An investigation of Communities of Inquiry within a blended mode of delivery for Technology Education

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ABSTRACT

Keywords: online learning, blended learning, Community of Inquiry, Technology Education, graduate teacher training, design-based research

Enhanced innovative learning through the purposeful development of effective blended teaching and learning environments supported by a variety of interfaces is a strategic focus of the NWU and specifically the Faculty of Educational Science.

There are several emerging models to ensure effective online and blended learning but the prominent model that has attracted attention is the Community of Inquiry (CoI) framework developed by Garrison, Anderson and Archer in 2000. The CoI framework is conceptually grounded in theories of teaching and learning in higher education and is consistent with John Dewey's work on community of inquiry. CoI is deeply rooted into pragmatism as is evident in Dewey's argument where he explains the idea of extracting meaning from experience.

The focused of this study was on blended learning in a graduate teacher training course in Technology Education. The content of Technology as a subject is derived from other disciplines such as science, engineering and design. Due to the unique features of Technology as a subject, it was of great value, within this applied discipline, to investigate the unique patterns and relationships occurring among CoI presences in such a module of a teacher training graduate course.

The purpose of the study was to:

- develop an understanding of how the three presences (teaching presence, social presence and cognitive presence) in CoI enhance online learning;
- investigate the extent of CoI in a blended mode of delivery within a TE graduate course; and
- develop, implement and evaluate a module for a graduate course in Technology teacher training for a blended mode of delivery, based on requirements for the development of CoI.

A design-based research methodology approach was followed for this study and included qualitative and quantitative methods in a multi-strand design. Design-based research is intrinsically linked to, and developmentally nourished by, multiple design and research methodologies, which utilises many data collection and analysis methods and which makes it suitable for a mixed method research.

Findings from the literature review on the value of CoI for the effectiveness of online learning indicated that blended learning is dependent on the ability to facilitate a CoI. It is through the application of the principles for CoI that a successful transition from a face-to-face to a blended mode of delivery for the applied subject TE was possible.

Findings with regard to the extent to which CoI manifested itself in this Technology graduate course indicated that teaching presence manifested itself to a good extent in the TE undergraduate course. The main findings that were of concern with regard to teaching presence included: insufficient clear instructions and communication, feelings of isolations and disconnectedness, lack of immediacy and the inability to connect online feedback to lecturer expertise. Although social presence did manifest itself to some extent in the TE undergraduate course, it was the hardest to establish out of the three presences. The main issues arising from the manifestation and existence of social presence included: insufficient sense of belonging in the online environment, students didn't feel comfortable expressing themselves affectively as well as uneasiness to communicate, interact and participate online with other module participants. Finally, cognitive presence did manifest itself to a satisfying extent in the TE undergraduate course. Findings suggest that there was a not sufficient structured triggering events to create a sense of puzzlement which suggests that more activities must be included that will encourage reflection and therefore will improve the movement through the cognitive inquiry process.

Other findings from the study indicated that students experienced time management and the coordination and management of group activities as challenging. These challenges experienced by students reflect a lack of self-regulation skills in learning presence. Other challenges included that students experienced in the online environment of blended learning included: accessibility, lack of technology skills and the newness of blended learning.

Design principles for the manifestation and existence of CoI for effective learning within a TE graduate module were establish for teaching presence, social presence and cognitive presence. The research contributed to the field by reporting on the process of how CoI can be enhanced in a

blended learning environment for a complex subject such as Technology, and by providing evidence based guidelines for the design and implementation of blended learning with CoI principles as guidelines.

LIST OF ACRONYMS

CoI	Communities of Inquiry
DoE	Department of Education
HEI's	Higher Education Institutions
ICT's	Information Communication Technologies
LMS	Learning Management System
NWU	North-West University
SEM	Structural Equation Modelling
TE	Technology Education
TECD 421	Learning Area Technology Methodology: Senior Phase
§	Paragraph

LIST OF ADDENDA

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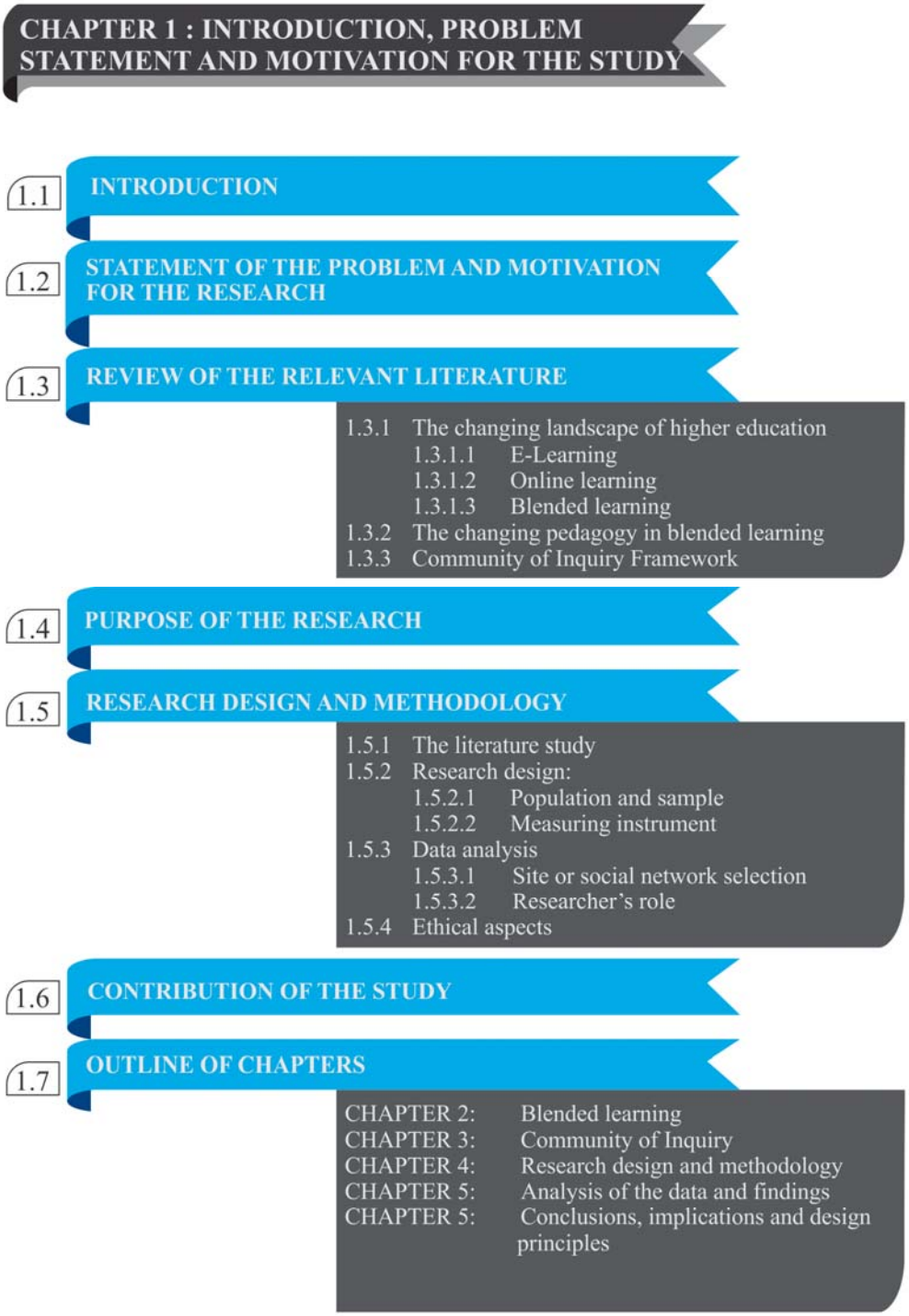
LOGIC



CHAPTER 1
INTRODUCTION, PROBLEM STATEMENT AND MOTIVATION FOR THE STUDY

1.1 INTRODUCTION

Online learning is pervading higher education, compelling educators to confront existing presuppositions about teaching and learning in higher education. Leaders of higher education are challenged to position their institutions to meet the connectivity demands of prospective students as well as their growing expectations and demands for quality learning experiences. Given the increasing evidence that internet information and communication technologies are transforming societies, there is good reason to believe that this will be the defining transformative innovation for higher education in the 21st century.

1.2 PROBLEM STATEMENT AND MOTIVATION FOR THE RESEARCH

The Faculty[1] of Educational Science at North-West University (NWU), Potchefstroom Campus, identified in its 2011-2013 strategic priorities for teaching and learning the need to finalise a framework for innovative learning through the intensified implementation and use of electronic media, new technologies and social media in order to enhance teaching and learning experiences for pre-service teachers attending the faculty (Faculty of Educational Sciences, 2011, p. 157)[2]. Furthermore, the NWU follows a broad teaching and learning approach of progressively independent study within a blended teaching and learning environment for all modules within programmes, supported by a variety of interfaces and organised by means of study materials (be they in a printed or electronic format) (North West University, 2011, p. 4).

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1 In South Africa, faculty refers to a department within a university or college devoted to a particular branch of knowledge where as in the US, UK and Canada, faculty refers to the academic staff at a university, college or school (Collins, 2003).

2 Page numbers are not required when using the APA reference style but users are encouraged to do so (Perdue Edu, 2009). For the purpose of this study I have provided page numbers for in-text referencing .

