with learning software for specific content goals (e.g., tutorials, simulation, etc.)	☐	☐	☐
G	Course on multimedia operations (e.g., using digital video and/or audio equipment)	☐	☐	☐

25. To what extent do the following statements about school vision apply to the staff in your school?

Please mark only one choice in each row.

		Not at all	A little	Somewhat	A lot
A	We discuss what we want to achieve through our lessons.	☐	☐	☐	☐
B	Teachers are constantly motivated to critically assess their own educational practices.	☐	☐	☐	☐
C	Teachers are expected to think about the school's vision and strategies with regard to educational practices.	☐	☐	☐	☐

26. To what extent do the following statements about teachers' participation in decision-making apply to you?

Please mark only one choice in each row.

		Not at all	A little	Somewhat	A lot
A	I can influence the development of the school's innovation implementation plans.	☐	☐	☐	☐
B	When implementing innovations, our school considers teachers' opinions and adjusts its action plan as needed.	☐	☐	☐	☐
C	I am able to implement innovations in my classroom according to my own judgment and insights.	☐	☐	☐	☐

27. To what extent do the following statements about professional collaboration among teachers apply to you?

Please mark only one choice in each row.

		Not at all	A little	Somewhat	A lot
A	I co-teach with my colleagues.	☐	☐	☐	☐
B	I discuss the problems that I experience at work with my colleagues.	☐	☐	☐	☐
C	I work with teachers in other schools on collaborative activities.	☐	☐	☐	☐
D	I work with teachers in other countries on collaborative activities.	☐	☐	☐	☐

28. To what extent do the following statements about support to teachers apply to you?

Please mark only one choice in each row.

		Not at all	A little	Somewhat	A lot
A	When necessary, I receive sufficient technical support from my school/region/state (e.g., by having a technician in my classes) to support my teaching.	☐	☐	☐	☐
B	My students can access computers easily outside scheduled class time without my help.	☐	☐	☐	☐
C	The administrative work arising from the use of ICT in my teaching (e.g., booking computer laboratories, changing class schedules) is easy to do in my school.	☐	☐	☐	☐

29. Do you have access to a computer at home?

☐ No → ***Please go to question 31.***

☐ Yes → ***Please continue.***

30. Do you use this computer for the following activities?

Please mark only one choice in each row.

		No	Yes
A	Teaching related activities	☐	☐
B	Connecting to the internet	☐	☐

31. To what age group do you belong?

Below 25	25–29	30–39	40–49	50–59	60 or above
☐	☐	☐	☐	☐	☐

32. What is your gender?

Male	Female
☐	☐

33. What is your highest level of education?

Please mark only one choice.

Secondary or high school	Post-secondary education (e.g., teachers college)	Bachelor's degree	Master's degree or above
☐	☐	☐	☐

34. Do you have a Bachelor's degree in Science or Mathematics?

Please mark only one choice.

No	Degree in Mathematics only	Degree in Science only	Degree in both Mathematics and Science
☐	☐	☐	☐

35. Do you have a teaching license or certificate?

No	Yes
☐	☐

36. How many years of experience do you have in teaching Mathematics or Science?

Less than 2 years	2–4 years	5– 9 years	10–19 years	20 years or more
☐	☐	☐	☐	☐

Part VIII: Specific Pedagogical Practice that Uses ICT

37. Which of the following description is applicable to you?

Please mark only one choice.

- ☐ I use ICT once a week or more in the target class. → ***Please continue.***
- ☐ I use ICT extensively in the target class during a limited period during the year (e.g., in a project or a theme) → ***Please continue.***
- ☐ None of the above → ***Please go to the end of the questionnaire.***

38. Please describe the one most satisfying pedagogical practice (that you applied in the target class) in this school year, in which you and/or your students used ICT extensively with specific content related to mathematics/science.

Please describe the pedagogical practice (e.g., a research project or a multimedia production), the ICT used (e.g., data logging tools, spreadsheets or web search) and its content (e.g., curricular goals; topic) in a maximum of 20 words.

___

___

___

___

39. Has the use of ICT in this pedagogical practice contributed to changes in the following students' outcomes in the target class:

Please mark only one choice in each row.

		Decreased	Made no difference	Increased
A	Subject-matter knowledge mastery	☐	☐	☐
B	ICT skills	☐	☐	☐
C	Learning motivation	☐	☐	☐
D	Ability to learn at own pace	☐	☐	☐
E	Communication skills	☐	☐	☐
F	Information-handling skills	☐	☐	☐
G	Collaborative skills	☐	☐	☐
H	Self-directed learning skills	☐	☐	☐
I	Problem-solving skills	☐	☐	☐
J	Achievement gap among students	☐	☐	☐
K	Self esteem	☐	☐	☐

40. Has the use of ICT in this pedagogical practice contributed to changes in the following aspects of your teaching of the target class:

Please mark only one choice in each row.

		Decreased	Made no difference	Increased
A	Quality of coaching students	☐	☐	☐
B	Time available to help individual students	☐	☐	☐
C	Time needed to solve technical problems	☐	☐	☐
D	Time needed for preparation	☐	☐	☐
E	Quality of instructions given to students	☐	☐	☐
F	Time needed for classroom management	☐	☐	☐
G	Quality of classroom discussion	☐	☐	☐
H	Collaboration between students	☐	☐	☐
I	Communication with the outside world	☐	☐	☐
J	Availability of new learning content	☐	☐	☐
K	Variety of learning resources/materials	☐	☐	☐
L	Variety of learning activities	☐	☐	☐
M	Adaptation to individual needs of students	☐	☐	☐
N	Amount of effort needed to motivate students	☐	☐	☐
O	Insight into the progress of student performance	☐	☐	☐
P	Self-confidence	☐	☐	☐

41. In this pedagogical practice, who was the main actor in initiating the following aspects of teaching and learning:

Please mark only one choice in each row.

NA: Not applicable for this specific pedagogical practice

		Teacher	Students	NA
A	Determining content	☐	☐	☐
B	Determining learning goals	☐	☐	☐
C	Getting started	☐	☐	☐
D	Organizing grouping	☐	☐	☐
E	Choosing learning resources/materials	☐	☐	☐
F	Deciding on the location of learning	☐	☐	☐
G	Planning of time	☐	☐	☐
H	Deciding on the time needed for learning	☐	☐	☐
I	Deciding on when to take a test	☐	☐	☐
J	Demonstrating learning achievement	☐	☐	☐
K	Monitoring progress	☐	☐	☐
L	Providing feedback	☐	☐	☐
M	Choosing learning activities/ strategies	☐	☐	☐

This is the end of the questionnaire.
Thank you very much for your time and effort!

[Return Instructions].

Placeholder for identification label
(105 x 35 mm)

SITES 2006

Second Information Technology in Education Study
--- Main Study ---

Principal Questionnaire

[International English Version]

International Association for the Evaluation of
Educational Achievement

[Put national center logos, references and credit here]

Instructions for NRCs

- Please check the introduction carefully for changes, insertions and deletions if you want to re-use parts of the FT translation.
- Refer to the accompanied list of changes from FT → MS to identify changed and adapted questions if you want to re-use parts of the FT translation.
- Text passages that are highlighted in yellow and enclosed in these <brackets> need to be adapted and documented on NAF for your country.
    - Where in the questionnaire <target grade> is written, insert here the grade level that is defined in your national sampling plan.
    - In the introduction, insert <national school definition> if needed. Follow instructions there. Consult Olaf Zuehlke (DPC) or Christian Monseur for further advice, if needed.
- Text passages that are highlighted in yellow and enclosed in these [brackets] need to be adapted for your country in this document, but do not require documentation on NAF.
- Some areas (text passages highlighted in yellow without brackets) require special attention. We expect slightly different terms to be used in national contexts. Adapt the following terms to your cultural context – if necessary – and document on the corresponding National Adaptation Form (NAF).
    - Question 4, dimension D: "guardians/caretakers"
    - Question 9, dimension H: "guardians/caretakers"
    - Question 25, Category: "External agency"
- Page breaks in this document have been inserted to ensure that no question/table breaks across pages. After translation you may need to adjust page breaks again. Retain section headings as first element on new pages. Do not change order of questions.
- Remove all highlights from questionnaire after adaptation/translation.
- Delete this page including the page break after adaptation/translation.

Introduction

The Second Information Technology in Education Study (SITES 2006) is an international assessment of teaching and learning practices and of how Information and Communication Technologies (ICT) support these in secondary schools around the world. Approximately 20 countries will provide information from representative samples of teachers on how they organize their teaching and learning, the ICT facilities they have available at school, how they use ICT for teaching and learning, and the obstacles or difficulties they experience in relation to these technologies. This information will give better insight into the current state of pedagogical approaches and of how technologies support them. It will also allow educational practitioners and policy-makers to gain a better understanding of areas needing intervention and additional support.

[Name of country], along with about 20 other countries, is taking part in this international study of pedagogical practices and the way that ICT supports these. The study is being conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA).

We are asking you for your help in order to determine the current state of pedagogical approaches to and the use of ICT. Please try to answer each question as accurately as you can.

Confidentiality

All information that is collected in this study will be treated confidentially. At no time will the name of any school or individual be identified. While results will be made available by country and by type of school within a country, you are guaranteed that neither your school nor any of its personnel will be identified in any report of the results of the study. [*For countries which have ethical survey guidelines which emphasize voluntary participation:* Participation in this survey is voluntary and any individual may withdraw at any time.]

About this Questionnaire

- This questionnaire asks for information from schools about education and policy matters related to pedagogical practices and computers. **We would like the person who completes this questionnaire to be the principal of the school.** If you do not have the information to answer particular questions, please consult other persons in the school. This questionnaire will take approximately 30 minutes to complete.
- The words computers and ICT (Information and Communication Technologies) are used interchangeably in this questionnaire.
- Please note that some questions refer to the entire school, while other questions refer to Grade <target grade> only. [*For countries, in which the definition of 'school' is not obvious to respondents add appropriate description depending on how sampling units were defined in the national sampling plan*: When questions refer to 'your school' we mean by 'school': <national school definition>.]
- Guidelines for answering the questions are typed in *italics*. Most questions can be answered by marking the one most appropriate answer.
- If you are completing the paper version of this questionnaire, please use a writing pen or ballpoint to write your answers.
- When you have completed this questionnaire, please [National Return Procedures and Date].

Further information

- When in doubt about any aspect of the questionnaire, or if you would like more information about it or the study, you can reach us by phone at the following numbers: [National Center Contact Information]

Thank you very much for your cooperation!

Pedagogy at Your School

The following questions address the characteristics of teaching and learning in your school.

1. To what extent is each of the following aspects of teaching and learning currently present in your school?

Please mark only one choice in each row.

		Not at all	To some extent	A lot
A	Students develop abilities to undertake independent learning.	☐	☐	☐
B	Students learn to search for, process and present information.	☐	☐	☐
C	Students are largely responsible for controlling their own learning progress.	☐	☐	☐
D	Students learn and/or work during lessons at their own pace.	☐	☐	☐
E	Students are involved in cooperative and/or project-based learning.	☐	☐	☐
F	Students determine for themselves when to take a test.	☐	☐	☐
G	Students learn search strategies to find diverse types of relevant information.	☐	☐	☐
H	Students learn to assemble, organize and integrate information.	☐	☐	☐
I	Students learn to critically evaluate the validity and value of information obtained from their searches on the Internet.	☐	☐	☐
J	Students present work using several forms of presentation (e.g., text, visual, verbal, electronic).	☐	☐	☐
K	Students are assigned projects that require several persons working together for an extended period of time.	☐	☐	☐
L	Students have autonomy to decide what topics to study.	☐	☐	☐

2. To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages Mathematics and Science teachers at Grade <target grade> to achieve the following goals?

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	To cover the prescribed curriculum content ...	☐	☐	☐	☐
B	To improve students' performance on assessments/examinations	☐	☐	☐	☐
C	To individualize student learning experiences in order to address different learning needs ..	☐	☐	☐	☐
D	To increase learning motivation and make learning more interesting	☐	☐	☐	☐
E	To foster students' ability and readiness to set own learning goals and to plan, monitor and evaluate own progress	☐	☐	☐	☐
F	To foster collaborative and organizational skills when working in teams	☐	☐	☐	☐
G	To provide activities which incorporate real-world examples/settings/applications for student learning	☐	☐	☐	☐
H	To provide opportunities for students to learn from experts and peers from other schools/organizations/countries	☐	☐	☐	☐
I	To foster communication skills in face-to-face and/or on-line situations	☐	☐	☐	☐
J	To prepare students for responsible Internet behavior (e.g., not to commit mail-bombing, such as spam, etc.) and/or to cope with cybercrime (e.g., Internet fraud, illegal access to secure information, etc.)	☐	☐	☐	☐

Pedagogy and ICT in your school

This section asks you to answer questions about pedagogy and ICT in your school.

3. For each of the following, how important is the use of ICT at Grade <target grade> in your school?

Please mark only one choice in each row.

		Not at all	A little	Somewhat	A lot
A	To prepare students for the world of work	☐	☐	☐	☐
B	To improve students' performance on assessments/examinations	☐	☐	☐	☐
C	To promote active learning strategies	☐	☐	☐	☐
D	To individualize student learning experiences in order to address different learning needs	☐	☐	☐	☐
E	To foster collaborative and organizational skills when working in teams	☐	☐	☐	☐
F	To develop students' independence and responsibility for their own learning	☐	☐	☐	☐
G	To do exercises to practice skills and procedures	☐	☐	☐	☐
H	To increase learning motivation and make learning more interesting	☐	☐	☐	☐
I	To satisfy parents' and the community 's expectations	☐	☐	☐	☐
J	To act as a catalyst in changing the pedagogical approaches of teachers	☐	☐	☐	☐

4. To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages teachers at Grade <target grade> to use ICT in each of the following activities?

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	Organize, monitor and support team-building and collaboration among students	☐	☐	☐	☐
B	Organize and/or mediate communication between students and experts/external mentors	☐	☐	☐	☐
C	Facilitate collaboration (within or outside of school) on student activities	☐	☐	☐	☐
D	Collaborate with parents/guardians/ caretakers in supporting/monitoring students' learning and/or in providing counseling	☐	☐	☐	☐
E	Provide students with experiences that show them how certain activities are done in real life or by experts	☐	☐	☐	☐

5. Are the following actions with regard to ICT at Grade <target grade> taken in your school?

Please mark only one choice in each row.

		No	Yes
A	Setting up security measures to prevent unauthorized system access or entry	☐	☐
B	Restricting the number of hours students are allowed to use the computer	☐	☐
C	Allowing students to access school computers outside school hours	☐	☐
D	Allowing students to access computers outside class hours (but during school hours)	☐	☐
E	Honouring of intellectual property rights (e.g., software copyrights)	☐	☐
F	Prohibiting access to adult-only material (e.g., pornography, violence)	☐	☐
G	Restricting the playing of games on school computers	☐	☐
H	Specifying the compulsory computer-related knowledge and skills that students need	☐	☐
I	Giving the local community (parents and/or others) access to school computers and/or the Internet	☐	☐
J	Complementing printed lesson materials with digital resources for teaching and learning	☐	☐
K	Providing teachers with laptop computers and/or other mobile learning devices	☐	☐
L	Providing students with laptop computers and/or other mobile learning devices	☐	☐

6. What priority level do you give to resource allocation in your school in order to enhance the use of ICT in teaching and learning for the Grade <target grade> students in your school?

Please mark only one choice in each row.

		Not a priority	Low priority	Medium priority	High priority
A	To decrease the number of students per computer	☐	☐	☐	☐
B	To increase the number of computers connected to the Internet	☐	☐	☐	☐
C	To increase the bandwidth for Internet access of the computers connected to the Internet ...	☐	☐	☐	☐
D	To increase the range of digital learning resources related to the school curriculum	☐	☐	☐	☐
E	To establish/enhance an online learning support platform and its management so that teaching and learning can take place any time, anywhere	☐	☐	☐	☐
F	To improve the technical skills of teachers	☐	☐	☐	☐
G	To improve the ability of teachers to make good pedagogical use of ICT	☐	☐	☐	☐
H	To broaden teachers' pedagogical repertoire and to widen their pedagogical competence to engage in new methods of teaching and learning	☐	☐	☐	☐
I	To improve students' ICT skills	☐	☐	☐	☐
J	To provide teachers with incentives (including salary adjustment, promotion, etc.) to integrate ICT use in their teaching	☐	☐	☐	☐
K	To increase the number of teachers using ICT for teaching/learning purposes	☐	☐	☐	☐

7. Has the school leadership (you and/or other school leaders) taken any of the following actions during the past few years?

Please mark only one choice in each row.

		No	Yes
A	Re-allocating workload to allow for collaborative planning for innovations in the classrooms	☐	☐
B	Re-allocating workload to allow for the provision of technical support for innovations	☐	☐
C	Organizing workshops to demonstrate the use of ICT-supported teaching and learning	☐	☐
D	Meeting teachers to review their pedagogical approach	☐	☐
E	Monitoring and evaluating the implementation of pedagogical changes	☐	☐
F	Establishing new teacher teams to coordinate the implementation of innovations in teachers' teaching and learning	☐	☐
G	Changing class schedules to facilitate the implementation of innovations	☐	☐
H	Implementing incentive schemes to encourage teachers to integrate ICT in their lessons	☐	☐
I	Encouraging teachers collaborate with external experts to improve their teaching and learning practices	☐	☐
J	Featuring new instructional methods in the school newspaper and/or other media (e.g., the school website)	☐	☐
K	Involving parents in ICT related activities	☐	☐

8. To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages teachers in Grade <target grade> to undertake the following activities

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	Assigning extended projects (2 weeks or longer)	☐	☐	☐	☐
B	Assigning short-task projects	☐	☐	☐	☐
C	Assigning production projects (e.g. making models or reports)	☐	☐	☐	☐
D	Involving students in self-accessed courses and/or learning activities	☐	☐	☐	☐
E	Involving students in open-ended scientific investigations	☐	☐	☐	☐
F	Undertaking field study activities	☐	☐	☐	☐
G	Using virtual laboratories, simulations	☐	☐	☐	☐
H	Applying exercises to practice skills and procedures	☐	☐	☐	☐
I	Involving students in laboratory experiments with clear instructions and well-defined outcomes	☐	☐	☐	☐
J	Involving students in studying natural phenomena through simulations	☐	☐	☐	☐
K	Involving students in processing and analyzing data	☐	☐	☐	☐

9. During this school year, how often did the school leadership (you and/or other school leaders) undertake each of the following?

Please mark only one choice in each row.

		Not at All	A few times	Monthly	Weekly
A	Organize activities to develop a common vision of what is meant by quality education .	☐	☐	☐	☐
B	Inform teachers about pedagogical changes taking place in the school	☐	☐	☐	☐
C	Inform teachers about educational developments outside the school	☐	☐	☐	☐
D	Consult teachers about desired pedagogical changes	☐	☐	☐	☐
E	Discuss with teachers what they want to achieve through their lessons	☐	☐	☐	☐
F	Motivate teachers to critically assess their own educational practices critically	☐	☐	☐	☐
G	Encourage teachers to assess their educational practices in the context of our school's goals	☐	☐	☐	☐
H	Discuss with parents/guardians/caretakers what pedagogical changes are taking place in our school	☐	☐	☐	☐
I	Discuss with students the teaching and learning in our school	☐	☐	☐	☐

10. To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages the following activities to take place in Grade <target grade>?

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	Teachers co-teach with their colleagues	☐	☐	☐	☐
B	Teachers collaborate with teachers from other schools...	☐	☐	☐	☐
C	Teachers discuss the problems that they experience at work with their colleagues	☐	☐	☐	☐
D	Teachers collaborate with teachers from other countries	☐	☐	☐	☐

11. To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages teachers to use each of the following types of assessment at Grade <target grade>?

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	Written test/examination	☐	☐	☐	☐
B	Written task/exercise	☐	☐	☐	☐
C	Individual oral presentation	☐	☐	☐	☐
D	Group presentation (oral/written)	☐	☐	☐	☐
E	Project report and/or (multimedia) product	☐	☐	☐	☐
F	Students' peer evaluations	☐	☐	☐	☐
G	Portfolio/learning log	☐	☐	☐	☐
H	Group assessment scores for collaborative tasks	☐	☐	☐	☐

Staff Development for Teachers and the School Leadership

The following contains a number of questions about staff development for Mathematics and/or Science teachers teaching Grade <target grade> and for the school leadership.

12. Are teachers of Mathematics and/or Science at Grade <target grade> required or encouraged to acquire knowledge and skills in each of the following?

Please mark only one choice in each row.

		No	Yes Encouraged	Yes Required
A	Integrating Web-based learning in their instructional practice	☐	☐	☐
B	Using new ways of assessment (portfolios, peer reviews, etc.)	☐	☐	☐
C	Developing real-life assignments for students	☐	☐	☐
D	Using real-life assignments developed by others	☐	☐	☐
E	Using computers for monitoring student progress	☐	☐	☐
F	Organizing forms of team-teaching	☐	☐	☐
G	Collaborating with other teachers via ICT	☐	☐	☐
H	Communicating with parents via ICT	☐	☐	☐
I	Being knowledgeable about the pedagogical issues of integrating ICT into teaching and learning	☐	☐	☐
J	Using subject-specific learning software (e.g., tutorials, simulation)	☐	☐	☐

13. How much of a priority is it for your school leadership (you and/or other school leaders) to acquire competencies in the following areas?

Please mark only one choice in each row.

		Not considered	Low priority	Medium priority	High priority
A	Developing a common pedagogical vision among teaching staff in the school	☐	☐	☐	☐
B	Managing the innovation of pedagogical practices in the school	☐	☐	☐	☐
C	Explaining to teachers the relevance of encouraging students to be responsible for their own learning process and outcomes	☐	☐	☐	☐
D	Identifying best practices that exist outside the school regarding the integration of ICT in learning	☐	☐	☐	☐
E	Promoting collaboration between teachers of different subjects	☐	☐	☐	☐
F	Managing the adoption of ICT-supported methods for assessing student progress ...	☐	☐	☐	☐
G	Organizing cooperation with other schools regarding the development of teaching and learning materials	☐	☐	☐	☐
H	Organizing cooperation with other schools regarding the development of ICT-based teaching and learning	☐	☐	☐	☐
I	Promoting the integration of ICT in the teaching and learning of traditional subjects	☐	☐	☐	☐
J	Developing a strategic plan for integrating ICT use in teaching and learning	☐	☐	☐	☐

Pedagogical Support for Persons Using ICT

14. How frequently does each of the following persons provide pedagogical support to those teachers in Grade <target grade> who want to use ICT for their teaching and learning activities?

Note: Pedagogical support may consist of giving advice and guidance on issues related to teaching and learning. Please do not consider support that is only technical.

Please mark only one choice in each row.

		Never	Few times a year	Monthly	Weekly	Not applicable
A	Experienced colleagues	☐	☐	☐	☐	☐
B	The school principal	☐	☐	☐	☐	☐
C	The technology coordinator	☐	☐	☐	☐	☐
D	Other staff from the school	☐	☐	☐	☐	☐
E	Experts from outside the school	☐	☐	☐	☐	☐

15. For each of the following activities, to what extent is pedagogical support available for teachers in Grade <target grade>?

Note: Pedagogical support may consist of advice and guidance (via persons, manuals, etc.) with regard to the activities mentioned below. Please do not consider support that is only technical.

Please mark only one choice in each row.

		Not at all	A little	Somewhat	A lot	Not applicable
A	Having students produce outcomes of media production projects (e.g., development of websites)	☐	☐	☐	☐	☐
B	Having students work on short projects (2 weeks or shorter)	☐	☐	☐	☐	☐
C	Having students work on extended projects (longer than 2 weeks)	☐	☐	☐	☐	☐
D	Having students collaborate with others by online means, such as online discussion forums	☐	☐	☐	☐	☐
E	Having students conduct open-ended scientific investigations	☐	☐	☐	☐	☐
F	Having students engage in field study activities	☐	☐	☐	☐	☐

Obstacles

16. To what extent is your school's capacity to realize its pedagogical goals hindered by each of the following obstacles?

Please mark only one choice in each row.

ICT-related obstacles	Not at all	A little	Somewhat	A lot	Not applicable
A Insufficient qualified technical personnel to support the use of ICT	☐	☐	☐	☐	☐
B Insufficient number of computers connected to the Internet	☐	☐	☐	☐	☐
C Insufficient Internet bandwidth or speed .	☐	☐	☐	☐	☐
D Lack of special ICT equipment for disabled students	☐	☐	☐	☐	☐
E Insufficient ICT equipment for instruction	☐	☐	☐	☐	☐
F Computers are out of date	☐	☐	☐	☐	☐
G Not enough digital educational resources for instruction	☐	☐	☐	☐	☐
H Lack of ICT tools for science laboratory work	☐	☐	☐	☐	☐
I Teachers' lack of ICT skills	☐	☐	☐	☐	☐
J Insufficient time for teachers to use ICT .	☐	☐	☐	☐	☐
Other obstacles					
K Pressure to score highly on standardized tests	☐	☐	☐	☐	☐
L Prescribed curricula are too strict	☐	☐	☐	☐	☐
M Insufficient or inappropriate space to accommodate the school's pedagogical approaches	☐	☐	☐	☐	☐
N Insufficient budget for non ICT-supplies (e.g., paper, pencils)	☐	☐	☐	☐	☐
O Using ICT for teaching and/or learning is not a goal of our school	☐	☐	☐	☐	☐

Organization of Learning

The questions below are about grouping of students and time schedules.

17. How often would visitors, who walk into a lesson in your school on a typical day, observe the following in Grade <target grade>?

Please mark only one choice in each row.

		Never	Sometimes	Often	Nearly always
A	Whole classes of students in their classroom with one teacher	☐	☐	☐	☐
B	In large classrooms, students working under the supervision of a team of teachers	☐	☐	☐	☐
C	Individuals or small groups of students being coached by teachers	☐	☐	☐	☐
D	Individuals or small groups of students working on their own at places they choose themselves	☐	☐	☐	☐

18. How often could students at your school expect the following to occur at Grade <target grade>?

Please mark only one choice in each row.

		Never	Sometimes	Often	Nearly always
A	Students working in different groups according to the projects they are engaged in or the subjects they are taking	☐	☐	☐	☐
B	Students all working in the same group (class)	☐	☐	☐	☐
C	Students spending their time in school following lessons according to a fixed schedule	☐	☐	☐	☐
D	Changes to the usual time schedule if students need time to complete their projects	☐	☐	☐	☐
E	Students having a lot of freedom to plan their own learning time	☐	☐	☐	☐

School Characteristics

The intention of this set of questions is to describe the general characteristics of your school.

19. What is the total number of boys and girls in the entire school?

Please write a whole number. Write 0 (zero), if none.

☐☐☐☐ Total number of girls ☐☐☐☐ Total number of boys

20. What are the lowest and highest grade levels in your school?

Please mark only one choice in each row.

		Kinder-garten	1	2	3	4	5	6	7	8	9	10	11	12	13
A	Lowest	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B	Highest	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

21. How many people live in the city, town, or village where your school is located?

Please mark only one choice.

- ☐ 3,000 people or fewer
- ☐ 3,001 to 15,000 people
- ☐ 15,001 to 50,000 people
- ☐ 50,001 to 100,000 people
- ☐ 100,001 to 500,000 people
- ☐ More than 500,000 people

22. Approximately what percentage of students are absent from your school on a typical school day?

Please mark only one choice.

- ☐ Less than 5%
- ☐ 5–10%
- ☐ 11–20%
- ☐ More than 20%

23. Approximately what percentage of students in your school are native speakers of <national language = language of instruction>?

Please mark only one choice.

- ☐ Less than 50%
- ☐ 50-75%
- ☐ 76-90%
- ☐ More than 90%

24. Has your school been involved in any of the following activities during the past few years?

Please mark only one choice in each row.

		No	Yes
A	Making changes to pedagogical practices	☐	☐
B	Adopting new assessment practices	☐	☐
C	Connecting to the Internet	☐	☐
D	Adapting buildings to suit the school's pedagogical approaches	☐	☐
E	Setting up computers in classrooms	☐	☐
F	Installing computer laboratories	☐	☐

25. Who at your school has the primary responsibility for making decisions about each of the following?

Please mark only one choice in each row.

		External agency	School leadership	Subject department	Teachers	Not applicable
A	Purchasing ICT equipment	☐	☐	☐	☐	☐
B	Selecting subject content to be learned	☐	☐	☐	☐	☐
C	Determining which pedagogical approaches will be used	☐	☐	☐	☐	☐
D	Choosing whether ICT is used	☐	☐	☐	☐	☐
E	Assessing learning progress in the classroom	☐	☐	☐	☐	☐
F	Using mobiles and/or handheld devices for instructional purposes	☐	☐	☐	☐	☐

Personal Background Information

Below are a few questions about your personal background.

26. Think about a new development/change that you consider highly satisfying, related to the learning experiences of students, that occurred in your school and under your principalship during the current academic year. Did you play any of the following roles in this new development?

Please mark only one choice in each row.

		No	Yes
A	I initiated the change, and teachers in our school further developed and implemented it.	☐	☐
B	I initiated the change, and I contributed substantially to its development and implementation.	☐	☐
C	Teachers initiated the change. The change was basically a bottom-up initiative that did not require my support.	☐	☐
D	Teachers initiated the change. My role was mainly in the form of moral support.	☐	☐
E	Teachers initiated the change, and I allocated resources and necessary staffing to support it.	☐	☐
F	The school management board initiated the change, and I led its development and implementation.	☐	☐
G	Parents/community groups initiated the change, and I supported its realization.	☐	☐
H	Students initiated the change, and I supported its realization.	☐	☐

27. Including this school year, how many years have you been:

Please mark only one choice in each row.

		Less than 3 years	3-5 years	6-10 years	11-20 years	21 years or more
A	Principal of any school (including years as principal in this school)	☐	☐	☐	☐	☐
B	Principal of this school	☐	☐	☐	☐	☐
C	Working in any professional capacity at this school (including years as teacher, vice-principal, and principal)	☐	☐	☐	☐	☐

28. What is your age?

- ☐ 30 years or less
- ☐ 31-35 years
- ☐ 36–45 years
- ☐ 46-55 years
- ☐ More than 55 years

29. Please indicate whether you are:

- ☐ Female
- ☐ Male

30. Are you involved in fundraising for ICT-related matters in your school?

Please mark only one choice.

- ☐ Yes, I personally spend quite some time doing this.
- ☐ I am involved in this, but another person/other people in the school do the major part of the job.
- ☐ No, we outsource fundraising matters.
- ☐ No, I and those of my colleagues involved in the school's leadership, spend no or very little time on this.
- ☐ Not applicable

31. Altogether, how often do you personally use a computer?

Please mark only one choice.

- ☐ Never → ***Please proceed to the end of the questionnaire.***
- ☐ A few times per year
- ☐ Almost monthly
- ☐ Weekly
- ☐ Daily

32. Do you use your computer for any of the following?

Please mark only one choice in each row.

		No	Yes
A	Writing documents and letters	☐	☐
B	Budgeting, monitoring or controlling expenses	☐	☐
C	Planning purposes	☐	☐
D	Communicating with teachers	☐	☐
E	Communicating with parents	☐	☐
F	Teaching/instruction	☐	☐
G	Time tabling	☐	☐
H	Searching for information	☐	☐
I	Developing and making presentations	☐	☐
J	Own professional development	☐	☐

33. Do you have access to a computer at home?

☐ No → ***Please proceed to the end of the questionnaire.***

☐ Yes → ***Please continue.***

34. Do you use this computer for the following activities?

Please mark only one choice in each row.

		No	Yes
A	School related activities	☐	☐
B	Connecting to the internet	☐	☐

This is the end of the questionnaire.
Thank you very much for your cooperation!

[Return Instructions]

Placeholder for identification label
(105 x 35 mm)

SITES 2006

Second Information Technology in Education Study
--- Main Study ---

Technical Questionnaire

[International English Version]

International Association for the Evaluation of Educational Achievement

[Put logos, national center references and credit here]

Instructions for NRCs

- Please check the introduction carefully for changes, insertions and deletions if you want to re-use parts of the FT translation.
- Refer to the accompanied list of changes from FT → MS to identify changed and adapted questions if you want to re-use parts of the FT translation.
- Text passages that are highlighted in yellow and enclosed in these <brackets> need to be adapted and documented on NAF for your country.
    - Where in the questionnaire <target grade> is written, insert here the grade level that is defined in your national sampling plan.
    - In the introduction, insert <national school definition> if needed. Follow instructions there. Consult Olaf Zuehlke (DPC) or Christian Monseur for further advice, if needed.
    - With regard to <grade range>: In Module 1 the grade range was generally defined as ranging from target grade minus 1 until target grade plus 1. This range was used for questions that were too general to ask at the target grade level, but for which it was expected (sometimes evidence-based) that the answers might differ between for instance upper- and lower secondary levels in a school. Special cases consisted of countries where there was a school level boundary somewhere within this grade range. In general it is advised to use the same translation as in Module-1 for Population 2. When in doubt, please contact the ICC.
- Text passages that are highlighted in yellow and enclosed in these [brackets] need to be adapted for your country in this document, but do not require documentation on NAF.
- Some areas (text passages highlighted in yellow without brackets) require special attention. We expect slightly different terms to be used in national contexts. Adapt the following terms to your cultural context – if necessary – and document on the corresponding National Adaptation Form (NAF).
    - Question 3, add more national subjects after dimension F by inserting new rows, if necessary;
    - Question 4, dimension E: “Data-logging tools”;
    - Question 4, dimension I, “cell phone”;
    - Question 4, dimension I, “web-based learning environments”;
    - Question 10, dimension D, “ministry/local/regional authorities”;
- Page breaks in this document have been inserted to ensure that no question/table breaks across pages. After translation you may need to adjust page breaks again. Retain section headings as first element on new pages. Do not change order of questions.
- Remove all highlights from questionnaire after adaptation/translation.
- Delete this page including the page break after adaptation/translation.

Introduction

The Second Information Technology in Education Study (SITES 2006) is an international assessment of teaching and learning practices and of how Information and Communication Technologies (ICT) support these in secondary schools around the world. Approximately 20 countries will provide information from representative samples of teachers on how they organize their teaching and learning, the ICT facilities they have available at school, how they use ICT for teaching and learning, and the obstacles or difficulties they experience in relation to these technologies. This information will give better insight into the current state of pedagogical approaches and of how technologies support them. It will also allow educational practitioners and policy-makers to gain a better understanding of areas needing intervention and additional support.

[Name of country], along with about 20 other countries, is taking part in this international study of pedagogical practices and the way that ICT supports these. The study is being conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA).

We are asking you for your help in order to determine the current state of pedagogical approaches to and the use of ICT. Please try to answer each question as accurately as you can.

Confidentiality

All information that is collected in this study will be treated confidentially. At no time will the name of any school or individual be identified. While results will be made available by country and by type of school within a country, you are guaranteed that neither your school nor any of its personnel will be identified in any report of the results of the study. [*For countries which have ethical survey guidelines which emphasize voluntary participation:* Participation in this survey is voluntary and any individual may withdraw at any time.]

About this Questionnaire

- This questionnaire asks for information from schools about education and policy matters related to pedagogical practices and ICT. **If you are the person answering this questionnaire, it is important that you are someone who knows about the ICT facilities in your school and about practices regarding their use in your school.** If you do not have the information to answer particular questions, then please consult other persons in your school. The questionnaire will take you approximately 30 minutes to complete.
- The words computers and ICT (Information and Communication Technologies) are used interchangeably in this questionnaire.
- Please note that some questions refer to the entire school, other questions refer to Grades <grade range>, while some questions pertain to Grade <target grade> only. [*For countries, in which the definition of 'school' is not obvious to respondents add appropriate description depending on how sampling units were defined in the national sampling plan*: When questions refer to 'your school' we mean by 'school': <national school definition>.]
- Guidelines for answering the questions are typed in *italics*. Most questions can be answered by marking the one most appropriate answer. When a question states, "*Please mark all that apply*", you may give more than one answer.
- If you are completing the paper version of this questionnaire, please use a writing pen or ballpoint to write your answers.
- When you have completed this questionnaire, please [National Return Procedures and Date].

Further information

- When in doubt about any aspect of the questionnaire, or if you would like more information about it or the study, you can reach us by phone at the following numbers: [National Center Contact Information]

Thank you very much for your cooperation!

ICT in Your School

1. How many years has your school been using ICT for teaching and/or learning purposes for students in Grades <grade range>?

Please mark only one choice.

- ☐ 0–2 years
- ☐ 3–5 years
- ☐ 6–10 years
- ☐ 11–15 years
- ☐ More than 15 years
- ☐ Don't know

2. To what extent do you agree with each of the following statements about the use of ICT in your school?

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	ICT is considered relevant in our school.	☐	☐	☐	☐
B	Our school has integrated ICT in most of our teaching and learning practices.	☐	☐	☐	☐
C	We have started to use ICT in the teaching and learning of school subjects.	☐	☐	☐	☐
D	We still do not know which ICT applications are useful for our school.	☐	☐	☐	☐
E	Constraints rule out the use of ICT in our school.	☐	☐	☐	☐

3. Approximately how often during this school year will students in Grade <target grade> be using ICT for learning in the following subject domains?

Please mark only one choice in each row.

		Never	Sometimes	Often	Nearly always
A	Mathematics	☐	☐	☐	☐
B	Natural Sciences	☐	☐	☐	☐
C	Social Sciences	☐	☐	☐	☐
D	Language of instruction (mother tongue)........	☐	☐	☐	☐
E	Foreign languages	☐	☐	☐	☐
F	ICT as separate subject................................	☐	☐	☐	☐

Resource Materials

4. For each of the following technology applications, indicate whether it is available and whether you need it in your school for teaching and/or learning in Grade <target grade>.

Please mark only one choice in each row.

		Available	Needed but not available	Not needed and not available
A	Equipment and hands-on materials (e.g., laboratory equipment, musical instruments, art materials, overhead projectors, slide projectors, electronic calculators)	☐	☐	☐
B	Tutorial/exercise software	☐	☐	☐
C	General office suite (e.g., word-processing, database, spreadsheet, presentation software)	☐	☐	☐
D	Multimedia production tools (e.g., media capture and editing equipment, drawing programs, webpage/multimedia production tools)	☐	☐	☐
E	Data-logging tools	☐	☐	☐
F	Simulations/modeling software/digital learning games	☐	☐	☐
G	Communication software (e.g., e-mail, chat, discussion forum)	☐	☐	☐
H	Digital resources (e.g., portal, dictionaries, encyclopedia)	☐	☐	☐
I	Mobile devices (e.g., Personal Digital Assistant (PDA), cell phone)	☐	☐	☐
J	Smart board/interactive whiteboard	☐	☐	☐
K	Learning management system (e.g., web-based learning environments)	☐	☐	☐
L	Mail accounts for teachers	☐	☐	☐
M	Mail accounts for students	☐	☐	☐

Hardware

5. In your school, about how many computers (including laptops) are:

Count terminals (if they have a keyboard and a screen) as computers

Count laptops as computers

Exclude computers which are not in use

Exclude computers which are only used as servers

Exclude graphical calculators and Personal Digital Assistants (PDAs), hand-held computers and smartphones (phone integrated with PDA)

Please write a whole number. Write 0 (zero), if none

- Available in the school altogether?
- Available to students in Grades <grade range>?
- Available only to teachers?
- Available only to administrative staff?
- Connected to the Internet/World Wide Web?
- Connected to a local area network (LAN)?
- Multimedia computers (equipped with a CD-ROM and/or DVD)?

6. How many of the computers in your school are laptops?

Please write a whole number. Write 0 (zero), if none

- Laptops

7. In your school, about how many of the following (school-owned) technologies are available?

A Personal Digital Assistant (PDA) is a palmtop with roughly the same functionalities as a PC.

Please write a whole number. Write 0 (zero), if none.

- PDAs and smartphones (phone integrated with PDA)
- Graphic calculators
- Smartboards (interactive whiteboard system)
- Projectors for presentation of digital materials

8. In your school, about what percentage of students bring any of the following to school?

Please mark only one choice in each row.

	Less than 10%	10–24%	25–49%	50–75%	More than 75%
PDAs/smartphones	☐	☐	☐	☐	☐
Graphic calculators	☐	☐	☐	☐	☐
Laptops	☐	☐	☐	☐	☐

9. Where are the computers for teaching and learning in Grade <target grade> located?

Please mark only one choice in each row.

		No	Yes
A	Most classrooms	☐	☐
B	Some classrooms	☐	☐
C	Computer laboratories	☐	☐
D	Library	☐	☐
E	Other places	☐	☐

10. Who is involved in the maintenance of computers in your school?

Please mark only one choice in each row.

		No	Yes
A	The school's own staff	☐	☐
B	Staff from other schools	☐	☐
C	An external company hired by the school	☐	☐
D	An external unit arranged by the ministry/local/regional authorities	☐	☐

Staff Development

11. Have teachers in your school acquired knowledge and skills in using ICT for teaching and learning in any of the following ways?

Please mark only one choice in each row.

		No	Yes
A	Via informal contacts/communication	☐	☐
B	Via the ICT coordinator or technical assistant	☐	☐
C	Via in-school courses	☐	☐
D	Via training from a teacher who has attended a course	☐	☐
E	Via the school's working group or committee for ICT in education	☐	☐
F	During meetings of the teaching staff where the use of ICT/computers in education is a regular item for discussion	☐	☐
G	Via a regular newsletter (printed or electronic)	☐	☐
H	Via courses conducted by an external agency or expert (in the school or on distance)	☐	☐
I	Via observation of and discussion with colleagues	☐	☐
J	Via reading professional journals and similar publications	☐	☐

12. For each of the following ICT-related courses, please indicate whether it is available to teachers in your school and who provides the course (inside or outside the school).

Please mark all that apply in each row.

		Not available	Available provider is school-based	Available provider is an external organization
A	Introductory course for Internet use and general applications (basic word-processing, spreadsheet, databases, etc.)	☐	☐	☐
B	Technical course for operating and maintaining computer systems	☐	☐	☐
C	Advanced course for applications/standard tools (e.g., advanced word-processing, complex relational databases)	☐	☐	☐
D	Advanced course for Internet use (e.g., creating websites/developing a home page, advanced use of Internet, video conferencing)	☐	☐	☐
E	Course on pedagogical issues related to integrating ICT into teaching and learning	☐	☐	☐
F	Subject-specific training with learning software for specific content goals (e.g., tutorials, simulation, etc.)	☐	☐	☐
G	Course on multimedia use (e.g., digital video and/or audio equipment)	☐	☐	☐

Support Facilities for ICT

13. Do you hold any of the following positions at your school?

Please mark only one choice in each row.

		No	Yes
A	Principal	☐	☐
B	Deputy principal	☐	☐
C	Head of department	☐	☐
D	Teacher	☐	☐
E	Librarian	☐	☐
F	Other than above	☐	☐

14. Which of the following duties do you have?

Please mark only one choice in each row.

		No	Yes
A	I teach ICT courses to students.	☐	☐
B	I teach ICT courses to teachers and other school staff.	☐	☐
C	I teach Mathematics and/or Science.	☐	☐
D	I teach other subjects.	☐	☐
E	I formally serve as ICT coordinator.	☐	☐
F	I informally serve as ICT coordinator.	☐	☐

15. Approximately how many 60 minute periods, on average per week, do the following persons spend on providing ICT support to teachers and students at your school?

Note: "Support" includes any services (formal or informal, technical or pedagogical) that help teachers and students use ICT.

Please write a whole number. Write 0 (zero) if none.

- [ ][ ] Yourself
- [ ][ ] ICT staff (not including yourself)
- [ ][ ] Other administrators and staff (e.g., media specialist)
- [ ][ ] Teachers
- [ ][ ] Students from own school who are assigned to provide this service
- [ ][ ] Volunteers from outside the school (e.g., parents)
- [ ][ ] Personnel from external companies
- [ ][ ] Others

16. To what extent is technical support available in your school if teachers want to use ICT for the following activities?

Please mark only one choice in each row.

		No support	Some support	Extensive support	Not applicable
A	Assigning extended projects (2 weeks or longer) ...	☐	☐	☐	☐
B	Assigning short-task projects	☐	☐	☐	☐
C	Assigning production projects (e.g. making models or reports)	☐	☐	☐	☐
D	Involving students in self-accessed courses and/or learning activities	☐	☐	☐	☐
E	Involving students in scientific investigations (open-ended)	☐	☐	☐	☐
F	Undertaking field study activities	☐	☐	☐	☐
G	Using virtual laboratories, simulations	☐	☐	☐	☐
H	Applying exercises to practice skills and procedures	☐	☐	☐	☐
I	Involving students in laboratory experiments with clear instructions and well-defined outcomes	☐	☐	☐	☐
J	Involving students in studying natural phenomena through simulations	☐	☐	☐	☐
K	Involving students in processing and analyzing data	☐	☐	☐	☐

Obstacles

17. To what extent is your school's capacity to realize its pedagogical goals hindered by each of the following obstacles?

Please mark only one choice in each row.

		Not at all	Very little	Somewhat	To a great extent	Not applicable
A	Insufficient qualified technical personnel to support the use of ICT	☐	☐	☐	☐	☐
B	Insufficient number of computers connected to the Internet	☐	☐	☐	☐	☐
C	Insufficient Internet bandwidth or speed ..	☐	☐	☐	☐	☐
D	Lack of special ICT equipment for disabled students	☐	☐	☐	☐	☐
E	Insufficient ICT equipment for instruction .	☐	☐	☐	☐	☐
F	Computers are out of date	☐	☐	☐	☐	☐
G	Not enough digital educational resources for instruction	☐	☐	☐	☐	☐
H	Lack of ICT tools for science laboratory work	☐	☐	☐	☐	☐
I	Teachers' lack of ICT skills	☐	☐	☐	☐	☐
J	Insufficient time for teachers to use ICT ...	☐	☐	☐	☐	☐
Other obstacles						
K	Pressure to score highly on standardized tests	☐	☐	☐	☐	☐
L	Prescribed curricula are too strict	☐	☐	☐	☐	☐
M	Insufficient or inappropriate space to accommodate the school's pedagogical approaches	☐	☐	☐	☐	☐
N	Insufficient budget for non ICT-supplies (e.g., paper, pencils)	☐	☐	☐	☐	☐
O	Using ICT for teaching and learning is not a goal of our school	☐	☐	☐	☐	☐

18. Do you have access to a computer at home?

☐ No → ***Please proceed to the end of the questionnaire.***

☐ Yes → ***Please continue.***

19. Do you use this computer for the following activities?

Please mark only one choice in each row.

		No	Yes
A	School related activities	☐	☐
B	Connecting to the internet	☐	☐

This is the end of the questionnaire.
Thank you very much for your cooperation!

[Return Instructions]

Frequencies

Notes

Output Created		09-Nov-2010 11:03:32
Comments		
Input	Data	C:\Documents and Settings\Administrator\Desktop\Els_Christo\BTMZAFM6.sav
	Active Dataset	DataSet3
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	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	666
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.

Syntax		FREQUENCIES VARIABLES=IDTEACH BTG01A1 BTG02A1 BTG03A1 BTG04A1 BTG05A1 BTG06A1 BTG07A1 BTG07B1 BTG07C1 BTG07D1 BTG07E1 BTG07F1 BTG07G1 BTG07H1 BTG07I1 BTG08A1 BTG08B1 BTG08C1 BTG08D1 BTG08E1 BTG08F1 BTG08G1 BTG08H1 BTG08I1 BTG08J1 BTG08K1 BTG08L1 BTG08M1 BTG09A1 BTG09A2 BTG09B1 BTG09B2 BTG09C1 BTG09C2 BTG09D1 BTG09D2 BTG09E1 BTG09E2 BTG09F1 BTG09F2 BTG09G1 BTG09G2 BTG09H1 BTG09H2 BTG09I1 BTG09I2 BTG09J1 BTG09J2 BTG09K1 BTG09K2 BTG09L1 BTG09L2 BTG09M1 BTG09M2 BTG10A1 BTG11A1 BTG12A1 BTG13A1 BTG14A1 BTG14A2 BTG14B1 BTG14B2 BTG14C1 BTG14C2 BTG14D1 BTG14D2 BTG14E1 BTG14E2 BTG14F1 BTG14F2 BTG14G1 BTG14G2 BTG14H1 BTG14H2 BTG14I1 BTG14I2 BTG14J1 BTG14J2 BTG14K1 BTG14K2 BTG14L1 BTG14L2 BTG15A1 BTG15A2 BTG15B1 BTG15B2 BTG15C1 BTG15C2 BTG15D1 BTG15D2 BTG15E1 BTG15E2 BTG15F1 BTG15F2 BTG15G1 BTG15G2 BTG15H1 BTG15H2 BTG16A1 BTG16A2 BTG16B1 BTG16B2 BTG16C1 BTG16C2 BTG16D1 BTG16D2 BTG16E1
Resources	Processor Time	0:00:00.234
	Elapsed Time	0:00:00.250

[DataSet3] C:\Documents and Settings\Administrator\Desktop\Els_Christo\BTMZAFM6.sav

Frequency Table

INF/HOW MANY STUDENTS IN TARGET CLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6	1	.2	.2	.2
	10	2	.3	.3	.5
	16	1	.2	.2	.6
	17	1	.2	.2	.8
	18	4	.6	.6	1.4
	19	1	.2	.2	1.5
	20	1	.2	.2	1.7
	21	1	.2	.2	1.8
	23	1	.2	.2	2.0
	24	4	.6	.6	2.6
	25	5	.8	.8	3.4
	26	2	.3	.3	3.7
	27	4	.6	.6	4.3
	28	5	.8	.8	5.1
	29	7	1.1	1.1	6.1
	30	17	2.6	2.6	8.8
	31	11	1.7	1.7	10.4
	32	15	2.3	2.3	12.7
	33	11	1.7	1.7	14.4
	34	15	2.3	2.3	16.7
	35	28	4.2	4.3	21.0
	36	15	2.3	2.3	23.3
	37	11	1.7	1.7	25.0
	38	18	2.7	2.8	27.8
	39	12	1.8	1.8	29.6
	40	34	5.1	5.2	34.9
	41	17	2.6	2.6	37.5

42		22	3.3	3.4	40.9
43		21	3.2	3.2	44.1
44		10	1.5	1.5	45.6
45		34	5.1	5.2	50.8
46		15	2.3	2.3	53.1
47		8	1.2	1.2	54.4
48		8	1.2	1.2	55.6
49		13	2.0	2.0	57.6
50		15	2.3	2.3	59.9
51		8	1.2	1.2	61.1
52		12	1.8	1.8	63.0
53		5	.8	.8	63.7
54		9	1.4	1.4	65.1
55		17	2.6	2.6	67.7
56		19	2.9	2.9	70.7
57		4	.6	.6	71.3
58		6	.9	.9	72.2
59		3	.5	.5	72.7
60		17	2.6	2.6	75.3
61		3	.5	.5	75.7
62		11	1.7	1.7	77.4
63		3	.5	.5	77.9
64		7	1.1	1.1	79.0
65		6	.9	.9	79.9
66		7	1.1	1.1	81.0
67		5	.8	.8	81.7
68		2	.3	.3	82.0
69		6	.9	.9	82.9
70		5	.8	.8	83.7
71		2	.3	.3	84.0
72		1	.2	.2	84.2
73		1	.2	.2	84.3
74		3	.5	.5	84.8
75		7	1.1	1.1	85.9

	76	2	.3	.3	86.2
	77	3	.5	.5	86.6
	78	1	.2	.2	86.8
	79	1	.2	.2	86.9
	80	6	.9	.9	87.9
	81	1	.2	.2	88.0
	85	3	.5	.5	88.5
	86	2	.3	.3	88.8
	87	2	.3	.3	89.1
	89	2	.3	.3	89.4
	90	2	.3	.3	89.7
	94	1	.2	.2	89.9
	95	2	.3	.3	90.2
	96	2	.3	.3	90.5
	98	3	.5	.5	90.9
	99	1	.2	.2	91.1
	100	1	.2	.2	91.2
	102	2	.3	.3	91.6
	103	1	.2	.2	91.7
	105	1	.2	.2	91.9
	110	1	.2	.2	92.0
	112	1	.2	.2	92.2
	113	1	.2	.2	92.3
	120	3	.5	.5	92.8
	127	1	.2	.2	92.9
	130	1	.2	.2	93.1
	132	3	.5	.5	93.5
	136	1	.2	.2	93.7
	140	1	.2	.2	93.9
	166	1	.2	.2	94.0
	170	2	.3	.3	94.3
	180	1	.2	.2	94.5
	184	2	.3	.3	94.8
	185	2	.3	.3	95.1

		Frequency	Percent	Valid Percent	Cumulative Percent
	190	4	.6	.6	95.7
	200	1	.2	.2	95.9
	205	1	.2	.2	96.0
	208	1	.2	.2	96.2
	213	2	.3	.3	96.5
	225	1	.2	.2	96.6
	227	1	.2	.2	96.8
	232	1	.2	.2	96.9
	234	2	.3	.3	97.2
	238	1	.2	.2	97.4
	240	1	.2	.2	97.5
	243	1	.2	.2	97.7
	253	2	.3	.3	98.0
	256	1	.2	.2	98.2
	288	4	.6	.6	98.8
	297	1	.2	.2	98.9
	300	1	.2	.2	99.1
	314	1	.2	.2	99.2
	321	1	.2	.2	99.4
	338	1	.2	.2	99.5
	340	1	.2	.2	99.7
	364	2	.3	.3	100.0
	Total	651	97.7	100.0	
Missing	OMITTED	11	1.7		
	System	4	.6		
	Total	15	2.3		
Total		666	100.0		

INF/GENDER MIX OF CLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALL BOYS	6	.9	.9	.9
	ALL GIRLS	15	2.3	2.3	3.3
	BOTH BOYS AND GIRLS	619	92.9	96.7	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	640	96.1	100.0	
Missing	OMITTED	22	3.3		
	System	4	.6		
	Total	26	3.9		
Total		666	100.0		

INF/CURRICULUM TRACK OF TARGET CLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ACADEMIC	607	91.1	95.0	95.0
	VOCATIONAL	10	1.5	1.6	96.6
	NO TRACKING	22	3.3	3.4	100.0
	Total	639	95.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	22	3.3		
	System	4	.6		
	Total	27	4.1		
Total		666	100.0		

INF/STUDENT ABSENTEEISM IN TARGET CLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LESS THAN 5%	487	73.1	74.2	74.2
	5–10%	129	19.4	19.7	93.9
	11–20%	30	4.5	4.6	98.5
	MORE THAN 20%	10	1.5	1.5	100.0
	Total	656	98.5	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	5	.8		
	System	4	.6		
	Total	10	1.5		
Total		666	100.0		

INF/NATIVE SPEAKERS OF LANGUAGE OF INSTR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MORE THAN 90%	211	31.7	33.1	33.1
	76–90%	38	5.7	6.0	39.0
	50–75%	67	10.1	10.5	49.5
	LESS THAN 50%	322	48.3	50.5	100.0
	Total	638	95.8	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	23	3.5		
	System	4	.6		
	Total	28	4.2		
Total		666	100.0		

INF/HOW MANY HRS OF MATH/SCIENCE LESSONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LESS THAN TWO HOURS	12	1.8	1.8	1.8
	2– 4 HRS	319	47.9	48.8	50.6
	5– 6 HRS	200	30.0	30.6	81.2
	7– 8 HRS	75	11.3	11.5	92.7
	MORE THAN 8 HRS	48	7.2	7.3	100.0
	Total	654	98.2	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	7	1.1		
	System	4	.6		
	Total	12	1.8		
Total		666	100.0		

INF/COMPETENCE/WORD PROCESSING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	262	39.3	41.7	41.7
	SOME STUDENTS	153	23.0	24.4	66.1

		Frequency	Percent	Valid Percent	Cumulative Percent
	MAJORITY OF STUDENTS	61	9.2	9.7	75.8
	NEARLY ALL STUDENTS	35	5.3	5.6	81.4
	DON'T KNOW	117	17.6	18.6	100.0
	Total	628	94.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	33	5.0		
	System	4	.6		
	Total	38	5.7		
Total		666	100.0		

INF/COMPETENCE/DATABASE SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	326	48.9	51.8	51.8
	SOME STUDENTS	115	17.3	18.3	70.1
	MAJORITY OF STUDENTS	25	3.8	4.0	74.1
	NEARLY ALL STUDENTS	14	2.1	2.2	76.3
	DON'T KNOW	149	22.4	23.7	100.0
	Total	629	94.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	32	4.8		
	System	4	.6		
	Total	37	5.6		
Total		666	100.0		

INF/COMPETENCE/SPREADSHEET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	337	50.6	53.6	53.6
	SOME STUDENTS	108	16.2	17.2	70.7
	MAJORITY OF STUDENTS	25	3.8	4.0	74.7
	NEARLY ALL STUDENTS	9	1.4	1.4	76.2

	DON'T KNOW	150	22.5	23.8	100.0
	Total	629	94.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	32	4.8		
	System	4	.6		
	Total	37	5.6		
Total		666	100.0		

INF/COMPETENCE/PRESENTATION SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	338	50.8	53.6	53.6
	SOME STUDENTS	103	15.5	16.3	69.9
	MAJORITY OF STUDENTS	26	3.9	4.1	74.0
	NEARLY ALL STUDENTS	11	1.7	1.7	75.8
	DON'T KNOW	153	23.0	24.2	100.0
	Total	631	94.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	30	4.5		
	System	4	.6		
	Total	35	5.3		
Total		666	100.0		

INF/COMPETENCE/APPLICATION OF MULTIMEDIA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	320	48.0	50.8	50.8
	SOME STUDENTS	114	17.1	18.1	68.9
	MAJORITY OF STUDENTS	29	4.4	4.6	73.5
	NEARLY ALL STUDENTS	20	3.0	3.2	76.7
	DON'T KNOW	147	22.1	23.3	100.0
	Total	630	94.6	100.0	

		Frequency	Percent	Valid Percent	Cumulative Percent
Missing	NOT REACHED	1	.2		
	OMITTED	31	4.7		
	System	4	.6		
	Total	36	5.4		
Total		666	100.0		

INF/COMPETENCE/EMAIL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	340	51.1	53.8	53.8
	SOME STUDENTS	109	16.4	17.2	71.0
	MAJORITY OF STUDENTS	27	4.1	4.3	75.3
	NEARLY ALL STUDENTS	14	2.1	2.2	77.5
	DON'T KNOW	142	21.3	22.5	100.0
	Total	632	94.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	29	4.4		
	System	4	.6		
	Total	34	5.1		
Total		666	100.0		

INF/COMPETENCE/INTERNET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	328	49.2	51.9	51.9
	SOME STUDENTS	112	16.8	17.7	69.6
	MAJORITY OF STUDENTS	35	5.3	5.5	75.2
	NEARLY ALL STUDENTS	21	3.2	3.3	78.5
	DON'T KNOW	136	20.4	21.5	100.0
	Total	632	94.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	29	4.4		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	4	.6		
	Total	34	5.1		
Total		666	100.0		

INF/COMPETENCE/GRAPHIC CALCULATOR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	328	49.2	51.9	51.9
	SOME STUDENTS	106	15.9	16.8	68.7
	MAJORITY OF STUDENTS	27	4.1	4.3	72.9
	NEARLY ALL STUDENTS	21	3.2	3.3	76.3
	DON’T KNOW	150	22.5	23.7	100.0
	Total	632	94.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	29	4.4		
	System	4	.6		
	Total	34	5.1		
Total		666	100.0		

INF/COMPETENCE/DATA LOGGING TOOLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	369	55.4	58.8	58.8
	SOME STUDENTS	72	10.8	11.5	70.2
	MAJORITY OF STUDENTS	8	1.2	1.3	71.5
	NEARLY ALL STUDENTS	5	.8	.8	72.3
	DON’T KNOW	174	26.1	27.7	100.0
	Total	628	94.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	33	5.0		
	System	4	.6		
	Total	38	5.7		

Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/WORLD OF WORK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	13	2.0	2.0	2.0
	A LITTLE	46	6.9	7.0	9.0
	SOMEWHAT	110	16.5	16.7	25.7
	VERY MUCH	488	73.3	74.3	100.0
	Total	657	98.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	4	.6		
	System	4	.6		
	Total	9	1.4		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/UPPER EDU

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	6	.9	.9	.9
	A LITTLE	15	2.3	2.3	3.2
	SOMEWHAT	75	11.3	11.4	14.6
	VERY MUCH	563	84.5	85.4	100.0
	Total	659	98.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	2	.3		
	System	4	.6		
	Total	7	1.1		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/LEARN FRM EXP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	43	6.5	6.5	6.5

		Frequency	Percent	Valid Percent	Cumulative Percent
	A LITTLE	85	12.8	12.9	19.5
	SOMEWHAT	175	26.3	26.6	46.1
	VERY MUCH	354	53.2	53.9	100.0
	Total	657	98.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	4	.6		
	System	4	.6		
	Total	9	1.4		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/REAL WORLD EX

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	10	1.5	1.5	1.5
	A LITTLE	55	8.3	8.4	9.9
	SOMEWHAT	148	22.2	22.6	32.5
	VERY MUCH	443	66.5	67.5	100.0
	Total	656	98.5	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	5	.8		
	System	4	.6		
	Total	10	1.5		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/PERFORMANCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	3	.5	.5	.5
	A LITTLE	14	2.1	2.1	2.6
	SOMEWHAT	64	9.6	9.7	12.3
	VERY MUCH	578	86.8	87.7	100.0
	Total	659	98.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	2	.3		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	4	.6		
	Total	7	1.1		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/INC MOTIVATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	4	.6	.6	.6
	A LITTLE	11	1.7	1.7	2.3
	SOMEWHAT	77	11.6	11.7	14.0
	VERY MUCH	567	85.1	86.0	100.0
	Total	659	98.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	2	.3		
	System	4	.6		
	Total	7	1.1		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/INDIV LEARNING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	6	.9	.9	.9
	A LITTLE	54	8.1	8.3	9.2
	SOMEWHAT	208	31.2	31.8	41.0
	VERY MUCH	386	58.0	59.0	100.0
	Total	654	98.2	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	7	1.1		
	System	4	.6		
	Total	12	1.8		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/SET GOALS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	10	1.5	1.5	1.5
	A LITTLE	74	11.1	11.3	12.8
	SOMEWHAT	189	28.4	28.8	41.6
	VERY MUCH	384	57.7	58.4	100.0
	Total	657	98.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	4	.6		
	System	4	.6		
	Total	9	1.4		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/ORGA SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	8	1.2	1.2	1.2
	A LITTLE	69	10.4	10.5	11.7
	SOMEWHAT	178	26.7	27.1	38.9
	VERY MUCH	401	60.2	61.1	100.0
	Total	656	98.5	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	5	.8		
	System	4	.6		
	Total	10	1.5		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/COMM SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	22	3.3	3.4	3.4
	A LITTLE	78	11.7	11.9	15.3
	SOMEWHAT	185	27.8	28.3	43.6
	VERY MUCH	368	55.3	56.4	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	653	98.0	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	8	1.2		
	System	4	.6		
	Total	13	2.0		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/EXPECTATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	14	2.1	2.2	2.2
	A LITTLE	45	6.8	6.9	9.1
	SOMEWHAT	174	26.1	26.8	35.8
	VERY MUCH	417	62.6	64.2	100.0
	Total	650	97.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	11	1.7		
	System	4	.6		
	Total	16	2.4		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/COMP ICT USE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	150	22.5	23.4	23.4
	A LITTLE	102	15.3	15.9	39.3
	SOMEWHAT	117	17.6	18.2	57.5
	VERY MUCH	273	41.0	42.5	100.0
	Total	642	96.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	19	2.9		
	System	4	.6		
	Total	24	3.6		
Total		666	100.0		

CURRGOALS/GOAL IMPORTANCE/RESPONSIBLE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	241	36.2	37.2	37.2
	A LITTLE	87	13.1	13.4	50.6
	SOMEWHAT	82	12.3	12.7	63.3
	VERY MUCH	238	35.7	36.7	100.0
	Total	648	97.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	13	2.0		
	System	4	.6		
	Total	18	2.7		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/EXT PROJECTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	120	18.0	19.0	19.0
	SOMETIMES	342	51.4	54.3	73.3
	OFTEN	130	19.5	20.6	94.0
	NEARLY ALWAYS	38	5.7	6.0	100.0
	Total	630	94.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	31	4.7		
	System	4	.6		
	Total	36	5.4		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/EXT PROJECT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	463	69.5	81.7	81.7
	YES	104	15.6	18.3	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	567	85.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	23	3.5		
	NOT REACHED	1	.2		
	OMITTED	71	10.7		
	System	4	.6		
	Total	99	14.9		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/SHORT TASK PROJECT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	54	8.1	8.5	8.5
	SOMETIMES	219	32.9	34.6	43.1
	OFTEN	246	36.9	38.9	82.0
	NEARLY ALWAYS	114	17.1	18.0	100.0
	Total	633	95.0	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	28	4.2		
	System	4	.6		
	Total	33	5.0		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/SHORT TASK/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	473	71.0	83.9	83.9
	YES	91	13.7	16.1	100.0
	Total	564	84.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	20	3.0		
	NOT REACHED	1	.2		
	OMITTED	77	11.6		
	System	4	.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	102	15.3		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/PRODUCT CREATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	109	16.4	17.3	17.3
	SOMETIMES	324	48.6	51.5	68.8
	OFTEN	132	19.8	21.0	89.8
	NEARLY ALWAYS	64	9.6	10.2	100.0
	Total	629	94.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	32	4.8		
	System	4	.6		
	Total	37	5.6		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/PROD CREAT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	481	72.2	86.0	86.0
	YES	78	11.7	14.0	100.0
	Total	559	83.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	24	3.6		
	NOT REACHED	1	.2		
	OMITTED	78	11.7		
	System	4	.6		
	Total	107	16.1		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/SELF ACCESSED

		Frequency	Percent	Valid Percent	Cumulative Percent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	74	11.1	11.8	11.8
	SOMETIMES	242	36.3	38.7	50.6
	OFTEN	202	30.3	32.3	82.9
	NEARLY ALWAYS	107	16.1	17.1	100.0
	Total	625	93.8	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	36	5.4		
	System	4	.6		
	Total	41	6.2		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/SELF ACCESSED/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	499	74.9	88.9	88.9
	YES	62	9.3	11.1	100.0
	Total	561	84.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	28	4.2		
	NOT REACHED	1	.2		
	OMITTED	72	10.8		
	System	4	.6		
	Total	105	15.8		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/SCIENTIFIC INVEST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	129	19.4	20.6	20.6
	SOMETIMES	285	42.8	45.5	66.0
	OFTEN	152	22.8	24.2	90.3
	NEARLY ALWAYS	61	9.2	9.7	100.0
	Total	627	94.1	100.0	
Missing	NOT REACHED	1	.2		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	33	5.0		
	System	5	.8		
	Total	39	5.9		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/SCIENT INV/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	472	70.9	85.5	85.5
	YES	80	12.0	14.5	100.0
	Total	552	82.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	26	3.9		
	NOT REACHED	1	.2		
	OMITTED	83	12.5		
	System	4	.6		
	Total	114	17.1		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/FIELD STUDY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	201	30.2	32.3	32.3
	SOMETIMES	258	38.7	41.5	73.8
	OFTEN	120	18.0	19.3	93.1
	NEARLY ALWAYS	43	6.5	6.9	100.0
	Total	622	93.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	39	5.9		
	System	4	.6		
	Total	44	6.6		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/FIELD STUDY/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	475	71.3	87.0	87.0
	YES	71	10.7	13.0	100.0
	Total	546	82.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	31	4.7		
	NOT REACHED	1	.2		
	OMITTED	84	12.6		
	System	4	.6		
	Total	120	18.0		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/TEACHERS LECTURE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	69	10.4	11.1	11.1
	SOMETIMES	122	18.3	19.6	30.7
	OFTEN	202	30.3	32.5	63.2
	NEARLY ALWAYS	229	34.4	36.8	100.0
	Total	622	93.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	39	5.9		
	System	4	.6		
	Total	44	6.6		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/TEACH LECTURE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	448	67.3	82.5	82.5
	YES	95	14.3	17.5	100.0
	Total	543	81.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	31	4.7		

		Frequency	Percent	Valid Percent	Cumulative Percent
	NOT REACHED	1	.2		
	OMITTED	87	13.1		
	System	4	.6		
	Total	123	18.5		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/PRACT AND SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	34	5.1	5.4	5.4
	SOMETIMES	118	17.7	18.8	24.2
	OFTEN	222	33.3	35.4	59.6
	NEARLY ALWAYS	253	38.0	40.4	100.0
	Total	627	94.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	34	5.1		
	System	4	.6		
	Total	39	5.9		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/PRAC AND SKILL/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	475	71.3	85.6	85.6
	YES	80	12.0	14.4	100.0
	Total	555	83.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	26	3.9		
	NOT REACHED	1	.2		
	OMITTED	80	12.0		
	System	4	.6		
	Total	111	16.7		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/LABORATORY EXP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	360	54.1	58.1	58.1
	SOMETIMES	132	19.8	21.3	79.4
	OFTEN	77	11.6	12.4	91.8
	NEARLY ALWAYS	51	7.7	8.2	100.0
	Total	620	93.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	41	6.2		
	System	4	.6		
	Total	46	6.9		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/LAB EXP/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	500	75.1	92.3	92.3
	YES	42	6.3	7.7	100.0
	Total	542	81.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	33	5.0		
	NOT REACHED	1	.2		
	OMITTED	86	12.9		
	System	4	.6		
	Total	124	18.6		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/MATH PRINCIPALS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	34	5.1	5.4	5.4
	SOMETIMES	135	20.3	21.4	26.8
	OFTEN	234	35.1	37.1	63.9

		Frequency	Percent	Valid Percent	Cumulative Percent
	NEARLY ALWAYS	228	34.2	36.1	100.0
	Total	631	94.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	30	4.5		
	System	4	.6		
	Total	35	5.3		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/MATH PRINC/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	475	71.3	85.3	85.3
	YES	82	12.3	14.7	100.0
	Total	557	83.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	22	3.3		
	NOT REACHED	1	.2		
	OMITTED	82	12.3		
	System	4	.6		
	Total	109	16.4		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/NATURAL PHENOMENA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	153	23.0	24.7	24.7
	SOMETIMES	236	35.4	38.1	62.7
	OFTEN	168	25.2	27.1	89.8
	NEARLY ALWAYS	63	9.5	10.2	100.0
	Total	620	93.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	41	6.2		
	System	4	.6		
	Total	46	6.9		

Total		666	100.0		

TEACHPRACT/ACTIVITIES/NAT PHENOM/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	494	74.2	90.6	90.6
	YES	51	7.7	9.4	100.0
	Total	545	81.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	33	5.0		
	NOT REACHED	1	.2		
	OMITTED	83	12.5		
	System	4	.6		
	Total	121	18.2		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/LOOK UP IDEAS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	46	6.9	7.3	7.3
	SOMETIMES	220	33.0	34.8	42.0
	OFTEN	205	30.8	32.4	74.4
	NEARLY ALWAYS	162	24.3	25.6	100.0
	Total	633	95.0	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	28	4.2		
	System	4	.6		
	Total	33	5.0		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/LOOK UP/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	434	65.2	77.6	77.6

		Frequency	Percent	Valid Percent	Cumulative Percent
	YES	125	18.8	22.4	100.0
	Total	559	83.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	20	3.0		
	NOT REACHED	1	.2		
	OMITTED	82	12.3		
	System	4	.6		
	Total	107	16.1		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/ANALYZING DATA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	89	13.4	14.2	14.2
	SOMETIMES	197	29.6	31.4	45.5
	OFTEN	206	30.9	32.8	78.3
	NEARLY ALWAYS	136	20.4	21.7	100.0
	Total	628	94.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	33	5.0		
	System	4	.6		
	Total	38	5.7		
Total		666	100.0		

TEACHPRACT/ACTIVITIES/ANALYZE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	456	68.5	81.9	81.9
	YES	101	15.2	18.1	100.0
	Total	557	83.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	25	3.8		
	NOT REACHED	1	.2		
	OMITTED	79	11.9		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	4	.6		
	Total	109	16.4		
Total		666	100.0		

TEACHPRACT/WHEN INSTRUCTING STUDENTS ARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALWAYS IN THE SAME LOCATION WITH	465	69.8	71.3	71.3
	SOMETIMES IN LOCATIONS AWAY FROM	151	22.7	23.2	94.5
	OFTEN IN LOCATIONS AWAY FROM ME	23	3.5	3.5	98.0
	ALWAYS IN LOCATIONS AWAY FROM ME	13	2.0	2.0	100.0
	Total	652	97.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	9	1.4		
	System	4	.6		
	Total	14	2.1		
Total		666	100.0		

TEACHPRACT/PARTICIPATE IN PLANNED ACTIV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALWAYS WORK IN THE SAME LOCATION	328	49.2	50.1	50.1
	SOMETIMES WORK IN DIFFERENT LOCAT	269	40.4	41.1	91.1
	OFTEN WORK IN DIFFERENT LOCATIONS	44	6.6	6.7	97.9
	ALWAYS WORK IN DIFFERENT LOCATION	14	2.1	2.1	100.0
	Total	655	98.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	.9		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	4	.6		
	Total	11	1.7		
Total		666	100.0		