Since accessibility to innovative information technologies is rapidly increasing, implying that education nowadays is no longer dependent upon time nor location, e-learning has become a powerful resource for higher education institutions (HEIs) (Hadjerrouit, 2007a, p. 107). As much as e-learning opens up new opportunities for the implementation of pedagogical innovations in an environment where students are expected to function as active, independent, self-reflecting and collaborative participants, the literature (Hannafin & Kim, 2003, p. 347) reveals that e-learning is often diffuse and contradictory. Due to a failure to incorporate the pedagogical principles of teaching and learning (Alsonso, Lopez, Manrique, & Vines, 2005, p. 218; Hadjerrouit, 2007b, p. 283), chances are that rather than finding e-learning enlightening, users could end up being confused. Herrington (2006) also warns that, often, e-learning is developed along learning designs that simply replicate a one-way transfer of information from lecturer to student. In contrast, authentic learning designs, such as the collaborative construction of knowledge, reflection and articulation as well as contextual learning, offer the opportunity to improve student engagement and educational outcomes.

Although there are guidelines for analysing, designing, developing, supplying and managing e-learning materials for example the quality matters rubric for course design and material, these guidelines for the South African context is still lacking. The very insufficiency of pedagogical advances made to date constitutes sufficient grounds for new research questions to be raised, especially with regards to the value of communities of learning and collaborative inquiry (Hannafin & Kim, 2003, p. 347). Finding answers to these questions has the potential to break new pedagogical ground.

Since research in the field of online learning reveals that e-learning ought to have a pedagogical foundation based on specific learning theories (Conole, Dyke, Olivier, & Seale, 2004, p. 17; Fowler & Mays, 2005, p. 2; Hadjerrouit, 2007b, p. 283), improvements to an e-learning environment will not necessarily stem from improved technology but rather from a better understanding of the learning process that occurs within an e-learning context. For this very reason, learning theories should be one of the driving forces behind the development of online learning materials (Hadjerrouit, 2007a, p. 107).

According to Hadjerrouit (2007a, p. 109) and Alonso *et al.* (2005, p. 218), e-learning to a large extent is still constructed without due regard for a systematic development process or approach, resulting in the poor analysis, design and evaluation of e-learning. A number of development approaches incorporate learning theories or development models, but few make an attempt to

translate learning theories into educational requirements through a systematic development approach. On the subject of blended learning (which contains aspects of e-learning), Hadjerrouit (2007b, p. 283) argues that this mode of learning can only be successful if it is based on solid learning theories and pedagogical strategies, adding that there is a dire need for design-based research in this field.

Although several models aimed at ensuring the effectiveness of online and blended learning have emerged (Akyol, Garison, & Ozden, 2009, p. 65), the most prominent and the one seemingly attracting most attention is the Community of Inquiry (CoI) framework developed by Garrison, Anderson and Archer in 2000 (Garrison, Anderson, & Archer, 2000). Conceptually, the CoI framework is grounded in theories of teaching and learning in higher education and is consistent with John Dewey's work on the community of inquiry.

In his work *Democracy and Education (*1955), Dewey argues that inquiry is a social activity and at the heart of an educational experience. Given his argument that "meaning is extracted from experience", the concept "community of inquiry" is deeply rooted in pragmatism. Articulating a vision of a social organism that recognises the need for lifelong learning, Dewey defined inquiry as a process of transforming situations, especially those that are problematic or uncertain, into a unified whole. In the case of communities, this wholeness of situations clearly relate to a society's ability to survive on rich communication and collective inquiry.

By way of explanation, it ought to be noted that within the context of pragmatism, *community* emphasises support for collaborative activity and for the creation of knowledge which is connected to people's lived experiences. *Inquiry*, on the other hand, points to support for open-ended participatory engagement. Community inquiry could, thus, be understood as a learning process that brings theory and action together in an experimental and critical manner (Bertram, 2007, p. 9; Dewey, 1955, pp. 5-6).

Having sketched the background, this study set out to provide a conceptual framework that provides structure, a heuristic understanding of and a methodology for studying the effectiveness of blended courses (Garrison, Anderson, & Archer, 2010, p. 6) within a community of inquiry. Furthermore, given the interactive and inquiry-based focus of e-learning communities of inquiry and since relationship patterns amongst the respective CoI presences may differ (Garrison, Cleveland-Innes, & Shing Fung, 2010, p. 32; Shea, Sau Li, Swan, & Pickett, 2005, p. 61), this study explicitly focussed on investigating the unique patterns and relationships occurring amongst

CoI presences in the module[3]/ course[4] TECD 421[5] which forms part of a teacher training graduate course.

Swan and Ice (2010, p. 2) suggested that the CoI framework would be more suitable to applied disciplines than pure disciplines. With its content being derived from other disciplines such as science, engineering and design, Technology Education (TE)[6] is regarded as an applied discipline because every aspect of an individual's life, whether performing routine actions or making informed decisions, is influenced by technology (Dugger, Meade, Delarny, & Nichols, 2003, p. 316). In short, technology deals with knowledge, skills and resources to meet people's needs and wants by developing practical solutions to problems while taking social and environmental factors into consideration (Department of Education, 2003, p. 4).

1.3 REVIEW OF THE RELEVANT LITERATURE

1.3.1 The changing landscape of higher education

In addition to substantial challenges facing higher education, such as global competition, socio-economic access, an increasing demand for highly skilled workers and rural and remote disadvantages, universities are also facing considerable challenges to adopt and accept new technologies within their teaching and learning programmes (Herrington & Reeves, 2011, p. 594). Furthermore, the international phenomenon referred to as globalisation has given rise to the need for a "knowledge economy" marked by the momentum and interaction of technological innovation involving the diffusion of ideas, practices and technologies (Smit & Doyle, 2002).

Clearly, a new landscape in education now exists where physical and virtual environments are blended to support learning in university courses (Stacey & Gerbic, 2008, p. 964), and according to Hadjerrouit (2007b, p. 284), this blended approach is becoming the most prominent delivery

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3 In education, a module refers to a short course of study and which, when combined with other such completed short courses, can count towards acquiring a particular qualification (Collins, 2003). (Also see footer 8 in Chapter 4)

4 The meaning of the word "course" in educational contexts varies, depending on the country it is used in. For example, in Canada and the United States, a "course" is a unit of teaching that typically lasts one academic term and is led by one or more instructor and usually describes an individual subject being taken. In the United Kingdom, Australia and Singapore, the term "course" refers to the entire programme of study required to complete a university degree. In South Africa, the term "course" is used to refer to the collection of all "modules" in a year. For the purpose of this study, the word "module" will be used to refer to the module TECD 421.

5 TECD 421 refers to the final year module, Learning Area Technology methodology: Senior phase.

6 The term used to describe "Technology" differs nationally and internationally. In the South African context, the term refers to the learning area Technology which specifies the school subject that is taught in the intermediate and senior phases in South African schools. Internationally, this term refers to Technology Education or Design Technology.

mechanism in higher education. Scholars are focusing on a new phenomenon they call "the next generation learners" who demonstrate fundamental differences in the way these scholars approach knowledge acquisition, problem solving and moving into the workplace. The question to ask, according to Dziuban, Moskal and Hartman (2005, p. 2), is whether higher education is meeting the needs of the present generation learners. This fundamental question leads to speculation on the need to transform higher education and ways to go about it.

In an attempt to overcome these challenges, methods to teach and learn are expanding dramatically, a phenomenon which is marked by the emergence of new information and communication technologies (ICTs) in support of innovative forms of pedagogy (Garrison, Cleveland-Innes, et al., 2010, p. 31; Hadjerrouit, 2007b, p. 284; Vaughan, 2010, p. 60). Consequently, e-learning, online and blended learning are pervasive in higher education nowadays.

1.3.1.1 e-Learning

Definitions in the literature commonly refer to e-learning as the intentional use of networked ICT in teaching and learning practices. However, other terms such as online learning, virtual learning and network- and web-based learning are also used to describe this mode of teaching and learning. Fundamentally, all these terms refer to educational processes that utilise ICT to mediate asynchronous as well as synchronous learning and teaching activities (Hadjerrouit, 2007a, p. 110).

In order to describe e-learning, concepts need to be clarified and the relationship between e-learning and related concepts such as online learning, internet-based learning, web-based learning and computer-based learning need to be investigated (Hadjerrouit, 2007a, p. 111). These concepts can be clarified as follow:

- Internet-based learning is broader than web-based learning. The web is only one of the internet services.
- Online learning could be organised through any network. Consequently, internet-based learning is only one category of online learning.
- Computer-based learning may take place via any electronic medium and is not automatically connected to a network.

In conclusion, e-learning encompasses both network-based (online, internet-based and web-based) and non-network based learning or computer-based learning. In this study, though, e-learning is used in a broader sense, referring to learning that takes place via a combination of face-to-face and online learning which is known as blended e-learning. Thus, for the purpose of this study, e-learning will be defined as learning through the use of technology and can be present in face-to-face as well as online and virtual learning spaces.

1.3.1.2 Online learning

Online learning is a method of learning delivered by using asynchronous and synchronous communications (Akyol et al., 2009, p. 65). This method of learning has the potential to connect people since it rethinks passive pedagogical methods common to higher education. Consequently, online learning has been the catalyst for many a contemporary instructional design where people are able to remain engaged, despite the constraints of time and space (Garrison, 2009, p. 93).

Garrison (2009, p. 98) distinguishes between two fundamental approaches to online learning. The first approach focuses on providing students with tools and techniques in order to access and organise information that sustain existing distance education practices and maximise learner independence. The second approach is to utilise the capabilities of online learning fully to create purposeful communities of inquiry that can transform higher education, based on collaborative constructivist principles.

Despite the fact that adopting and adjusting to collaborative approaches in online courses require a radical shift in the core assumptions, goals and practice, this mode of delivery, according to Garrison (2009, p. 98) takes prominence.

1.3.1.3 Blended learning

Dziuban, Hartman and Moskal (2004, p. 2) regard blended learning as a mere combination of face-to-face classroom instruction with online learning, a view seemingly supported by Bleed (2001, p. 18) and Reasons, Valadares and Slavkin (2005, p. 83), the latter referring to this mode of delivery as "a hybrid format". However, Garrison and Vaughan (2008b, p. 5) define blended learning as the *thoughtful fusion of face-to-face and online learning experiences in such a way that the strengths of each are blended into a unique learning experience*. To this, Alonso *et al.* (2005) added that blended learning should also contain a mixture of event-based activities in the form of self-paced learning and/or live e-learning.

Guarding against blended learning becoming yet another hybrid, Bleed (2001, p. 20) warns against blended learning being interpreted as the "bolting" of technology onto a traditional course, using technology as an add-on to teach a difficult concept or adding supplemental information. Instead, he suggests that blended learning should be viewed as an opportunity to redesign the manner in which courses are developed, scheduled and delivered in higher education through a combination of physical and virtual instruction.

Naturally, the balance between online and face-to-face components will vary for every course because blended learning environments are influenced by many factors including the goals of the instructional course, student characteristics, experience of the instructor, the discipline, teaching styles and the developmental level of students (Osguthorpe & Graham, 2003, p. 228). Furthermore, since learning environments have been combined, the strengths and weaknesses associated with the respective learning environments have to be recognised. The most important consideration is to ensure that the blending includes the strengths of each of the different learning environments and none of the weaknesses (Osguthorpe & Graham, 2003, p. 229).

Irrespective of the diverse definitions of blended learning, those most commonly used recognise some combination of virtual and physical environments (Stacey & Gerbic, 2008, p. 965). Thus, for the purpose of this study, blended learning will mean a combination of face-to-face instruction and online learning, with the implied redesign of courses.

Clearly, blended learning has the potential to improve learning, but despite the novelty, there are also challenges, especially with regard to the complexity, unique identity and acceptance of the two environments (on-line and face-to-face), that need to be overcome. To add to the conundrum, little is known about what constitutes a successfully blended learning environment.

To date, experimenting with blended learning environments usually had certain purposes in mind, and these purposes differed from one course to the next. In this study, too, implementing a blended approach in an applied discipline was explored, the exception being that, as suggested by Osguthorpe and Graham (2003, p. 229), the intention from the outset was to add a degree of pedagogical richness, access to knowledge and social interaction to an graduate TE module.

1.3.2 The changing pedagogy of blended learning

Effective pedagogical practices and the use of improved interactive strategies are the most common reasons for the use of blended learning (Osguthorpe & Graham, 2003, p. 231). Dzuiban *et al.* (2004, p. 3) and Garrison (2009, p. 99) noticed that blended learning approaches increase the level of active learning strategies, peer-to-peer learning strategies and the learner centred strategies being employed. Clearly, blended approaches can increase a student's pedagogical options for the purpose of mastering content more effectively, but it can also simultaneously increase the student's ability to access information (Osguthorpe & Graham, 2003, p. 231).

Whereas face-to-face learning and teaching pedagogy have been researched for many years, here an investigation of the pedagogy of the online component of blended learning is called for. In short, care should be taken that from a pedagogical point of view, pedagogy guides technological choices, not the other way around (Picciano, 2009, p. 10).

For this reason, learning theories need to be translated into pedagogical requirements, and such a translation is necessary in any attempt at examining the implementation of blended learning. The CoI framework (Chapter 3, Figure 3.1) is available as a means to investigate effective online and blended learning environments in higher education (Garrison et al., 2000, p. 5).

1.3.3 Community of inquiry framework

Naturally, learning is the goal of education, and learning effectiveness must be the first measure by which any form of learning success is judged. However, despite being reassured that they are working towards attaining the exact same goals as their face-to-face counterparts, students engaged in a blended learning environment run the risk of becoming "disengaged", resulting in a potential negative impact on learning (Richardson & Swan, 2003, p. 69).

Studies found that when students experience social interaction, they experience higher levels of mastery as well as the opportunity to reposition and redefine themselves in the world (Baker & Taylor, 2012, p. 6). Pure distance education limits this kind of social interaction, but with blended environments, the possibilities for social interaction, both in class and online, are enhanced (Osguthorpe & Graham, 2003, p. 231).

Nevertheless, despite an escalation in research on online and blended learning effectiveness over the past decade, development, acceptance and verification of theoretical frameworks distinctive to these learning environments are still relatively lacking. Although several models of online learning effectiveness are emerging, one that has attracted attention is the CoI framework developed by Garrison, Anderson and Archer in 2000. The CoI framework provides a well-structured model and a set of guidelines to create effective learning communities in online and blended learning environments (Garison & Vaughan, 2008b, p. 53).

The assumption, according to the CoI framework, is that higher-order learning is best supported in a community of learners who are engaged in building understanding and critical reflection. The philosophical foundation of the CoI indicates that certain collaborative interactions create "distance presence", resulting in the emergence of a CoI (Garrison, 2009, p. 100; Garrison et al., 2010a, p32). These interactions are based on collaborative constructivism and the core elements of a collaborative constructivist learning environment. CoI strongly relates to pragmatism and is grounded in John Dewey's notion of practical inquiry (Dewey, 1955, p. 5) where the concept "community" emphasises support for collaborative activities and the construction of knowledge (Bertram, 2007, p. 9).

Garrison and Cleveland-Innes (2005, p. 135) believe that CoI encompasses more than a social community and extends beyond the magnitude of interaction amongst participants. They believe that CoI is the integration of cognitive, social and teaching presence and that, considered together, these three presences provide the structure to understand deep and meaningful learning as well as to address interactive inquiry consistent with the ideals of higher education (Garrison & Cleveland-Innes, 2005, p. 135; Garrison, Cleveland-Innes, et al., 2010, p. 32). Here it ought to be noted that presence refers to the state or fact of being present, current or occurring in immediate proximity in time or space (Collins, 2003). The three presences identified within a community of inquiry are teaching presence, cognitive presence and social presence. These three presences need to overlap, and this interconnectedness must be understood in order to create and uphold a collaborative CoI (Shea et al., 2005, p. 61; Swan & Ice, 2010, p. 1).

From the literature review, it is clear that blended learning has the potential to improve learning, but several challenges in responding to the complexity of two environments still need to be addressed. The range of contradictory reports in the literature on the potential of different blended learning models highlights the need for further research on specific blended learning courses in order to establish proper standards for effective course design and implementation (Precel, Eshet-Alkalai, & Alberton, 2009). These challenges, and the fact that little is known about what

construes a successful blended learning environment, constitute the need to investigate CoI. It is also necessary to investigate the effect of CoI on teaching and learning as well as the development, implementation and evaluation of a blended mode of delivery for TE, based on CoI principles.

Against this background, the study reported on here aimed to address the following compelling research question:

- *What is the value of CoI in a blended mode of delivery for TE?*

To fully address the main research question, sub-questions were posed to gain additional insight. These questions included:

- *Sub-question 1: How do CoI contribute to the effectiveness of online learning?*
- *Sub-question 2: To what extent did CoI manifested itself in a blended mode of delivery in a TE graduate course?*
- *Sub-question 3: What is required in a blended mode of delivery to ensure the existence of CoI for effective learning within a TE graduate course?*

1.4 PURPOSE OF THE RESEARCH

Given the main research question and the sub-questions outlined above, this study set out to:

- Develop an understanding of how the three presences in CoI enhance online learning;
- Investigate the extent of CoI in a blended mode of delivery within a TE graduate course; and
- Develop, implement and evaluate a module for a graduate course in TE teacher training for a blended mode of delivery, based on the requirements for the development of CoI.

1.5 RESEARCH DESIGN AND METHODOLOGY

This research has been approached from a pragmatic paradigm. The ontology from a pragmatic paradigm is characterised by a view that the world has singular and multiple realities. Data is collected by "what works" to address research questions and is congruent with mixed research approaches (Creswell, 2009, p. 231). As such, design-based research is well aligned with the philosophy of pragmatism which argues that theories are tools for action and that the way they are combined in practice defines their meaning and value (Dewey, 1955, p. 93).

This research approach suits a study of a blended learning programme in as far as the research could be conducted in four phases (Amiel & Reeves, 2008, p. 32; Hadjerrouit, 2007b, p. 284):

- Phase 1 involved analysing the problems and deficiencies of current educational practices, formulating research questions and reviewing relevant literature.
- In Phase 2, the above culminated in a discussion of a blended learning model to be implemented in an investigation of the issues surrounding current educational practice.
- The implementation phase, Phase 3, involved the application of the blended learning model identified in Phase 2 to the applied discipline TE via multiple methods such as questionnaires, interviews and document analysis in order to collect empirical data.
- In Phase 4, the evaluation phase, the blended learning programme in question was evaluated through the systematic analysis of data collected, critical evaluation and reflection.

Since analysis, design, implementation and evaluation are interdependent and reciprocal, in this study, too, successive cycles of experimentation resulted in refinements being made in order to address the shortcomings in each cycle. This interactive process resulted in practical insights being gained whilst simultaneously aiding the generation of pragmatic design principles that could aid educational researchers to establish a firmer theoretical foundation for blended learning (Hadjerrouit, 2007b, p. 285).