TEACHPRACT/LEARN ACTIVITIES TAKE PLACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALWAYS DURING SCHEDULED SCHOOL HO	265	39.8	40.5	40.5
	SOMETIMES OUTSIDE SCHEDULED SCHOO	341	51.2	52.1	92.7
	OFTEN OUTSIDE SCHEDULED SCHOOL HO	25	3.8	3.8	96.5
	AT ANY TIME (NO SCHEDULED SCHOOL	23	3.5	3.5	100.0
	Total	654	98.2	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	7	1.1		
	System	4	.6		
	Total	12	1.8		
Total		666	100.0		

TEACHPRACT/I PROVIDE FEEDBACK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALWAYS DURING SCHOOL HOURS	521	78.2	79.3	79.3
	SOMETIMES OUTSIDE SCHEDULED SCHOO	104	15.6	15.8	95.1
	OFTEN OUTSIDE SCHEDULED SCHOOL HO	5	.8	.8	95.9
	AT ANY TIME (NO SCHEDULED SCHOOL	27	4.1	4.1	100.0
	Total	657	98.6	100.0	

		Frequency	Percent	Valid Percent	Cumulative Percent
Missing	NOT REACHED	1	.2		
	OMITTED	4	.6		
	System	4	.6		
	Total	9	1.4		
Total		666	100.0		

TEACHPRACT/ACTIV/PRESENT INFORMATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	11	1.7	1.7	1.7
	SOMETIMES	60	9.0	9.3	11.0
	OFTEN	180	27.0	27.9	38.9
	NEARLY ALWAYS	395	59.3	61.1	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	15	2.3		
	System	4	.6		
	Total	20	3.0		
Total		666	100.0		

TEACHPRACT/ACTIV/PRESENT INFORMATION/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	491	73.7	83.1	83.1
	YES	100	15.0	16.9	100.0
	Total	591	88.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	11	1.7		
	NOT REACHED	2	.3		
	OMITTED	58	8.7		
	System	4	.6		
	Total	75	11.3		
Total		666	100.0		

TEACHPRACT/ACTIV/REMEDIAL INSTRUCTIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	12	1.8	1.9	1.9
	SOMETIMES	158	23.7	24.4	26.3
	OFTEN	237	35.6	36.6	62.9
	NEARLY ALWAYS	240	36.0	37.1	100.0
	Total	647	97.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	13	2.0		
	System	4	.6		
	Total	19	2.9		
Total		666	100.0		

TEACHPRACT/ACTIV/REMEDIAL INSTRUCT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	503	75.5	85.5	85.5
	YES	85	12.8	14.5	100.0
	Total	588	88.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	10	1.5		
	NOT REACHED	2	.3		
	OMITTED	62	9.3		
	System	4	.6		
	Total	78	11.7		
Total		666	100.0		

TEACHPRACT/ACTIV/HELP ADVICE STUDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	7	1.1	1.1	1.1
	SOMETIMES	127	19.1	19.7	20.8
	OFTEN	253	38.0	39.3	60.1

		Frequency	Percent	Valid Percent	Cumulative Percent
	NEARLY ALWAYS	257	38.6	39.9	100.0
	Total	644	96.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	16	2.4		
	System	4	.6		
	Total	22	3.3		
Total		666	100.0		

TEACHPRACT/ACTIV/HELP ADVICE STUD/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	514	77.2	88.3	88.3
	YES	68	10.2	11.7	100.0
	Total	582	87.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	13	2.0		
	NOT REACHED	2	.3		
	OMITTED	65	9.8		
	System	4	.6		
	Total	84	12.6		
Total		666	100.0		

TEACHPRACT/ACTIV/WHOLE CLASS DISCUSSIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	35	5.3	5.4	5.4
	SOMETIMES	158	23.7	24.6	30.0
	OFTEN	210	31.5	32.7	62.7
	NEARLY ALWAYS	240	36.0	37.3	100.0
	Total	643	96.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	17	2.6		
	System	4	.6		
	Total	23	3.5		

Total		666	100.0		

TEACHPRACT/ACTIV/WHOLE CLASS DISC/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	531	79.7	91.7	91.7
	YES	48	7.2	8.3	100.0
	Total	579	86.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	14	2.1		
	NOT REACHED	2	.3		
	OMITTED	67	10.1		
	System	4	.6		
	Total	87	13.1		
Total		666	100.0		

TEACHPRACT/ACTIV/ASSESS STUDENTS LEARN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	7	1.1	1.1	1.1
	SOMETIMES	65	9.8	10.2	11.3
	OFTEN	243	36.5	38.0	49.2
	NEARLY ALWAYS	325	48.8	50.8	100.0
	Total	640	96.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	20	3.0		
	System	4	.6		
	Total	26	3.9		
Total		666	100.0		

TEACHPRACT/ACTIV/ASSESS STUD LEARN/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	503	75.5	87.0	87.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	YES	75	11.3	13.0	100.0
	Total	578	86.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	17	2.6		
	NOT REACHED	2	.3		
	OMITTED	65	9.8		
	System	4	.6		
	Total	88	13.2		
Total		666	100.0		

TEACHPRACT/ACTIV/PROVIDE FEEDBACK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	13	2.0	2.0	2.0
	SOMETIMES	113	17.0	17.6	19.7
	OFTEN	218	32.7	34.0	53.7
	NEARLY ALWAYS	297	44.6	46.3	100.0
	Total	641	96.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	19	2.9		
	System	4	.6		
	Total	25	3.8		
Total		666	100.0		

TEACHPRACT/ACTIV/PROVIDE FEEDBACK/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	518	77.8	90.1	90.1
	YES	57	8.6	9.9	100.0
	Total	575	86.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	16	2.4		
	NOT REACHED	2	.3		
	OMITTED	69	10.4		

	System	4	.6		
	Total	91	13.7		
Total		666	100.0		

TEACHPRACT/ACTIV/CLASSROOM MANAGEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	9	1.4	1.4	1.4
	SOMETIMES	30	4.5	4.7	6.1
	OFTEN	127	19.1	19.7	25.8
	NEARLY ALWAYS	478	71.8	74.2	100.0
	Total	644	96.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	16	2.4		
	System	4	.6		
	Total	22	3.3		
Total		666	100.0		

TEACHPRACT/ACTIV/CLASSROOM MNGMNT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	527	79.1	90.7	90.7
	YES	54	8.1	9.3	100.0
	Total	581	87.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	13	2.0		
	NOT REACHED	2	.3		
	OMITTED	66	9.9		
	System	4	.6		
	Total	85	12.8		
Total		666	100.0		

TEACHPRACT/ACTIV/TEAM BUILDING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	19	2.9	3.0	3.0
	SOMETIMES	106	15.9	16.5	19.5
	OFTEN	232	34.8	36.1	55.6
	NEARLY ALWAYS	285	42.8	44.4	100.0
	Total	642	96.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	18	2.7		
	System	4	.6		
	Total	24	3.6		
Total		666	100.0		

TEACHPRACT/ACTIV/TEAM BUILDING/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	524	78.7	91.0	91.0
	YES	52	7.8	9.0	100.0
	Total	576	86.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	15	2.3		
	NOT REACHED	2	.3		
	OMITTED	69	10.4		
	System	4	.6		
	Total	90	13.5		
Total		666	100.0		

TEACHPRACT/ACTIV/MEDIATE COMMUNICATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	114	17.1	17.6	17.6
	SOMETIMES	210	31.5	32.5	50.2
	OFTEN	174	26.1	26.9	77.1
	NEARLY ALWAYS	148	22.2	22.9	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	646	97.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	14	2.1		
	System	4	.6		
	Total	20	3.0		
Total		666	100.0		

TEACHPRACT/ACTIV/MEDIATE COMM/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	524	78.7	90.8	90.8
	YES	53	8.0	9.2	100.0
	Total	577	86.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	11	1.7		
	NOT REACHED	2	.3		
	OMITTED	72	10.8		
	System	4	.6		
	Total	89	13.4		
Total		666	100.0		

TEACHPRACT/ACTIV/LIAISE WITH COLLABS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	98	14.7	15.4	15.4
	SOMETIMES	271	40.7	42.7	58.1
	OFTEN	162	24.3	25.5	83.6
	NEARLY ALWAYS	104	15.6	16.4	100.0
	Total	635	95.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	25	3.8		
	System	4	.6		
	Total	31	4.7		
Total		666	100.0		

TEACHPRACT/ACTIV/LIAISE WITH COLLABS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	511	76.7	90.0	90.0
	YES	57	8.6	10.0	100.0
	Total	568	85.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	22	3.3		
	NOT REACHED	2	.3		
	OMITTED	70	10.5		
	System	4	.6		
	Total	98	14.7		
Total		666	100.0		

TEACHPRACT/ACTIV/PROVIDE COUNSELING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	47	7.1	7.3	7.3
	SOMETIMES	231	34.7	35.9	43.2
	OFTEN	196	29.4	30.4	73.6
	NEARLY ALWAYS	170	25.5	26.4	100.0
	Total	644	96.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	16	2.4		
	System	4	.6		
	Total	22	3.3		
Total		666	100.0		

TEACHPRACT/ACTIV/PROV COUNSELING/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	535	80.3	93.4	93.4
	YES	38	5.7	6.6	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	573	86.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	13	2.0		
	NOT REACHED	2	.3		
	OMITTED	74	11.1		
	System	4	.6		
	Total	93	14.0		
Total		666	100.0		

TEACHPRACT/ACTIV/COLLAB WITH PARENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	43	6.5	6.7	6.7
	SOMETIMES	255	38.3	39.5	46.1
	OFTEN	206	30.9	31.9	78.0
	NEARLY ALWAYS	142	21.3	22.0	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	14	2.1		
	System	4	.6		
	Total	20	3.0		
Total		666	100.0		

TEACHPRACT/ACTIV/COLLAB WITH PARENTS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	519	77.9	92.0	92.0
	YES	45	6.8	8.0	100.0
	Total	564	84.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	11	1.7		
	NOT REACHED	2	.3		
	OMITTED	85	12.8		
	System	4	.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	102	15.3		
Total		666	100.0		

TEACHPRACT/ASSESS/WRITTEN TEST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	4	.6	.6	.6
	YES	644	96.7	99.4	100.0
	Total	648	97.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	12	1.8		
	System	4	.6		
	Total	18	2.7		
Total		666	100.0		

TEACHPRACT/ASSESS/WRITTEN TEST/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	456	68.5	75.9	75.9
	YES	145	21.8	24.1	100.0
	Total	601	90.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	10	1.5		
	NOT REACHED	2	.3		
	OMITTED	49	7.4		
	System	4	.6		
	Total	65	9.8		
Total		666	100.0		

TEACHPRACT/ASSESS/WRITTEN TASKS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	7	1.1	1.1	1.1
	YES	641	96.2	98.9	100.0

	Total	648	97.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	12	1.8		
	System	4	.6		
	Total	18	2.7		
Total		666	100.0		

TEACHPRACT/ASSESS/WRITTEN TASKS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	466	70.0	77.9	77.9
	YES	132	19.8	22.1	100.0
	Total	598	89.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	10	1.5		
	NOT REACHED	2	.3		
	OMITTED	52	7.8		
	System	4	.6		
	Total	68	10.2		
Total		666	100.0		

TEACHPRACT/ASSESS/ORAL PRESENTATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	189	28.4	29.1	29.1
	YES	460	69.1	70.9	100.0
	Total	649	97.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	11	1.7		
	System	4	.6		
	Total	17	2.6		
Total		666	100.0		

TEACHPRACT/ASSESS/ORAL PRESENT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	535	80.3	89.8	89.8
	YES	61	9.2	10.2	100.0
	Total	596	89.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	9	1.4		
	NOT REACHED	2	.3		
	OMITTED	55	8.3		
	System	4	.6		
	Total	70	10.5		
Total		666	100.0		

TEACHPRACT/ASSESS/GROUP PRESENTATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	98	14.7	15.1	15.1
	YES	549	82.4	84.9	100.0
	Total	647	97.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	13	2.0		
	System	4	.6		
	Total	19	2.9		
Total		666	100.0		

TEACHPRACT/ASSESS/GROUP PRESENT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	511	76.7	86.2	86.2
	YES	82	12.3	13.8	100.0
	Total	593	89.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	11	1.7		
	NOT REACHED	2	.3		
	OMITTED	56	8.4		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	4	.6		
	Total	73	11.0		
Total		666	100.0		

TEACHPRACT/ASSESS/PROJECT REPORT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	142	21.3	22.0	22.0
	YES	503	75.5	78.0	100.0
	Total	645	96.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	15	2.3		
	System	4	.6		
	Total	21	3.2		
Total		666	100.0		

TEACHPRACT/ASSESS/PROJECT REPORT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	493	74.0	83.3	83.3
	YES	99	14.9	16.7	100.0
	Total	592	88.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	13	2.0		
	NOT REACHED	2	.3		
	OMITTED	55	8.3		
	System	4	.6		
	Total	74	11.1		
Total		666	100.0		

TEACHPRACT/ASSESS/PEER EVALUATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	109	16.4	16.8	16.8

	YES	540	81.1	83.2	100.0
	Total	649	97.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	11	1.7		
	System	4	.6		
	Total	17	2.6		
Total		666	100.0		

TEACHPRACT/ASSESS/PEER EVALUATION/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	530	79.6	88.8	88.8
	YES	67	10.1	11.2	100.0
	Total	597	89.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	9	1.4		
	NOT REACHED	2	.3		
	OMITTED	54	8.1		
	System	4	.6		
	Total	69	10.4		
Total		666	100.0		

TEACHPRACT/ASSESS/PORTFOLIO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	56	8.4	8.7	8.7
	YES	591	88.7	91.3	100.0
	Total	647	97.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	13	2.0		
	System	4	.6		
	Total	19	2.9		
Total		666	100.0		

TEACHPRACT/ASSESS/PORTFOLIO/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	494	74.2	83.4	83.4
	YES	98	14.7	16.6	100.0
	Total	592	88.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	11	1.7		
	NOT REACHED	2	.3		
	OMITTED	57	8.6		
	System	4	.6		
	Total	74	11.1		
Total		666	100.0		

TEACHPRACT/ASSESS/GROUP ASSESSMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	95	14.3	14.7	14.7
	YES	551	82.7	85.3	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	14	2.1		
	System	4	.6		
	Total	20	3.0		
Total		666	100.0		

TEACHPRACT/ASSESS/GROUP ASSESSMENT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	510	76.6	86.3	86.3
	YES	81	12.2	13.7	100.0
	Total	591	88.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	12	1.8		

		Frequency	Percent	Valid Percent	Cumulative Percent
	NOT REACHED	2	.3		
	OMITTED	57	8.6		
	System	4	.6		
	Total	75	11.3		
Total		666	100.0		

STUDPRACT/ACTIV/WORKING AT SAME PACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	36	5.4	5.6	5.6
	SOMETIMES	204	30.6	31.8	37.4
	OFTEN	236	35.4	36.8	74.3
	NEARLY ALWAYS	165	24.8	25.7	100.0
	Total	641	96.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	19	2.9		
	System	4	.6		
	Total	25	3.8		
Total		666	100.0		

STUDPRACT/ACTIV/WORKING AT SAME PACE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	505	75.8	89.9	89.9
	YES	57	8.6	10.1	100.0
	Total	562	84.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	15	2.3		
	NOT REACHED	2	.3		
	OMITTED	83	12.5		
	System	4	.6		
	Total	104	15.6		
Total		666	100.0		

STUDPRACT/ACTIV/LEARNING AT OWN PACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	19	2.9	3.0	3.0
	SOMETIMES	207	31.1	32.2	35.2
	OFTEN	260	39.0	40.5	75.7
	NEARLY ALWAYS	156	23.4	24.3	100.0
	Total	642	96.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	18	2.7		
	System	4	.6		
	Total	24	3.6		
Total		666	100.0		

STUDPRACT/ACTIV/LEARNING AT OWN PACE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	504	75.7	90.3	90.3
	YES	54	8.1	9.7	100.0
	Total	558	83.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	14	2.1		
	NOT REACHED	2	.3		
	OMITTED	88	13.2		
	System	4	.6		
	Total	108	16.2		
Total		666	100.0		

STUDPRACT/ACTIV/COMPLETE WORKSHEETS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	14	2.1	2.2	2.2
	SOMETIMES	106	15.9	16.5	18.7
	OFTEN	219	32.9	34.1	52.8

		Frequency	Percent	Valid Percent	Cumulative Percent
	NEARLY ALWAYS	303	45.5	47.2	100.0
	Total	642	96.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	18	2.7		
	System	4	.6		
	Total	24	3.6		
Total		666	100.0		

STUDPRACT/ACTIV/COMPLETE WORKSHEETS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	484	72.7	86.6	86.6
	YES	75	11.3	13.4	100.0
	Total	559	83.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	14	2.1		
	NOT REACHED	2	.3		
	OMITTED	87	13.1		
	System	4	.6		
	Total	107	16.1		
Total		666	100.0		

STUDPRACT/ACTIV/GIVE PRESENTATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	85	12.8	13.3	13.3
	SOMETIMES	281	42.2	44.0	57.3
	OFTEN	170	25.5	26.6	83.9
	NEARLY ALWAYS	103	15.5	16.1	100.0
	Total	639	95.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	21	3.2		
	System	4	.6		
	Total	27	4.1		

Total		666	100.0		

STUDPRACT/ACTIV/GIVE PRESENTATION/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	492	73.9	89.0	89.0
	YES	61	9.2	11.0	100.0
	Total	553	83.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	17	2.6		
	NOT REACHED	2	.3		
	OMITTED	90	13.5		
	System	4	.6		
	Total	113	17.0		
Total		666	100.0		

STUDPRACT/ACTIV/DETERMINE OWN GOALS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	167	25.1	26.1	26.1
	SOMETIMES	274	41.1	42.8	68.9
	OFTEN	133	20.0	20.8	89.7
	NEARLY ALWAYS	66	9.9	10.3	100.0
	Total	640	96.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	20	3.0		
	System	4	.6		
	Total	26	3.9		
Total		666	100.0		

STUDPRACT/ACTIV/DETERMINE OWN GOALS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	509	76.4	91.7	91.7

		Frequency	Percent	Valid Percent	Cumulative Percent
	YES	46	6.9	8.3	100.0
	Total	555	83.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	16	2.4		
	NOT REACHED	2	.3		
	OMITTED	89	13.4		
	System	4	.6		
	Total	111	16.7		
Total		666	100.0		

STUDPRACT/ACTIV/EXPLAIN OWN IDEAS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	35	5.3	5.4	5.4
	SOMETIMES	243	36.5	37.7	43.2
	OFTEN	243	36.5	37.7	80.9
	NEARLY ALWAYS	123	18.5	19.1	100.0
	Total	644	96.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	16	2.4		
	System	4	.6		
	Total	22	3.3		
Total		666	100.0		

STUDPRACT/ACTIV/EXPLAIN OWN IDEAS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	510	76.6	90.6	90.6
	YES	53	8.0	9.4	100.0
	Total	563	84.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	12	1.8		
	NOT REACHED	2	.3		
	OMITTED	85	12.8		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	4	.6		
	Total	103	15.5		
Total		666	100.0		

STUDPRACT/ACTIV/COLLABORATE WITH PEERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	276	41.4	43.1	43.1
	SOMETIMES	240	36.0	37.5	80.6
	OFTEN	83	12.5	13.0	93.6
	NEARLY ALWAYS	41	6.2	6.4	100.0
	Total	640	96.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	20	3.0		
	System	4	.6		
	Total	26	3.9		
Total		666	100.0		

STUDPRACT/ACTIV/COLLAB WITH PEERS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	511	76.7	91.9	91.9
	YES	45	6.8	8.1	100.0
	Total	556	83.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	16	2.4		
	NOT REACHED	2	.3		
	OMITTED	88	13.2		
	System	4	.6		
	Total	110	16.5		
Total		666	100.0		

STUDPRACT/ACTIV/ANSWER TESTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	6	.9	.9	.9
	SOMETIMES	89	13.4	13.9	14.9
	OFTEN	252	37.8	39.4	54.3
	NEARLY ALWAYS	292	43.8	45.7	100.0
	Total	639	95.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	21	3.2		
	System	4	.6		
	Total	27	4.1		
Total		666	100.0		

STUDPRACT/ACTIV/ANSWER TESTS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	499	74.9	89.6	89.6
	YES	58	8.7	10.4	100.0
	Total	557	83.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	17	2.6		
	NOT REACHED	2	.3		
	OMITTED	86	12.9		
	System	4	.6		
	Total	109	16.4		
Total		666	100.0		

STUDPRACT/ACTIV/PEER EVALUATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	49	7.4	7.6	7.6
	SOMETIMES	238	35.7	37.1	44.8
	OFTEN	220	33.0	34.3	79.1
	NEARLY ALWAYS	134	20.1	20.9	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	641	96.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	19	2.9		
	System	4	.6		
	Total	25	3.8		
Total		666	100.0		

STUDPRACT/ACTIV/PEER EVALUATION/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	513	77.0	92.1	92.1
	YES	44	6.6	7.9	100.0
	Total	557	83.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	15	2.3		
	NOT REACHED	2	.3		
	OMITTED	88	13.2		
	System	4	.6		
	Total	109	16.4		
Total		666	100.0		

STUDPRACT/ACTIV/REFLECT EXPERIENCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	130	19.5	20.5	20.5
	SOMETIMES	268	40.2	42.2	62.7
	OFTEN	167	25.1	26.3	89.0
	NEARLY ALWAYS	70	10.5	11.0	100.0
	Total	635	95.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	25	3.8		
	System	4	.6		
	Total	31	4.7		
Total		666	100.0		

STUDPRACT/ACTIV/REFLECT EXPERIENCE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	512	76.9	92.6	92.6
	YES	41	6.2	7.4	100.0
	Total	553	83.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	21	3.2		
	NOT REACHED	2	.3		
	OMITTED	86	12.9		
	System	4	.6		
	Total	113	17.0		
Total		666	100.0		

STUDPRACT/ACTIV/COMMUNICATE WITH OUTSIDE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	225	33.8	35.2	35.2
	SOMETIMES	268	40.2	41.9	77.2
	OFTEN	103	15.5	16.1	93.3
	NEARLY ALWAYS	43	6.5	6.7	100.0
	Total	639	95.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	21	3.2		
	System	4	.6		
	Total	27	4.1		
Total		666	100.0		

STUDPRACT/ACTIV/COMM WITH OUSIDE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	508	76.3	91.7	91.7
	YES	46	6.9	8.3	100.0

	Total	554	83.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	17	2.6		
	NOT REACHED	2	.3		
	OMITTED	89	13.4		
	System	4	.6		
	Total	112	16.8		
Total		666	100.0		

STUDPRACT/ACTIV/CONTRIBUTE TO COMMUNITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	257	38.6	40.1	40.1
	SOMETIMES	257	38.6	40.1	80.2
	OFTEN	92	13.8	14.4	94.5
	NEARLY ALWAYS	35	5.3	5.5	100.0
	Total	641	96.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	19	2.9		
	System	4	.6		
	Total	25	3.8		
Total		666	100.0		

STUDPRACT/ACTIV/CONTR TO CUMMUNITY/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	514	77.2	92.8	92.8
	YES	40	6.0	7.2	100.0
	Total	554	83.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	15	2.3		
	NOT REACHED	2	.3		
	OMITTED	91	13.7		
	System	4	.6		

	Total	112	16.8		
Total		666	100.0		

LEARNRES/INCORP/HANDS ON MATERIALS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	217	32.6	33.2	33.2
	SOMETIMES	247	37.1	37.8	71.1
	OFTEN	105	15.8	16.1	87.1
	NEARLY ALWAYS	84	12.6	12.9	100.0
	Total	653	98.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	7	1.1		
	System	4	.6		
	Total	13	2.0		
Total		666	100.0		

LEARNRES/INCORP/TUTORIAL SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	395	59.3	60.9	60.9
	SOMETIMES	135	20.3	20.8	81.7
	OFTEN	85	12.8	13.1	94.8
	NEARLY ALWAYS	34	5.1	5.2	100.0
	Total	649	97.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	10	1.5		
	System	5	.8		
	Total	17	2.6		
Total		666	100.0		

LEARNRES/INCORP/GENERAL OFFICE SUITE

		Frequency	Percent	Valid Percent	Cumulative Percent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	503	75.5	77.4	77.4
	SOMETIMES	89	13.4	13.7	91.1
	OFTEN	41	6.2	6.3	97.4
	NEARLY ALWAYS	17	2.6	2.6	100.0
	Total	650	97.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	10	1.5		
	System	4	.6		
	Total	16	2.4		
Total		666	100.0		

LEARNRES/INCORP/MULTIMEDIA PROD TOOLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	520	78.1	80.1	80.1
	SOMETIMES	96	14.4	14.8	94.9
	OFTEN	23	3.5	3.5	98.5
	NEARLY ALWAYS	10	1.5	1.5	100.0
	Total	649	97.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	11	1.7		
	System	4	.6		
	Total	17	2.6		
Total		666	100.0		

LEARNRES/INCORP/DATA LOGGING TOOLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	556	83.5	85.9	85.9
	SOMETIMES	67	10.1	10.4	96.3
	OFTEN	17	2.6	2.6	98.9
	NEARLY ALWAYS	7	1.1	1.1	100.0
	Total	647	97.1	100.0	
Missing	NOT REACHED	2	.3		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	13	2.0		
	System	4	.6		
	Total	19	2.9		
Total		666	100.0		

LEARNRES/INCORP/MODELING SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	545	81.8	83.7	83.7
	SOMETIMES	79	11.9	12.1	95.9
	OFTEN	21	3.2	3.2	99.1
	NEARLY ALWAYS	6	.9	.9	100.0
	Total	651	97.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	9	1.4		
	System	4	.6		
	Total	15	2.3		
Total		666	100.0		

LEARNRES/INCORP/COMMUNICATION SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	548	82.3	84.4	84.4
	SOMETIMES	73	11.0	11.2	95.7
	OFTEN	19	2.9	2.9	98.6
	NEARLY ALWAYS	9	1.4	1.4	100.0
	Total	649	97.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	11	1.7		
	System	4	.6		
	Total	17	2.6		
Total		666	100.0		

LEARNRES/INCORP/DIGITAL RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	403	60.5	62.1	62.1
	SOMETIMES	171	25.7	26.3	88.4
	OFTEN	55	8.3	8.5	96.9
	NEARLY ALWAYS	20	3.0	3.1	100.0
	Total	649	97.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	11	1.7		
	System	4	.6		
	Total	17	2.6		
Total		666	100.0		

LEARNRES/INCORP/MOBILE DEVICES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	449	67.4	69.1	69.1
	SOMETIMES	137	20.6	21.1	90.2
	OFTEN	49	7.4	7.5	97.7
	NEARLY ALWAYS	15	2.3	2.3	100.0
	Total	650	97.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	10	1.5		
	System	4	.6		
	Total	16	2.4		
Total		666	100.0		

LEARNRES/INCORP/SMART BOARD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	486	73.0	75.3	75.3
	SOMETIMES	83	12.5	12.9	88.2
	OFTEN	43	6.5	6.7	94.9
	NEARLY ALWAYS	33	5.0	5.1	100.0

	Total	645	96.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	15	2.3		
	System	4	.6		
	Total	21	3.2		
Total		666	100.0		

LEARNRES/INCORP/LEARN MANAGEMENT SYS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	550	82.6	85.0	85.0
	SOMETIMES	71	10.7	11.0	96.0
	OFTEN	17	2.6	2.6	98.6
	NEARLY ALWAYS	9	1.4	1.4	100.0
	Total	647	97.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	13	2.0		
	System	4	.6		
	Total	19	2.9		
Total		666	100.0		

IMPACTICT/DO YOU USE ICT IN TEACHING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	414	62.2	81.7	81.7
	YES	93	14.0	18.3	100.0
	Total	507	76.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	153	23.0		
	System	4	.6		
	Total	159	23.9		
Total		666	100.0		

IMPACTICT/YOU/ICT SKILLS HAVE IMPROVED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	64	9.6	34.4	34.4
	A LITTLE	42	6.3	22.6	57.0
	SOMEWHAT	34	5.1	18.3	75.3
	A LOT	46	6.9	24.7	100.0
	Total	186	27.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	60	9.0		
	System	4	.6		
	Total	480	72.1		
Total		666	100.0		

IMPACTICT/YOU/INCORPORATE NEW METHODS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	51	7.7	28.5	28.5
	A LITTLE	34	5.1	19.0	47.5
	SOMEWHAT	43	6.5	24.0	71.5
	A LOT	51	7.7	28.5	100.0
	Total	179	26.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	67	10.1		
	System	4	.6		
	Total	487	73.1		
Total		666	100.0		

IMPACTICT/YOU/MORE INDIV FEEDBACK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	51	7.7	28.3	28.3

	A LITTLE	34	5.1	18.9	47.2
	SOMEWHAT	39	5.9	21.7	68.9
	A LOT	56	8.4	31.1	100.0
	Total	180	27.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	66	9.9		
	System	4	.6		
	Total	486	73.0		
Total		666	100.0		

IMPACTICT/YOU/INCORPORATE NEW WAYS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	44	6.6	24.4	24.4
	A LITTLE	37	5.6	20.6	45.0
	SOMEWHAT	54	8.1	30.0	75.0
	A LOT	45	6.8	25.0	100.0
	Total	180	27.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	66	9.9		
	System	4	.6		
	Total	486	73.0		
Total		666	100.0		

IMPACTICT/YOU/MONITOR STUDENTS LEARNING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	54	8.1	30.2	30.2
	A LITTLE	25	3.8	14.0	44.1
	SOMEWHAT	51	7.7	28.5	72.6

	A LOT	49	7.4	27.4	100.0
	Total	179	26.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	67	10.1		
	System	4	.6		
	Total	487	73.1		
Total		666	100.0		

IMPACTICT/YOU/ACCESS MORE DIV RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	50	7.5	28.7	28.7
	A LITTLE	41	6.2	23.6	52.3
	SOMEWHAT	44	6.6	25.3	77.6
	A LOT	39	5.9	22.4	100.0
	Total	174	26.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	72	10.8		
	System	4	.6		
	Total	492	73.9		
Total		666	100.0		

IMPACTICT/YOU/COLL MORE WITH COLLEAGUES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	46	6.9	26.0	26.0
	A LITTLE	23	3.5	13.0	39.0
	SOMEWHAT	51	7.7	28.8	67.8
	A LOT	57	8.6	32.2	100.0
	Total	177	26.6	100.0	

		Frequency	Percent	Valid Percent	Cumulative Percent
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	69	10.4		
	System	4	.6		
	Total	489	73.4		
Total		666	100.0		

IMPACTICT/YOU/COLL MORE WITH PEERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	58	8.7	32.6	32.6
	A LITTLE	42	6.3	23.6	56.2
	SOMEWHAT	41	6.2	23.0	79.2
	A LOT	37	5.6	20.8	100.0
	Total	178	26.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	68	10.2		
	System	4	.6		
	Total	488	73.3		
Total		666	100.0		

IMPACTICT/YOU/COMPLETE ADMIN TASKS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	42	6.3	23.7	23.7
	A LITTLE	24	3.6	13.6	37.3
	SOMEWHAT	51	7.7	28.8	66.1
	A LOT	60	9.0	33.9	100.0
	Total	177	26.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		

	OMITTED	69	10.4		
	System	4	.6		
	Total	489	73.4		
Total		666	100.0		

IMPACTICT/YOU/WORKLOAD HAS INCREASED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	56	8.4	31.3	31.3
	A LITTLE	35	5.3	19.6	50.8
	SOMEWHAT	34	5.1	19.0	69.8
	A LOT	54	8.1	30.2	100.0
	Total	179	26.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	67	10.1		
	System	4	.6		
	Total	487	73.1		
Total		666	100.0		

IMPACTICT/YOU/INCREASED WORK PRESSURE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	57	8.6	32.0	32.0
	A LITTLE	35	5.3	19.7	51.7
	SOMEWHAT	37	5.6	20.8	72.5
	A LOT	49	7.4	27.5	100.0
	Total	178	26.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	68	10.2		
	System	4	.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	488	73.3		
Total		666	100.0		

IMPACTICT/STUD/SUBJECT MATTER KNOWLEDGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	6	.9	3.6	3.6
	DECREASED A LITTLE	5	.8	3.0	6.6
	NO IMPACT	52	7.8	31.3	38.0
	INCREASED A LITTLE	66	9.9	39.8	77.7
	INCREASED A LOT	37	5.6	22.3	100.0
	Total	166	24.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	80	12.0		
	System	4	.6		
	Total	500	75.1		
Total		666	100.0		

IMPACTICT/STUD/LEARNING MOTIV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	6	.9	3.6	3.6
	DECREASED A LITTLE	5	.8	3.0	6.7
	NO IMPACT	50	7.5	30.3	37.0
	INCREASED A LITTLE	57	8.6	34.5	71.5
	INCREASED A LOT	47	7.1	28.5	100.0
	Total	165	24.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	81	12.2		
	System	4	.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	501	75.2		
Total		666	100.0		

IMPACTICT/STUD/INFO HANDLING SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	7	1.1	4.3	4.3
	DECREASED A LITTLE	7	1.1	4.3	8.5
	NO IMPACT	54	8.1	32.9	41.5
	INCREASED A LITTLE	56	8.4	34.1	75.6
	INCREASED A LOT	40	6.0	24.4	100.0
	Total	164	24.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	82	12.3		
	System	4	.6		
	Total	502	75.4		
Total		666	100.0		

IMPACTICT/STUD/PROBLEM SOLVING SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	4	.6	2.5	2.5
	DECREASED A LITTLE	10	1.5	6.2	8.6
	NO IMPACT	53	8.0	32.7	41.4
	INCREASED A LITTLE	58	8.7	35.8	77.2
	INCREASED A LOT	37	5.6	22.8	100.0
	Total	162	24.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	84	12.6		
	System	4	.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	504	75.7		
Total		666	100.0		

IMPACTICT/STUD/SELF DIRECT LEARN SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	8	1.2	4.9	4.9
	DECREASED A LITTLE	8	1.2	4.9	9.8
	NO IMPACT	56	8.4	34.4	44.2
	INCREASED A LITTLE	56	8.4	34.4	78.5
	INCREASED A LOT	35	5.3	21.5	100.0
	Total	163	24.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	83	12.5		
	System	4	.6		
	Total	503	75.5		
Total		666	100.0		

IMPACTICT/STUD/COLLABORATIVE SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	6	.9	3.7	3.7
	DECREASED A LITTLE	10	1.5	6.1	9.8
	NO IMPACT	51	7.7	31.3	41.1
	INCREASED A LITTLE	68	10.2	41.7	82.8
	INCREASED A LOT	28	4.2	17.2	100.0
	Total	163	24.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	83	12.5		
	System	4	.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	503	75.5		
Total		666	100.0		

IMPACTICT/STUD/COMMUNICATION SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	5	.8	3.1	3.1
	DECREASED A LITTLE	9	1.4	5.5	8.6
	NO IMPACT	46	6.9	28.2	36.8
	INCREASED A LITTLE	58	8.7	35.6	72.4
	INCREASED A LOT	45	6.8	27.6	100.0
	Total	163	24.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	83	12.5		
	System	4	.6		
	Total	503	75.5		
Total		666	100.0		

IMPACTICT/STUD/ICT SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	13	2.0	7.9	7.9
	DECREASED A LITTLE	3	.5	1.8	9.8
	NO IMPACT	57	8.6	34.8	44.5
	INCREASED A LITTLE	59	8.9	36.0	80.5
	INCREASED A LOT	32	4.8	19.5	100.0
	Total	164	24.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	82	12.3		
	System	4	.6		

	Total	502	75.4		
Total		666	100.0		

IMPACTICT/STUD/LEARN AT THEIR OWN PACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	9	1.4	5.6	5.6
	DECREASED A LITTLE	7	1.1	4.3	9.9
	NO IMPACT	50	7.5	31.1	41.0
	INCREASED A LITTLE	60	9.0	37.3	78.3
	INCREASED A LOT	35	5.3	21.7	100.0
	Total	161	24.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	85	12.8		
	System	4	.6		
	Total	505	75.8		
Total		666	100.0		

IMPACTICT/STUD/SELF ESTEEM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	8	1.2	4.9	4.9
	DECREASED A LITTLE	4	.6	2.4	7.3
	NO IMPACT	50	7.5	30.5	37.8
	INCREASED A LITTLE	61	9.2	37.2	75.0
	INCREASED A LOT	41	6.2	25.0	100.0
	Total	164	24.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	82	12.3		
	System	4	.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	502	75.4		
Total		666	100.0		

IMPACTICT/STUD/ACHIEVEMENT GAP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	9	1.4	5.6	5.6
	DECREASED A LITTLE	13	2.0	8.1	13.8
	NO IMPACT	59	8.9	36.9	50.6
	INCREASED A LITTLE	51	7.7	31.9	82.5
	INCREASED A LOT	28	4.2	17.5	100.0
	Total	160	24.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	86	12.9		
	System	4	.6		
	Total	506	76.0		
Total		666	100.0		

IMPACTICT/STUD/TIME SPENT ON LEARNING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	12	1.8	7.4	7.4
	DECREASED A LITTLE	12	1.8	7.4	14.8
	NO IMPACT	51	7.7	31.5	46.3
	INCREASED A LITTLE	58	8.7	35.8	82.1
	INCREASED A LOT	29	4.4	17.9	100.0
	Total	162	24.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	84	12.6		
	System	4	.6		

	Total	504	75.7		
Total		666	100.0		

IMPACTICT/STUD/SCHOOL ATTENDANCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	10	1.5	6.1	6.1
	DECREASED A LITTLE	8	1.2	4.9	11.0
	NO IMPACT	67	10.1	41.1	52.1
	INCREASED A LITTLE	35	5.3	21.5	73.6
	INCREASED A LOT	43	6.5	26.4	100.0
	Total	163	24.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	83	12.5		
	System	4	.6		
	Total	503	75.5		
Total		666	100.0		

IMPACTICT/STUD/ASSESSMENT RESULTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	8	1.2	4.9	4.9
	DECREASED A LITTLE	6	.9	3.7	8.6
	NO IMPACT	56	8.4	34.4	42.9
	INCREASED A LITTLE	61	9.2	37.4	80.4
	INCREASED A LOT	32	4.8	19.6	100.0
	Total	163	24.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	83	12.5		
	System	4	.6		

	Total	503	75.5		
Total		666	100.0		

IMPACTICT/STUD/DIGITAL DEVIDE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	12	1.8	7.3	7.3
	DECREASED A LITTLE	15	2.3	9.1	16.4
	NO IMPACT	71	10.7	43.0	59.4
	INCREASED A LITTLE	42	6.3	25.5	84.8
	INCREASED A LOT	25	3.8	15.2	100.0
	Total	165	24.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	414	62.2		
	NOT REACHED	2	.3		
	OMITTED	81	12.2		
	System	4	.6		
	Total	501	75.2		
Total		666	100.0		

INFOYOU/CONFIDENT/PRODUCE LETTER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	150	22.5	23.4	23.4
	A LITTLE	114	17.1	17.8	41.3
	SOMEWHAT	95	14.3	14.8	56.1
	A LOT	281	42.2	43.9	100.0
	Total	640	96.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	24	3.6		
	Total	26	3.9		
Total		666	100.0		

INFOYOU/CONFIDENT/EMAIL A FILE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	254	38.1	39.7	39.7
	A LITTLE	89	13.4	13.9	53.7
	SOMEWHAT	81	12.2	12.7	66.4
	A LOT	215	32.3	33.6	100.0
	Total	639	95.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	25	3.8		
	Total	27	4.1		
Total		666	100.0		

INFOYOU/CONFIDENT/TAKE PHOTOS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	312	46.8	48.7	48.7
	A LITTLE	97	14.6	15.1	63.8
	SOMEWHAT	72	10.8	11.2	75.0
	A LOT	160	24.0	25.0	100.0
	Total	641	96.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	23	3.5		
	Total	25	3.8		
Total		666	100.0		

INFOYOU/CONFIDENT/FILE ELECTRONIC DOCS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	213	32.0	33.1	33.1
	A LITTLE	113	17.0	17.6	50.7
	SOMEWHAT	78	11.7	12.1	62.8
	A LOT	239	35.9	37.2	100.0
	Total	643	96.5	100.0	
Missing	NOT REACHED	2	.3		

	OMITTED	21	3.2		
	Total	23	3.5		
Total		666	100.0		

INFOYOU/CONFIDENT/USE SPREADSHEET PROG

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	236	35.4	36.7	36.7
	A LITTLE	103	15.5	16.0	52.7
	SOMEWHAT	88	13.2	13.7	66.4
	A LOT	216	32.4	33.6	100.0
	Total	643	96.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	21	3.2		
	Total	23	3.5		
Total		666	100.0		

INFOYOU/CONFIDENT/SHARE KNOWLEDGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	314	47.1	49.1	49.1
	A LITTLE	106	15.9	16.6	65.6
	SOMEWHAT	86	12.9	13.4	79.1
	A LOT	134	20.1	20.9	100.0
	Total	640	96.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	24	3.6		
	Total	26	3.9		
Total		666	100.0		

INFOYOU/CONFIDENT/PRODUCE PRESENTATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	322	48.3	50.2	50.2

		Frequency	Percent	Valid Percent	Cumulative Percent
	A LITTLE	129	19.4	20.1	70.2
	SOMEWHAT	65	9.8	10.1	80.4
	A LOT	126	18.9	19.6	100.0
	Total	642	96.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	22	3.3		
	Total	24	3.6		
Total		666	100.0		

INFOYOU/CONFIDENT/ONLINE PURCHASES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	342	51.4	53.4	53.4
	A LITTLE	96	14.4	15.0	68.3
	SOMEWHAT	70	10.5	10.9	79.3
	A LOT	133	20.0	20.7	100.0
	Total	641	96.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	23	3.5		
	Total	25	3.8		
Total		666	100.0		

INFOYOU/CONFIDENT/PREPARE LESSONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	324	48.6	50.7	50.7
	A LITTLE	115	17.3	18.0	68.7
	SOMEWHAT	96	14.4	15.0	83.7
	A LOT	104	15.6	16.3	100.0
	Total	639	95.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	25	3.8		
	Total	27	4.1		
Total		666	100.0		

INFOYOU/CONFIDENT/SUITABLE FOR ICT USE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	298	44.7	46.7	46.7
	A LITTLE	131	19.7	20.5	67.2
	SOMEWHAT	112	16.8	17.6	84.8
	A LOT	97	14.6	15.2	100.0
	Total	638	95.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	26	3.9		
	Total	28	4.2		
Total		666	100.0		

INFOYOU/CONFIDENT/USEFUL RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	278	41.7	43.6	43.6
	A LITTLE	96	14.4	15.1	58.7
	SOMEWHAT	106	15.9	16.6	75.4
	A LOT	157	23.6	24.6	100.0
	Total	637	95.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	27	4.1		
	Total	29	4.4		
Total		666	100.0		

INFOYOU/CONFIDENT/MONITOR PROGRESS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	320	48.0	50.1	50.1
	A LITTLE	105	15.8	16.4	66.5
	SOMEWHAT	102	15.3	16.0	82.5
	A LOT	112	16.8	17.5	100.0

	Total	639	95.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	25	3.8		
	Total	27	4.1		
Total		666	100.0		

INFOYOU/CONFIDENT/EFFECT PRESENTATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	311	46.7	48.7	48.7
	A LITTLE	111	16.7	17.4	66.1
	SOMEWHAT	104	15.6	16.3	82.4
	A LOT	112	16.8	17.6	100.0
	Total	638	95.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	26	3.9		
	Total	28	4.2		
Total		666	100.0		

INFOYOU/CONFIDENT/COLLAB WITH OTHERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	317	47.6	49.9	49.9
	A LITTLE	121	18.2	19.1	69.0
	SOMEWHAT	92	13.8	14.5	83.5
	A LOT	105	15.8	16.5	100.0
	Total	635	95.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	29	4.4		
	Total	31	4.7		
Total		666	100.0		

INFOYOU/CONFIDENT/EDUCATIONAL SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	317	47.6	49.6	49.6
	A LITTLE	99	14.9	15.5	65.1
	SOMEWHAT	81	12.2	12.7	77.8
	A LOT	142	21.3	22.2	100.0
	Total	639	95.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	25	3.8		
	Total	27	4.1		
Total		666	100.0		

INFOYOU/CONFIDENT/USE INTERNET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	318	47.7	49.8	49.8
	A LITTLE	105	15.8	16.5	66.3
	SOMEWHAT	84	12.6	13.2	79.5
	A LOT	131	19.7	20.5	100.0
	Total	638	95.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	26	3.9		
	Total	28	4.2		
Total		666	100.0		

INFOYOU/ENH/MONITOR MORE EFFECTIVELY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	32	4.8	5.1	5.1
	LOW PRIORITY	46	6.9	7.3	12.4
	MEDIUM PRIORITY	168	25.2	26.8	39.2
	HIGH PRIORITY	381	57.2	60.8	100.0
	Total	627	94.1	100.0	
Missing	NOT REACHED	2	.3		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	37	5.6		
	Total	39	5.9		
Total		666	100.0		

INFOYOU/ENH/EXERCISES FOR STUD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	36	5.4	5.7	5.7
	LOW PRIORITY	35	5.3	5.6	11.3
	MEDIUM PRIORITY	155	23.3	24.7	36.0
	HIGH PRIORITY	402	60.4	64.0	100.0
	Total	628	94.3	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	35	5.3		
	Total	38	5.7		
Total		666	100.0		

INFOYOU/ENH/BETTER LECTURES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	34	5.1	5.4	5.4
	LOW PRIORITY	31	4.7	5.0	10.4
	MEDIUM PRIORITY	128	19.2	20.5	30.9
	HIGH PRIORITY	431	64.7	69.1	100.0
	Total	624	93.7	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	39	5.9		
	Total	42	6.3		
Total		666	100.0		

INFOYOU/ENH/MULTIMEDIA PROD PROJECTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	47	7.1	7.5	7.5

		Frequency	Percent	Valid Percent	Cumulative Percent
	LOW PRIORITY	63	9.5	10.1	17.7
	MEDIUM PRIORITY	152	22.8	24.4	42.1
	HIGH PRIORITY	361	54.2	57.9	100.0
	Total	623	93.5	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	40	6.0		
	Total	43	6.5		
Total		666	100.0		

INFOYOU/ENH/ADDRESS INDIV DIFFERENCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	37	5.6	5.9	5.9
	LOW PRIORITY	53	8.0	8.5	14.4
	MEDIUM PRIORITY	165	24.8	26.3	40.7
	HIGH PRIORITY	372	55.9	59.3	100.0
	Total	627	94.1	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	36	5.4		
	Total	39	5.9		
Total		666	100.0		

INFOYOU/ENH/SHORT PROJECTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	38	5.7	6.1	6.1
	LOW PRIORITY	64	9.6	10.2	16.3
	MEDIUM PRIORITY	192	28.8	30.7	47.0
	HIGH PRIORITY	332	49.8	53.0	100.0
	Total	626	94.0	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	37	5.6		
	Total	40	6.0		
Total		666	100.0		

INFOYOU/ENH/EXTENDED PROJECTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	43	6.5	6.9	6.9
	LOW PRIORITY	82	12.3	13.1	19.9
	MEDIUM PRIORITY	211	31.7	33.7	53.6
	HIGH PRIORITY	291	43.7	46.4	100.0
	Total	627	94.1	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	36	5.4		
	Total	39	5.9		
Total		666	100.0		

INFOYOU/ENH/SCIENTIFIC INVESTIGATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	71	10.7	11.4	11.4
	LOW PRIORITY	73	11.0	11.8	23.2
	MEDIUM PRIORITY	138	20.7	22.2	45.4
	HIGH PRIORITY	339	50.9	54.6	100.0
	Total	621	93.2	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	42	6.3		
	Total	45	6.8		
Total		666	100.0		

INFOYOU/ENH/COLLABORATE WITH PEERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	47	7.1	7.5	7.5
	LOW PRIORITY	69	10.4	11.0	18.6
	MEDIUM PRIORITY	147	22.1	23.5	42.1
	HIGH PRIORITY	362	54.4	57.9	100.0

	Total	625	93.8	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	38	5.7		
	Total	41	6.2		
Total		666	100.0		

INFOYOU/ENH/COLLABORATE WITH TEACHERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	36	5.4	5.8	5.8
	LOW PRIORITY	40	6.0	6.4	12.1
	MEDIUM PRIORITY	149	22.4	23.8	35.9
	HIGH PRIORITY	401	60.2	64.1	100.0
	Total	626	94.0	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	37	5.6		
	Total	40	6.0		
Total		666	100.0		

INFOYOU/ENH/COLLABORATE WITH CLASSMATES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	34	5.1	5.4	5.4
	LOW PRIORITY	50	7.5	8.0	13.4
	MEDIUM PRIORITY	151	22.7	24.1	37.5
	HIGH PRIORITY	391	58.7	62.5	100.0
	Total	626	94.0	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	37	5.6		
	Total	40	6.0		
Total		666	100.0		

INFOYOU/ENH/SELF ACCESSED ACTIVITIES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	33	5.0	5.3	5.3
	LOW PRIORITY	52	7.8	8.3	13.6
	MEDIUM PRIORITY	153	23.0	24.4	38.0
	HIGH PRIORITY	388	58.3	62.0	100.0
	Total	626	94.0	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	37	5.6		
	Total	40	6.0		
Total		666	100.0		

INFOYOU/OBST/NOT CONSIDERED USEFUL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	459	68.9	74.0	74.0
	YES	161	24.2	26.0	100.0
	Total	620	93.1	100.0	
Missing	NOT REACHED	3	.5		
	OMITTED	43	6.5		
	Total	46	6.9		
Total		666	100.0		

INFOYOU/OBST/NO REQUIRED INFRASTRUCTURE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	227	34.1	36.1	36.1
	YES	402	60.4	63.9	100.0
	Total	629	94.4	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	33	5.0		
	Total	37	5.6		
Total		666	100.0		

INFOYOU/OBST/NO REQUIRED ICT SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	272	40.8	43.5	43.5
	YES	353	53.0	56.5	100.0
	Total	625	93.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	37	5.6		
	Total	41	6.2		
Total		666	100.0		

INFOYOU/OBST/NO PEDAGOGICAL SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	235	35.3	37.5	37.5
	YES	391	58.7	62.5	100.0
	Total	626	94.0	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	36	5.4		
	Total	40	6.0		
Total		666	100.0		

INFOYOU/OBST/NO CONFIDENCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	376	56.5	60.1	60.1
	YES	250	37.5	39.9	100.0
	Total	626	94.0	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	36	5.4		
	Total	40	6.0		
Total		666	100.0		

INFOYOU/OBST/STUDENTS HAVE NO ICT SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	163	24.5	26.2	26.2
	YES	460	69.1	73.8	100.0
	Total	623	93.5	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	39	5.9		
	Total	43	6.5		
Total		666	100.0		

INFOYOU/OBST/NO ACCESS TO REQUIRED ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	153	23.0	24.2	24.2
	YES	478	71.8	75.8	100.0
	Total	631	94.7	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	31	4.7		
	Total	35	5.3		
Total		666	100.0		

INFOYOU/OBST/NO TIME NECESSARY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	362	54.4	57.6	57.6
	YES	266	39.9	42.4	100.0
	Total	628	94.3	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	34	5.1		
	Total	38	5.7		
Total		666	100.0		

INFOYOU/OBST/HOW TO IDENTIFY ICT TOOLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	288	43.2	46.1	46.1
	YES	337	50.6	53.9	100.0
	Total	625	93.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	37	5.6		
	Total	41	6.2		
Total		666	100.0		

INFOYOU/OBST/SCHOOL LACKS DIGITAL RES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	148	22.2	23.7	23.7
	YES	477	71.6	76.3	100.0
	Total	625	93.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	37	5.6		
	Total	41	6.2		
Total		666	100.0		

INFOYOU/OBST/CANNOT MAKE OWN DECISIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	315	47.3	50.4	50.4
	YES	310	46.5	49.6	100.0
	Total	625	93.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	37	5.6		
	Total	41	6.2		
Total		666	100.0		

INFOYOU/OBST/ACCESS OUTSIDE SCHOOL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	310	46.5	49.2	49.2
	YES	320	48.0	50.8	100.0
	Total	630	94.6	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	32	4.8		
	Total	36	5.4		
Total		666	100.0		

INFOYOU/PRODEV/INTRO COURSE FOR INTERNET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	33	5.0	5.2	5.2
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	419	62.9	66.0	71.2
	YES, I HAVE	183	27.5	28.8	100.0
	Total	635	95.3	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	21	3.2		
	System	6	.9		
	Total	31	4.7		
Total		666	100.0		

INFOYOU/PRODEV/TECHNICAL COURSE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	63	9.5	9.9	9.9
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	467	70.1	73.2	83.1
	YES, I HAVE	108	16.2	16.9	100.0
	Total	638	95.8	100.0	
Missing	NOT REACHED	4	.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	20	3.0		
	System	4	.6		
	Total	28	4.2		
Total		666	100.0		

INFOYOU/PRODEV/ADV COURSE APPLICATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	47	7.1	7.4	7.4
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	520	78.1	81.4	88.7
	YES, I HAVE	72	10.8	11.3	100.0
	Total	639	95.9	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	20	3.0		
	System	3	.5		
	Total	27	4.1		
Total		666	100.0		

INFOYOU/PRODEV/ADV COURSE INTERNET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	50	7.5	7.8	7.8
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	536	80.5	84.0	91.8
	YES, I HAVE	52	7.8	8.2	100.0
	Total	638	95.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	20	3.0		
	System	4	.6		
	Total	28	4.2		
Total		666	100.0		

INFOYOU/PRODEV/PEDAGOGICAL ISSUES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	28	4.2	4.4	4.4
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	548	82.3	86.0	90.4
	YES, I HAVE	61	9.2	9.6	100.0
	Total	637	95.6	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	25	3.8		
	Total	29	4.4		
Total		666	100.0		

INFOYOU/PRODEV/SUBJECT SPECIFIC TRAINING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	20	3.0	3.1	3.1
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	564	84.7	88.4	91.5
	YES, I HAVE	54	8.1	8.5	100.0
	Total	638	95.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	24	3.6		
	Total	28	4.2		
Total		666	100.0		

INFOYOU/PRODEV/MULTIMEDIA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	33	5.0	5.2	5.2
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	548	82.3	85.8	90.9
	YES, I HAVE	58	8.7	9.1	100.0

	Total	639	95.9	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	23	3.5		
	Total	27	4.1		
Total		666	100.0		

INFOYOU/SCHVISION/DISCUSS WHAT WE WANT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	29	4.4	4.5	4.5
	A LITTLE	89	13.4	13.8	18.3
	SOMEWHAT	172	25.8	26.6	44.9
	A LOT	356	53.5	55.1	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	16	2.4		
	Total	20	3.0		
Total		666	100.0		

INFOYOU/SCHVISION/CONSTANTLY MOTIVATED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	19	2.9	2.9	2.9
	A LITTLE	97	14.6	15.0	18.0
	SOMEWHAT	198	29.7	30.7	48.7
	A LOT	331	49.7	51.3	100.0
	Total	645	96.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	17	2.6		
	Total	21	3.2		
Total		666	100.0		

INFOYOU/SCHVISION/TEACHERS THINK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	22	3.3	3.4	3.4
	A LITTLE	73	11.0	11.3	14.7
	SOMEWHAT	176	26.4	27.2	42.0
	A LOT	375	56.3	58.0	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	16	2.4		
	Total	20	3.0		
Total		666	100.0		

INFOYOU/TEACHPART/I CAN INFLUENCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	56	8.4	8.7	8.7
	A LITTLE	144	21.6	22.3	31.0
	SOMEWHAT	220	33.0	34.1	65.0
	A LOT	226	33.9	35.0	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	16	2.4		
	Total	20	3.0		
Total		666	100.0		

INFOYOU/TEACHPART/CONSIDER TEACH OPP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	40	6.0	6.2	6.2
	A LITTLE	117	17.6	18.1	24.3
	SOMEWHAT	231	34.7	35.8	60.1
	A LOT	258	38.7	39.9	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	4	.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	16	2.4		
	Total	20	3.0		
Total		666	100.0		

INFOYOU/TEACHPART/OWN JUDGEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	23	3.5	3.6	3.6
	A LITTLE	76	11.4	11.8	15.4
	SOMEWHAT	198	29.7	30.8	46.2
	A LOT	346	52.0	53.8	100.0
	Total	643	96.5	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	19	2.9		
	Total	23	3.5		
Total		666	100.0		

INFOYOU/PROFCOLLAB/CO TEACH WITH COLL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	37	5.6	5.7	5.7
	A LITTLE	78	11.7	12.1	17.8
	SOMEWHAT	174	26.1	27.0	44.8
	A LOT	356	53.5	55.2	100.0
	Total	645	96.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	17	2.6		
	Total	21	3.2		
Total		666	100.0		

INFOYOU/PROFCOLLAB/DISCUSS PROBLEMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	3	.5	.5	.5

	A LITTLE	41	6.2	6.3	6.8
	SOMEWHAT	123	18.5	19.0	25.9
	A LOT	479	71.9	74.1	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	16	2.4		
	Total	20	3.0		
Total		666	100.0		

INFOYOU/PROFCOLLAB/TEACH OTHER SCHOOL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	47	7.1	7.3	7.3
	A LITTLE	129	19.4	20.0	27.3
	SOMEWHAT	228	34.2	35.3	62.6
	A LOT	241	36.2	37.4	100.0
	Total	645	96.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	17	2.6		
	Total	21	3.2		
Total		666	100.0		

INFOYOU/PROFCOLLAB/TEACH OTHER CNTRY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	462	69.4	71.6	71.6
	A LITTLE	70	10.5	10.9	82.5
	SOMEWHAT	48	7.2	7.4	89.9
	A LOT	65	9.8	10.1	100.0
	Total	645	96.8	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	17	2.6		
	Total	21	3.2		
Total		666	100.0		

INFOYOU/TEACHSUP/SUFFICIENT TECH SUPPORT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	280	42.0	43.3	43.3
	A LITTLE	138	20.7	21.4	64.7
	SOMEWHAT	121	18.2	18.7	83.4
	A LOT	107	16.1	16.6	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	4	.6		
	OMITTED	16	2.4		
	Total	20	3.0		
Total		666	100.0		

INFOYOU/TEACHSUP/ACCESS COMPS EASILY OUT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	420	63.1	65.3	65.3
	A LITTLE	118	17.7	18.4	83.7
	SOMEWHAT	50	7.5	7.8	91.4
	A LOT	55	8.3	8.6	100.0
	Total	643	96.5	100.0	
Missing	NOT REACHED	5	.8		
	OMITTED	18	2.7		
	Total	23	3.5		
Total		666	100.0		

INFOYOU/TEACHSUP/ADMIN WORK EASY TO DO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	364	54.7	56.7	56.7
	A LITTLE	125	18.8	19.5	76.2
	SOMEWHAT	85	12.8	13.2	89.4
	A LOT	68	10.2	10.6	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	642	96.4	100.0	
Missing	NOT REACHED	5	.8		
	OMITTED	19	2.9		
	Total	24	3.6		
Total		666	100.0		

INFOYOU/ACCESS TO COMPUTER AT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	255	38.3	45.1	45.1
	YES	310	46.5	54.9	100.0
	Total	565	84.8	100.0	
Missing	NOT REACHED	5	.8		
	OMITTED	96	14.4		
	Total	101	15.2		
Total		666	100.0		

INFOYOU/USECOMP/TEACHING REL ACTIV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	122	18.3	34.0	34.0
	YES	237	35.6	66.0	100.0
	Total	359	53.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	251	37.7		
	NOT REACHED	5	.8		
	OMITTED	49	7.4		
	System	2	.3		
	Total	307	46.1		
Total		666	100.0		

INFOYOU/USECOMP/CONNECTING TO WWW

		Frequency	Percent	Valid Percent	Cumulative Percent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	211	31.7	59.3	59.3
	YES	145	21.8	40.7	100.0
	Total	356	53.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	251	37.7		
	NOT REACHED	5	.8		
	OMITTED	52	7.8		
	System	2	.3		
	Total	310	46.5		
Total		666	100.0		

INFOYOU/TO WHAT AGE GROUP DO YOU BELONG

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BELOW 25	15	2.3	2.4	2.4
	25–29	86	12.9	13.5	15.9
	30–39	273	41.0	42.9	58.8
	40–49	203	30.5	31.9	90.7
	50–59	54	8.1	8.5	99.2
	60 OR ABOVE	5	.8	.8	100.0
	Total	636	95.5	100.0	
Missing	NOT REACHED	5	.8		
	OMITTED	25	3.8		
	Total	30	4.5		
Total		666	100.0		

INFOYOU/WHAT IS YOUR GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	306	45.9	47.8	47.8
	FEMALE	334	50.2	52.2	100.0
	Total	640	96.1	100.0	
Missing	NOT REACHED	5	.8		
	OMITTED	21	3.2		

	Total	26	3.9		
Total		666	100.0		

INFOYOU/HIGHEST LEVEL OF EDUCATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SECONDARY OR HIGH SCHOOL	20	3.0	3.1	3.1
	POST-SECONDARY EDUCATION (E.G., T	362	54.4	56.0	59.1
	BACHELOR'S DEGREE	177	26.6	27.4	86.5
	MASTER'S DEGREE OR ABOVE	87	13.1	13.5	100.0
	Total	646	97.0	100.0	
Missing	NOT REACHED	5	.8		
	OMITTED	15	2.3		
	Total	20	3.0		
Total		666	100.0		

INFOYOU/BACHELORS DEGR IN SCIENCE MATHS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	498	74.8	76.1	76.1
	DEGREE IN MATHEMATICS ONLY	76	11.4	11.6	87.8
	DEGREE IN SCIENCE ONLY	22	3.3	3.4	91.1
	DEGREE IN BOTH MATHEMATICS AND SC	58	8.7	8.9	100.0
	Total	654	98.2	100.0	
Missing	NOT REACHED	5	.8		
	OMITTED	7	1.1		
	Total	12	1.8		
Total		666	100.0		

INFOYOU/TEACHING LICENSE OR CERTIFICATE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	65	9.8	10.0	10.0
	YES	586	88.0	90.0	100.0
	Total	651	97.7	100.0	
Missing	NOT REACHED	5	.8		
	OMITTED	10	1.5		
	Total	15	2.3		
Total		666	100.0		

INFOYOU/YEARS OF EXPERIENCE TEACHING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LESS THAN 2 YEARS	70	10.5	10.6	10.6
	2–4 YEARS	117	17.6	17.8	28.4
	5– 9 YEARS	135	20.3	20.5	48.9
	10–19 YEARS	227	34.1	34.5	83.4
	20 YEARS OR MORE	109	16.4	16.6	100.0
	Total	658	98.8	100.0	
Missing	NOT REACHED	5	.8		
	OMITTED	3	.5		
	Total	8	1.2		
Total		666	100.0		

PEDPRAC/WHICH DESCRIPTION IS APPLICABLE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I USE ICT ONCE A WEEK OR MORE IN THE TAR	37	5.6	12.0	12.0
	I USE ICT EXTENSIVELY IN THE TARGET CLAS	35	5.3	11.3	23.3
	NONE OF THE ABOVE	237	35.6	76.7	100.0
	Total	309	46.4	100.0	

		Frequency	Percent	Valid Percent	Cumulative Percent
Missing	NOT REACHED	5	.8		
	OMITTED	348	52.3		
	System	4	.6		
	Total	357	53.6		
Total		666	100.0		

PEDPRAC/STUDOUT/SUBJECT MATTER KNOW

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	11	1.7	7.0	7.0
	MADE NO DIFFERENCE	48	7.2	30.6	37.6
	INCREASED	98	14.7	62.4	100.0
	Total	157	23.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	25	3.8		
	OMITTED	243	36.5		
	System	4	.6		
	Total	509	76.4		
Total		666	100.0		

PEDPRAC/STUDOUT/ICT SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.8	7.7	7.7
	MADE NO DIFFERENCE	54	8.1	34.6	42.3
	INCREASED	90	13.5	57.7	100.0
	Total	156	23.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	26	3.9		
	OMITTED	243	36.5		
	System	4	.6		
	Total	510	76.6		

Total		666	100.0		

PEDPRAC/STUDOUT/LEARNING MOTIVATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	8	1.2	5.1	5.1
	MADE NO DIFFERENCE	43	6.5	27.6	32.7
	INCREASED	105	15.8	67.3	100.0
	Total	156	23.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	242	36.3		
	System	4	.6		
	Total	510	76.6		
Total		666	100.0		

PEDPRAC/STUDOUT/LEARN AT OWN PACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	9	1.4	5.8	5.8
	MADE NO DIFFERENCE	58	8.7	37.4	43.2
	INCREASED	88	13.2	56.8	100.0
	Total	155	23.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	243	36.5		
	System	4	.6		
	Total	511	76.7		
Total		666	100.0		

PEDPRAC/STUDOUT/COMMUNICATION SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.8	7.7	7.7
	MADE NO DIFFERENCE	43	6.5	27.7	35.5
	INCREASED	100	15.0	64.5	100.0
	Total	155	23.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	243	36.5		
	System	4	.6		
	Total	511	76.7		
Total		666	100.0		

PEDPRAC/STUDOUT/INFO HANDLING SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	9	1.4	5.8	5.8
	MADE NO DIFFERENCE	53	8.0	34.0	39.7
	INCREASED	94	14.1	60.3	100.0
	Total	156	23.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	242	36.3		
	System	4	.6		
	Total	510	76.6		
Total		666	100.0		

PEDPRAC/STUDOUT/COLLAB SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	9	1.4	5.8	5.8
	MADE NO DIFFERENCE	63	9.5	40.4	46.2
	INCREASED	84	12.6	53.8	100.0

	Total	156	23.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	242	36.3		
	System	4	.6		
	Total	510	76.6		
Total		666	100.0		

PEDPRAC/STUDOUT/SELF DIR LEARN SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	8	1.2	5.1	5.1
	MADE NO DIFFERENCE	63	9.5	40.4	45.5
	INCREASED	85	12.8	54.5	100.0
	Total	156	23.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	242	36.3		
	System	4	.6		
	Total	510	76.6		
Total		666	100.0		

PEDPRAC/STUDOUT/PROBLEM SOLVING SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	7	1.1	4.5	4.5
	MADE NO DIFFERENCE	51	7.7	32.9	37.4
	INCREASED	97	14.6	62.6	100.0
	Total	155	23.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	243	36.5		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	4	.6		
	Total	511	76.7		
Total		666	100.0		

PEDPRAC/STUDOUT/ACHIEVEMENT GAP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.8	7.8	7.8
	MADE NO DIFFERENCE	56	8.4	36.4	44.2
	INCREASED	86	12.9	55.8	100.0
	Total	154	23.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	244	36.6		
	System	4	.6		
	Total	512	76.9		
Total		666	100.0		

PEDPRAC/STUDOUT/SELF ESTEEM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	9	1.4	5.8	5.8
	MADE NO DIFFERENCE	50	7.5	32.3	38.1
	INCREASED	96	14.4	61.9	100.0
	Total	155	23.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	243	36.5		
	System	4	.6		
	Total	511	76.7		
Total		666	100.0		

PEDPRAC/YOURTEACH/QUALITY OF COACHING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	9	1.4	5.7	5.7
	MADE NO DIFFERENCE	50	7.5	31.4	37.1
	INCREASED	100	15.0	62.9	100.0
	Total	159	23.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	239	35.9		
	System	4	.6		
	Total	507	76.1		
Total		666	100.0		

PEDPRAC/YOURTEACH/HELP INDIV STUDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	14	2.1	8.8	8.8
	MADE NO DIFFERENCE	61	9.2	38.1	46.9
	INCREASED	85	12.8	53.1	100.0
	Total	160	24.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	238	35.7		
	System	4	.6		
	Total	506	76.0		
Total		666	100.0		

PEDPRAC/YOURTEACH/SOLVE TECH PROBLEMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	19	2.9	12.0	12.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	MADE NO DIFFERENCE	60	9.0	38.0	50.0
	INCREASED	79	11.9	50.0	100.0
	Total	158	23.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	27	4.1		
	OMITTED	240	36.0		
	System	4	.6		
	Total	508	76.3		
Total		666	100.0		

PEDPRAC/YOURTEACH/TIME NEEDED FOR PREP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	24	3.6	15.1	15.1
	MADE NO DIFFERENCE	49	7.4	30.8	45.9
	INCREASED	86	12.9	54.1	100.0
	Total	159	23.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	238	35.7		
	System	4	.6		
	Total	507	76.1		
Total		666	100.0		

PEDPRAC/YOURTEACH/QUAL OF INSTRUCTIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	11	1.7	7.1	7.1
	MADE NO DIFFERENCE	51	7.7	32.9	40.0
	INCREASED	93	14.0	60.0	100.0
	Total	155	23.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	NOT REACHED	28	4.2		
	OMITTED	242	36.3		
	System	4	.6		
	Total	511	76.7		
Total		666	100.0		

PEDPRAC/YOURTEACH/CLASSROOM MANAGEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	20	3.0	12.7	12.7
	MADE NO DIFFERENCE	55	8.3	34.8	47.5
	INCREASED	83	12.5	52.5	100.0
	Total	158	23.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	239	35.9		
	System	4	.6		
	Total	508	76.3		
Total		666	100.0		

PEDPRAC/YOURTEACH/CLASSROOM DISCUSSION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	11	1.7	6.9	6.9
	MADE NO DIFFERENCE	53	8.0	33.3	40.3
	INCREASED	95	14.3	59.7	100.0
	Total	159	23.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	238	35.7		
	System	4	.6		
	Total	507	76.1		

Total		666	100.0		

PEDPRAC/YOURTEACH/COLLAB BETW STUDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	7	1.1	4.4	4.4
	MADE NO DIFFERENCE	61	9.2	38.4	42.8
	INCREASED	91	13.7	57.2	100.0
	Total	159	23.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	238	35.7		
	System	4	.6		
	Total	507	76.1		
Total		666	100.0		

PEDPRAC/YOURTEACH/COMM WITH OUTSIDE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	17	2.6	10.7	10.7
	MADE NO DIFFERENCE	62	9.3	39.0	49.7
	INCREASED	80	12.0	50.3	100.0
	Total	159	23.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	238	35.7		
	System	4	.6		
	Total	507	76.1		
Total		666	100.0		

PEDPRAC/YOURTEACH/NEW LEARNING CONTENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	9	1.4	5.7	5.7
	MADE NO DIFFERENCE	51	7.7	32.1	37.7
	INCREASED	99	14.9	62.3	100.0
	Total	159	23.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	238	35.7		
	System	4	.6		
	Total	507	76.1		
Total		666	100.0		

PEDPRAC/YOURTEACH/LEARNING RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	14	2.1	8.9	8.9
	MADE NO DIFFERENCE	53	8.0	33.5	42.4
	INCREASED	91	13.7	57.6	100.0
	Total	158	23.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	239	35.9		
	System	4	.6		
	Total	508	76.3		
Total		666	100.0		

PEDPRAC/YOURTEACH/LEARNING ACTIVITIES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.8	7.6	7.6
	MADE NO DIFFERENCE	49	7.4	31.0	38.6
	INCREASED	97	14.6	61.4	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	158	23.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	239	35.9		
	System	4	.6		
	Total	508	76.3		
Total		666	100.0		

PEDPRAC/YOURTEACH/INDIV NEEDS OF STUD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	13	2.0	8.2	8.2
	MADE NO DIFFERENCE	61	9.2	38.6	46.8
	INCREASED	84	12.6	53.2	100.0
	Total	158	23.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	239	35.9		
	System	4	.6		
	Total	508	76.3		
Total		666	100.0		

PEDPRAC/YOURTEACH/EFFORT TO MOT STUD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	15	2.3	9.4	9.4
	MADE NO DIFFERENCE	57	8.6	35.8	45.3
	INCREASED	87	13.1	54.7	100.0
	Total	159	23.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	238	35.7		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	4	.6		
	Total	507	76.1		
Total		666	100.0		

PEDPRAC/YOURTEACH/PROG OF PERFORMANCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	8	1.2	5.0	5.0
	MADE NO DIFFERENCE	56	8.4	35.2	40.3
	INCREASED	95	14.3	59.7	100.0
	Total	159	23.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	238	35.7		
	System	4	.6		
	Total	507	76.1		
Total		666	100.0		

PEDPRAC/YOURTEACH/SELF CONFIDENCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	7	1.1	4.4	4.4
	MADE NO DIFFERENCE	52	7.8	32.7	37.1
	INCREASED	100	15.0	62.9	100.0
	Total	159	23.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	238	35.7		
	System	4	.6		
	Total	507	76.1		
Total		666	100.0		

PEDPRAC/ACTOR/DETERMINING CONTENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	334	50.2	85.2	85.2
	STUDENTS	10	1.5	2.6	87.8
	NA	48	7.2	12.2	100.0
	Total	392	58.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	28	4.2		
	OMITTED	5	.8		
	System	4	.6		
	Total	274	41.1		
Total		666	100.0		

PEDPRAC/ACTOR/DETERMINING LEARN GOALS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	325	48.8	83.3	83.3
	STUDENTS	27	4.1	6.9	90.3
	NA	38	5.7	9.7	100.0
	Total	390	58.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	29	4.4		
	OMITTED	6	.9		
	System	4	.6		
	Total	276	41.4		
Total		666	100.0		

PEDPRAC/ACTOR/GETTING STARTED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	308	46.2	80.2	80.2

		Frequency	Percent	Valid Percent	Cumulative Percent
	STUDENTS	38	5.7	9.9	90.1
	NA	38	5.7	9.9	100.0
	Total	384	57.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	29	4.4		
	OMITTED	12	1.8		
	System	4	.6		
	Total	282	42.3		
Total		666	100.0		

PEDPRAC/ACTOR/ORGANIZING GROUPING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	294	44.1	75.4	75.4
	STUDENTS	61	9.2	15.6	91.0
	NA	35	5.3	9.0	100.0
	Total	390	58.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	29	4.4		
	OMITTED	6	.9		
	System	4	.6		
	Total	276	41.4		
Total		666	100.0		

PEDPRAC/ACTOR/CHOOSING LEARN RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	342	51.4	87.7	87.7
	STUDENTS	16	2.4	4.1	91.8
	NA	32	4.8	8.2	100.0
	Total	390	58.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	NOT REACHED	30	4.5		
	OMITTED	5	.8		
	System	4	.6		
	Total	276	41.4		
Total		666	100.0		

PEDPRAC/ACTOR/DECIDING LOCATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	325	48.8	83.5	83.5
	STUDENTS	25	3.8	6.4	90.0
	NA	39	5.9	10.0	100.0
	Total	389	58.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	30	4.5		
	OMITTED	6	.9		
	System	4	.6		
	Total	277	41.6		
Total		666	100.0		

PEDPRAC/ACTOR/PLANNING OF TIME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	340	51.1	86.5	86.5
	STUDENTS	19	2.9	4.8	91.3
	NA	34	5.1	8.7	100.0
	Total	393	59.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	30	4.5		
	OMITTED	2	.3		
	System	4	.6		
	Total	273	41.0		

Total		666	100.0		

PEDPRAC/ACTOR/DECIDING ON TIME NEEDED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	324	48.6	82.9	82.9
	STUDENTS	31	4.7	7.9	90.8
	NA	36	5.4	9.2	100.0
	Total	391	58.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	30	4.5		
	OMITTED	4	.6		
	System	4	.6		
	Total	275	41.3		
Total		666	100.0		

PEDPRAC/ACTOR/DECIDING WHEN TO TAKE TEST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	321	48.2	82.9	82.9
	STUDENTS	30	4.5	7.8	90.7
	NA	36	5.4	9.3	100.0
	Total	387	58.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	30	4.5		
	OMITTED	8	1.2		
	System	4	.6		
	Total	279	41.9		
Total		666	100.0		

PEDPRAC/ACTOR/DEMONSTRATING ACHIEVEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	257	38.6	66.2	66.2
	STUDENTS	95	14.3	24.5	90.7
	NA	36	5.4	9.3	100.0
	Total	388	58.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	30	4.5		
	OMITTED	7	1.1		
	System	4	.6		
	Total	278	41.7		
Total		666	100.0		

PEDPRAC/ACTOR/MONITORING PROGRESS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	349	52.4	89.5	89.5
	STUDENTS	9	1.4	2.3	91.8
	NA	32	4.8	8.2	100.0
	Total	390	58.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	31	4.7		
	OMITTED	4	.6		
	System	4	.6		
	Total	276	41.4		
Total		666	100.0		

PEDPRAC/ACTOR/PROVIDING FEEDBACK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	302	45.3	77.8	77.8
	STUDENTS	52	7.8	13.4	91.2
	NA	34	5.1	8.8	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	388	58.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	31	4.7		
	OMITTED	6	.9		
	System	4	.6		
	Total	278	41.7		
Total		666	100.0		

PEDPRAC/ACTOR/CHOOSING LEARN STRATEGIES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	352	52.9	89.6	89.6
	STUDENTS	9	1.4	2.3	91.9
	NA	32	4.8	8.1	100.0
	Total	393	59.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	237	35.6		
	NOT REACHED	31	4.7		
	OMITTED	1	.2		
	System	4	.6		
	Total	273	41.0		
Total		666	100.0		

Frequencies

Notes

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Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.