Seemingly, a mixed research approach is most suited to design-based research since this form of research is intrinsically linked to, and developmentally nourished by, multiple design and research methodologies, which utilises a multitude of data collection and analysis methods, be they qualitative, quantitative or a mixture of both (Wang & Hannafin, 2005, p. 6).

For the purpose of this study, a mixed research, multi-strand design was followed in as far as a partially mixed, sequential dominant status design had been used. A partially mixed, sequential dominant status involves conducting a study in phases that occur sequentially, resulting in neither the qualitative nor the quantitative phase enjoying greater emphasis (Leech & Onwuegbuzi, 2009, p. 270).

According to this design, the conclusions that are made on the basis of the results of the first strand lead to the formulation of questions and the collection and analysis of data in the next strand. The final inferences are based on the results of both strands of the study, with the purpose of the second

strand being to either confirm or refute the inferences of the first strand or to provide further information for the findings stemming from the initial strand (Teddie & Tashakkori, 2006, p. 22).

Philosophically, mixed research is pragmatic by nature because it is an approach to knowledge (theory and practice) that attempts to consider multiple viewpoints, perspectives, positions and standpoints (Johnson, Onwuegbuzie, & Turner, 2007, p. 113).

1.5.1 The literature study

A literature study was conducted to explore the existing body of knowledge with regard to the development, implementation and evaluation of a module for a graduate course in TE for a blended mode of delivery, based on CoI principles. To this end, and using the keywords *community of inquiry, blended learning, e-learning, online learning, graduate course, study material, technology education, subject matter, pedagogy,* databases the likes of ERIC, Academic Search Premier and Google Scholar was explored.

1.5.2 Research design

The design-based research approach followed in this study included qualitative and quantitative methods in a multi-strand design.

1.5.2.1 Population and sample

The target population for this study was a group of TE teacher students enrolled as full-time students with the Faculty of Educational Sciences at the NWU. Due to the limited size of the population (n=58), the entire group of students constituted the sample and were asked to complete the pre- and post-questionnaires on CoI, while a sample of these students also participated in the focus-group interviews.

1.5.2.2 Measuring instrument

For the purpose of this study, the quantitative phase of the research process was conducted by means of a CoI survey. Although a standardised CoI Survey Instrument developed by a group of researchs in 2008 (Arbaugh et al., 2008, pp. 133-136) is available to investigate teaching presence, cognitive presence and social presence in online and blended learning in higher education, cognisance must be taken of the fact that this instrument was developed and tested in contexts

different to those applicable to this study. For this reason, the available CoI instrument was adapted and tested amongst a group of students in a context similar to that of the population of this study. Having done so, the CoI instrument was then adapted to suit the local context.

1.5.3 Data analysis

For the purpose of this study, descriptive statistics were used to organise and analyse the quantitative data in a meaningful way. In particular, descriptive statistics, as described by McMillan and Schumacher (2006, p. 206), were used to examine the manifestation of CoI in a blended mode of delivery for TE.

The qualitative data analysis included thematic methods of analysis in order to find similarities relating to incidents and respondents' experiences with regard to the manifestation and existence of CoI in the blended module. Qualitative analysis with Atlas.ti®, a computer-aided qualitative analysis program, was used to code and organise the collected data. The purpose of the qualitative interviews was to uncover themes (concepts, trends, issues, ideas, and problems) for further refinement of the re-designed module and to determine the existence and/or emergence of the three presences that underpin CoI.

1.5.3.1 Site or social network selection

The social nework selection included full time TE teacher students attending the Faculty of Educational Sciences at the NWU.

1.5.3.2 Researcher's role

Having recognised the need to arrive at a framework for innovative learning that incorporates the implementation and use of electronic media, new technologies and social media, and with the intention to determine the value of CoI in a blended learning environment for TE, the researcher's role was limited to that of interviewer during the qualitative part of the study. Since McMillan and Schumacher (2006, p. 435) hold that involvement and immersion in a changing, real-world situation is essential for qualitative research, the researcher was also responsible for planning and designing refinements in collaboration with the lecturer to the module TECD 421.

1.5.4 Ethical aspects

Ethics can be defined as norms for conduct that distinguish between acceptable and unacceptable behaviour (Resnik, 2010). Ethical principles were applied throughout the project, particularly in as far as professional competence, professional relationships with participants, privacy and trustworthiness (Fraenkel & Wallen, 2003, p. 57) are concerned. Having duly completed and submitted the requisite applications to the North-West University's Ethics Committee, permission was obtained to commence the research (Ethics number: NWU 00122-12S2). In addition, each student teacher was asked to sign a letter of consent, thereby furnishing the researcher with permission to continue the research. In this letter, teacher-students were assured that their participation would be voluntary, that they had the right to withdraw at any time and that their identity and the information they offered would be treated with utmost confidentiality at all times.

1.6 CONTRIBUTION OF THE STUDY

Blended learning has the potential to improve learning in HE and therefore the contribution of this study is that it may serve to critically evaluate the value of blended learning in higher education. This study may also contribute to finalise a framework for innovative learning and the implementation and use of electronic media, new technologies and social media in order to enhance teaching and learning experiences for pre-service teachers studying at the Faculty of Educational Sciences at NWU as well as contextually similar institutions.

The fact that little is known about what construes a successful blended learning environment created the need to investigate CoI. The contribution of this study regarding CoI is that it may serve as a guideline for the development, implementation and evaluation of a blended mode of delivery for TE, based on CoI principles.

The contribution of the study regarding teacher training and TE as applied science was the development, implementation and evaluation of a blended learning module, based on CoI principles, for a module in TE, using online learning tools as enhanced support for the traditional classroom. The research contributed to the field by reporting on the process of how CoI can be enhanced in a blended learning environment for a complex subject such as Technology, and by providing evidence based guidelines for the design and implementation of blended learning with CoI in mind.

This study also contribute in the sense that it provided a critical evaluation of the methodology of design-based research which may indicate the meaningfulness of such a methodology suitable to both research and the design of technology-enhanced learning environments.

1.7 OUTLINE OF CHAPTERS

The research conducted will be presented here according to the following chapters:

Chapter 2: Blended learning

This chapter provides a detailed and critical description of and discussion on what blended learning is as well as the challenges, requirements and guidelines inherent to such a mode of delivery. Furthermore, this chapter aims to highlight the implications of a blended mode of delivery for the applied discipline TE in higher education.

Chapter 3: Community of Inquiry

In this chapter, a critical discussion on what a CoI entails is provided. It investigates the historic development, composition and nature of such a CoI and details the rationale behind such a community as well as the impact thereof on the online component within a blended mode of delivery. Additionally, the implications of a CoI for a blended mode of delivery are examined while the means to sustain such a community in the applied discipline TE are addressed.

Chapter 4: Research design and methodology

This chapter provides a detailed outline and discussion of the methodological choices relevant to the design and methodology followed in this study. It also elaborates on participant selection, the development of measuring instruments, data collection strategies and the methods employed to analyse data.

Chapter 5: Analysis of data and findings

In this chapter, a detailed account of the data collected is provided. In addition, by taking cognisance of the resultant analysis and findings, this chapter aims to establish to what extent the research question and its sub-questions have been addressed.

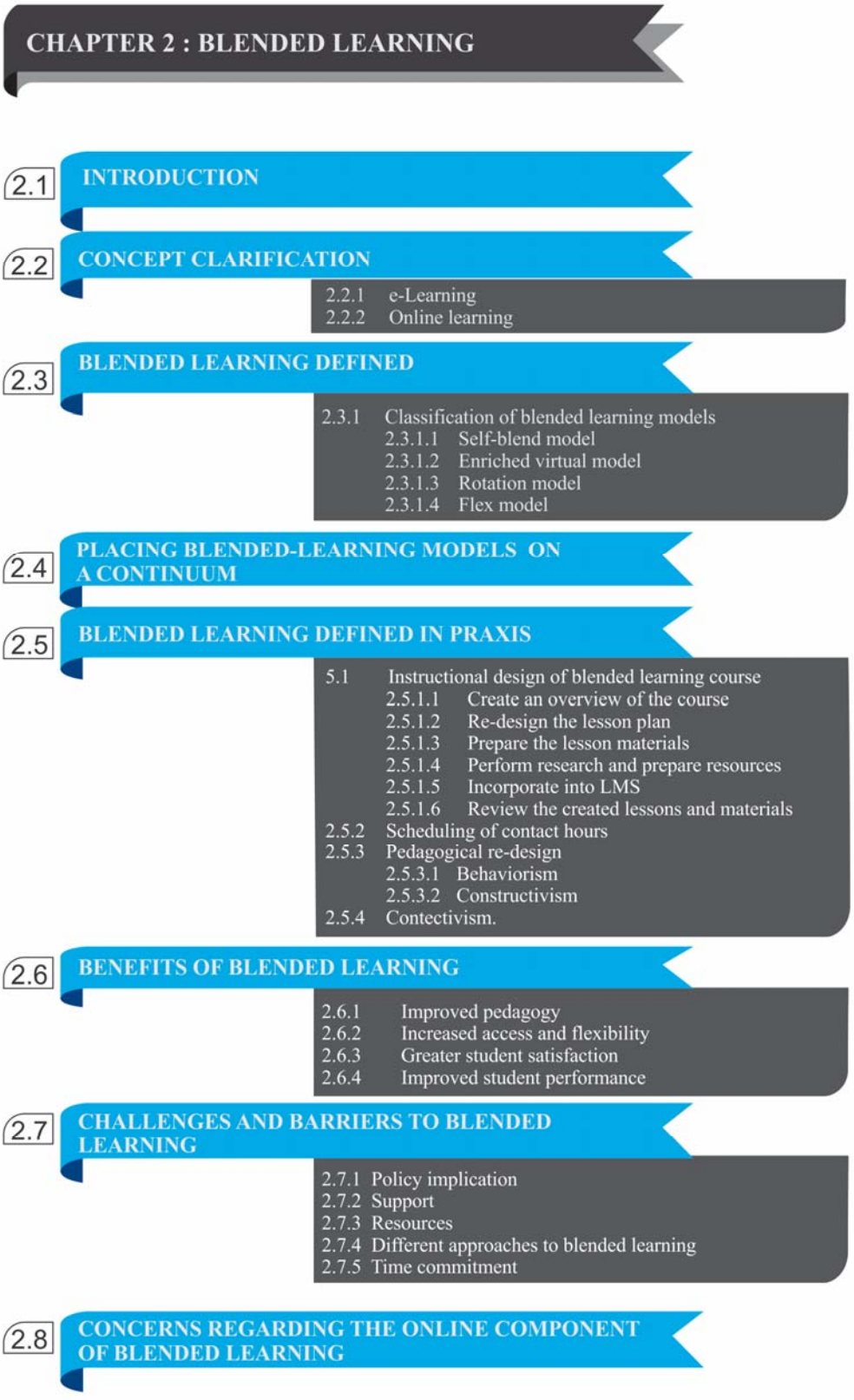
Chapter 6: Conclusions, implications and recommendations

The final chapter, Chapter 6, aims to answer the research question and its sub-questions by summarising the research findings in as far as they pertain to the manifestation of the three presences identified in the CoI framework, namely social presence, teaching presence and cognitive presence, in the TE graduate course. The notion of a fourth presence, learning presence, is also discussed whilst the challenges experienced by students in a blended learning environment are summarised. Importantly, this chapter aims to report on the re-design principles and refinement strategies required to manifest and ensure the existence of CoI for effective learning.

Looking ahead, the intention with Chapter 6 is also to reiterate the contribution this study has made towards the development, implementation and evaluation of a blended learning module, based on CoI principles, with the intention to make recommendations not only for future research but also with a view to finalising a framework for innovative learning that implements and employs electronic media, new technologies and social media in order to enhance the teaching and learning experiences of pre-service teachers attending the Faculty of Educational Sciences at the NWU.

CHAPTER 2

LOGIC



CHAPTER 2
BLENDED LEARING

2.1 INTRODUCTION

Given its innovative strategy to teaching and learning practices, the NWU decided to adopt a blended mode of delivery. In light of this dissertation, it would be imperative to first explore the motivation and rationale for such a decision before unpacking the implications of blended learning as mode of delivery for the applied discipline of Technology Education. In addition to such an exploration, this chapter will also provide a detailed and critical description and discussion of what blended learning is as well as the challenges, requirements and guidelines pertaining to such a mode of delivery.

Universities in the 21st century are undergoing rapid socio-economic and technological changes. These changes require universities to examine their educational practices carefully. Some of the changes facing universities include a large population of students from diverse backgrounds, rising tuition costs, time constraints, conversant content requirements, concerns about student success and a demand for more client-responsive and flexible courses. In facing such challenges, academic leaders in higher education need to rethink organisational structures, strategies and policies appropriate for the interminable technological age (Akyol et al., 2009, p. 65; Hadjerrouit, 2007b, p. 283; Rovai & Jordan, 2004, p. 2; Vaughan, 2010, p. 60; Walace & Young, 2010; Yuen, 2011, p. 3). The question to ask, according to Dziuban, Moskal and Hartman (2005, p. 2), is whether higher education is meeting the needs of the present generation's students. This fundamental question leads to speculation on the need and ways to transform higher education. Blended learning could be an option to address some of the changed educational needs of the next generation.

In its strategic priorities for teaching and learning (2011-2013), the Faculty of Educational Sciences at the NWU, Potchefstroom Campus, identified the need to finalise a framework for innovative learning through the intensified implementation and use of electronic media, new technologies and social media in order to enhance teaching and learning experiences for graduate teachers studying at the faculty (Faculty of Educational Sciences, 2011, p. 157). The NWU's teaching and learning policy clearly states that programmes are to be delivered by means of a blended mode, which can

include a combination of face-to-face and online contact between lecturer and student (North-West University, 2011).

2.2 CONCEPT CLARIFICATION

In order to provide a broad and in-depth definition and description of the concept blended learning, other related concepts such as e-learning, internet-based learning, web-based learning, computer-based learning and online learning need to be clarified.

2.2.1 E-learning

Definitions in the literature commonly refer to e-learning as the intentional use of networked information and communication technology in teaching and learning practices. Other terms such as online learning, virtual learning and network- and web-based learning are also used to describe this mode of teaching and learning. Fundamentally, all of these refer to educational processes that utilise information and communication technology to mediate asynchronous as well as synchronous learning and teaching activities (Hadjerrouit, 2007a).

In order to arrive at a description of e-learning, concepts first need to be clarified, and the relationship between e-learning and related concepts such as online learning, internet-based learning, web-based learning and computer-based learning need to be investigated (Hadjerrouit, 2007a) (Figure 2.1). To follow, then, e-learning concepts can be clarified as follows:

- Internet-based learning is broader than web-based learning. The web is only one of the internet services.
- Online learning could be organised through any network; consequently, internet-based learning is only one category of online learning.
- Computer-based learning may take place via any electronic medium and does not automatically presuppose connection to a network.

In sum, e-learning includes both network-based (online learning, internet-based and web-based) and non-network-based learning or computer-based learning. For the purpose of this study, e-learning will be defined as learning through the use of technology and can be present in face-to-face as well as online and virtual learning spaces, as illustrated in Figure 2.1.

2.2.2 Online learning

Online learning is a method of learning delivered by way of asynchronous and synchronous communications (Akyol et al., 2009, p. 65). Garrison (2009, p. 98) distinguishes between two fundamental approaches to online learning: The first approach focuses on providing learners with tools and techniques in order to access and organise information that sustain existing distance-education practices and maximise learner independence. The second approach is to utilise the capabilities of online learning fully in order to create purposeful communities of inquiry that can transform higher education, based on collaborative constructivist principles. To adopt and adjust to collaborative approaches in online courses require a radical shift in the core assumptions, goals and practice of such a mode of delivery (Garrison, 2009, p. 98).

The balance between online and face-to-face components will vary from course to course because blended learning environments are influenced by many factors, including the goals of the instructional course, the characteristics and developmental level of the students, the experience and teaching style of the instructor and the discipline being studied (Osguthorpe & Graham, 2003, p. 228). Since learning environments have been combined, the strengths and weaknesses associated with different learning environments have to be recognised. When considering strengths and weaknesses, the most important consideration is to ensure a blending between online and face-to-face components including the strengths of each of the different learning environments and none of the weaknesses (Osguthorpe & Graham, 2003, p. 229).

2.3 BLENDED LEARNING DEFINED

Given the afore-going, blended learning could well be an option to address the varying needs of the next generation. Merriam-Webster's Online Dictionary defines "blend" as harmonising, mixing together two elements as well as the act of combining several into one. Learning can be defined as the act or experience of one that learns, knowledge or skills acquired by instruction and/or the modification of a behavioural tendency by experience (Merriam-Webster's Online Dictionary). Clark (2003) describes the concept blended learning as the use of two or more different methods of training. This may include combinations such as blending classroom instruction, blending online instruction with access to a mentor or lecturer, blending simulations with structured courses, blending on-the-job training with brownbag informal sessions or blending managerial coaching with e-learning activities. The year 2006 marked a shift in the use of the term blended learning with the mentioning of blended learning systems. This follows on critique that the concept blended learning was defined too broadly (as is evident from Clark's definition referenced above) and could

encompass virtually all learning systems. Graham went further and described learning systems as those that combine face-to-face instruction with computer-mediated instruction (Graham, 2006, p. 5). It is more common to regard blended learning as a combination of online and face-to face learning, as is evident in the following definitions.

Vaughan (2007, p. 85) defines blended learning as the thoughtful fusion of face-to-face and online learning experiences, emphasising the need for redesigning learning and teaching in such a manner that the strengths of each are blended into a unique learning experience. Dziuban, Hartman and Moskal (2004, p. 2) refer to blended learning as learning programmes that combine face-to-face classroom instruction with online learning. Alonso *et al.* (2005) add to the above the mixture of event-based activities such as self-paced learning and live e-learning. In addition to the above descriptions, the literature also refers to blended learning as a hybrid format of delivery (Bleed, 2001, p. 18; Reasons, Valadares, & Slavkin, 2005, p. 83). Horn and Staker (2012, p. 3) regard blended learning as a formal education programme in which students learn at least in part through the online delivery of content and instruction with elements of student control over time, place and pace but also at least in part in a brick-and-mortar location (classroom environment).

According to Friesen (2012), blended learning encompasses the range of possibilities presented by combining internet and digital media with established classroom practices that require the physical co-presence of lecturer and students. As such, blended learning emerges from an understanding of the relative strengths of face-to-face and online learning but replaces aspects of face-to-face learning, such as lectures, practical work in laboratories, simulations, tutorials and assessments, with appropriate online learning. Thus blended learning presents an alternative approach to teaching and learning through a mixture of classroom and online activities consistent with the goals and outcomes of programmes (Garrison & Kanuka, 2004, p. 97; Garrison & Vaughan, 2008, p. 6).