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Frequency Table

INF/HOW MANY STUDENTS IN TARGET CLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6	2	.3	.3	.3
	10	2	.3	.3	.7
	18	1	.2	.2	.8
	20	1	.2	.2	1.0
	21	1	.2	.2	1.2
	23	1	.2	.2	1.3
	24	1	.2	.2	1.5
	25	2	.3	.3	1.8
	26	3	.5	.5	2.3
	27	2	.3	.3	2.7
	28	3	.5	.5	3.2
	29	8	1.3	1.3	4.5
	30	13	2.1	2.2	6.6
	31	9	1.4	1.5	8.1
	32	14	2.3	2.3	10.5
	33	16	2.6	2.7	13.1
	34	14	2.3	2.3	15.4
	35	28	4.5	4.7	20.1
	36	11	1.8	1.8	21.9
	37	14	2.3	2.3	24.3
	38	18	2.9	3.0	27.2
	39	8	1.3	1.3	28.6
	40	28	4.5	4.7	33.2
	41	16	2.6	2.7	35.9
	42	15	2.4	2.5	38.4
	43	11	1.8	1.8	40.2
	44	9	1.4	1.5	41.7

45	37	5.9	6.1	47.8
46	11	1.8	1.8	49.7
47	9	1.4	1.5	51.2
48	14	2.3	2.3	53.5
49	10	1.6	1.7	55.1
50	21	3.4	3.5	58.6
51	7	1.1	1.2	59.8
52	4	.6	.7	60.5
53	6	1.0	1.0	61.5
54	12	1.9	2.0	63.5
55	16	2.6	2.7	66.1
56	12	1.9	2.0	68.1
57	7	1.1	1.2	69.3
58	8	1.3	1.3	70.6
59	4	.6	.7	71.3
60	16	2.6	2.7	73.9
61	1	.2	.2	74.1
62	5	.8	.8	74.9
63	3	.5	.5	75.4
64	9	1.4	1.5	76.9
65	8	1.3	1.3	78.2
66	3	.5	.5	78.7
67	5	.8	.8	79.6
68	6	1.0	1.0	80.6
69	5	.8	.8	81.4
70	7	1.1	1.2	82.6
71	2	.3	.3	82.9
72	1	.2	.2	83.1
74	5	.8	.8	83.9
75	6	1.0	1.0	84.9
76	2	.3	.3	85.2
77	1	.2	.2	85.4
78	1	.2	.2	85.5
80	6	1.0	1.0	86.5

81	3	.5	.5	87.0
82	2	.3	.3	87.4
83	1	.2	.2	87.5
84	1	.2	.2	87.7
85	3	.5	.5	88.2
86	2	.3	.3	88.5
87	3	.5	.5	89.0
90	3	.5	.5	89.5
92	2	.3	.3	89.9
93	2	.3	.3	90.2
95	2	.3	.3	90.5
96	1	.2	.2	90.7
97	1	.2	.2	90.9
98	1	.2	.2	91.0
100	1	.2	.2	91.2
103	1	.2	.2	91.4
105	1	.2	.2	91.5
110	2	.3	.3	91.9
112	2	.3	.3	92.2
120	3	.5	.5	92.7
121	2	.3	.3	93.0
127	1	.2	.2	93.2
130	1	.2	.2	93.4
136	1	.2	.2	93.5
160	1	.2	.2	93.7
164	1	.2	.2	93.9
166	1	.2	.2	94.0
170	3	.5	.5	94.5
180	1	.2	.2	94.7
184	2	.3	.3	95.0
185	2	.3	.3	95.3
190	2	.3	.3	95.7
196	1	.2	.2	95.8
213	1	.2	.2	96.0

	217	1	.2	.2	96.2
	220	1	.2	.2	96.3
	225	3	.5	.5	96.8
	228	1	.2	.2	97.0
	238	2	.3	.3	97.3
	250	4	.6	.7	98.0
	253	1	.2	.2	98.2
	256	1	.2	.2	98.3
	262	1	.2	.2	98.5
	280	1	.2	.2	98.7
	288	1	.2	.2	98.8
	297	1	.2	.2	99.0
	319	1	.2	.2	99.2
	340	1	.2	.2	99.3
	360	1	.2	.2	99.5
	364	2	.3	.3	99.8
	406	1	.2	.2	100.0
	Total	602	96.8	100.0	
Missing	OMITTED	13	2.1		
	System	7	1.1		
	Total	20	3.2		
Total		622	100.0		

INF/GENDER MIX OF CLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALL BOYS	4	.6	.7	.7
	ALL GIRLS	13	2.1	2.2	2.9
	BOTH BOYS AND GIRLS	575	92.4	97.1	100.0
	Total	592	95.2	100.0	
Missing	OMITTED	23	3.7		
	System	7	1.1		
	Total	30	4.8		
Total		622	100.0		

INF/CURRICULUM TRACK OF TARGET CLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ACADEMIC	551	88.6	94.8	94.8
	VOCATIONAL	10	1.6	1.7	96.6
	NO TRACKING	20	3.2	3.4	100.0
	Total	581	93.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	33	5.3		
	System	7	1.1		
	Total	41	6.6		
Total		622	100.0		

INF/STUDENT ABSENTEEISM IN TARGET CLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LESS THAN 5%	443	71.2	73.3	73.3
	5–10%	126	20.3	20.9	94.2
	11–20%	26	4.2	4.3	98.5
	MORE THAN 20%	9	1.4	1.5	100.0
	Total	604	97.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	10	1.6		
	System	7	1.1		
	Total	18	2.9		
Total		622	100.0		

INF/NATIVE SPEAKERS OF LANGUAGE OF INSTR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MORE THAN 90%	191	30.7	33.0	33.0
	76–90%	46	7.4	7.9	40.9
	50–75%	55	8.8	9.5	50.4

		Frequency	Percent	Valid Percent	Cumulative Percent
	LESS THAN 50%	287	46.1	49.6	100.0
	Total	579	93.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	35	5.6		
	System	7	1.1		
	Total	43	6.9		
Total		622	100.0		

INF/HOW MANY HRS OF MATH/SCIENCE LESSONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LESS THAN TWO HOURS	31	5.0	5.2	5.2
	2– 4 HRS	301	48.4	50.3	55.4
	5– 6 HRS	166	26.7	27.7	83.1
	7– 8 HRS	58	9.3	9.7	92.8
	MORE THAN 8 HRS	43	6.9	7.2	100.0
	Total	599	96.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	15	2.4		
	System	7	1.1		
	Total	23	3.7		
Total		622	100.0		

INF/COMPETENCE/WORD PROCESSING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	244	39.2	42.5	42.5
	SOME STUDENTS	128	20.6	22.3	64.8
	MAJORITY OF STUDENTS	66	10.6	11.5	76.3
	NEARLY ALL STUDENTS	38	6.1	6.6	82.9
	DON’T KNOW	98	15.8	17.1	100.0
	Total	574	92.3	100.0	

		Frequency	Percent	Valid Percent	Cumulative Percent
Missing	NOT REACHED	1	.2		
	OMITTED	40	6.4		
	System	7	1.1		
	Total	48	7.7		
Total		622	100.0		

INF/COMPETENCE/DATABASE SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	305	49.0	52.9	52.9
	SOME STUDENTS	96	15.4	16.6	69.5
	MAJORITY OF STUDENTS	33	5.3	5.7	75.2
	NEARLY ALL STUDENTS	13	2.1	2.3	77.5
	DON'T KNOW	130	20.9	22.5	100.0
	Total	577	92.8	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	37	5.9		
	System	7	1.1		
	Total	45	7.2		
Total		622	100.0		

INF/COMPETENCE/SPREADSHEET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	313	50.3	54.3	54.3
	SOME STUDENTS	100	16.1	17.4	71.7
	MAJORITY OF STUDENTS	22	3.5	3.8	75.5
	NEARLY ALL STUDENTS	13	2.1	2.3	77.8
	DON'T KNOW	128	20.6	22.2	100.0
	Total	576	92.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	38	6.1		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	7	1.1		
	Total	46	7.4		
Total		622	100.0		

INF/COMPETENCE/PRESENTATION SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	320	51.4	55.7	55.7
	SOME STUDENTS	98	15.8	17.0	72.7
	MAJORITY OF STUDENTS	17	2.7	3.0	75.7
	NEARLY ALL STUDENTS	12	1.9	2.1	77.7
	DON'T KNOW	128	20.6	22.3	100.0
	Total	575	92.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	39	6.3		
	System	7	1.1		
	Total	47	7.6		
Total		622	100.0		

INF/COMPETENCE/APPLICATION OF MULTIMEDIA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	304	48.9	52.5	52.5
	SOME STUDENTS	106	17.0	18.3	70.8
	MAJORITY OF STUDENTS	29	4.7	5.0	75.8
	NEARLY ALL STUDENTS	17	2.7	2.9	78.8
	DON'T KNOW	123	19.8	21.2	100.0
	Total	579	93.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	35	5.6		
	System	7	1.1		
	Total	43	6.9		

Total		622	100.0		

INF/COMPETENCE/EMAIL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	330	53.1	57.0	57.0
	SOME STUDENTS	91	14.6	15.7	72.7
	MAJORITY OF STUDENTS	20	3.2	3.5	76.2
	NEARLY ALL STUDENTS	21	3.4	3.6	79.8
	DON'T KNOW	117	18.8	20.2	100.0
	Total	579	93.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	35	5.6		
	System	7	1.1		
	Total	43	6.9		
Total		622	100.0		

INF/COMPETENCE/INTERNET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	320	51.4	55.3	55.3
	SOME STUDENTS	99	15.9	17.1	72.4
	MAJORITY OF STUDENTS	24	3.9	4.1	76.5
	NEARLY ALL STUDENTS	26	4.2	4.5	81.0
	DON'T KNOW	110	17.7	19.0	100.0
	Total	579	93.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	35	5.6		
	System	7	1.1		
	Total	43	6.9		
Total		622	100.0		

INF/COMPETENCE/GRAPHIC CALCULATOR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	309	49.7	53.4	53.4
	SOME STUDENTS	89	14.3	15.4	68.7
	MAJORITY OF STUDENTS	28	4.5	4.8	73.6
	NEARLY ALL STUDENTS	24	3.9	4.1	77.7
	DON'T KNOW	129	20.7	22.3	100.0
	Total	579	93.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	35	5.6		
	System	7	1.1		
	Total	43	6.9		
Total		622	100.0		

INF/COMPETENCE/DATA LOGGING TOOLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEARLY NONE	337	54.2	58.7	58.7
	SOME STUDENTS	71	11.4	12.4	71.1
	MAJORITY OF STUDENTS	9	1.4	1.6	72.6
	NEARLY ALL STUDENTS	6	1.0	1.0	73.7
	DON'T KNOW	151	24.3	26.3	100.0
	Total	574	92.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	40	6.4		
	System	7	1.1		
	Total	48	7.7		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/WORLD OF WORK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	8	1.3	1.3	1.3
	A LITTLE	48	7.7	7.9	9.2
	SOMEWHAT	93	15.0	15.2	24.4
	VERY MUCH	462	74.3	75.6	100.0
	Total	611	98.2	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	3	.5		
	System	7	1.1		
	Total	11	1.8		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/UPPER EDU

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	2	.3	.3	.3
	A LITTLE	17	2.7	2.8	3.1
	SOMEWHAT	79	12.7	12.9	16.0
	VERY MUCH	513	82.5	84.0	100.0
	Total	611	98.2	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	3	.5		
	System	7	1.1		
	Total	11	1.8		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/LEARN FRM EXP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	26	4.2	4.3	4.3
	A LITTLE	78	12.5	12.9	17.1
	SOMEWHAT	160	25.7	26.4	43.5
	VERY MUCH	343	55.1	56.5	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	607	97.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	7	1.1		
	System	7	1.1		
	Total	15	2.4		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/REAL WORLD EX

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	6	1.0	1.0	1.0
	A LITTLE	48	7.7	7.9	8.9
	SOMEWHAT	125	20.1	20.5	29.3
	VERY MUCH	431	69.3	70.7	100.0
	Total	610	98.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	4	.6		
	System	7	1.1		
	Total	12	1.9		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/PERFORMANCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	2	.3	.3	.3
	A LITTLE	11	1.8	1.8	2.1
	SOMEWHAT	58	9.3	9.5	11.6
	VERY MUCH	540	86.8	88.4	100.0
	Total	611	98.2	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	3	.5		
	System	7	1.1		
	Total	11	1.8		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/INC MOTIVATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	1	.2	.2	.2
	A LITTLE	10	1.6	1.6	1.8
	SOMEWHAT	64	10.3	10.5	12.3
	VERY MUCH	535	86.0	87.7	100.0
	Total	610	98.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	4	.6		
	System	7	1.1		
	Total	12	1.9		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/INDIV LEARNING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	6	1.0	1.0	1.0
	A LITTLE	57	9.2	9.4	10.4
	SOMEWHAT	189	30.4	31.1	41.4
	VERY MUCH	356	57.2	58.6	100.0
	Total	608	97.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	7	1.1		
	Total	14	2.3		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/ORGA SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	5	.8	.8	.8
	A LITTLE	39	6.3	6.4	7.2

		Frequency	Percent	Valid Percent	Cumulative Percent
	SOMEWHAT	159	25.6	26.2	33.4
	VERY MUCH	404	65.0	66.6	100.0
	Total	607	97.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	8	1.3		
	Total	15	2.4		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/COMM SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	14	2.3	2.3	2.3
	A LITTLE	49	7.9	8.1	10.4
	SOMEWHAT	162	26.0	26.7	37.1
	VERY MUCH	382	61.4	62.9	100.0
	Total	607	97.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	8	1.3		
	Total	15	2.4		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/EXPECTATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	6	1.0	1.0	1.0
	A LITTLE	43	6.9	7.1	8.1
	SOMEWHAT	159	25.6	26.2	34.3
	VERY MUCH	399	64.1	65.7	100.0
	Total	607	97.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	8	1.3		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	15	2.4		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/COMP ICT USE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	122	19.6	20.6	20.6
	A LITTLE	83	13.3	14.0	34.6
	SOMEWHAT	121	19.5	20.4	55.0
	VERY MUCH	267	42.9	45.0	100.0
	Total	593	95.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	21	3.4		
	System	7	1.1		
	Total	29	4.7		
Total		622	100.0		

CURRGOALS/GOAL IMPORTANCE/RESPONSIBLE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	195	31.4	32.7	32.7
	A LITTLE	83	13.3	13.9	46.6
	SOMEWHAT	91	14.6	15.2	61.8
	VERY MUCH	228	36.7	38.2	100.0
	Total	597	96.0	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	17	2.7		
	System	7	1.1		
	Total	25	4.0		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/EXT PROJECTS

		Frequency	Percent	Valid Percent	Cumulative Percent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	95	15.3	16.1	16.1
	SOMETIMES	315	50.6	53.5	69.6
	OFTEN	134	21.5	22.8	92.4
	NEARLY ALWAYS	45	7.2	7.6	100.0
	Total	589	94.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	25	4.0		
	System	7	1.1		
	Total	33	5.3		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/EXT PROJECT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	392	63.0	76.7	76.7
	YES	119	19.1	23.3	100.0
	Total	511	82.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	22	3.5		
	NOT REACHED	1	.2		
	OMITTED	81	13.0		
	System	7	1.1		
	Total	111	17.8		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/SHORT TASK PROJECT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	52	8.4	8.8	8.8
	SOMETIMES	158	25.4	26.9	35.7
	OFTEN	264	42.4	44.9	80.6
	NEARLY ALWAYS	114	18.3	19.4	100.0
	Total	588	94.5	100.0	
Missing	NOT REACHED	1	.2		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	26	4.2		
	System	7	1.1		
	Total	34	5.5		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/SHORT TASK/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	412	66.2	81.6	81.6
	YES	93	15.0	18.4	100.0
	Total	505	81.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	23	3.7		
	NOT REACHED	1	.2		
	OMITTED	86	13.8		
	System	7	1.1		
	Total	117	18.8		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/PRODUCT CREATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	70	11.3	11.8	11.8
	SOMETIMES	300	48.2	50.4	62.2
	OFTEN	173	27.8	29.1	91.3
	NEARLY ALWAYS	52	8.4	8.7	100.0
	Total	595	95.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	19	3.1		
	System	7	1.1		
	Total	27	4.3		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/PROD CREAT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	415	66.7	81.5	81.5
	YES	94	15.1	18.5	100.0
	Total	509	81.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	16	2.6		
	NOT REACHED	1	.2		
	OMITTED	89	14.3		
	System	7	1.1		
	Total	113	18.2		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/SELF ACCESSED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	96	15.4	16.3	16.3
	SOMETIMES	214	34.4	36.3	52.5
	OFTEN	185	29.7	31.4	83.9
	NEARLY ALWAYS	95	15.3	16.1	100.0
	Total	590	94.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	24	3.9		
	System	7	1.1		
	Total	32	5.1		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/SELF ACCESSED/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	437	70.3	87.6	87.6
	YES	62	10.0	12.4	100.0
	Total	499	80.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	21	3.4		

		Frequency	Percent	Valid Percent	Cumulative Percent
	NOT REACHED	1	.2		
	OMITTED	94	15.1		
	System	7	1.1		
	Total	123	19.8		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/SCIENTIFIC INVEST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	76	12.2	12.8	12.8
	SOMETIMES	240	38.6	40.3	53.1
	OFTEN	202	32.5	33.9	87.1
	NEARLY ALWAYS	77	12.4	12.9	100.0
	Total	595	95.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	19	3.1		
	System	7	1.1		
	Total	27	4.3		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/SCIENT INV/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	397	63.8	78.6	78.6
	YES	108	17.4	21.4	100.0
	Total	505	81.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	16	2.6		
	NOT REACHED	1	.2		
	OMITTED	93	15.0		
	System	7	1.1		
	Total	117	18.8		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/FIELD STUDY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	140	22.5	23.7	23.7
	SOMETIMES	302	48.6	51.2	74.9
	OFTEN	114	18.3	19.3	94.2
	NEARLY ALWAYS	34	5.5	5.8	100.0
	Total	590	94.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	24	3.9		
	System	7	1.1		
	Total	32	5.1		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/FIELD STUDY/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	434	69.8	86.5	86.5
	YES	68	10.9	13.5	100.0
	Total	502	80.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	21	3.4		
	NOT REACHED	1	.2		
	OMITTED	91	14.6		
	System	7	1.1		
	Total	120	19.3		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/TEACHERS LECTURE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	69	11.1	11.7	11.7
	SOMETIMES	145	23.3	24.5	36.1
	OFTEN	181	29.1	30.6	66.7

		Frequency	Percent	Valid Percent	Cumulative Percent
	NEARLY ALWAYS	197	31.7	33.3	100.0
	Total	592	95.2	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	22	3.5		
	System	7	1.1		
	Total	30	4.8		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/TEACH LECTURE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	397	63.8	78.8	78.8
	YES	107	17.2	21.2	100.0
	Total	504	81.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	19	3.1		
	NOT REACHED	1	.2		
	OMITTED	91	14.6		
	System	7	1.1		
	Total	118	19.0		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/PRACT AND SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	47	7.6	8.0	8.0
	SOMETIMES	169	27.2	28.6	36.6
	OFTEN	238	38.3	40.3	76.9
	NEARLY ALWAYS	136	21.9	23.1	100.0
	Total	590	94.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	24	3.9		
	System	7	1.1		
	Total	32	5.1		

Total		622	100.0		

TEACHPRACT/ACTIVITIES/PRAC AND SKILL/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	430	69.1	86.0	86.0
	YES	70	11.3	14.0	100.0
	Total	500	80.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	21	3.4		
	NOT REACHED	1	.2		
	OMITTED	93	15.0		
	System	7	1.1		
	Total	122	19.6		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/LABORATORY EXP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	179	28.8	30.2	30.2
	SOMETIMES	201	32.3	33.9	64.1
	OFTEN	148	23.8	25.0	89.0
	NEARLY ALWAYS	65	10.5	11.0	100.0
	Total	593	95.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	21	3.4		
	System	7	1.1		
	Total	29	4.7		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/LAB EXP/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	452	72.7	89.0	89.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	YES	56	9.0	11.0	100.0
	Total	508	81.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	18	2.9		
	NOT REACHED	1	.2		
	OMITTED	88	14.1		
	System	7	1.1		
	Total	114	18.3		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/MATH PRINCIPALS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	88	14.1	15.0	15.0
	SOMETIMES	221	35.5	37.8	52.8
	OFTEN	180	28.9	30.8	83.6
	NEARLY ALWAYS	96	15.4	16.4	100.0
	Total	585	94.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	29	4.7		
	System	7	1.1		
	Total	37	5.9		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/MATH PRINC/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	439	70.6	88.7	88.7
	YES	56	9.0	11.3	100.0
	Total	495	79.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	26	4.2		
	NOT REACHED	1	.2		
	OMITTED	93	15.0		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	7	1.1		
	Total	127	20.4		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/NATURAL PHENOMENA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	103	16.6	17.6	17.6
	SOMETIMES	224	36.0	38.3	55.9
	OFTEN	194	31.2	33.2	89.1
	NEARLY ALWAYS	64	10.3	10.9	100.0
	Total	585	94.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	29	4.7		
	System	7	1.1		
	Total	37	5.9		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/NAT PHENOM/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	417	67.0	84.1	84.1
	YES	79	12.7	15.9	100.0
	Total	496	79.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	26	4.2		
	NOT REACHED	1	.2		
	OMITTED	92	14.8		
	System	7	1.1		
	Total	126	20.3		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/LOOK UP IDEAS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	47	7.6	7.9	7.9
	SOMETIMES	188	30.2	31.8	39.7
	OFTEN	210	33.8	35.5	75.2
	NEARLY ALWAYS	147	23.6	24.8	100.0
	Total	592	95.2	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	22	3.5		
	System	7	1.1		
	Total	30	4.8		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/LOOK UP/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	366	58.8	72.9	72.9
	YES	136	21.9	27.1	100.0
	Total	502	80.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	19	3.1		
	NOT REACHED	1	.2		
	OMITTED	93	15.0		
	System	7	1.1		
	Total	120	19.3		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/ANALYZING DATA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	105	16.9	17.8	17.8
	SOMETIMES	184	29.6	31.2	49.1
	OFTEN	194	31.2	32.9	82.0
	NEARLY ALWAYS	106	17.0	18.0	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	589	94.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	25	4.0		
	System	7	1.1		
	Total	33	5.3		
Total		622	100.0		

TEACHPRACT/ACTIVITIES/ANALYZE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	396	63.7	79.0	79.0
	YES	105	16.9	21.0	100.0
	Total	501	80.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	22	3.5		
	NOT REACHED	1	.2		
	OMITTED	91	14.6		
	System	7	1.1		
	Total	121	19.5		
Total		622	100.0		

TEACHPRACT/WHEN INSTRUCTING STUDENTS ARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALWAYS IN THE SAME LOCATION WITH	436	70.1	71.8	71.8
	SOMETIMES IN LOCATIONS AWAY FROM	137	22.0	22.6	94.4
	OFTEN IN LOCATIONS AWAY FROM ME	25	4.0	4.1	98.5
	ALWAYS IN LOCATIONS AWAY FROM ME	9	1.4	1.5	100.0
	Total	607	97.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	7	1.1		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	7	1.1		
	Total	15	2.4		
Total		622	100.0		

TEACHPRACT/PARTICIPATE IN PLANNED ACTIV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALWAYS WORK IN THE SAME LOCATION	252	40.5	41.3	41.3
	SOMETIMES WORK IN DIFFERENT LOCAT	293	47.1	48.0	89.3
	OFTEN WORK IN DIFFERENT LOCATIONS	49	7.9	8.0	97.4
	ALWAYS WORK IN DIFFERENT LOCATION	16	2.6	2.6	100.0
	Total	610	98.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	4	.6		
	System	7	1.1		
	Total	12	1.9		
Total		622	100.0		

TEACHPRACT/LEARN ACTIVITIES TAKE PLACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALWAYS DURING SCHEDULED SCHOOL HO	243	39.1	39.7	39.7
	SOMETIMES OUTSIDE SCHEDULED SCHOO	321	51.6	52.5	92.2
	OFTEN OUTSIDE SCHEDULED SCHOOL HO	24	3.9	3.9	96.1
	AT ANY TIME (NO SCHEDULED SCHOOL	24	3.9	3.9	100.0
	Total	612	98.4	100.0	
Missing	NOT REACHED	1	.2		

	OMITTED	2	.3		
	System	7	1.1		
	Total	10	1.6		
Total		622	100.0		

TEACHPRACT/I PROVIDE FEEDBACK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ALWAYS DURING SCHOOL HOURS	495	79.6	81.0	81.0
	SOMETIMES OUTSIDE SCHEDULED SCHOO	89	14.3	14.6	95.6
	OFTEN OUTSIDE SCHEDULED SCHOOL HO	2	.3	.3	95.9
	AT ANY TIME (NO SCHEDULED SCHOOL	25	4.0	4.1	100.0
	Total	611	98.2	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	3	.5		
	System	7	1.1		
	Total	11	1.8		
Total		622	100.0		

TEACHPRACT/ACTIV/PRESENT INFORMATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	16	2.6	2.7	2.7
	SOMETIMES	77	12.4	12.9	15.6
	OFTEN	196	31.5	32.8	48.3
	NEARLY ALWAYS	309	49.7	51.7	100.0
	Total	598	96.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	16	2.6		
	System	7	1.1		

	Total	24	3.9		
Total		622	100.0		

TEACHPRACT/ACTIV/PRESENT INFORMATION/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	428	68.8	82.0	82.0
	YES	94	15.1	18.0	100.0
	Total	522	83.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	13	2.1		
	NOT REACHED	1	.2		
	OMITTED	79	12.7		
	System	7	1.1		
	Total	100	16.1		
Total		622	100.0		

TEACHPRACT/ACTIV/REMEDIAL INSTRUCTIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	7	1.1	1.2	1.2
	A LITTLE	55	8.8	9.0	10.2
	SOMEWHAT	172	27.7	28.3	38.5
	VERY MUCH	374	60.1	61.5	100.0
	Total	608	97.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	7	1.1		
	Total	14	2.3		
Total		622	100.0		

TEACHPRACT/ACTIV/REMEDIAL INSTRUCT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	450	72.3	86.0	86.0
	YES	73	11.7	14.0	100.0
	Total	523	84.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	13	2.1		
	NOT REACHED	1	.2		
	OMITTED	78	12.5		
	System	7	1.1		
	Total	99	15.9		
Total		622	100.0		

TEACHPRACT/ACTIV/HELP ADVICE STUDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	16	2.6	2.7	2.7
	SOMETIMES	122	19.6	20.5	23.2
	OFTEN	274	44.1	46.0	69.1
	NEARLY ALWAYS	184	29.6	30.9	100.0
	Total	596	95.8	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	18	2.9		
	System	7	1.1		
	Total	26	4.2		
Total		622	100.0		

TEACHPRACT/ACTIV/HELP ADVICE STUD/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	433	69.6	83.8	83.8
	YES	84	13.5	16.2	100.0
	Total	517	83.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	15	2.4		
	NOT REACHED	1	.2		

	OMITTED	82	13.2		
	System	7	1.1		
	Total	105	16.9		
Total		622	100.0		

TEACHPRACT/ACTIV/WHOLE CLASS DISCUSSIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	30	4.8	5.0	5.0
	SOMETIMES	149	24.0	25.0	30.0
	OFTEN	227	36.5	38.1	68.1
	NEARLY ALWAYS	190	30.5	31.9	100.0
	Total	596	95.8	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	18	2.9		
	System	7	1.1		
	Total	26	4.2		
Total		622	100.0		

TEACHPRACT/ACTIV/WHOLE CLASS DISC/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	449	72.2	87.0	87.0
	YES	67	10.8	13.0	100.0
	Total	516	83.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	15	2.4		
	NOT REACHED	1	.2		
	OMITTED	83	13.3		
	System	7	1.1		
	Total	106	17.0		
Total		622	100.0		

TEACHPRACT/ACTIV/ASSESS STUDENTS LEARN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	10	1.6	1.7	1.7
	SOMETIMES	69	11.1	11.6	13.3
	OFTEN	262	42.1	44.0	57.2
	NEARLY ALWAYS	255	41.0	42.8	100.0
	Total	596	95.8	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	18	2.9		
	System	7	1.1		
	Total	26	4.2		
Total		622	100.0		

TEACHPRACT/ACTIV/ASSESS STUD LEARN/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	423	68.0	82.1	82.1
	YES	92	14.8	17.9	100.0
	Total	515	82.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	15	2.4		
	NOT REACHED	1	.2		
	OMITTED	83	13.3		
	System	8	1.3		
	Total	107	17.2		
Total		622	100.0		

TEACHPRACT/ACTIV/PROVIDE FEEDBACK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	15	2.4	2.5	2.5
	SOMETIMES	102	16.4	17.1	19.7
	OFTEN	238	38.3	40.0	59.7
	NEARLY ALWAYS	240	38.6	40.3	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	595	95.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	19	3.1		
	System	7	1.1		
	Total	27	4.3		
Total		622	100.0		

TEACHPRACT/ACTIV/PROVIDE FEEDBACK/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	446	71.7	87.1	87.1
	YES	66	10.6	12.9	100.0
	Total	512	82.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	16	2.6		
	NOT REACHED	1	.2		
	OMITTED	86	13.8		
	System	7	1.1		
	Total	110	17.7		
Total		622	100.0		

TEACHPRACT/ACTIV/CLASSROOM MANAGEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	9	1.4	1.5	1.5
	SOMETIMES	36	5.8	6.0	7.5
	OFTEN	158	25.4	26.4	33.9
	NEARLY ALWAYS	396	63.7	66.1	100.0
	Total	599	96.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	15	2.4		
	System	7	1.1		
	Total	23	3.7		
Total		622	100.0		

TEACHPRACT/ACTIV/CLASSROOM MNGMNT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	452	72.7	87.6	87.6
	YES	64	10.3	12.4	100.0
	Total	516	83.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	12	1.9		
	NOT REACHED	1	.2		
	OMITTED	86	13.8		
	System	7	1.1		
	Total	106	17.0		
Total		622	100.0		

TEACHPRACT/ACTIV/TEAM BUILDING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	19	3.1	3.2	3.2
	SOMETIMES	102	16.4	17.1	20.2
	OFTEN	244	39.2	40.8	61.0
	NEARLY ALWAYS	233	37.5	39.0	100.0
	Total	598	96.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	16	2.6		
	System	7	1.1		
	Total	24	3.9		
Total		622	100.0		

TEACHPRACT/ACTIV/TEAM BUILDING/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	461	74.1	89.7	89.7
	YES	53	8.5	10.3	100.0

			Frequency	Percent	Valid Percent	Cumulative Percent
	Total		514	82.6	100.0	
Missing	LOGICALLY NOT APPLICABLE		13	2.1		
	NOT REACHED		1	.2		
	OMITTED		87	14.0		
	System		7	1.1		
	Total		108	17.4		
Total			622	100.0		

TEACHPRACT/ACTIV/MEDIATE COMMUNICATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	97	15.6	16.3	16.3
	SOMETIMES	202	32.5	33.9	50.3
	OFTEN	171	27.5	28.7	79.0
	NEARLY ALWAYS	125	20.1	21.0	100.0
	Total	595	95.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	19	3.1		
	System	7	1.1		
	Total	27	4.3		
Total		622	100.0		

TEACHPRACT/ACTIV/MEDIATE COMM/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	451	72.5	87.9	87.9
	YES	62	10.0	12.1	100.0
	Total	513	82.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	16	2.6		
	NOT REACHED	1	.2		
	OMITTED	85	13.7		
	System	7	1.1		

	Total	109	17.5		
Total		622	100.0		

TEACHPRACT/ACTIV/LIAISE WITH COLLABS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	109	17.5	18.4	18.4
	SOMETIMES	237	38.1	40.1	58.5
	OFTEN	159	25.6	26.9	85.4
	NEARLY ALWAYS	86	13.8	14.6	100.0
	Total	591	95.0	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	23	3.7		
	System	7	1.1		
	Total	31	5.0		
Total		622	100.0		

TEACHPRACT/ACTIV/LIAISE WITH COLLABS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	446	71.7	87.6	87.6
	YES	63	10.1	12.4	100.0
	Total	509	81.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	20	3.2		
	NOT REACHED	1	.2		
	OMITTED	85	13.7		
	System	7	1.1		
	Total	113	18.2		
Total		622	100.0		