Several other descriptions of the concept blended learning have emerged over time, and according to Driscoll (2003), blended learning suggests the following:

- Combining or mixing modes of web-based technology (live virtual classroom, self-paced instruction, collaborative learning and streaming video, audio and text) to accomplish an educational goal;

- Combining various pedagogical approaches (constructivism, behaviourism) to produce optimal outcomes with or without instructional technology;

- Combining any form of instructional technology (video tape, CD-ROM, web-based training, film) with face-to-face instructor-led training; and
- Mixing or combining instructional technology with actual practical tasks in order to create a harmonious effect of learning and working.

According to Friesen (2012, p. 5), the term blended learning had stabilised by 2009 in terms of the differences, similarities and compatibilities of two sets of terms, namely face-to-face and online learning systems as modes of delivery.

As evident from the above discussion, it is clear that blended learning means different things to different people, and although various definitions of blended learning have been documented in the literature, those most commonly used recognise some combination of virtual and physical learning environments. For the purpose of this study, blended learning will be defined as a combination of face-to-face instruction and online learning, with the implied redesign of courses and the adaptation of pedagogy in higher education.

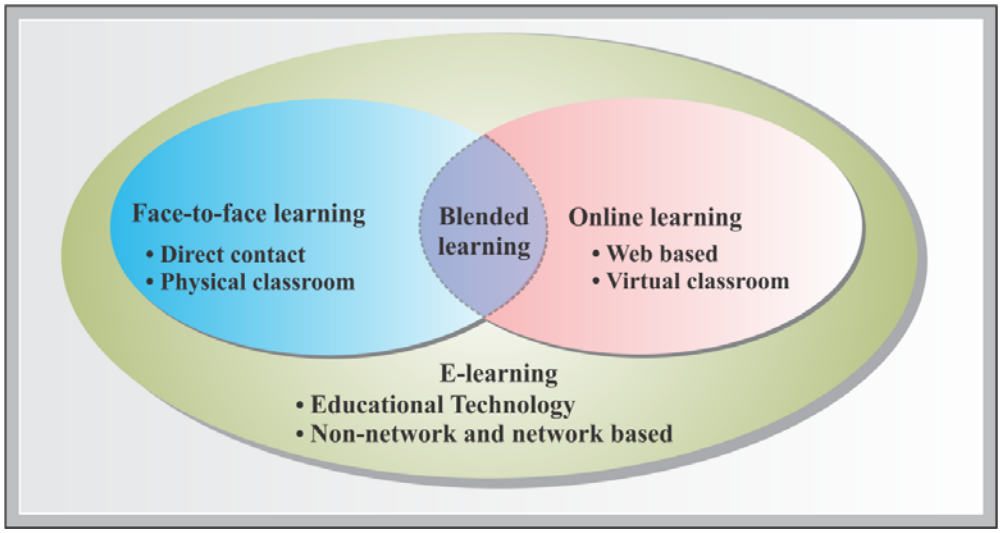


Figure 2.1: Components of e-learning

The balance between online and face-to-face components will vary for every course due to varying contextual factors such as the goals of the instructional course, student characteristics, experience of the instructor, the discipline being studied, teaching styles and the developmental level of students (Osguthorpe & Graham, 2003, p. 228) This necessitates the need for a classification of blended learning models which will be the focus of the discussion in section 2.3.1.

2.3.1 Classification of blended learning models

A report on the classification of blended learning from Staker and Horn (2012, p. 2) categorises possible combinations of different forms of blended learning into four models (Figure 2.2).

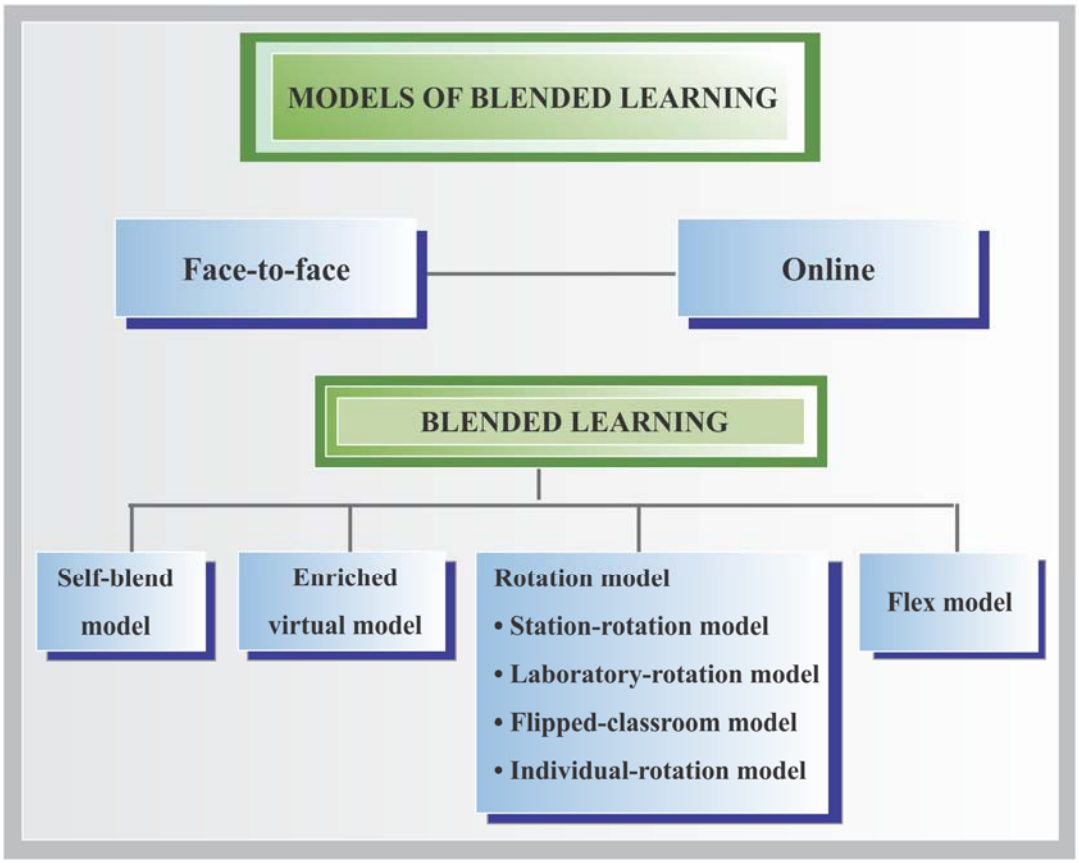


Figure 2.2: Four models of blended learning (Staker & Horn, 2012)

The self-blended, enriched virtual and flipped-classroom (rotation) models have direct relevance to higher education and will be highlighted. Conversely, other combinations in the rotation model and the flex model are more appropriate to basic education due to their characteristics, which include fixed schedules such as specific time schedules and timetables.

2.3.1.1 Self-blend model

This model describes a scenario in which students choose to take one or more course entirely online in order to supplement their traditional courses and can take the online courses either on the physical campus or off-site. Thus, students self-blend some individual online courses and take other courses on-campus. This model may be suitable for higher education purposes.

2.3.1.2 Enriched virtual model

With this model, students divide their time between attending on-campus classes and remote learning, using online delivery of content and instruction. Thus students need not attend the campus classroom every day of the week using online learning for enrichment.

2.3.1.3 Rotation model

In the rotation model, face-to-face and online learning is alternated on a rotation basis. Different types of rotation models can be distinguished, namely flipped classroom station rotation, laboratory rotation and individual rotation.

- Flipped classroom

  Students rotate according to a fixed schedule between guided face-to-face practice and projects on campus during the day, while the online delivery of content and instruction takes place at a remote location (home). The primary delivery of content happens online which differentiates a flipped classroom from students who are only completing assignments online after hours. Students have control over time, place, path and pace because the model allows them to choose the location where online content and instruction are being delivered. According to Campus Technology (2012, p. 4), the flipped classroom offers a number of benefits for students and lecturers. These benefits include the fact that students no longer have to attempt to take notes of lecture presentations; instead, they can review lecture material at their convenience. Another benefit is that lecturers now spend more time interacting directly with students instead of lecturing because class time can now be used as a type of workshop where students can ask questions about lecture content, test their skills by applying knowledge and interact with one another in hands-on activities.

- Station rotation

  Students rotate according to a fixed schedule or at the lecturer's discretion between classroom-based learning environments. The students spend the greater part of their time in the same space and are given the opportunity to go online to engage in instructional activities. Staker and Horn (2012, p. 8) explain that these opportunities can be provided in the classroom, at a nearby computer lab, or at home and can be arranged according to students' individual needs. Because of the general co-location of students and lecturer in an ongoing face-to-face course setting, these activities are presumably related to accessing

materials such as lecturers' presentations or communicating with those outside the classroom.

- Laboratory rotation

  Students rotate according to a fixed schedule or at the lecturer's discretion between learning spaces on the brick-and-mortar campus. At least one of these spaces is a learning laboratory for predominantly online learning, while the additional classrooms house other learning activities.

- Individual rotation

  Students rotate according to an individually customised, fixed schedule between learning environments, of which at least one is utilised for online learning. The individual rotation model differs from other rotation models because students do not necessarily rotate to each available station of modality.