TEACHPRACT/ACTIV/PROVIDE COUNSELING

		Frequency	Percent	Valid Percent	Cumulative Percent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	43	6.9	7.3	7.3
	SOMETIMES	220	35.4	37.2	44.5
	OFTEN	201	32.3	34.0	78.5
	NEARLY ALWAYS	127	20.4	21.5	100.0
	Total	591	95.0	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	23	3.7		
	System	7	1.1		
	Total	31	5.0		
Total		622	100.0		

TEACHPRACT/ACTIV/PROV COUNSELING/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	459	73.8	90.4	90.4
	YES	49	7.9	9.6	100.0
	Total	508	81.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	20	3.2		
	NOT REACHED	1	.2		
	OMITTED	86	13.8		
	System	7	1.1		
	Total	114	18.3		
Total		622	100.0		

TEACHPRACT/ACTIV/COLLAB WITH PARENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	40	6.4	6.7	6.7
	SOMETIMES	241	38.7	40.5	47.2
	OFTEN	208	33.4	35.0	82.2
	NEARLY ALWAYS	106	17.0	17.8	100.0
	Total	595	95.7	100.0	
Missing	NOT REACHED	1	.2		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	19	3.1		
	System	7	1.1		
	Total	27	4.3		
Total		622	100.0		

TEACHPRACT/ACTIV/COLLAB WITH PARENTS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	451	72.5	88.8	88.8
	YES	57	9.2	11.2	100.0
	Total	508	81.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	16	2.6		
	NOT REACHED	1	.2		
	OMITTED	90	14.5		
	System	7	1.1		
	Total	114	18.3		
Total		622	100.0		

TEACHPRACT/ASSESS/WRITTEN TEST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	6	1.0	1.0	1.0
	YES	603	96.9	99.0	100.0
	Total	609	97.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	5	.8		
	System	7	1.1		
	Total	13	2.1		
Total		622	100.0		

TEACHPRACT/ASSESS/WRITTEN TEST/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent

Valid	NO	415	66.7	74.6	74.6
	YES	141	22.7	25.4	100.0
	Total	556	89.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	3	.5		
	NOT REACHED	1	.2		
	OMITTED	55	8.8		
	System	7	1.1		
	Total	66	10.6		
Total		622	100.0		

TEACHPRACT/ASSESS/WRITTEN TASKS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	4	.6	.7	.7
	YES	605	97.3	99.3	100.0
	Total	609	97.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	5	.8		
	System	7	1.1		
	Total	13	2.1		
Total		622	100.0		

TEACHPRACT/ASSESS/WRITTEN TASKS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	412	66.2	74.6	74.6
	YES	140	22.5	25.4	100.0
	Total	552	88.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	3	.5		
	NOT REACHED	1	.2		
	OMITTED	59	9.5		
	System	7	1.1		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	70	11.3		
Total		622	100.0		

TEACHPRACT/ASSESS/ORAL PRESENTATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	101	16.2	16.6	16.6
	YES	507	81.5	83.4	100.0
	Total	608	97.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	7	1.1		
	Total	14	2.3		
Total		622	100.0		

TEACHPRACT/ASSESS/ORAL PRESENT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	458	73.6	83.4	83.4
	YES	91	14.6	16.6	100.0
	Total	549	88.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	4	.6		
	NOT REACHED	1	.2		
	OMITTED	61	9.8		
	System	7	1.1		
	Total	73	11.7		
Total		622	100.0		

TEACHPRACT/ASSESS/GROUP PRESENTATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	44	7.1	7.2	7.2
	YES	564	90.7	92.8	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	608	97.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	7	1.1		
	Total	14	2.3		
Total		622	100.0		

TEACHPRACT/ASSESS/GROUP PRESENT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	445	71.5	80.6	80.6
	YES	107	17.2	19.4	100.0
	Total	552	88.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	4	.6		
	NOT REACHED	1	.2		
	OMITTED	58	9.3		
	System	7	1.1		
	Total	70	11.3		
Total		622	100.0		

TEACHPRACT/ASSESS/PROJECT REPORT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	92	14.8	15.1	15.1
	YES	516	83.0	84.9	100.0
	Total	608	97.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	7	1.1		
	Total	14	2.3		
Total		622	100.0		

TEACHPRACT/ASSESS/PROJECT REPORT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	423	68.0	76.5	76.5
	YES	130	20.9	23.5	100.0
	Total	553	88.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	4	.6		
	NOT REACHED	1	.2		
	OMITTED	57	9.2		
	System	7	1.1		
	Total	69	11.1		
Total		622	100.0		

TEACHPRACT/ASSESS/PEER EVALUATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	97	15.6	16.0	16.0
	YES	509	81.8	84.0	100.0
	Total	606	97.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	8	1.3		
	System	7	1.1		
	Total	16	2.6		
Total		622	100.0		

TEACHPRACT/ASSESS/PEER EVALUATION/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	466	74.9	85.0	85.0
	YES	82	13.2	15.0	100.0
	Total	548	88.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	6	1.0		
	NOT REACHED	1	.2		
	OMITTED	60	9.6		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	7	1.1		
	Total	74	11.9		
Total		622	100.0		

TEACHPRACT/ASSESS/PORTFOLIO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	54	8.7	8.9	8.9
	YES	554	89.1	91.1	100.0
	Total	608	97.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	7	1.1		
	Total	14	2.3		
Total		622	100.0		

TEACHPRACT/ASSESS/PORTFOLIO/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	435	69.9	79.2	79.2
	YES	114	18.3	20.8	100.0
	Total	549	88.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	4	.6		
	NOT REACHED	1	.2		
	OMITTED	61	9.8		
	System	7	1.1		
	Total	73	11.7		
Total		622	100.0		

TEACHPRACT/ASSESS/GROUP ASSESSMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	60	9.6	9.9	9.9

		Frequency	Percent	Valid Percent	Cumulative Percent
	YES	548	88.1	90.1	100.0
	Total	608	97.7	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	6	1.0		
	System	7	1.1		
	Total	14	2.3		
Total		622	100.0		

TEACHPRACT/ASSESS/GROUP ASSESSMENT/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	457	73.5	82.9	82.9
	YES	94	15.1	17.1	100.0
	Total	551	88.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	4	.6		
	NOT REACHED	1	.2		
	OMITTED	59	9.5		
	System	7	1.1		
	Total	71	11.4		
Total		622	100.0		

STUDPRACT/ACTIV/WORKING AT SAME PACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	37	5.9	6.1	6.1
	SOMETIMES	211	33.9	35.0	41.1
	OFTEN	206	33.1	34.2	75.3
	NEARLY ALWAYS	149	24.0	24.7	100.0
	Total	603	96.9	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	11	1.8		
	System	7	1.1		
	Total	19	3.1		

		Frequency	Percent	Valid Percent	Cumulative Percent
Total		622	100.0		

STUDPRACT/ACTIV/WORKING AT SAME PACE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	457	73.5	86.9	86.9
	YES	69	11.1	13.1	100.0
	Total	526	84.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	10	1.6		
	NOT REACHED	1	.2		
	OMITTED	78	12.5		
	System	7	1.1		
	Total	96	15.4		
Total		622	100.0		

STUDPRACT/ACTIV/LEARNING AT OWN PACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	38	6.1	6.3	6.3
	SOMETIMES	212	34.1	34.9	41.2
	OFTEN	246	39.5	40.5	81.7
	NEARLY ALWAYS	111	17.8	18.3	100.0
	Total	607	97.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	7	1.1		
	System	7	1.1		
	Total	15	2.4		
Total		622	100.0		

STUDPRACT/ACTIV/LEARNING AT OWN PACE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	466	74.9	89.3	89.3

		Frequency	Percent	Valid Percent	Cumulative Percent
	YES	56	9.0	10.7	100.0
	Total	522	83.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	6	1.0		
	NOT REACHED	1	.2		
	OMITTED	86	13.8		
	System	7	1.1		
	Total	100	16.1		
Total		622	100.0		

STUDPRACT/ACTIV/COMPLETE WORKSHEETS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	19	3.1	3.1	3.1
	SOMETIMES	99	15.9	16.4	19.5
	OFTEN	253	40.7	41.8	61.3
	NEARLY ALWAYS	234	37.6	38.7	100.0
	Total	605	97.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	9	1.4		
	System	7	1.1		
	Total	17	2.7		
Total		622	100.0		

STUDPRACT/ACTIV/COMPLETE WORKSHEETS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	444	71.4	84.7	84.7
	YES	80	12.9	15.3	100.0
	Total	524	84.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	8	1.3		
	NOT REACHED	1	.2		
	OMITTED	82	13.2		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	7	1.1		
	Total	98	15.8		
Total		622	100.0		

STUDPRACT/ACTIV/GIVE PRESENTATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	29	4.7	4.8	4.8
	SOMETIMES	294	47.3	48.8	53.7
	OFTEN	184	29.6	30.6	84.2
	NEARLY ALWAYS	95	15.3	15.8	100.0
	Total	602	96.8	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	12	1.9		
	System	7	1.1		
	Total	20	3.2		
Total		622	100.0		

STUDPRACT/ACTIV/GIVE PRESENTATION/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	439	70.6	85.2	85.2
	YES	76	12.2	14.8	100.0
	Total	515	82.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	11	1.8		
	NOT REACHED	1	.2		
	OMITTED	88	14.1		
	System	7	1.1		
	Total	107	17.2		
Total		622	100.0		

STUDPRACT/ACTIV/DETERMINE OWN GOALS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	140	22.5	23.3	23.3
	SOMETIMES	267	42.9	44.4	67.7
	OFTEN	129	20.7	21.5	89.2
	NEARLY ALWAYS	65	10.5	10.8	100.0
	Total	601	96.6	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	13	2.1		
	System	7	1.1		
	Total	21	3.4		
Total		622	100.0		

STUDPRACT/ACTIV/DETERMINE OWN GOALS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	464	74.6	89.2	89.2
	YES	56	9.0	10.8	100.0
	Total	520	83.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	12	1.9		
	NOT REACHED	1	.2		
	OMITTED	82	13.2		
	System	7	1.1		
	Total	102	16.4		
Total		622	100.0		

STUDPRACT/ACTIV/EXPLAIN OWN IDEAS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	24	3.9	4.0	4.0
	SOMETIMES	252	40.5	41.6	45.5
	OFTEN	216	34.7	35.6	81.2
	NEARLY ALWAYS	114	18.3	18.8	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	606	97.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	8	1.3		
	System	7	1.1		
	Total	16	2.6		
Total		622	100.0		

STUDPRACT/ACTIV/EXPLAIN OWN IDEAS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	466	74.9	88.8	88.8
	YES	59	9.5	11.2	100.0
	Total	525	84.4	100.0	
Missing	LOGICALLY NOT APPLICABLE	7	1.1		
	NOT REACHED	1	.2		
	OMITTED	82	13.2		
	System	7	1.1		
	Total	97	15.6		
Total		622	100.0		

STUDPRACT/ACTIV/COLLABORATE WITH PEERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	286	46.0	47.3	47.3
	SOMETIMES	207	33.3	34.2	81.5
	OFTEN	74	11.9	12.2	93.7
	NEARLY ALWAYS	38	6.1	6.3	100.0
	Total	605	97.3	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	9	1.4		
	System	7	1.1		
	Total	17	2.7		
Total		622	100.0		

STUDPRACT/ACTIV/COLLAB WITH PEERS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	476	76.5	91.2	91.2
	YES	46	7.4	8.8	100.0
	Total	522	83.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	8	1.3		
	NOT REACHED	1	.2		
	OMITTED	84	13.5		
	System	7	1.1		
	Total	100	16.1		
Total		622	100.0		

STUDPRACT/ACTIV/ANSWER TESTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	4	.6	.7	.7
	SOMETIMES	111	17.8	18.3	19.0
	OFTEN	271	43.6	44.7	63.7
	NEARLY ALWAYS	220	35.4	36.3	100.0
	Total	606	97.4	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	8	1.3		
	System	7	1.1		
	Total	16	2.6		
Total		622	100.0		

STUDPRACT/ACTIV/ANSWER TESTS/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	450	72.3	86.2	86.2
	YES	72	11.6	13.8	100.0

			Frequency	Percent	Valid Percent	Cumulative Percent
	Total		522	83.9	100.0	
Missing	LOGICALLY NOT APPLICABLE		7	1.1		
	NOT REACHED		1	.2		
	OMITTED		85	13.7		
	System		7	1.1		
	Total		100	16.1		
Total			622	100.0		

STUDPRACT/ACTIV/PEER EVALUATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	44	7.1	7.4	7.4
	SOMETIMES	247	39.7	41.4	48.7
	OFTEN	222	35.7	37.2	85.9
	NEARLY ALWAYS	84	13.5	14.1	100.0
	Total	597	96.0	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	17	2.7		
	System	7	1.1		
	Total	25	4.0		
Total		622	100.0		

STUDPRACT/ACTIV/PEER EVALUATION/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	461	74.1	89.5	89.5
	YES	54	8.7	10.5	100.0
	Total	515	82.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	16	2.6		
	NOT REACHED	1	.2		
	OMITTED	83	13.3		
	System	7	1.1		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	107	17.2		
Total		622	100.0		

STUDPRACT/ACTIV/REFLECT EXPERIENCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	127	20.4	21.2	21.2
	SOMETIMES	261	42.0	43.5	64.7
	OFTEN	151	24.3	25.2	89.8
	NEARLY ALWAYS	61	9.8	10.2	100.0
	Total	600	96.5	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	14	2.3		
	System	7	1.1		
	Total	22	3.5		
Total		622	100.0		

STUDPRACT/ACTIV/REFLECT EXPERIENCE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	470	75.6	90.9	90.9
	YES	47	7.6	9.1	100.0
	Total	517	83.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	13	2.1		
	NOT REACHED	1	.2		
	OMITTED	84	13.5		
	System	7	1.1		
	Total	105	16.9		
Total		622	100.0		

STUDPRACT/ACTIV/COMMUNICATE WITH OUTSIDE

		Frequency	Percent	Valid Percent	Cumulative Percent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	220	35.4	36.7	36.7
	SOMETIMES	250	40.2	41.7	78.3
	OFTEN	90	14.5	15.0	93.3
	NEARLY ALWAYS	40	6.4	6.7	100.0
	Total	600	96.5	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	14	2.3		
	System	7	1.1		
	Total	22	3.5		
Total		622	100.0		

STUDPRACT/ACTIV/COMM WITH OUSIDE/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	457	73.5	89.3	89.3
	YES	55	8.8	10.7	100.0
	Total	512	82.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	13	2.1		
	NOT REACHED	1	.2		
	OMITTED	89	14.3		
	System	7	1.1		
	Total	110	17.7		
Total		622	100.0		

STUDPRACT/ACTIV/CONTRIBUTE TO COMMUNITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	223	35.9	37.0	37.0
	SOMETIMES	260	41.8	43.1	80.1
	OFTEN	83	13.3	13.8	93.9
	NEARLY ALWAYS	37	5.9	6.1	100.0
	Total	603	96.9	100.0	
Missing	NOT REACHED	1	.2		

	OMITTED	11	1.8		
	System	7	1.1		
	Total	19	3.1		
Total		622	100.0		

STUDPRACT/ACTIV/CONTR TO CUMMUNITY/ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	463	74.4	89.9	89.9
	YES	52	8.4	10.1	100.0
	Total	515	82.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	10	1.6		
	NOT REACHED	1	.2		
	OMITTED	89	14.3		
	System	7	1.1		
	Total	107	17.2		
Total		622	100.0		

LEARNRES/INCORP/HANDS ON MATERIALS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	151	24.3	24.8	24.8
	SOMETIMES	230	37.0	37.7	62.5
	OFTEN	134	21.5	22.0	84.4
	NEARLY ALWAYS	95	15.3	15.6	100.0
	Total	610	98.1	100.0	
Missing	NOT REACHED	1	.2		
	OMITTED	4	.6		
	System	7	1.1		
	Total	12	1.9		
Total		622	100.0		

LEARNRES/INCORP/TUTORIAL SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	392	63.0	64.9	64.9
	SOMETIMES	112	18.0	18.5	83.4
	OFTEN	78	12.5	12.9	96.4
	NEARLY ALWAYS	22	3.5	3.6	100.0
	Total	604	97.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	9	1.4		
	System	7	1.1		
	Total	18	2.9		
Total		622	100.0		

LEARNRES/INCORP/GENERAL OFFICE SUITE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	459	73.8	76.1	76.1
	SOMETIMES	91	14.6	15.1	91.2
	OFTEN	35	5.6	5.8	97.0
	NEARLY ALWAYS	18	2.9	3.0	100.0
	Total	603	96.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	10	1.6		
	System	7	1.1		
	Total	19	3.1		
Total		622	100.0		

LEARNRES/INCORP/MULTIMEDIA PROD TOOLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	472	75.9	78.1	78.1
	SOMETIMES	104	16.7	17.2	95.4
	OFTEN	20	3.2	3.3	98.7
	NEARLY ALWAYS	8	1.3	1.3	100.0

	Total	604	97.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	9	1.4		
	System	7	1.1		
	Total	18	2.9		
Total		622	100.0		

LEARNRES/INCORP/DATA LOGGING TOOLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	516	83.0	85.9	85.9
	SOMETIMES	57	9.2	9.5	95.3
	OFTEN	20	3.2	3.3	98.7
	NEARLY ALWAYS	8	1.3	1.3	100.0
	Total	601	96.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	12	1.9		
	System	7	1.1		
	Total	21	3.4		
Total		622	100.0		

LEARNRES/INCORP/MODELING SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	502	80.7	83.0	83.0
	SOMETIMES	77	12.4	12.7	95.7
	OFTEN	22	3.5	3.6	99.3
	NEARLY ALWAYS	4	.6	.7	100.0
	Total	605	97.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	8	1.3		
	System	7	1.1		
	Total	17	2.7		
Total		622	100.0		

LEARNRES/INCORP/COMMUNICATION SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	496	79.7	82.5	82.5
	SOMETIMES	74	11.9	12.3	94.8
	OFTEN	24	3.9	4.0	98.8
	NEARLY ALWAYS	7	1.1	1.2	100.0
	Total	601	96.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	12	1.9		
	System	7	1.1		
	Total	21	3.4		
Total		622	100.0		

LEARNRES/INCORP/DIGITAL RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	343	55.1	56.8	56.8
	SOMETIMES	177	28.5	29.3	86.1
	OFTEN	63	10.1	10.4	96.5
	NEARLY ALWAYS	21	3.4	3.5	100.0
	Total	604	97.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	9	1.4		
	System	7	1.1		
	Total	18	2.9		
Total		622	100.0		

LEARNRES/INCORP/MOBILE DEVICES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	432	69.5	71.8	71.8
	SOMETIMES	118	19.0	19.6	91.4

		Frequency	Percent	Valid Percent	Cumulative Percent
	OFTEN	40	6.4	6.6	98.0
	NEARLY ALWAYS	12	1.9	2.0	100.0
	Total	602	96.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	11	1.8		
	System	7	1.1		
	Total	20	3.2		
Total		622	100.0		

LEARNRES/INCORP/SMART BOARD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	461	74.1	76.7	76.7
	SOMETIMES	78	12.5	13.0	89.7
	OFTEN	38	6.1	6.3	96.0
	NEARLY ALWAYS	24	3.9	4.0	100.0
	Total	601	96.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	12	1.9		
	System	7	1.1		
	Total	21	3.4		
Total		622	100.0		

LEARNRES/INCORP/LEARN MANAGEMENT SYS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEVER	501	80.5	82.7	82.7
	SOMETIMES	79	12.7	13.0	95.7
	OFTEN	20	3.2	3.3	99.0
	NEARLY ALWAYS	6	1.0	1.0	100.0
	Total	606	97.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	7	1.1		
	System	7	1.1		

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	16	2.6		
Total		622	100.0		

IMPACTICT/DO YOU USE ICT IN TEACHING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	370	59.5	84.1	84.1
	YES	70	11.3	15.9	100.0
	Total	440	70.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	173	27.8		
	System	7	1.1		
	Total	182	29.3		
Total		622	100.0		

IMPACTICT/YOU/ICT SKILLS HAVE IMPROVED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	52	8.4	27.7	27.7
	A LITTLE	49	7.9	26.1	53.7
	SOMEWHAT	34	5.5	18.1	71.8
	A LOT	53	8.5	28.2	100.0
	Total	188	30.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	55	8.8		
	System	7	1.1		
	Total	434	69.8		
Total		622	100.0		

IMPACTICT/YOU/INCORPORATE NEW METHODS

		Frequency	Percent	Valid Percent	Cumulative Percent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	52	8.4	28.6	28.6
	A LITTLE	36	5.8	19.8	48.4
	SOMEWHAT	45	7.2	24.7	73.1
	A LOT	49	7.9	26.9	100.0
	Total	182	29.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	61	9.8		
	System	7	1.1		
	Total	440	70.7		
Total		622	100.0		

IMPACTICT/YOU/MORE INDIV FEEDBACK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	50	8.0	27.8	27.8
	A LITTLE	38	6.1	21.1	48.9
	SOMEWHAT	41	6.6	22.8	71.7
	A LOT	51	8.2	28.3	100.0
	Total	180	28.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	63	10.1		
	System	7	1.1		
	Total	442	71.1		
Total		622	100.0		

IMPACTICT/YOU/INCORPORATE NEW WAYS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	47	7.6	26.6	26.6
	A LITTLE	42	6.8	23.7	50.3

		Frequency	Percent	Valid Percent	Cumulative Percent
	SOMEWHAT	41	6.6	23.2	73.4
	A LOT	47	7.6	26.6	100.0
	Total	177	28.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	66	10.6		
	System	7	1.1		
	Total	445	71.5		
Total		622	100.0		

IMPACTICT/YOU/MONITOR STUDENTS LEARNING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	47	7.6	26.4	26.4
	A LITTLE	36	5.8	20.2	46.6
	SOMEWHAT	41	6.6	23.0	69.7
	A LOT	54	8.7	30.3	100.0
	Total	178	28.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	65	10.5		
	System	7	1.1		
	Total	444	71.4		
Total		622	100.0		

IMPACTICT/YOU/ACCESS MORE DIV RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	50	8.0	28.4	28.4
	A LITTLE	42	6.8	23.9	52.3
	SOMEWHAT	47	7.6	26.7	79.0
	A LOT	37	5.9	21.0	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	176	28.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	67	10.8		
	System	7	1.1		
	Total	446	71.7		
Total		622	100.0		

IMPACTICT/YOU/COLL MORE WITH COLLEAGUES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	46	7.4	25.8	25.8
	A LITTLE	31	5.0	17.4	43.3
	SOMEWHAT	40	6.4	22.5	65.7
	A LOT	61	9.8	34.3	100.0
	Total	178	28.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	65	10.5		
	System	7	1.1		
	Total	444	71.4		
Total		622	100.0		

IMPACTICT/YOU/COLL MORE WITH PEERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	50	8.0	28.4	28.4
	A LITTLE	43	6.9	24.4	52.8
	SOMEWHAT	35	5.6	19.9	72.7
	A LOT	48	7.7	27.3	100.0
	Total	176	28.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		

		Frequency	Percent	Valid Percent	Cumulative Percent
	NOT REACHED	2	.3		
	OMITTED	67	10.8		
	System	7	1.1		
	Total	446	71.7		
Total		622	100.0		

IMPACTICT/YOU/COMPLETE ADMIN TASKS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	45	7.2	26.0	26.0
	A LITTLE	28	4.5	16.2	42.2
	SOMEWHAT	31	5.0	17.9	60.1
	A LOT	69	11.1	39.9	100.0
	Total	173	27.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	70	11.3		
	System	7	1.1		
	Total	449	72.2		
Total		622	100.0		

IMPACTICT/YOU/WORKLOAD HAS INCREASED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	55	8.8	30.9	30.9
	A LITTLE	37	5.9	20.8	51.7
	SOMEWHAT	35	5.6	19.7	71.3
	A LOT	51	8.2	28.7	100.0
	Total	178	28.6	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	65	10.5		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	7	1.1		
	Total	444	71.4		
Total		622	100.0		

IMPACTICT/YOU/INCREASED WORK PRESSURE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	58	9.3	32.8	32.8
	A LITTLE	30	4.8	16.9	49.7
	SOMEWHAT	39	6.3	22.0	71.8
	A LOT	50	8.0	28.2	100.0
	Total	177	28.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	66	10.6		
	System	7	1.1		
	Total	445	71.5		
Total		622	100.0		

IMPACTICT/YOU/BECOME LESS EFFECTIVE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	107	17.2	60.8	60.8
	A LITTLE	34	5.5	19.3	80.1
	SOMEWHAT	20	3.2	11.4	91.5
	A LOT	15	2.4	8.5	100.0
	Total	176	28.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	67	10.8		
	System	7	1.1		
	Total	446	71.7		

Total		622	100.0		

IMPACTICT/STUD/SUBJECT MATTER KNOWLEDGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	7	1.1	4.0	4.0
	DECREASED A LITTLE	10	1.6	5.7	9.7
	NO IMPACT	52	8.4	29.7	39.4
	INCREASED A LITTLE	63	10.1	36.0	75.4
	INCREASED A LOT	43	6.9	24.6	100.0
	Total	175	28.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	68	10.9		
	System	7	1.1		
	Total	447	71.9		
Total		622	100.0		

IMPACTICT/STUD/LEARNING MOTIV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	6	1.0	3.4	3.4
	DECREASED A LITTLE	7	1.1	4.0	7.4
	NO IMPACT	57	9.2	32.6	40.0
	INCREASED A LITTLE	60	9.6	34.3	74.3
	INCREASED A LOT	45	7.2	25.7	100.0
	Total	175	28.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	68	10.9		
	System	7	1.1		
	Total	447	71.9		

Total		622	100.0		

IMPACTICT/STUD/INFO HANDLING SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	7	1.1	4.0	4.0
	DECREASED A LITTLE	7	1.1	4.0	8.0
	NO IMPACT	55	8.8	31.4	39.4
	INCREASED A LITTLE	62	10.0	35.4	74.9
	INCREASED A LOT	44	7.1	25.1	100.0
	Total	175	28.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	68	10.9		
	System	7	1.1		
	Total	447	71.9		
Total		622	100.0		

IMPACTICT/STUD/PROBLEM SOLVING SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	6	1.0	3.4	3.4
	DECREASED A LITTLE	7	1.1	4.0	7.5
	NO IMPACT	61	9.8	35.1	42.5
	INCREASED A LITTLE	61	9.8	35.1	77.6
	INCREASED A LOT	39	6.3	22.4	100.0
	Total	174	28.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	69	11.1		
	System	7	1.1		
	Total	448	72.0		

Total		622	100.0		

IMPACTICT/STUD/SELF DIRECT LEARN SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	6	1.0	3.4	3.4
	DECREASED A LITTLE	7	1.1	4.0	7.4
	NO IMPACT	66	10.6	37.7	45.1
	INCREASED A LITTLE	62	10.0	35.4	80.6
	INCREASED A LOT	34	5.5	19.4	100.0
	Total	175	28.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	68	10.9		
	System	7	1.1		
	Total	447	71.9		
Total		622	100.0		

IMPACTICT/STUD/COLLABORATIVE SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	6	1.0	3.5	3.5
	DECREASED A LITTLE	5	.8	2.9	6.4
	NO IMPACT	65	10.5	37.8	44.2
	INCREASED A LITTLE	63	10.1	36.6	80.8
	INCREASED A LOT	33	5.3	19.2	100.0
	Total	172	27.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	71	11.4		
	System	7	1.1		
	Total	450	72.3		

Total		622	100.0		

IMPACTICT/STUD/COMMUNICATION SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	8	1.3	4.6	4.6
	DECREASED A LITTLE	3	.5	1.7	6.4
	NO IMPACT	60	9.6	34.7	41.0
	INCREASED A LITTLE	59	9.5	34.1	75.1
	INCREASED A LOT	43	6.9	24.9	100.0
	Total	173	27.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	70	11.3		
	System	7	1.1		
	Total	449	72.2		
Total		622	100.0		

IMPACTICT/STUD/ICT SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	9	1.4	5.1	5.1
	DECREASED A LITTLE	7	1.1	4.0	9.1
	NO IMPACT	58	9.3	33.0	42.0
	INCREASED A LITTLE	76	12.2	43.2	85.2
	INCREASED A LOT	26	4.2	14.8	100.0
	Total	176	28.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	67	10.8		
	System	7	1.1		
	Total	446	71.7		

Total		622	100.0		

IMPACTICT/STUD/LEARN AT THEIR OWN PACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	8	1.3	4.6	4.6
	DECREASED A LITTLE	6	1.0	3.4	8.0
	NO IMPACT	59	9.5	33.7	41.7
	INCREASED A LITTLE	65	10.5	37.1	78.9
	INCREASED A LOT	37	5.9	21.1	100.0
	Total	175	28.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	68	10.9		
	System	7	1.1		
	Total	447	71.9		
Total		622	100.0		

IMPACTICT/STUD/SELF ESTEEM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	7	1.1	4.1	4.1
	DECREASED A LITTLE	2	.3	1.2	5.3
	NO IMPACT	58	9.3	34.1	39.4
	INCREASED A LITTLE	56	9.0	32.9	72.4
	INCREASED A LOT	47	7.6	27.6	100.0
	Total	170	27.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	73	11.7		
	System	7	1.1		
	Total	452	72.7		

		Frequency	Percent	Valid Percent	Cumulative Percent
Total		622	100.0		

IMPACTICT/STUD/ACHIEVEMENT GAP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	8	1.3	4.7	4.7
	DECREASED A LITTLE	7	1.1	4.1	8.8
	NO IMPACT	62	10.0	36.3	45.0
	INCREASED A LITTLE	58	9.3	33.9	78.9
	INCREASED A LOT	36	5.8	21.1	100.0
	Total	171	27.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	72	11.6		
	System	7	1.1		
	Total	451	72.5		
Total		622	100.0		

IMPACTICT/STUD/TIME SPENT ON LEARNING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	10	1.6	5.8	5.8
	DECREASED A LITTLE	8	1.3	4.7	10.5
	NO IMPACT	57	9.2	33.1	43.6
	INCREASED A LITTLE	64	10.3	37.2	80.8
	INCREASED A LOT	33	5.3	19.2	100.0
	Total	172	27.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	71	11.4		
	System	7	1.1		
	Total	450	72.3		

Total		622	100.0		

IMPACTICT/STUD/SCHOOL ATTENDANCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	9	1.4	5.2	5.2
	DECREASED A LITTLE	6	1.0	3.5	8.7
	NO IMPACT	68	10.9	39.3	48.0
	INCREASED A LITTLE	51	8.2	29.5	77.5
	INCREASED A LOT	39	6.3	22.5	100.0
	Total	173	27.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	70	11.3		
	System	7	1.1		
	Total	449	72.2		
Total		622	100.0		

IMPACTICT/STUD/ASSESSMENT RESULTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	6	1.0	3.5	3.5
	DECREASED A LITTLE	4	.6	2.3	5.8
	NO IMPACT	60	9.6	34.7	40.5
	INCREASED A LITTLE	69	11.1	39.9	80.3
	INCREASED A LOT	34	5.5	19.7	100.0
	Total	173	27.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	70	11.3		
	System	7	1.1		
	Total	449	72.2		

Total		622	100.0		

IMPACTICT/STUD/DIGITAL DEVIDE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED A LOT	13	2.1	7.6	7.6
	DECREASED A LITTLE	8	1.3	4.7	12.2
	NO IMPACT	70	11.3	40.7	52.9
	INCREASED A LITTLE	59	9.5	34.3	87.2
	INCREASED A LOT	22	3.5	12.8	100.0
	Total	172	27.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	370	59.5		
	NOT REACHED	2	.3		
	OMITTED	71	11.4		
	System	7	1.1		
	Total	450	72.3		
Total		622	100.0		

INFOYOU/CONFIDENT/PRODUCE LETTER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	125	20.1	20.9	20.9
	A LITTLE	115	18.5	19.3	40.2
	SOMEWHAT	102	16.4	17.1	57.3
	A LOT	255	41.0	42.7	100.0
	Total	597	96.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	23	3.7		
	Total	25	4.0		
Total		622	100.0		

INFOYOU/CONFIDENT/EMAIL A FILE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	229	36.8	38.6	38.6
	A LITTLE	89	14.3	15.0	53.5
	SOMEWHAT	87	14.0	14.6	68.2
	A LOT	189	30.4	31.8	100.0
	Total	594	95.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	26	4.2		
	Total	28	4.5		
Total		622	100.0		

INFOYOU/CONFIDENT/TAKE PHOTOS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	273	43.9	45.8	45.8
	A LITTLE	94	15.1	15.8	61.6
	SOMEWHAT	70	11.3	11.7	73.3
	A LOT	159	25.6	26.7	100.0
	Total	596	95.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	24	3.9		
	Total	26	4.2		
Total		622	100.0		

INFOYOU/CONFIDENT/FILE ELECTRONIC DOCS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	212	34.1	35.5	35.5
	A LITTLE	79	12.7	13.2	48.7
	SOMEWHAT	93	15.0	15.6	64.2
	A LOT	214	34.4	35.8	100.0
	Total	598	96.1	100.0	
Missing	NOT REACHED	2	.3		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	22	3.5		
	Total	24	3.9		
Total		622	100.0		

INFOYOU/CONFIDENT/USE SPREADSHEET PROG

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	227	36.5	38.0	38.0
	A LITTLE	102	16.4	17.1	55.0
	SOMEWHAT	88	14.1	14.7	69.7
	A LOT	181	29.1	30.3	100.0
	Total	598	96.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	22	3.5		
	Total	24	3.9		
Total		622	100.0		

INFOYOU/CONFIDENT/SHARE KNOWLEDGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	289	46.5	48.3	48.3
	A LITTLE	97	15.6	16.2	64.5
	SOMEWHAT	88	14.1	14.7	79.3
	A LOT	124	19.9	20.7	100.0
	Total	598	96.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	22	3.5		
	Total	24	3.9		
Total		622	100.0		

INFOYOU/CONFIDENT/PRODUCE PRESENTATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	288	46.3	48.3	48.3

	A LITTLE	97	15.6	16.3	64.6
	SOMEWHAT	87	14.0	14.6	79.2
	A LOT	124	19.9	20.8	100.0
	Total	596	95.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	24	3.9		
	Total	26	4.2		
Total		622	100.0		

INFOYOU/CONFIDENT/ONLINE PURCHASES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	308	49.5	51.5	51.5
	A LITTLE	98	15.8	16.4	67.9
	SOMEWHAT	64	10.3	10.7	78.6
	A LOT	128	20.6	21.4	100.0
	Total	598	96.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	22	3.5		
	Total	24	3.9		
Total		622	100.0		

INFOYOU/CONFIDENT/PREPARE LESSONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	303	48.7	50.8	50.8
	A LITTLE	111	17.8	18.6	69.5
	SOMEWHAT	85	13.7	14.3	83.7
	A LOT	97	15.6	16.3	100.0
	Total	596	95.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	24	3.9		
	Total	26	4.2		
Total		622	100.0		

INFOYOU/CONFIDENT/SUITABLE FOR ICT USE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	269	43.2	45.5	45.5
	A LITTLE	123	19.8	20.8	66.3
	SOMEWHAT	111	17.8	18.8	85.1
	A LOT	88	14.1	14.9	100.0
	Total	591	95.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	29	4.7		
	Total	31	5.0		
Total		622	100.0		

INFOYOU/CONFIDENT/USEFUL RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	254	40.8	42.8	42.8
	A LITTLE	97	15.6	16.3	59.1
	SOMEWHAT	90	14.5	15.2	74.2
	A LOT	153	24.6	25.8	100.0
	Total	594	95.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	26	4.2		
	Total	28	4.5		
Total		622	100.0		

INFOYOU/CONFIDENT/MONITOR PROGRESS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	288	46.3	48.5	48.5
	A LITTLE	98	15.8	16.5	65.0
	SOMEWHAT	99	15.9	16.7	81.6
	A LOT	109	17.5	18.4	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	594	95.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	26	4.2		
	Total	28	4.5		
Total		622	100.0		

INFOYOU/CONFIDENT/EFFECT PRESENTATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	286	46.0	48.1	48.1
	A LITTLE	103	16.6	17.3	65.5
	SOMEWHAT	92	14.8	15.5	81.0
	A LOT	113	18.2	19.0	100.0
	Total	594	95.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	26	4.2		
	Total	28	4.5		
Total		622	100.0		

INFOYOU/CONFIDENT/COLLAB WITH OTHERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	293	47.1	49.4	49.4
	A LITTLE	109	17.5	18.4	67.8
	SOMEWHAT	95	15.3	16.0	83.8
	A LOT	96	15.4	16.2	100.0
	Total	593	95.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	27	4.3		
	Total	29	4.7		
Total		622	100.0		