2.3.1.4 Flex model

Students move on an individually customised, fluid schedule among learning environments, and the lecturer is on site. The flex model can be seen as involving specific arrangements and supervision which does not make this model suitable for higher education settings because of the heavily organised class environments encompassing specific time schedules and timetables. In this model, students take one or more courses online, all whilst being situated with a physically co-present lecturer and other students where work can be supervised.

For the purpose of this study, the enriched virtual model as well as the rotational flipped-classroom model is regarded as most suitable. The reason being that part of the module will be presented during on-campus contact sessions where students will be present on site, whilst other aspects of the course will be structured online. For example, if using the rotational flipped-classroom model, students would typically attend a fixed face-to-face session and will be expected to engage with study material online at any chosen location throughout the week until the next face-to-face session the following week during which practical activities will be discussed. If using the enriched virtual model, students will be expected to basically engage with study material almost exclusively online with the odd face-to-face session, with the latter being optional. In this model, the emphasis is by and large on the online learning experience, whilst the flipped classroom still retains a fairly substantial segment of face-to-face interaction compared to the enriched virtual model. I am of the

opinion that the flipped-classroom model should be used as primary model in blended learning, with the understanding that it should be gradually replaced by the enriched virtual module as students become more self-regulated.

2.4 PLACING BLENDED LEARNING MODELS ON A CONTINUUM

The four models (§ 2.2.2) can all be positioned somewhere on the blended continuum (Figure 2.3) depending on contextual factors such as the goals of the instructional course, student characteristics, experience of the instructor, the discipline being studied, teaching styles and the developmental level of students.

The International Association for K-12 online learning summarises five stages to illustrate the continuum of blended learning (Figure 2.3). These five stages give educators and lecturers a clear picture of the various ways in which online learning blends with and supports traditional instruction (Eduviews, 2009) whilst simultaneously providing a broad continuum where lecturers interested in blended learning can position the appropriate model (Figure 2.2) in order to make online learning a meaningful part of the curriculum.

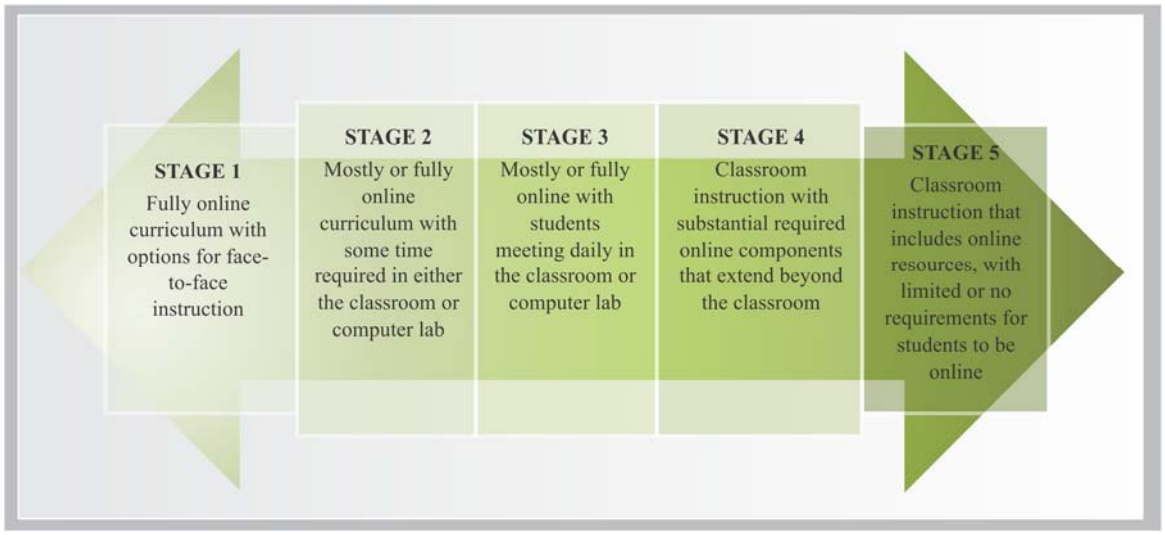


Figure 2.3: Blended learning continuum (Eduviews, 2009)

At the beginning of the study the TE module was situated in stage 5 with the focus on classroom instruction and no online requirements. After the re-design process (Addendum A) the referred module are now situated in stage 3 with the focus on mostly online with students meeting some weeks in the classroom.

2.5 BLENDED LEARNING IN PRAXIS

It is important to acknowledge that true blended learning is not as obvious as one would think. The concept of blended learning, described as the thoughtful fusion of face-to-face and online learning experiences, may be apparent, but the practical application is far more complex (Garrison & Kanuka, 2004, p. 96; Garrison & Vaughan, 2008, p. 5). Although it is not yet clear as to how much or how little online learning is inherent to blended learning, this mode of learning needs to be distinguished from that of technology-enhanced classrooms or fully online experiences. As such, blended learning is not an additional educational layer but rather represents a restructuring of class contact hours with the goal to enhance education. Bleed (2001, p. 20) argues that blended learning should not be interpreted as the "bolting" of technology onto a traditional course, where technology is used as an add-on to teach difficult concepts or to add information. Rather, he suggests that blended learning should be viewed as an opportunity to redesign the manner in which course design ought to be *developed, scheduled* and *delivered* in higher education.

A blended learning design, therefore, represents a fundamental re-conceptualisation and reorganisation of teaching and learning dynamics which encompass various contextual needs and contingencies such as discipline, developmental level and resources (Garrison & Kanuka, 2004, p. 97). As most lecturers are unfamiliar with blended learning, it is necessary to develop good practices of instructional design for this mode of learning. According to Cheung, Lam, Lau and Shim (2010), instructional tools and design are important components of blended learning, and the thorough integration of all components within instructional methods will be crucial to the success of blended learning. During the transition from face-to-face to blended learning, the lecturer will simultaneously act as instructional designer, technology specialist and course administrator. Since the aforementioned tasks will require significant time and effort, and since traditional design practices which worked well with face-to-face learning may not be useful in blended learning, lecturers ought to be guided in instructional design when developing blended learning courses (Cheung et al., 2010). In this regard, some appropriate guidelines will now be discussed.

2.5.1 Instructional design of blended learning courses

Instructional design is a systematic approach to course development that ensures specific goals are attained. It is an iterative process that requires continuous evaluation and feedback (European University Institute, 2009). The design of a blended learning course, according to Cheung *et al.* (2010), is a process that follows different phases, namely creating an overview of the course, redesigning lesson plans, preparing lesson material, doing research and developing resources accordingly, incorporating the former into learning management systems and reviewing the lesson plans thus created. As elucidated in the following paragraphs, the intention during this study is to use suggestions from Cheung *et al.* (2010) and the European University Institute (2009) as guidelines during the instructional design of a course in TE.

2.5.1.1 Create an overview of the course

The first step in designing a blended course is to create an overview of the course. The lecturer develops an initial plan of the course structure, teaching and learning strategies, integration of learning objectives, teaching plans and assessment methods. These aspects must be considered and reviewed to ensure the integration of the desired learning goals in the blended learning environment. The purpose of creating an overview of a course is to portray the context of the course and to establish a positive transition from a face-to-face mode to a blended mode. Cheung *et al.* (2010) recommend that an outline be developed of what can be done before, during and after class.

2.5.1.2 Re-design the lesson plan

After preparing the course overview, the lecturer develops a lesson plan to see how online learning can be integrated with face-to-face learning. The lesson plan is a set of specifications about what learning activities will occur before, during and after class and what the lecturer and students will do. Because of the unfamiliarity of the blended learning environment, the lesson plan should be detailed enough to state how online learning materials can be utilised maximally to enrich the student's learning experience. During the redesign of the lesson plan, the lecturer can identify the changes that ought to be made and also determine how each learning activity is to be completed.

2.5.1.3 Prepare the lesson materials

Based on the lesson plan, the lecturer prepares learning material such as hand-outs, notes, presentation slides, video clips and other relevant resources. During this phase, group projects,

assessment questions and discussions are also prepared. Since it is important that learning activities and lesson materials should be a good match, lesson materials based on the content, expectations and available resources ought to be used as tools to extend the capability of students.

2.5.1.4 Perform research and prepare resources

The next step in designing a blended course is to perform research and prepare extensive educational resources to enrich the learning experience. Dzuiban *et al.* (2004, p. 8) state that since commonly mentioned challenges in designing blended learning courses include time and resource constraints, lecturers ought to be skilled in displaying a critical attitude towards resources, focusing only on those that are both useful and essential in the classroom.

2.5.1.5 Incorporate into a learning management system

The lesson content is packaged as learning objectives for incorporation into a learning management system (LMS)[7] which serves as the learning platform. It is important that students understand what it is they are expected to learn and how they are expected to master the learning as this approach involves more independent study than before. In addition, a study schedule should be provided to help students form a clear picture of the course structure so that they are able to see what they need to do and within which time frame the activities are to be completed. All these learning functions should be supported by the learning management system.

2.5.1.6 Review the created lessons and materials

The final step in designing a blended learning environment is to review the lessons and materials before delivering the course. This review should, however, be a continuous process to develop and improve blended learning modules as context and technologies change (Cheung et al., 2010).

2.5.2 Scheduling of contact hours

Blended learning forces lecturers to question the essence of the learning opportunities they design and to consider how much time should be spent in the classroom and online. It represents a distinct design methodology that transcends the conventional classroom paradigm. The proportion of face-

[7] A learning management system (LMS) help lecturers to create different types of courses an projects for web-based e-learning, collaboration and research management.

to-face and online learning activities may vary, but it is important to remember that blended learning's distinguishing feature is the integration of face-to-face and online learning (Garrison & Kanuka, 2004, p. 97; Garrison & Vaughan, 2008, p. 7).