INFOYOU/CONFIDENT/EDUCATIONAL SOFTWARE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	300	48.2	50.4	50.4
	A LITTLE	88	14.1	14.8	65.2
	SOMEWHAT	84	13.5	14.1	79.3
	A LOT	123	19.8	20.7	100.0
	Total	595	95.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	25	4.0		
	Total	27	4.3		
Total		622	100.0		

INFOYOU/CONFIDENT/USE INTERNET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	283	45.5	47.4	47.4
	A LITTLE	103	16.6	17.3	64.7
	SOMEWHAT	78	12.5	13.1	77.7
	A LOT	133	21.4	22.3	100.0
	Total	597	96.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	23	3.7		
	Total	25	4.0		
Total		622	100.0		

INFOYOU/ENH/MONITOR MORE EFFECTIVELY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	28	4.5	4.7	4.7
	LOW PRIORITY	40	6.4	6.8	11.5
	MEDIUM PRIORITY	145	23.3	24.6	36.1
	HIGH PRIORITY	377	60.6	63.9	100.0
	Total	590	94.9	100.0	
Missing	NOT REACHED	2	.3		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	30	4.8		
	Total	32	5.1		
Total		622	100.0		

INFOYOU/ENH/EXERCISES FOR STUD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	28	4.5	4.8	4.8
	LOW PRIORITY	31	5.0	5.3	10.1
	MEDIUM PRIORITY	145	23.3	24.7	34.8
	HIGH PRIORITY	383	61.6	65.2	100.0
	Total	587	94.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	33	5.3		
	Total	35	5.6		
Total		622	100.0		

INFOYOU/ENH/BETTER LECTURES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	29	4.7	4.9	4.9
	LOW PRIORITY	14	2.3	2.4	7.3
	MEDIUM PRIORITY	118	19.0	20.1	27.4
	HIGH PRIORITY	427	68.6	72.6	100.0
	Total	588	94.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	32	5.1		
	Total	34	5.5		
Total		622	100.0		

INFOYOU/ENH/MULTIMEDIA PROD PROJECTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	34	5.5	5.8	5.8

		Frequency	Percent	Valid Percent	Cumulative Percent
	LOW PRIORITY	43	6.9	7.3	13.1
	MEDIUM PRIORITY	167	26.8	28.4	41.4
	HIGH PRIORITY	345	55.5	58.6	100.0
	Total	589	94.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	31	5.0		
	Total	33	5.3		
Total		622	100.0		

INFOYOU/ENH/ADDRESS INDIV DIFFERENCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	31	5.0	5.3	5.3
	LOW PRIORITY	43	6.9	7.3	12.5
	MEDIUM PRIORITY	169	27.2	28.6	41.2
	HIGH PRIORITY	347	55.8	58.8	100.0
	Total	590	94.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	30	4.8		
	Total	32	5.1		
Total		622	100.0		

INFOYOU/ENH/SHORT PROJECTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	27	4.3	4.6	4.6
	LOW PRIORITY	50	8.0	8.5	13.1
	MEDIUM PRIORITY	188	30.2	31.9	44.9
	HIGH PRIORITY	325	52.3	55.1	100.0
	Total	590	94.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	30	4.8		
	Total	32	5.1		
Total		622	100.0		

INFOYOU/ENH/EXTENDED PROJECTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	27	4.3	4.6	4.6
	LOW PRIORITY	73	11.7	12.4	16.9
	MEDIUM PRIORITY	193	31.0	32.7	49.7
	HIGH PRIORITY	297	47.7	50.3	100.0
	Total	590	94.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	30	4.8		
	Total	32	5.1		
Total		622	100.0		

INFOYOU/ENH/SCIENTIFIC INVESTIGATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	28	4.5	4.8	4.8
	LOW PRIORITY	25	4.0	4.3	9.1
	MEDIUM PRIORITY	126	20.3	21.5	30.6
	HIGH PRIORITY	406	65.3	69.4	100.0
	Total	585	94.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	34	5.5		
	System	1	.2		
	Total	37	5.9		
Total		622	100.0		

INFOYOU/ENH/COLLABORATE WITH PEERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	34	5.5	5.8	5.8
	LOW PRIORITY	46	7.4	7.8	13.6
	MEDIUM PRIORITY	152	24.4	25.8	39.4

		Frequency	Percent	Valid Percent	Cumulative Percent
	HIGH PRIORITY	357	57.4	60.6	100.0
	Total	589	94.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	31	5.0		
	Total	33	5.3		
Total		622	100.0		

INFOYOU/ENH/COLLABORATE WITH TEACHERS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	30	4.8	5.1	5.1
	LOW PRIORITY	37	5.9	6.3	11.4
	MEDIUM PRIORITY	149	24.0	25.3	36.7
	HIGH PRIORITY	373	60.0	63.3	100.0
	Total	589	94.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	31	5.0		
	Total	33	5.3		
Total		622	100.0		

INFOYOU/ENH/COLLABORATE WITH CLASSMATES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	30	4.8	5.1	5.1
	LOW PRIORITY	53	8.5	9.0	14.1
	MEDIUM PRIORITY	147	23.6	24.9	39.0
	HIGH PRIORITY	360	57.9	61.0	100.0
	Total	590	94.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	30	4.8		
	Total	32	5.1		
Total		622	100.0		

INFOYOU/ENH/SELF ACCESSED ACTIVITIES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	31	5.0	5.3	5.3
	LOW PRIORITY	51	8.2	8.6	13.9
	MEDIUM PRIORITY	156	25.1	26.4	40.3
	HIGH PRIORITY	352	56.6	59.7	100.0
	Total	590	94.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	30	4.8		
	Total	32	5.1		
Total		622	100.0		

INFOYOU/OBST/NOT CONSIDERED USEFUL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	427	68.6	75.7	75.7
	YES	137	22.0	24.3	100.0
	Total	564	90.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	56	9.0		
	Total	58	9.3		
Total		622	100.0		

INFOYOU/OBST/NO REQUIRED INFRASTRUCTURE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	220	35.4	38.3	38.3
	YES	355	57.1	61.7	100.0
	Total	575	92.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	45	7.2		
	Total	47	7.6		
Total		622	100.0		

INFOYOU/OBST/NO REQUIRED ICT SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	265	42.6	46.0	46.0
	YES	311	50.0	54.0	100.0
	Total	576	92.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	44	7.1		
	Total	46	7.4		
Total		622	100.0		

INFOYOU/OBST/NO PEDAGOGICAL SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	220	35.4	38.5	38.5
	YES	351	56.4	61.5	100.0
	Total	571	91.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	48	7.7		
	System	1	.2		
	Total	51	8.2		
Total		622	100.0		

INFOYOU/OBST/NO CONFIDENCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	350	56.3	61.2	61.2
	YES	222	35.7	38.8	100.0
	Total	572	92.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	47	7.6		
	System	1	.2		
	Total	50	8.0		
Total		622	100.0		

INFOYOU/OBST/STUDENTS HAVE NO ICT SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	160	25.7	28.0	28.0
	YES	412	66.2	72.0	100.0
	Total	572	92.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	47	7.6		
	System	1	.2		
	Total	50	8.0		
Total		622	100.0		

INFOYOU/OBST/NO ACCESS TO REQUIRED ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	136	21.9	24.0	24.0
	YES	431	69.3	76.0	100.0
	Total	567	91.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	52	8.4		
	System	1	.2		
	Total	55	8.8		
Total		622	100.0		

INFOYOU/OBST/NO TIME NECESSARY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	333	53.5	58.6	58.6
	YES	235	37.8	41.4	100.0
	Total	568	91.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	51	8.2		
	System	1	.2		

	Total	54	8.7		
Total		622	100.0		

INFOYOU/OBST/HOW TO IDENTIFY ICT TOOLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	272	43.7	47.7	47.7
	YES	298	47.9	52.3	100.0
	Total	570	91.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	49	7.9		
	System	1	.2		
	Total	52	8.4		
Total		622	100.0		

INFOYOU/OBST/SCHOOL LACKS DIGITAL RES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	166	26.7	29.0	29.0
	YES	406	65.3	71.0	100.0
	Total	572	92.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	47	7.6		
	System	1	.2		
	Total	50	8.0		
Total		622	100.0		

INFOYOU/OBST/CANNOT MAKE OWN DECISIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	301	48.4	53.3	53.3
	YES	264	42.4	46.7	100.0
	Total	565	90.8	100.0	
Missing	NOT REACHED	2	.3		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	54	8.7		
	System	1	.2		
	Total	57	9.2		
Total		622	100.0		

INFOYOU/OBST/ACCESS OUTSIDE SCHOOL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	280	45.0	48.7	48.7
	YES	295	47.4	51.3	100.0
	Total	575	92.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	44	7.1		
	System	1	.2		
	Total	47	7.6		
Total		622	100.0		

INFOYOU/PRODEV/INTRO COURSE FOR INTERNET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	28	4.5	4.8	4.8
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	413	66.4	70.1	74.9
	YES, I HAVE	148	23.8	25.1	100.0
	Total	589	94.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	29	4.7		
	System	2	.3		
	Total	33	5.3		
Total		622	100.0		

INFOYOU/PRODEV/TECHNICAL COURSE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	42	6.8	7.1	7.1
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	472	75.9	79.7	86.8
	YES, I HAVE	78	12.5	13.2	100.0
	Total	592	95.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	27	4.3		
	System	1	.2		
	Total	30	4.8		
Total		622	100.0		

INFOYOU/PRODEV/ADV COURSE APPLICATIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	34	5.5	5.8	5.8
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	498	80.1	84.3	90.0
	YES, I HAVE	59	9.5	10.0	100.0
	Total	591	95.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	27	4.3		
	System	2	.3		
	Total	31	5.0		
Total		622	100.0		

INFOYOU/PRODEV/ADV COURSE INTERNET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	34	5.5	5.8	5.8
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	525	84.4	88.8	94.6

		Frequency	Percent	Valid Percent	Cumulative Percent
	YES, I HAVE	32	5.1	5.4	100.0
	Total	591	95.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	28	4.5		
	System	1	.2		
	Total	31	5.0		
Total		622	100.0		

INFOYOU/PRODEV/PEDAGOGICAL ISSUES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	20	3.2	3.4	3.4
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	517	83.1	87.5	90.9
	YES, I HAVE	54	8.7	9.1	100.0
	Total	591	95.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	29	4.7		
	Total	31	5.0		
Total		622	100.0		

INFOYOU/PRODEV/SUBJECT SPECIFIC TRAINING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	19	3.1	3.2	3.2
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	524	84.2	88.5	91.7
	YES, I HAVE	49	7.9	8.3	100.0
	Total	592	95.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	28	4.5		
	Total	30	4.8		
Total		622	100.0		

INFOYOU/PRODEV/MULTIMEDIA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO, I DO NOT WISH TO ATTEND	28	4.5	4.7	4.7
	NO, I WOULD LIKE TO ATTEND IF AVAILABLE	513	82.5	86.7	91.4
	YES, I HAVE	51	8.2	8.6	100.0
	Total	592	95.2	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	28	4.5		
	Total	30	4.8		
Total		622	100.0		

INFOYOU/SCHVISION/DISCUSS WHAT WE WANT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	22	3.5	3.7	3.7
	A LITTLE	76	12.2	12.7	16.3
	SOMEWHAT	165	26.5	27.5	43.8
	A LOT	337	54.2	56.2	100.0
	Total	600	96.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	20	3.2		
	Total	22	3.5		
Total		622	100.0		

INFOYOU/SCHVISION/CONSTANTLY MOTIVATED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	26	4.2	4.3	4.3
	A LITTLE	78	12.5	13.0	17.3
	SOMEWHAT	167	26.8	27.8	45.2

		Frequency	Percent	Valid Percent	Cumulative Percent
	A LOT	329	52.9	54.8	100.0
	Total	600	96.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	20	3.2		
	Total	22	3.5		
Total		622	100.0		

INFOYOU/SCHVISION/TEACHERS THINK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	22	3.5	3.7	3.7
	A LITTLE	56	9.0	9.3	13.0
	SOMEWHAT	145	23.3	24.2	37.2
	A LOT	376	60.5	62.8	100.0
	Total	599	96.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	21	3.4		
	Total	23	3.7		
Total		622	100.0		

INFOYOU/TEACHPART/I CAN INFLUENCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	54	8.7	9.0	9.0
	A LITTLE	121	19.5	20.1	29.1
	SOMEWHAT	211	33.9	35.1	64.2
	A LOT	215	34.6	35.8	100.0
	Total	601	96.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	19	3.1		
	Total	21	3.4		
Total		622	100.0		

INFOYOU/TEACHPART/CONSIDER TEACH OPP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	42	6.8	7.0	7.0
	A LITTLE	100	16.1	16.6	23.6
	SOMEWHAT	213	34.2	35.4	59.0
	A LOT	247	39.7	41.0	100.0
	Total	602	96.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	18	2.9		
	Total	20	3.2		
Total		622	100.0		

INFOYOU/TEACHPART/OWN JUDGEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	19	3.1	3.2	3.2
	A LITTLE	63	10.1	10.5	13.6
	SOMEWHAT	194	31.2	32.3	45.9
	A LOT	325	52.3	54.1	100.0
	Total	601	96.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	19	3.1		
	Total	21	3.4		
Total		622	100.0		

INFOYOU/PROFCOLLAB/CO TEACH WITH COLL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	43	6.9	7.2	7.2
	A LITTLE	63	10.1	10.5	17.7
	SOMEWHAT	203	32.6	33.8	51.5
	A LOT	291	46.8	48.5	100.0
	Total	600	96.5	100.0	
Missing	NOT REACHED	2	.3		

	OMITTED	20	3.2		
	Total	22	3.5		
Total		622	100.0		

INFOYOU/PROFCOLLAB/DISCUSS PROBLEMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	8	1.3	1.3	1.3
	A LITTLE	37	5.9	6.2	7.5
	SOMEWHAT	146	23.5	24.3	31.8
	A LOT	409	65.8	68.2	100.0
	Total	600	96.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	20	3.2		
	Total	22	3.5		
Total		622	100.0		

INFOYOU/PROFCOLLAB/TEACH OTHER SCHOOL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	51	8.2	8.5	8.5
	A LITTLE	107	17.2	17.8	26.3
	SOMEWHAT	207	33.3	34.4	60.7
	A LOT	236	37.9	39.3	100.0
	Total	601	96.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	19	3.1		
	Total	21	3.4		
Total		622	100.0		

INFOYOU/PROFCOLLAB/TEACH OTHER CNTRY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	440	70.7	73.2	73.2

			Frequency	Percent	Valid Percent	Cumulative Percent
	A LITTLE		53	8.5	8.8	82.0
	SOMEWHAT		38	6.1	6.3	88.4
	A LOT		70	11.3	11.6	100.0
	Total		601	96.6	100.0	
Missing	NOT REACHED		2	.3		
	OMITTED		19	3.1		
	Total		21	3.4		
Total			622	100.0		

INFOYOU/TEACHSUP/SUFFICIENT TECH SUPPORT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	290	46.6	48.4	48.4
	A LITTLE	121	19.5	20.2	68.6
	SOMEWHAT	122	19.6	20.4	89.0
	A LOT	66	10.6	11.0	100.0
	Total	599	96.3	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	21	3.4		
	Total	23	3.7		
Total		622	100.0		

INFOYOU/TEACHSUP/ACCESS COMPS EASILY OUT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	408	65.6	68.2	68.2
	A LITTLE	81	13.0	13.5	81.8
	SOMEWHAT	65	10.5	10.9	92.6
	A LOT	44	7.1	7.4	100.0
	Total	598	96.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	22	3.5		
	Total	24	3.9		
Total		622	100.0		

INFOYOU/TEACHSUP/ADMIN WORK EASY TO DO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT AT ALL	359	57.7	60.3	60.3
	A LITTLE	96	15.4	16.1	76.5
	SOMEWHAT	85	13.7	14.3	90.8
	A LOT	55	8.8	9.2	100.0
	Total	595	95.7	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	25	4.0		
	Total	27	4.3		
Total		622	100.0		

INFOYOU/ACCESS TO COMPUTER AT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	207	33.3	39.4	39.4
	YES	319	51.3	60.6	100.0
	Total	526	84.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	94	15.1		
	Total	96	15.4		
Total		622	100.0		

INFOYOU/USECOMP/TEACHING REL ACTIV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	127	20.4	33.8	33.8
	YES	249	40.0	66.2	100.0
	Total	376	60.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	202	32.5		
	NOT REACHED	2	.3		

		Frequency	Percent	Valid Percent	Cumulative Percent
	OMITTED	39	6.3		
	System	3	.5		
	Total	246	39.5		
Total		622	100.0		

INFOYOU/USECOMP/CONNECTING TO WWW

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	245	39.4	65.9	65.9
	YES	127	20.4	34.1	100.0
	Total	372	59.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	202	32.5		
	NOT REACHED	2	.3		
	OMITTED	43	6.9		
	System	3	.5		
	Total	250	40.2		
Total		622	100.0		

INFOYOU/TO WHAT AGE GROUP DO YOU BELONG

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BELOW 25	22	3.5	3.7	3.7
	25–29	69	11.1	11.5	15.1
	30–39	243	39.1	40.4	55.5
	40–49	201	32.3	33.4	88.9
	50–59	56	9.0	9.3	98.2
	60 OR ABOVE	11	1.8	1.8	100.0
	Total	602	96.8	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	18	2.9		
	Total	20	3.2		
Total		622	100.0		

INFOYOU/WHAT IS YOUR GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	266	42.8	44.1	44.1
	FEMALE	337	54.2	55.9	100.0
	Total	603	96.9	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	17	2.7		
	Total	19	3.1		
Total		622	100.0		

INFOYOU/HIGHEST LEVEL OF EDUCATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SECONDARY OR HIGH SCHOOL	19	3.1	3.1	3.1
	POST-SECONDARY EDUCATION (E.G., T	315	50.6	51.9	55.0
	BACHELOR'S DEGREE	176	28.3	29.0	84.0
	MASTER'S DEGREE OR ABOVE	97	15.6	16.0	100.0
	Total	607	97.6	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	13	2.1		
	Total	15	2.4		
Total		622	100.0		

INFOYOU/BACHELORS DEGR IN SCIENCE MATHS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	459	73.8	75.2	75.2
	DEGREE IN MATHEMATICS ONLY	7	1.1	1.1	76.4
	DEGREE IN SCIENCE ONLY	96	15.4	15.7	92.1

		Frequency	Percent	Valid Percent	Cumulative Percent
	DEGREE IN BOTH MATHEMATICS AND SC	48	7.7	7.9	100.0
	Total	610	98.1	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	10	1.6		
	Total	12	1.9		
Total		622	100.0		

INFOYOU/TEACHING LICENSE OR CERTIFICATE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	58	9.3	9.5	9.5
	YES	554	89.1	90.5	100.0
	Total	612	98.4	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	8	1.3		
	Total	10	1.6		
Total		622	100.0		

INFOYOU/YEARS OF EXPERIENCE TEACHING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LESS THAN 2 YEARS	66	10.6	10.7	10.7
	2–4 YEARS	116	18.6	18.7	29.4
	5– 9 YEARS	124	19.9	20.0	49.4
	10–19 YEARS	224	36.0	36.2	85.6
	20 YEARS OR MORE	89	14.3	14.4	100.0
	Total	619	99.5	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	1	.2		
	Total	3	.5		
Total		622	100.0		

PEDPRAC/WHICH DESCRIPTION IS APPLICABLE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I USE ICT ONCE A WEEK OR MORE IN THE TAR	33	5.3	12.6	12.6
	I USE ICT EXTENSIVELY IN THE TARGET CLAS	41	6.6	15.7	28.4
	NONE OF THE ABOVE	187	30.1	71.6	100.0
	Total	261	42.0	100.0	
Missing	NOT REACHED	2	.3		
	OMITTED	352	56.6		
	System	7	1.1		
	Total	361	58.0		
Total		622	100.0		

PEDPRAC/STUDOUT/SUBJECT MATTER KNOW

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	15	2.4	8.8	8.8
	MADE NO DIFFERENCE	48	7.7	28.2	37.1
	INCREASED	107	17.2	62.9	100.0
	Total	170	27.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	21	3.4		
	OMITTED	237	38.1		
	System	7	1.1		
	Total	452	72.7		
Total		622	100.0		

PEDPRAC/STUDOUT/ICT SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	21	3.4	12.4	12.4
	MADE NO DIFFERENCE	51	8.2	30.0	42.4
	INCREASED	98	15.8	57.6	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	170	27.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	23	3.7		
	OMITTED	235	37.8		
	System	7	1.1		
	Total	452	72.7		
Total		622	100.0		

PEDPRAC/STUDOUT/LEARNING MOTIVATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	15	2.4	8.9	8.9
	MADE NO DIFFERENCE	46	7.4	27.4	36.3
	INCREASED	107	17.2	63.7	100.0
	Total	168	27.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	23	3.7		
	OMITTED	237	38.1		
	System	7	1.1		
	Total	454	73.0		
Total		622	100.0		

PEDPRAC/STUDOUT/LEARN AT OWN PACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	17	2.7	10.1	10.1
	MADE NO DIFFERENCE	57	9.2	33.9	44.0
	INCREASED	94	15.1	56.0	100.0
	Total	168	27.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	25	4.0		
	OMITTED	235	37.8		

	System	7	1.1		
	Total	454	73.0		
Total		622	100.0		

PEDPRAC/STUDOUT/COMMUNICATION SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	14	2.3	8.3	8.3
	MADE NO DIFFERENCE	53	8.5	31.5	39.9
	INCREASED	101	16.2	60.1	100.0
	Total	168	27.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	25	4.0		
	OMITTED	235	37.8		
	System	7	1.1		
	Total	454	73.0		
Total		622	100.0		

PEDPRAC/STUDOUT/INFO HANDLING SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	15	2.4	9.0	9.0
	MADE NO DIFFERENCE	53	8.5	31.7	40.7
	INCREASED	99	15.9	59.3	100.0
	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	25	4.0		
	OMITTED	236	37.9		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/STUDOUT/COLLAB SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	15	2.4	8.9	8.9
	MADE NO DIFFERENCE	60	9.6	35.7	44.6
	INCREASED	93	15.0	55.4	100.0
	Total	168	27.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	25	4.0		
	OMITTED	235	37.8		
	System	7	1.1		
	Total	454	73.0		
Total		622	100.0		

PEDPRAC/STUDOUT/SELF DIR LEARN SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	13	2.1	7.7	7.7
	MADE NO DIFFERENCE	59	9.5	34.9	42.6
	INCREASED	97	15.6	57.4	100.0
	Total	169	27.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	25	4.0		
	OMITTED	234	37.6		
	System	7	1.1		
	Total	453	72.8		
Total		622	100.0		

PEDPRAC/STUDOUT/PROBLEM SOLVING SKILLS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	14	2.3	8.3	8.3

		Frequency	Percent	Valid Percent	Cumulative Percent
	MADE NO DIFFERENCE	59	9.5	34.9	43.2
	INCREASED	96	15.4	56.8	100.0
	Total	169	27.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	25	4.0		
	OMITTED	234	37.6		
	System	7	1.1		
	Total	453	72.8		
Total		622	100.0		

PEDPRAC/STUDOUT/ACHIEVEMENT GAP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.9	7.1	7.1
	MADE NO DIFFERENCE	68	10.9	40.5	47.6
	INCREASED	88	14.1	52.4	100.0
	Total	168	27.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	25	4.0		
	OMITTED	235	37.8		
	System	7	1.1		
	Total	454	73.0		
Total		622	100.0		

PEDPRAC/STUDOUT/SELF ESTEEM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	17	2.7	10.1	10.1
	MADE NO DIFFERENCE	54	8.7	32.0	42.0
	INCREASED	98	15.8	58.0	100.0
	Total	169	27.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		

		Frequency	Percent	Valid Percent	Cumulative Percent
	NOT REACHED	25	4.0		
	OMITTED	234	37.6		
	System	7	1.1		
	Total	453	72.8		
Total		622	100.0		

PEDPRAC/YOURTEACH/QUALITY OF COACHING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	11	1.8	6.6	6.6
	MADE NO DIFFERENCE	45	7.2	27.1	33.7
	INCREASED	110	17.7	66.3	100.0
	Total	166	26.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	25	4.0		
	OMITTED	237	38.1		
	System	7	1.1		
	Total	456	73.3		
Total		622	100.0		

PEDPRAC/YOURTEACH/HELP INDIV STUDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	17	2.7	10.2	10.2
	MADE NO DIFFERENCE	64	10.3	38.6	48.8
	INCREASED	85	13.7	51.2	100.0
	Total	166	26.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	233	37.5		
	System	7	1.1		
	Total	456	73.3		

Total		622	100.0		

PEDPRAC/YOURTEACH/SOLVE TECH PROBLEMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	21	3.4	12.6	12.6
	MADE NO DIFFERENCE	65	10.5	38.9	51.5
	INCREASED	81	13.0	48.5	100.0
	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	232	37.3		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/YOURTEACH/TIME NEEDED FOR PREP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	28	4.5	17.0	17.0
	MADE NO DIFFERENCE	51	8.2	30.9	47.9
	INCREASED	86	13.8	52.1	100.0
	Total	165	26.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	234	37.6		
	System	7	1.1		
	Total	457	73.5		
Total		622	100.0		

PEDPRAC/YOURTEACH/QUAL OF INSTRUCTIONS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	14	2.3	8.5	8.5
	MADE NO DIFFERENCE	46	7.4	27.9	36.4
	INCREASED	105	16.9	63.6	100.0
	Total	165	26.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	234	37.6		
	System	7	1.1		
	Total	457	73.5		
Total		622	100.0		

PEDPRAC/YOURTEACH/CLASSROOM MANAGEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	24	3.9	14.5	14.5
	MADE NO DIFFERENCE	60	9.6	36.1	50.6
	INCREASED	82	13.2	49.4	100.0
	Total	166	26.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	233	37.5		
	System	7	1.1		
	Total	456	73.3		
Total		622	100.0		

PEDPRAC/YOURTEACH/CLASSROOM DISCUSSION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.9	7.2	7.2
	MADE NO DIFFERENCE	54	8.7	32.3	39.5
	INCREASED	101	16.2	60.5	100.0

	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	232	37.3		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/YOURTEACH/COLLAB BETW STUDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	14	2.3	8.4	8.4
	MADE NO DIFFERENCE	55	8.8	32.9	41.3
	INCREASED	98	15.8	58.7	100.0
	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	232	37.3		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/YOURTEACH/COMM WITH OUTSIDE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	15	2.4	9.0	9.0
	MADE NO DIFFERENCE	63	10.1	38.0	47.0
	INCREASED	88	14.1	53.0	100.0
	Total	166	26.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	233	37.5		

		Frequency	Percent	Valid Percent	Cumulative Percent
	System	7	1.1		
	Total	456	73.3		
Total		622	100.0		

PEDPRAC/YOURTEACH/NEW LEARNING CONTENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.9	7.2	7.2
	MADE NO DIFFERENCE	51	8.2	30.7	38.0
	INCREASED	103	16.6	62.0	100.0
	Total	166	26.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	233	37.5		
	System	7	1.1		
	Total	456	73.3		
Total		622	100.0		

PEDPRAC/YOURTEACH/LEARNING RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	13	2.1	7.8	7.8
	MADE NO DIFFERENCE	51	8.2	30.5	38.3
	INCREASED	103	16.6	61.7	100.0
	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	232	37.3		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/YOURTEACH/LEARNING ACTIVITIES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.9	7.2	7.2
	MADE NO DIFFERENCE	50	8.0	29.9	37.1
	INCREASED	105	16.9	62.9	100.0
	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	232	37.3		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/YOURTEACH/INDIV NEEDS OF STUD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.9	7.2	7.2
	MADE NO DIFFERENCE	59	9.5	35.3	42.5
	INCREASED	96	15.4	57.5	100.0
	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	232	37.3		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/YOURTEACH/EFFORT TO MOT STUD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	16	2.6	9.6	9.6

		Frequency	Percent	Valid Percent	Cumulative Percent
	MADE NO DIFFERENCE	58	9.3	34.7	44.3
	INCREASED	93	15.0	55.7	100.0
	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	232	37.3		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/YOURTEACH/PROG OF PERFORMANCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.9	7.2	7.2
	MADE NO DIFFERENCE	57	9.2	34.1	41.3
	INCREASED	98	15.8	58.7	100.0
	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	232	37.3		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/YOURTEACH/SELF CONFIDENCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DECREASED	12	1.9	7.2	7.2
	MADE NO DIFFERENCE	49	7.9	29.3	36.5
	INCREASED	106	17.0	63.5	100.0
	Total	167	26.8	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		

	NOT REACHED	29	4.7		
	OMITTED	232	37.3		
	System	7	1.1		
	Total	455	73.2		
Total		622	100.0		

PEDPRAC/ACTOR/DETERMINING CONTENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	334	53.7	84.6	84.6
	STUDENTS	9	1.4	2.3	86.8
	NA	52	8.4	13.2	100.0
	Total	395	63.5	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	29	4.7		
	OMITTED	4	.6		
	System	7	1.1		
	Total	227	36.5		
Total		622	100.0		

PEDPRAC/ACTOR/DETERMINING LEARN GOALS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	331	53.2	84.2	84.2
	STUDENTS	19	3.1	4.8	89.1
	NA	43	6.9	10.9	100.0
	Total	393	63.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	32	5.1		
	OMITTED	3	.5		
	System	7	1.1		
	Total	229	36.8		

Total		622	100.0		

PEDPRAC/ACTOR/GETTING STARTED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	311	50.0	79.5	79.5
	STUDENTS	39	6.3	10.0	89.5
	NA	41	6.6	10.5	100.0
	Total	391	62.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	33	5.3		
	OMITTED	4	.6		
	System	7	1.1		
	Total	231	37.1		
Total		622	100.0		

PEDPRAC/ACTOR/ORGANIZING GROUPING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	292	46.9	74.9	74.9
	STUDENTS	60	9.6	15.4	90.3
	NA	38	6.1	9.7	100.0
	Total	390	62.7	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	34	5.5		
	OMITTED	4	.6		
	System	7	1.1		
	Total	232	37.3		
Total		622	100.0		

PEDPRAC/ACTOR/CHOOSING LEARN RESOURCES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	322	51.8	82.4	82.4
	STUDENTS	29	4.7	7.4	89.8
	NA	40	6.4	10.2	100.0
	Total	391	62.9	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	34	5.5		
	OMITTED	3	.5		
	System	7	1.1		
	Total	231	37.1		
Total		622	100.0		

PEDPRAC/ACTOR/DECIDING LOCATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	324	52.1	83.7	83.7
	STUDENTS	15	2.4	3.9	87.6
	NA	48	7.7	12.4	100.0
	Total	387	62.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	34	5.5		
	OMITTED	7	1.1		
	System	7	1.1		
	Total	235	37.8		
Total		622	100.0		

PEDPRAC/ACTOR/PLANNING OF TIME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	341	54.8	86.5	86.5
	STUDENTS	9	1.4	2.3	88.8
	NA	44	7.1	11.2	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	394	63.3	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	34	5.5		
	System	7	1.1		
	Total	228	36.7		
Total		622	100.0		

PEDPRAC/ACTOR/DECIDING ON TIME NEEDED

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	313	50.3	79.6	79.6
	STUDENTS	28	4.5	7.1	86.8
	NA	52	8.4	13.2	100.0
	Total	393	63.2	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	34	5.5		
	OMITTED	1	.2		
	System	7	1.1		
	Total	229	36.8		
Total		622	100.0		

PEDPRAC/ACTOR/DECIDING WHEN TO TAKE TEST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	318	51.1	81.1	81.1
	STUDENTS	35	5.6	8.9	90.1
	NA	39	6.3	9.9	100.0
	Total	392	63.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	34	5.5		
	OMITTED	2	.3		
	System	7	1.1		

	Total	230	37.0		
Total		622	100.0		

PEDPRAC/ACTOR/DEMONSTRATING ACHIEVEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	264	42.4	68.4	68.4
	STUDENTS	79	12.7	20.5	88.9
	NA	43	6.9	11.1	100.0
	Total	386	62.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	34	5.5		
	OMITTED	8	1.3		
	System	7	1.1		
	Total	236	37.9		
Total		622	100.0		

PEDPRAC/ACTOR/MONITORING PROGRESS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	346	55.6	88.3	88.3
	STUDENTS	8	1.3	2.0	90.3
	NA	38	6.1	9.7	100.0
	Total	392	63.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	34	5.5		
	OMITTED	2	.3		
	System	7	1.1		
	Total	230	37.0		
Total		622	100.0		

PEDPRAC/ACTOR/PROVIDING FEEDBACK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	293	47.1	75.9	75.9
	STUDENTS	55	8.8	14.2	90.2
	NA	38	6.1	9.8	100.0
	Total	386	62.1	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	34	5.5		
	OMITTED	8	1.3		
	System	7	1.1		
	Total	236	37.9		
Total		622	100.0		

PEDPRAC/ACTOR/CHOOSING LEARN STRATEGIES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TEACHER	337	54.2	86.0	86.0
	STUDENTS	16	2.6	4.1	90.1
	NA	39	6.3	9.9	100.0
	Total	392	63.0	100.0	
Missing	LOGICALLY NOT APPLICABLE	187	30.1		
	NOT REACHED	35	5.6		
	OMITTED	1	.2		
	System	7	1.1		
	Total	230	37.0		
Total		622	100.0		

Placeholder for identification label
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SITES 2006

Second Information Technology in Education Study
--- Main Study ---

Principal Questionnaire

[International English Version]

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Instructions for NRCs

- Please check the introduction carefully for changes, insertions and deletions if you want to re-use parts of the FT translation.
- Refer to the accompanied list of changes from FT → MS to identify changed and adapted questions if you want to re-use parts of the FT translation.
- Text passages that are highlighted in yellow and enclosed in these <brackets> need to be adapted and documented on NAF for your country.
    - Where in the questionnaire <target grade> is written, insert here the grade level that is defined in your national sampling plan.
    - In the introduction, insert <national school definition> if needed. Follow instructions there. Consult Olaf Zuehlke (DPC) or Christian Monseur for further advice, if needed.
- Text passages that are highlighted in yellow and enclosed in these [brackets] need to be adapted for your country in this document, but do not require documentation on NAF.
- Some areas (text passages highlighted in yellow without brackets) require special attention. We expect slightly different terms to be used in national contexts. Adapt the following terms to your cultural context – if necessary – and document on the corresponding National Adaptation Form (NAF).
    - Question 4, dimension D: “guardians/caretakers”
    - Question 9, dimension H: “guardians/caretakers”
    - Question 25, Category: “External agency”
- Page breaks in this document have been inserted to ensure that no question/table breaks across pages. After translation you may need to adjust page breaks again. Retain section headings as first element on new pages. Do not change order of questions.
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- Delete this page including the page break after adaptation/translation.

Introduction

The Second Information Technology in Education Study (SITES 2006) is an international assessment of teaching and learning practices and of how Information and Communication Technologies (ICT) support these in secondary schools around the world. Approximately 20 countries will provide information from representative samples of teachers on how they organize their teaching and learning, the ICT facilities they have available at school, how they use ICT for teaching and learning, and the obstacles or difficulties they experience in relation to these technologies. This information will give better insight into the current state of pedagogical approaches and of how technologies support them. It will also allow educational practitioners and policy-makers to gain a better understanding of areas needing intervention and additional support.

[Name of country], along with about 20 other countries, is taking part in this international study of pedagogical practices and the way that ICT supports these. The study is being conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA).

We are asking you for your help in order to determine the current state of pedagogical approaches to and the use of ICT. Please try to answer each question as accurately as you can.

Confidentiality

All information that is collected in this study will be treated confidentially. At no time will the name of any school or individual be identified. While results will be made available by country and by type of school within a country, you are guaranteed that neither your school nor any of its personnel will be identified in any report of the results of the study. [*For countries which have ethical survey guidelines which emphasize voluntary participation:* Participation in this survey is voluntary and any individual may withdraw at any time.]

About this Questionnaire

- This questionnaire asks for information from schools about education and policy matters related to pedagogical practices and computers. **We would like the person who completes this questionnaire to be the principal of the school.** If you do not have the information to answer particular questions, please consult other persons in the school. This questionnaire will take approximately 30 minutes to complete.
- The words computers and ICT (Information and Communication Technologies) are used interchangeably in this questionnaire.
- Please note that some questions refer to the entire school, while other questions refer to Grade <target grade> only. [*For countries, in which the definition of 'school' is not obvious to respondents add appropriate description depending on how sampling units were defined in the national sampling plan*: When questions refer to 'your school' we mean by 'school': <national school definition>.]
- Guidelines for answering the questions are typed in *italics*. Most questions can be answered by marking the one most appropriate answer.
- If you are completing the paper version of this questionnaire, please use a writing pen or ballpoint to write your answers.
- When you have completed this questionnaire, please [National Return Procedures and Date].

Further information

- When in doubt about any aspect of the questionnaire, or if you would like more information about it or the study, you can reach us by phone at the following numbers: [National Center Contact Information]

Thank you very much for your cooperation!

Pedagogy at Your School

The following questions address the characteristics of teaching and learning in your school.

1. To what extent is each of the following aspects of teaching and learning currently present in your school?

Please mark only one choice in each row.

		Not at all	To some extent	A lot
A	Students develop abilities to undertake independent learning.	☐	☐	☐
B	Students learn to search for, process and present information.	☐	☐	☐
C	Students are largely responsible for controlling their own learning progress.	☐	☐	☐
D	Students learn and/or work during lessons at their own pace.	☐	☐	☐
E	Students are involved in cooperative and/or project-based learning.	☐	☐	☐
F	Students determine for themselves when to take a test.	☐	☐	☐
G	Students learn search strategies to find diverse types of relevant information.	☐	☐	☐
H	Students learn to assemble, organize and integrate information.	☐	☐	☐
I	Students learn to critically evaluate the validity and value of information obtained from their searches on the Internet.	☐	☐	☐
J	Students present work using several forms of presentation (e.g., text, visual, verbal, electronic).	☐	☐	☐
K	Students are assigned projects that require several persons working together for an extended period of time.	☐	☐	☐
L	Students have autonomy to decide what topics to study.	☐	☐	☐

2. To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages Mathematics and Science teachers at Grade <target grade> to achieve the following goals?

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	To cover the prescribed curriculum content ...	☐	☐	☐	☐
B	To improve students' performance on assessments/examinations	☐	☐	☐	☐
C	To individualize student learning experiences in order to address different learning needs ..	☐	☐	☐	☐
D	To increase learning motivation and make learning more interesting	☐	☐	☐	☐
E	To foster students' ability and readiness to set own learning goals and to plan, monitor and evaluate own progress	☐	☐	☐	☐
F	To foster collaborative and organizational skills when working in teams	☐	☐	☐	☐
G	To provide activities which incorporate real-world examples/settings/applications for student learning	☐	☐	☐	☐
H	To provide opportunities for students to learn from experts and peers from other schools/organizations/countries	☐	☐	☐	☐
I	To foster communication skills in face-to-face and/or on-line situations	☐	☐	☐	☐
J	To prepare students for responsible Internet behavior (e.g., not to commit mail-bombing, such as spam, etc.) and/or to cope with cybercrime (e.g., Internet fraud, illegal access to secure information, etc.)	☐	☐	☐	☐

Pedagogy and ICT in your school

This section asks you to answer questions about pedagogy and ICT in your school.

3. For each of the following, how important is the use of ICT at Grade <target grade> in your school?

Please mark only one choice in each row.

		Not at all	A little	Somewhat	A lot
A	To prepare students for the world of work	☐	☐	☐	☐
B	To improve students' performance on assessments/examinations	☐	☐	☐	☐
C	To promote active learning strategies	☐	☐	☐	☐
D	To individualize student learning experiences in order to address different learning needs	☐	☐	☐	☐
E	To foster collaborative and organizational skills when working in teams	☐	☐	☐	☐
F	To develop students' independence and responsibility for their own learning	☐	☐	☐	☐
G	To do exercises to practice skills and procedures	☐	☐	☐	☐
H	To increase learning motivation and make learning more interesting	☐	☐	☐	☐
I	To satisfy parents' and the community 's expectations	☐	☐	☐	☐
J	To act as a catalyst in changing the pedagogical approaches of teachers	☐	☐	☐	☐

4. **To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages teachers at Grade <target grade> to use ICT in each of the following activities?**

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	Organize, monitor and support team-building and collaboration among students	☐	☐	☐	☐
B	Organize and/or mediate communication between students and experts/external mentors	☐	☐	☐	☐
C	Facilitate collaboration (within or outside of school) on student activities	☐	☐	☐	☐
D	Collaborate with parents/guardians/ caretakers in supporting/monitoring students' learning and/or in providing counseling	☐	☐	☐	☐
E	Provide students with experiences that show them how certain activities are done in real life or by experts	☐	☐	☐	☐

5. Are the following actions with regard to ICT at Grade <target grade> taken in your school?

Please mark only one choice in each row.

		No	Yes
A	Setting up security measures to prevent unauthorized system access or entry	☐	☐
B	Restricting the number of hours students are allowed to use the computer	☐	☐
C	Allowing students to access school computers outside school hours	☐	☐
D	Allowing students to access computers outside class hours (but during school hours)	☐	☐
E	Honouring of intellectual property rights (e.g., software copyrights)	☐	☐
F	Prohibiting access to adult-only material (e.g., pornography, violence)	☐	☐
G	Restricting the playing of games on school computers	☐	☐
H	Specifying the compulsory computer-related knowledge and skills that students need	☐	☐
I	Giving the local community (parents and/or others) access to school computers and/or the Internet	☐	☐
J	Complementing printed lesson materials with digital resources for teaching and learning	☐	☐
K	Providing teachers with laptop computers and/or other mobile learning devices	☐	☐
L	Providing students with laptop computers and/or other mobile learning devices	☐	☐

6. What priority level do you give to resource allocation in your school in order to enhance the use of ICT in teaching and learning for the Grade <target grade> students in your school?

Please mark only one choice in each row.

		Not a priority	Low priority	Medium priority	High priority
A	To decrease the number of students per computer	☐	☐	☐	☐
B	To increase the number of computers connected to the Internet	☐	☐	☐	☐
C	To increase the bandwidth for Internet access of the computers connected to the Internet ...	☐	☐	☐	☐
D	To increase the range of digital learning resources related to the school curriculum	☐	☐	☐	☐
E	To establish/enhance an online learning support platform and its management so that teaching and learning can take place any time, anywhere	☐	☐	☐	☐
F	To improve the technical skills of teachers	☐	☐	☐	☐
G	To improve the ability of teachers to make good pedagogical use of ICT	☐	☐	☐	☐
H	To broaden teachers' pedagogical repertoire and to widen their pedagogical competence to engage in new methods of teaching and learning	☐	☐	☐	☐
I	To improve students' ICT skills	☐	☐	☐	☐
J	To provide teachers with incentives (including salary adjustment, promotion, etc.) to integrate ICT use in their teaching	☐	☐	☐	☐
K	To increase the number of teachers using ICT for teaching/learning purposes	☐	☐	☐	☐

7. Has the school leadership (you and/or other school leaders) taken any of the following actions during the past few years?

Please mark only one choice in each row.

		No	Yes
A	Re-allocating workload to allow for collaborative planning for innovations in the classrooms	☐	☐
B	Re-allocating workload to allow for the provision of technical support for innovations	☐	☐
C	Organizing workshops to demonstrate the use of ICT-supported teaching and learning	☐	☐
D	Meeting teachers to review their pedagogical approach	☐	☐
E	Monitoring and evaluating the implementation of pedagogical changes	☐	☐
F	Establishing new teacher teams to coordinate the implementation of innovations in teachers' teaching and learning	☐	☐
G	Changing class schedules to facilitate the implementation of innovations	☐	☐
H	Implementing incentive schemes to encourage teachers to integrate ICT in their lessons	☐	☐
I	Encouraging teachers collaborate with external experts to improve their teaching and learning practices	☐	☐
J	Featuring new instructional methods in the school newspaper and/or other media (e.g., the school website)	☐	☐
K	Involving parents in ICT related activities	☐	☐

8. To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages teachers in Grade <target grade> to undertake the following activities

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	Assigning extended projects (2 weeks or longer)	☐	☐	☐	☐
B	Assigning short-task projects	☐	☐	☐	☐
C	Assigning production projects (e.g. making models or reports)	☐	☐	☐	☐
D	Involving students in self-accessed courses and/or learning activities	☐	☐	☐	☐
E	Involving students in open-ended scientific investigations	☐	☐	☐	☐
F	Undertaking field study activities	☐	☐	☐	☐
G	Using virtual laboratories, simulations	☐	☐	☐	☐
H	Applying exercises to practice skills and procedures	☐	☐	☐	☐
I	Involving students in laboratory experiments with clear instructions and well-defined outcomes	☐	☐	☐	☐
J	Involving students in studying natural phenomena through simulations	☐	☐	☐	☐
K	Involving students in processing and analyzing data	☐	☐	☐	☐

9. During this school year, how often did the school leadership (you and/or other school leaders) undertake each of the following?

Please mark only one choice in each row.

		Not at All	A few times	Monthly	Weekly
A	Organize activities to develop a common vision of what is meant by quality education .	☐	☐	☐	☐
B	Inform teachers about pedagogical changes taking place in the school	☐	☐	☐	☐
C	Inform teachers about educational developments outside the school	☐	☐	☐	☐
D	Consult teachers about desired pedagogical changes	☐	☐	☐	☐
E	Discuss with teachers what they want to achieve through their lessons	☐	☐	☐	☐
F	Motivate teachers to critically assess their own educational practices critically	☐	☐	☐	☐
G	Encourage teachers to assess their educational practices in the context of our school's goals	☐	☐	☐	☐
H	Discuss with parents/guardians/caretakers what pedagogical changes are taking place in our school	☐	☐	☐	☐
I	Discuss with students the teaching and learning in our school	☐	☐	☐	☐

10. To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages the following activities to take place in Grade <target grade>?

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	Teachers co-teach with their colleagues	☐	☐	☐	☐
B	Teachers collaborate with teachers from other schools...	☐	☐	☐	☐
C	Teachers discuss the problems that they experience at work with their colleagues	☐	☐	☐	☐
D	Teachers collaborate with teachers from other countries	☐	☐	☐	☐

11. To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages teachers to use each of the following types of assessment at Grade <target grade>?

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	Written test/examination	☐	☐	☐	☐
B	Written task/exercise	☐	☐	☐	☐
C	Individual oral presentation	☐	☐	☐	☐
D	Group presentation (oral/written)	☐	☐	☐	☐
E	Project report and/or (multimedia) product	☐	☐	☐	☐
F	Students' peer evaluations	☐	☐	☐	☐
G	Portfolio/learning log	☐	☐	☐	☐
H	Group assessment scores for collaborative tasks	☐	☐	☐	☐

Staff Development for Teachers and the School Leadership

The following contains a number of questions about staff development for Mathematics and/or Science teachers teaching Grade <target grade> and for the school leadership.

12. Are teachers of Mathematics and/or Science at Grade <target grade> required or encouraged to acquire knowledge and skills in each of the following?

Please mark only one choice in each row.

		No	Yes Encouraged	Yes Required
A	Integrating Web-based learning in their instructional practice	☐	☐	☐
B	Using new ways of assessment (portfolios, peer reviews, etc.)	☐	☐	☐
C	Developing real-life assignments for students	☐	☐	☐
D	Using real-life assignments developed by others	☐	☐	☐
E	Using computers for monitoring student progress	☐	☐	☐
F	Organizing forms of team-teaching	☐	☐	☐
G	Collaborating with other teachers via ICT	☐	☐	☐
H	Communicating with parents via ICT	☐	☐	☐
I	Being knowledgeable about the pedagogical issues of integrating ICT into teaching and learning	☐	☐	☐
J	Using subject-specific learning software (e.g., tutorials, simulation)	☐	☐	☐

13. How much of a priority is it for your school leadership (you and/or other school leaders) to acquire competencies in the following areas?

Please mark only one choice in each row.

		Not considered	Low priority	Medium priority	High priority
A	Developing a common pedagogical vision among teaching staff in the school	☐	☐	☐	☐
B	Managing the innovation of pedagogical practices in the school	☐	☐	☐	☐
C	Explaining to teachers the relevance of encouraging students to be responsible for their own learning process and outcomes	☐	☐	☐	☐
D	Identifying best practices that exist outside the school regarding the integration of ICT in learning	☐	☐	☐	☐
E	Promoting collaboration between teachers of different subjects	☐	☐	☐	☐
F	Managing the adoption of ICT-supported methods for assessing student progress ...	☐	☐	☐	☐
G	Organizing cooperation with other schools regarding the development of teaching and learning materials	☐	☐	☐	☐
H	Organizing cooperation with other schools regarding the development of ICT-based teaching and learning	☐	☐	☐	☐
I	Promoting the integration of ICT in the teaching and learning of traditional subjects	☐	☐	☐	☐
J	Developing a strategic plan for integrating ICT use in teaching and learning	☐	☐	☐	☐

Pedagogical Support for Persons Using ICT

14. How frequently does each of the following persons provide pedagogical support to those teachers in Grade <target grade> who want to use ICT for their teaching and learning activities?

Note: Pedagogical support may consist of giving advice and guidance on issues related to teaching and learning. Please do not consider support that is only technical.

Please mark only one choice in each row.

		Never	Few times a year	Monthly	Weekly	Not applicable
A	Experienced colleagues	☐	☐	☐	☐	☐
B	The school principal	☐	☐	☐	☐	☐
C	The technology coordinator	☐	☐	☐	☐	☐
D	Other staff from the school	☐	☐	☐	☐	☐
E	Experts from outside the school	☐	☐	☐	☐	☐

15. For each of the following activities, to what extent is pedagogical support available for teachers in Grade <target grade>?

Note: Pedagogical support may consist of advice and guidance (via persons, manuals, etc.) with regard to the activities mentioned below. Please do not consider support that is only technical.

Please mark only one choice in each row.

		Not at all	A little	Somewhat	A lot	Not applicable
A	Having students produce outcomes of media production projects (e.g., development of websites)	☐	☐	☐	☐	☐
B	Having students work on short projects (2 weeks or shorter)	☐	☐	☐	☐	☐
C	Having students work on extended projects (longer than 2 weeks)	☐	☐	☐	☐	☐
D	Having students collaborate with others by online means, such as online discussion forums	☐	☐	☐	☐	☐
E	Having students conduct open-ended scientific investigations	☐	☐	☐	☐	☐
F	Having students engage in field study activities	☐	☐	☐	☐	☐

Obstacles

16. To what extent is your school's capacity to realize its pedagogical goals hindered by each of the following obstacles?

Please mark only one choice in each row.

ICT-related obstacles		Not at all	A little	Somewhat	A lot	Not applicable
A	Insufficient qualified technical personnel to support the use of ICT	☐	☐	☐	☐	☐
B	Insufficient number of computers connected to the Internet	☐	☐	☐	☐	☐
C	Insufficient Internet bandwidth or speed .	☐	☐	☐	☐	☐
D	Lack of special ICT equipment for disabled students	☐	☐	☐	☐	☐
E	Insufficient ICT equipment for instruction	☐	☐	☐	☐	☐
F	Computers are out of date	☐	☐	☐	☐	☐
G	Not enough digital educational resources for instruction	☐	☐	☐	☐	☐
H	Lack of ICT tools for science laboratory work	☐	☐	☐	☐	☐
I	Teachers' lack of ICT skills	☐	☐	☐	☐	☐
J	Insufficient time for teachers to use ICT .	☐	☐	☐	☐	☐
Other obstacles						
K	Pressure to score highly on standardized tests	☐	☐	☐	☐	☐
L	Prescribed curricula are too strict	☐	☐	☐	☐	☐
M	Insufficient or inappropriate space to accommodate the school's pedagogical approaches	☐	☐	☐	☐	☐
N	Insufficient budget for non ICT-supplies (e.g., paper, pencils)	☐	☐	☐	☐	☐
O	Using ICT for teaching and/or learning is not a goal of our school	☐	☐	☐	☐	☐

Organization of Learning

The questions below are about grouping of students and time schedules.

17. How often would visitors, who walk into a lesson in your school on a typical day, observe the following in Grade <target grade>?

Please mark only one choice in each row.

		Never	Sometimes	Often	Nearly always
A	Whole classes of students in their classroom with one teacher	☐	☐	☐	☐
B	In large classrooms, students working under the supervision of a team of teachers	☐	☐	☐	☐
C	Individuals or small groups of students being coached by teachers	☐	☐	☐	☐
D	Individuals or small groups of students working on their own at places they choose themselves	☐	☐	☐	☐

18. How often could students at your school expect the following to occur at Grade <target grade>?

Please mark only one choice in each row.

		Never	Sometimes	Often	Nearly always
A	Students working in different groups according to the projects they are engaged in or the subjects they are taking	☐	☐	☐	☐
B	Students all working in the same group (class)	☐	☐	☐	☐
C	Students spending their time in school following lessons according to a fixed schedule	☐	☐	☐	☐
D	Changes to the usual time schedule if students need time to complete their projects	☐	☐	☐	☐
E	Students having a lot of freedom to plan their own learning time	☐	☐	☐	☐

School Characteristics

The intention of this set of questions is to describe the general characteristics of your school.

19. What is the total number of boys and girls in the entire school?

Please write a whole number. Write 0 (zero), if none.

☐☐☐☐ Total number of girls ☐☐☐☐ Total number of boys

20. What are the lowest and highest grade levels in your school?

Please mark only one choice in each row.

		Kinder-garten	1	2	3	4	5	6	7	8	9	10	11	12	13
A	Lowest	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
B	Highest	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

21. How many people live in the city, town, or village where your school is located?

Please mark only one choice.

☐ 3,000 people or fewer

☐ 3,001 to 15,000 people

☐ 15,001 to 50,000 people

☐ 50,001 to 100,000 people

☐ 100,001 to 500,000 people

☐ More than 500,000 people

22. Approximately what percentage of students are absent from your school on a typical school day?

Please mark only one choice.

☐ Less than 5%

☐ 5–10%

☐ 11–20%

☐ More than 20%

23. Approximately what percentage of students in your school are native speakers of <national language = language of instruction>?

Please mark only one choice.

- ☐ Less than 50%
- ☐ 50-75%
- ☐ 76-90%
- ☐ More than 90%

24. Has your school been involved in any of the following activities during the past few years?

Please mark only one choice in each row.

		No	Yes
A	Making changes to pedagogical practices	☐	☐
B	Adopting new assessment practices	☐	☐
C	Connecting to the Internet	☐	☐
D	Adapting buildings to suit the school's pedagogical approaches	☐	☐
E	Setting up computers in classrooms	☐	☐
F	Installing computer laboratories	☐	☐

25. Who at your school has the primary responsibility for making decisions about each of the following?

Please mark only one choice in each row.

		External agency	School leadership	Subject department	Teachers	Not applicable
A	Purchasing ICT equipment	☐	☐	☐	☐	☐
B	Selecting subject content to be learned	☐	☐	☐	☐	☐
C	Determining which pedagogical approaches will be used	☐	☐	☐	☐	☐
D	Choosing whether ICT is used	☐	☐	☐	☐	☐
E	Assessing learning progress in the classroom	☐	☐	☐	☐	☐
F	Using mobiles and/or handheld devices for instructional purposes	☐	☐	☐	☐	☐

Personal Background Information

Below are a few questions about your personal background.

26. Think about a new development/change that you consider highly satisfying, related to the learning experiences of students, that occurred in your school and under your principalship during the current academic year. Did you play any of the following roles in this new development?

Please mark only one choice in each row.

		No	Yes
A	I initiated the change, and teachers in our school further developed and implemented it.	☐	☐
B	I initiated the change, and I contributed substantially to its development and implementation.	☐	☐
C	Teachers initiated the change. The change was basically a bottom-up initiative that did not require my support.	☐	☐
D	Teachers initiated the change. My role was mainly in the form of moral support.	☐	☐
E	Teachers initiated the change, and I allocated resources and necessary staffing to support it.	☐	☐
F	The school management board initiated the change, and I led its development and implementation.	☐	☐
G	Parents/community groups initiated the change, and I supported its realization.	☐	☐
H	Students initiated the change, and I supported its realization.	☐	☐

27. Including this school year, how many years have you been:

Please mark only one choice in each row.

		Less than 3 years	3-5 years	6-10 years	11-20 years	21 years or more
A	Principal of any school (including years as principal in this school)	☐	☐	☐	☐	☐
B	Principal of this school	☐	☐	☐	☐	☐
C	Working in any professional capacity at this school (including years as teacher, vice-principal, and principal)	☐	☐	☐	☐	☐

28. What is your age?

- ☐ 30 years or less
- ☐ 31-35 years
- ☐ 36–45 years
- ☐ 46-55 years
- ☐ More than 55 years

29. Please indicate whether you are:

- ☐ Female
- ☐ Male

30. Are you involved in fundraising for ICT-related matters in your school?

Please mark only one choice.

- ☐ Yes, I personally spend quite some time doing this.
- ☐ I am involved in this, but another person/other people in the school do the major part of the job.
- ☐ No, we outsource fundraising matters.
- ☐ No, I and those of my colleagues involved in the school's leadership, spend no or very little time on this.
- ☐ Not applicable

31. Altogether, how often do you personally use a computer?

Please mark only one choice.

- ☐ Never→ ***Please proceed to the end of the questionnaire.***
- ☐ A few times per year
- ☐ Almost monthly
- ☐ Weekly
- ☐ Daily

32. Do you use your computer for any of the following?

Please mark only one choice in each row.

		No	Yes
A	Writing documents and letters	☐	☐
B	Budgeting, monitoring or controlling expenses	☐	☐
C	Planning purposes	☐	☐
D	Communicating with teachers	☐	☐
E	Communicating with parents	☐	☐
F	Teaching/instruction	☐	☐
G	Time tabling	☐	☐
H	Searching for information	☐	☐
I	Developing and making presentations	☐	☐
J	Own professional development	☐	☐

33. Do you have access to a computer at home?

☐ No → ***Please proceed to the end of the questionnaire.***

☐ Yes → ***Please continue.***

34. Do you use this computer for the following activities?

Please mark only one choice in each row.

		No	Yes
A	School related activities	☐	☐
B	Connecting to the internet	☐	☐

This is the end of the questionnaire.
Thank you very much for your cooperation!

[Return Instructions]

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SITES 2006

Second Information Technology in Education Study
--- Main Study ---

Technical Questionnaire

[International English Version]

International Association for the Evaluation of Educational Achievement

[Put logos, national center references and credit here]

Instructions for NRCs

- Please check the introduction carefully for changes, insertions and deletions if you want to re-use parts of the FT translation.
- Refer to the accompanied list of changes from FT → MS to identify changed and adapted questions if you want to re-use parts of the FT translation.
- Text passages that are highlighted in yellow and enclosed in these <brackets> need to be adapted and documented on NAF for your country.
    - Where in the questionnaire <target grade> is written, insert here the grade level that is defined in your national sampling plan.
    - In the introduction, insert <national school definition> if needed. Follow instructions there. Consult Olaf Zuehlke (DPC) or Christian Monseur for further advice, if needed.
    - With regard to <grade range>: In Module 1 the grade range was generally defined as ranging from target grade minus 1 until target grade plus 1. This range was used for questions that were too general to ask at the target grade level, but for which it was expected (sometimes evidence-based) that the answers might differ between for instance upper- and lower secondary levels in a school. Special cases consisted of countries where there was a school level boundary somewhere within this grade range. In general it is advised to use the same translation as in Module-1 for Population 2. When in doubt, please contact the ICC.
- Text passages that are highlighted in yellow and enclosed in these [brackets] need to be adapted for your country in this document, but do not require documentation on NAF.
- Some areas (text passages highlighted in yellow without brackets) require special attention. We expect slightly different terms to be used in national contexts. Adapt the following terms to your cultural context – if necessary – and document on the corresponding National Adaptation Form (NAF).
    - Question 3, add more national subjects after dimension F by inserting new rows, if necessary;
    - Question 4, dimension E: “Data-logging tools”;
    - Question 4, dimension I, “cell phone”;
    - Question 4, dimension I, “web-based learning environments”;
    - Question 10, dimension D, “ministry/local/regional authorities”;
- Page breaks in this document have been inserted to ensure that no question/table breaks across pages. After translation you may need to adjust page breaks again. Retain section headings as first element on new pages. Do not change order of questions.
- Remove all highlights from questionnaire after adaptation/translation.
- Delete this page including the page break after adaptation/translation.

Introduction

The Second Information Technology in Education Study (SITES 2006) is an international assessment of teaching and learning practices and of how Information and Communication Technologies (ICT) support these in secondary schools around the world. Approximately 20 countries will provide information from representative samples of teachers on how they organize their teaching and learning, the ICT facilities they have available at school, how they use ICT for teaching and learning, and the obstacles or difficulties they experience in relation to these technologies. This information will give better insight into the current state of pedagogical approaches and of how technologies support them. It will also allow educational practitioners and policy-makers to gain a better understanding of areas needing intervention and additional support.

[Name of country], along with about 20 other countries, is taking part in this international study of pedagogical practices and the way that ICT supports these. The study is being conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA).

We are asking you for your help in order to determine the current state of pedagogical approaches to and the use of ICT. Please try to answer each question as accurately as you can.

Confidentiality

All information that is collected in this study will be treated confidentially. At no time will the name of any school or individual be identified. While results will be made available by country and by type of school within a country, you are guaranteed that neither your school nor any of its personnel will be identified in any report of the results of the study. [*For countries which have ethical survey guidelines which emphasize voluntary participation:* Participation in this survey is voluntary and any individual may withdraw at any time.]

About this Questionnaire

- This questionnaire asks for information from schools about education and policy matters related to pedagogical practices and ICT. **If you are the person answering this questionnaire, it is important that you are someone who knows about the ICT facilities in your school and about practices regarding their use in your school.** If you do not have the information to answer particular questions, then please consult other persons in your school. The questionnaire will take you approximately 30 minutes to complete.
- The words computers and ICT (Information and Communication Technologies) are used interchangeably in this questionnaire.
- Please note that some questions refer to the entire school, other questions refer to Grades <grade range>, while some questions pertain to Grade <target grade> only. [*For countries, in which the definition of 'school' is not obvious to respondents add appropriate description depending on how sampling units were defined in the national sampling plan*: When questions refer to 'your school' we mean by 'school': <national school definition>.]
- Guidelines for answering the questions are typed in *italics*. Most questions can be answered by marking the one most appropriate answer. When a question states, "*Please mark all that apply*", you may give more than one answer.
- If you are completing the paper version of this questionnaire, please use a writing pen or ballpoint to write your answers.
- When you have completed this questionnaire, please [National Return Procedures and Date].

Further information

- When in doubt about any aspect of the questionnaire, or if you would like more information about it or the study, you can reach us by phone at the following numbers: [National Center Contact Information]

Thank you very much for your cooperation!

ICT in Your School

1. How many years has your school been using ICT for teaching and/or learning purposes for students in Grades <grade range>?

Please mark only one choice.

- ☐ 0–2 years
- ☐ 3–5 years
- ☐ 6–10 years
- ☐ 11–15 years
- ☐ More than 15 years
- ☐ Don't know

2. To what extent do you agree with each of the following statements about the use of ICT in your school?

Please mark only one choice in each row.

		Strongly disagree	Disagree	Agree	Strongly agree
A	ICT is considered relevant in our school.	☐	☐	☐	☐
B	Our school has integrated ICT in most of our teaching and learning practices.	☐	☐	☐	☐
C	We have started to use ICT in the teaching and learning of school subjects.	☐	☐	☐	☐
D	We still do not know which ICT applications are useful for our school.	☐	☐	☐	☐
E	Constraints rule out the use of ICT in our school.	☐	☐	☐	☐

3. Approximately how often during this school year will students in Grade <target grade> be using ICT for learning in the following subject domains?

Please mark only one choice in each row.

		Never	Sometimes	Often	Nearly always
A	Mathematics	☐	☐	☐	☐
B	Natural Sciences	☐	☐	☐	☐
C	Social Sciences	☐	☐	☐	☐
D	Language of instruction (mother tongue)........	☐	☐	☐	☐
E	Foreign languages	☐	☐	☐	☐
F	ICT as separate subject...............................	☐	☐	☐	☐

Resource Materials

4. For each of the following technology applications, indicate whether it is available and whether you need it in your school for teaching and/or learning in Grade <target grade>.

Please mark only one choice in each row.

		Available	Needed but not available	Not needed and not available
A	Equipment and hands-on materials (e.g., laboratory equipment, musical instruments, art materials, overhead projectors, slide projectors, electronic calculators)	☐	☐	☐
B	Tutorial/exercise software	☐	☐	☐
C	General office suite (e.g., word-processing, database, spreadsheet, presentation software)	☐	☐	☐
D	Multimedia production tools (e.g., media capture and editing equipment, drawing programs, webpage/multimedia production tools)	☐	☐	☐
E	Data-logging tools	☐	☐	☐
F	Simulations/modeling software/digital learning games	☐	☐	☐
G	Communication software (e.g., e-mail, chat, discussion forum)	☐	☐	☐
H	Digital resources (e.g., portal, dictionaries, encyclopedia)	☐	☐	☐
I	Mobile devices (e.g., Personal Digital Assistant (PDA), cell phone)	☐	☐	☐
J	Smart board/interactive whiteboard	☐	☐	☐
K	Learning management system (e.g., web-based learning environments)	☐	☐	☐
L	Mail accounts for teachers	☐	☐	☐
M	Mail accounts for students	☐	☐	☐

Hardware

5. In your school, about how many computers (including laptops) are:

Count terminals (if they have a keyboard and a screen) as computers

Count laptops as computers

Exclude computers which are not in use

Exclude computers which are only used as servers

Exclude graphical calculators and Personal Digital Assistants (PDAs), hand-held computers and smartphones (phone integrated with PDA)

Please write a whole number. Write 0 (zero), if none

- [ ] Available in the school altogether?
- [ ] Available to students in Grades <grade range>?
- [ ] Available only to teachers?
- [ ] Available only to administrative staff?
- [ ] Connected to the Internet/World Wide Web?
- [ ] Connected to a local area network (LAN)?
- [ ] Multimedia computers (equipped with a CD-ROM and/or DVD)?

6. How many of the computers in your school are laptops?

Please write a whole number. Write 0 (zero), if none

- [ ] Laptops

7. In your school, about how many of the following (school-owned) technologies are available?

A Personal Digital Assistant (PDA) is a palmtop with roughly the same functionalities as a PC.

Please write a whole number. Write 0 (zero), if none.

- [ ] PDAs and smartphones (phone integrated with PDA)
- [ ] Graphic calculators
- [ ] Smartboards (interactive whiteboard system)
- [ ] Projectors for presentation of digital materials

8. In your school, about what percentage of students bring any of the following to school?

Please mark only one choice in each row.

	Less than 10%	10–24%	25–49%	50–75%	More than 75%
PDAs/smartphones	☐	☐	☐	☐	☐
Graphic calculators	☐	☐	☐	☐	☐
Laptops	☐	☐	☐	☐	☐

9. Where are the computers for teaching and learning in Grade <target grade> located?

Please mark only one choice in each row.

		No	Yes
A	Most classrooms	☐	☐
B	Some classrooms	☐	☐
C	Computer laboratories	☐	☐
D	Library	☐	☐
E	Other places	☐	☐

10. Who is involved in the maintenance of computers in your school?

Please mark only one choice in each row.

		No	Yes
A	The school's own staff	☐	☐
B	Staff from other schools	☐	☐
C	An external company hired by the school	☐	☐
D	An external unit arranged by the ministry/local/regional authorities	☐	☐

Staff Development

11. Have teachers in your school acquired knowledge and skills in using ICT for teaching and learning in any of the following ways?

Please mark only one choice in each row.

		No	Yes
A	Via informal contacts/communication	☐	☐
B	Via the ICT coordinator or technical assistant	☐	☐
C	Via in-school courses	☐	☐
D	Via training from a teacher who has attended a course	☐	☐
E	Via the school's working group or committee for ICT in education	☐	☐
F	During meetings of the teaching staff where the use of ICT/computers in education is a regular item for discussion	☐	☐
G	Via a regular newsletter (printed or electronic)	☐	☐
H	Via courses conducted by an external agency or expert (in the school or on distance)	☐	☐
I	Via observation of and discussion with colleagues	☐	☐
J	Via reading professional journals and similar publications	☐	☐

12. For each of the following ICT-related courses, please indicate whether it is available to teachers in your school and who provides the course (inside or outside the school).

Please mark all that apply in each row.

		Not available	Available provider is school-based	Available provider is an external organization
A	Introductory course for Internet use and general applications (basic word-processing, spreadsheet, databases, etc.)	☐	☐	☐
B	Technical course for operating and maintaining computer systems	☐	☐	☐
C	Advanced course for applications/standard tools (e.g., advanced word-processing, complex relational databases)	☐	☐	☐
D	Advanced course for Internet use (e.g., creating websites/developing a home page, advanced use of Internet, video conferencing)	☐	☐	☐
E	Course on pedagogical issues related to integrating ICT into teaching and learning	☐	☐	☐
F	Subject-specific training with learning software for specific content goals (e.g., tutorials, simulation, etc.)	☐	☐	☐
G	Course on multimedia use (e.g., digital video and/or audio equipment)	☐	☐	☐

Support Facilities for ICT

13. Do you hold any of the following positions at your school?

Please mark only one choice in each row.

		No	Yes
A	Principal	☐	☐
B	Deputy principal	☐	☐
C	Head of department	☐	☐
D	Teacher	☐	☐
E	Librarian	☐	☐
F	Other than above	☐	☐

14. Which of the following duties do you have?

Please mark only one choice in each row.

		No	Yes
A	I teach ICT courses to students.	☐	☐
B	I teach ICT courses to teachers and other school staff.	☐	☐
C	I teach Mathematics and/or Science.	☐	☐
D	I teach other subjects.	☐	☐
E	I formally serve as ICT coordinator.	☐	☐
F	I informally serve as ICT coordinator.	☐	☐

15. Approximately how many 60 minute periods, on average per week, do the following persons spend on providing ICT support to teachers and students at your school?

Note: "Support" includes any services (formal or informal, technical or pedagogical) that help teachers and students use ICT.

Please write a whole number. Write 0 (zero) if none.

- ☐☐ Yourself
- ☐☐ ICT staff (not including yourself)
- ☐☐ Other administrators and staff (e.g., media specialist)
- ☐☐ Teachers
- ☐☐ Students from own school who are assigned to provide this service
- ☐☐ Volunteers from outside the school (e.g., parents)
- ☐☐ Personnel from external companies
- ☐☐ Others

16. To what extent is technical support available in your school if teachers want to use ICT for the following activities?

Please mark only one choice in each row.

		No support	Some support	Extensive support	Not applicable
A	Assigning extended projects (2 weeks or longer) ...	☐	☐	☐	☐
B	Assigning short-task projects	☐	☐	☐	☐
C	Assigning production projects (e.g. making models or reports)	☐	☐	☐	☐
D	Involving students in self-accessed courses and/or learning activities	☐	☐	☐	☐
E	Involving students in scientific investigations (open-ended)	☐	☐	☐	☐
F	Undertaking field study activities	☐	☐	☐	☐
G	Using virtual laboratories, simulations	☐	☐	☐	☐
H	Applying exercises to practice skills and procedures	☐	☐	☐	☐
I	Involving students in laboratory experiments with clear instructions and well-defined outcomes	☐	☐	☐	☐
J	Involving students in studying natural phenomena through simulations	☐	☐	☐	☐
K	Involving students in processing and analyzing data	☐	☐	☐	☐

Obstacles

17. To what extent is your school's capacity to realize its pedagogical goals hindered by each of the following obstacles?

Please mark only one choice in each row.

		Not at all	Very little	Somewhat	To a great extent	Not applicable
A	Insufficient qualified technical personnel to support the use of ICT	☐	☐	☐	☐	☐
B	Insufficient number of computers connected to the Internet	☐	☐	☐	☐	☐
C	Insufficient Internet bandwidth or speed ..	☐	☐	☐	☐	☐
D	Lack of special ICT equipment for disabled students	☐	☐	☐	☐	☐
E	Insufficient ICT equipment for instruction .	☐	☐	☐	☐	☐
F	Computers are out of date	☐	☐	☐	☐	☐
G	Not enough digital educational resources for instruction	☐	☐	☐	☐	☐
H	Lack of ICT tools for science laboratory work	☐	☐	☐	☐	☐
I	Teachers' lack of ICT skills	☐	☐	☐	☐	☐
J	Insufficient time for teachers to use ICT ...	☐	☐	☐	☐	☐
Other obstacles						
K	Pressure to score highly on standardized tests	☐	☐	☐	☐	☐
L	Prescribed curricula are too strict	☐	☐	☐	☐	☐
M	Insufficient or inappropriate space to accommodate the school's pedagogical approaches	☐	☐	☐	☐	☐
N	Insufficient budget for non ICT-supplies (e.g., paper, pencils)	☐	☐	☐	☐	☐
O	Using ICT for teaching and learning is not a goal of our school	☐	☐	☐	☐	☐

18. Do you have access to a computer at home?

- ☐ No → ***Please proceed to the end of the questionnaire.***
- ☐ Yes → ***Please continue.***

19. Do you use this computer for the following activities?

Please mark only one choice in each row.

		No	Yes
A	School related activities	☐	☐
B	Connecting to the internet	☐	☐

This is the end of the questionnaire.
Thank you very much for your cooperation!

[Return Instructions]