As already mentioned, the word blended implies a mixture or combination. Picciano (2009, p. 10) describes typical blended learning approaches where the time spent online varies depending on the course structure. Typical examples of how contact hours can be scheduled are:

- Simple separation of part of a course into an online component: For example, in a course where students meet for three weekly contact hours, two hours might be scheduled for traditional classroom practice, while the equivalent of one weekly hour is conducted online. The two learning environments for this course are carefully separated, and although they may overlap, it is possible to differentiate between the various parts of the course.

- Programmes that offer three compulsory online courses per semester: The students meet for three consecutive five-week sessions, and students do a collaborative 15-week project that overlaps the courses. In addition to being required to maintain regular communication with one another through email and group discussion boards, students are also required to attend face-to-face meetings once a month where course materials from the online courses are presented and discussed in greater detail. With this blended learning approach, the different parts of the course cannot be differentiated that easily.

2.5.3 Pedagogical re-design

Undisputedly, pedagogy has a critical role to play in the use of blended learning as part of a transformative re-design process within education (Hadjerrouit, 2007a, p. 111; Harris, Connolly, & Feeney, 2009, p. 160; Precel et al., 2009). Research in the field of online learning reveals that blended and online learning has a pedagogical foundation that is based on specific learning theories (Conole et al., 2004, p. 17; Fowler & Mays, 2005, p. 2; Hadjerrouit, 2007b, p. 283). However, the enhancement of a blended learning environment will not necessarily stem from improved technology but rather from a better understanding of the learning process that occurs within an online and face-to-face learning context. To this end, I hold that although learning theories should be one of the driving forces behind the *development* of online learning materials (Hadjerrouit, 2007a, p. 107), the role these theories play in course *design* and *delivery* should not be discounted.

Pedagogy can be broadly defined as any conscious activity by one person designed to enhance learning in another (Mortimore, 1999, p. 17) However, Segall (2004, p. 498) holds that pedagogy

is often reduced to being something that merely refers to methods of instruction and neglects the implication of pedagogy in knowledge and discourse. Ukpokodu (2009, p. 2) seemingly agrees with Segall, and although she concedes that pedagogy is concerned with what is to be done in the classroom, such as integration of curriculum content, the practice and use of classroom strategies and techniques and evaluation purposes and methods, she believes that pedagogy extends well beyond mere strategies, methods and techniques. Her contention is that pedagogy also represents how we specify particular versions of what knowledge is most valuable, and how we might construct representation of ourselves, others and the world.

For the purpose of this study, I will refer to pedagogy as the principles and methods of instruction, in this case as applied to teaching and learning in higher education. Thus in this instance the concept pedagogy can be regarded as an umbrella term which incorporates virtually all aspects of teaching and learning, thereby encapsulating aspects mentioned in section 2.5.1 which relate to the method of instruction. However, a more detailed discussion of other relevant pedagogical ideas relating to teaching and learning methods, such as learning theories, may well be warranted and will now follow.

Face-to-face learning and teaching pedagogy have been researched for many years. It is the pedagogy of the online component of blended learning that needs to be investigated. From a pedagogical point of view, pedagogy should lead technological choices and not the other way around (Picciano, 2009, p. 13). A suitable framework for the specific pedagogy of the online component of blended learning has not been studied thoroughly enough to provide clear guidance as to the way forward to facilitate effective blended learning (Stacey & Gerbic, 2008, p. 967). Consequently, in this study, suitable pedagogical practice, principles and frameworks for a blended learning module for Technology Education will be investigated.

The pivotal role various learning theories play in implementing sound and effective pedagogical practices, principles and frameworks cannot be underestimated. Pedagogical principles are theories that manage good educational practices, and as far as online learning is concerned, good educational practices are represented by instructional technology (Alsonso et al., 2005, p. 218). Consequently, certain learning theories ought to be implemented to achieve essential aspects of online learning, using Information Communication Technologies (ICTs). These aspects, according to Hadjerrouit (2007a, p. 111) and Siemens (2004), include:

- Behaviourist learning to support the transmission of knowledge from the instructor to the student;

- Constructivist learning theories to support collaborative learning, dialogue and discussion both with the instructor and associate students; and

- Connectivistic learning theory to support the importance of instructing students to search for, filter, analyse and synthesise information in order to obtain knowledge.

In sections 2.5.3.1-2.5.3.3, the learning theories referred to above will be discussed with specific reference to their relevance for blended learning.

2.5.3.1 Behaviourism

The behaviourist learning theory assumes that the goal of learning is to transmit knowledge from the instructor to the learner in an efficient manner. Instructors are clearly central to learning activities within a behaviourist setting. Although a behaviourist approach promotes stability with regards to knowledge acquisition, it offers very few opportunities for students to express their own ideas (Alsonso et al., 2005, p. 218). Nevertheless, despite being criticised for stimulating surface learning, it is important to realise that behaviourist learning remains suitable for novice learners where transferable knowledge from the instructor is necessary, as well as in situations where prescriptive solutions are required (Alsonso et al., 2005, p. 219; Ebert, 2005; Hadjerrouit, 2007a, p. 112).

2.5.3.2 Constructivism

The constructivist learning theory views knowledge as a constructed entity arrived at by each student through a learning process. With this type of learning, students are required to demonstrate their skills by constructing their own knowledge when solving practical problems. Thus the constructivist theory calls for student-centred instruction because learners are assumed to learn better when they are forced to discover things themselves rather than when instructed (Alsonso et al., 2005, p. 219; Hadjerrouit, 2007a, p. 112). Accordingly, students learn through collaborative learning strategies, implying that learning occurs as students improve their knowledge through discussion, dialogue, collaboration and information sharing (Alsonso et al., 2005, p. 219; Hadjerrouit, 2007a, p. 112).

2.5.3.3 Connectivism

Connectivism is driven by the understanding that decisions are based on rapidly altering foundations. Since new information is continually being acquired, the ability to recognise when new information can be used and applied in different contexts is of vital importance. According to Siemens (2004), it is this ability to see connections between fields, ideas and concepts that sets connectivism as a learning theory apart, heightening its applicability to and importance for modules in TE where students are constantly required to critically evaluate the suitably of one solution against the next and to apply what they have learned to other contexts.

Since a fundamental philosophical difference exists between the respective learning theories, a mixture of theories is being used in practice. In this regard, circumstances surrounding the learning situation must guide lecturers when deciding which approach would be most appropriate: Some learning experiences require prescriptive solutions, whereas others are more suited to constructivism (Ebert, 2005, p. 288; Hadjerrouit, 2007b, p. 285).

Further to this line of arguing, Mayes and Fowler (1999, p. 493) hold that learning development occurs in three stages, namely conceptualisation, construction and dialogue. The essential feature of these learning stages is that they describe a continuous cycle of gradual refinement of understanding. Nevertheless, as illustrated by the examples below, all three stages of learning contain elements that are closely related to the constructivist learning theories (Hadjerrouit, 2007b, p. 289):

Conceptualisation phase

> This phase is characterised by the process of interaction between the students' pre-existing framework and new knowledge and is, consequently, associated with the cognitive learning theory.

Construction phase

> The construction phase of learning refers to the process of building and combining concepts through their use in the performance of meaningful tasks and, therefore, relates to the constructivist learning theory.

Dialogue phase

> This phase refers to the testing of conceptualisations and the creation of new concepts during conversation with both fellow students and the lecturer. Since dialogue emerges through collaborative learning, this phase relates to the situated learning theory

According to Hadjerrouit (2007b, p. 289), throughout the implementation of blended learning programmes, emphasis ought to be placed on all three stages of the learning cycle, namely learning as behaviour, learning as knowledge construction and learning as dialogue and social practice.

Picciano (2009, p. 15) adds to the learning cycle a component of reflection as a powerful pedagogical strategy in blended learning courses. While reflection can be a deeply personal activity, the ability to share one's reflections with the lecturer and fellow students is a key component in the online component of blended learning.

Learning theories must be translated into pedagogical requirements, and such a translation is necessary in any attempt to examine blended learning implementation. The challenge is, therefore, to systematically explore the integration of pedagogical ideals and new communication technology that will advance higher education in a blended learning environment rather than to reinforce existing face-to-face practices for the online component in blended learning (Hadjerrouit, 2007b, p. 284).

Clearly, blended learning opens a wide range of possibilities for redesign that extend well beyond merely enhancing the traditional classroom lecture. Rather, in this instance, redesign means to conceptualise and to restructure teaching and learning situations (Garrison & Vaughan, 2008, p. 6), which in itself implies that lecturers should have a clear understanding of the relevant pedagogical requirements and the ability to restructure teaching and learning situations effectively if an enhanced online component in a blended learning environment is to be utilised to the greatest benefit of all involved.

2.6 BENEFITS OF BLENDED LEARNING

Since the properties and possibilities of both face-to-face and online learning are combined in blended learning, it ought to be possible to exceed the intrinsic potential each individual method holds, especially since the strengths of both methods are recognised, with the intention being to create a unique fusion of synchronous and asynchronous, direct and mediated modes of

communication (Garrison & Vaughan, 2008, p. 6). First to investigate the benefits of blended learning exclusively were Walace and Young (2010), followed by a study conducted in 2011 by COHERE (Collaboration for Online Higher Education and Research). The reported findings of both studies list the benefits of blended learning as (i) improved pedagogy and (ii) increased access and flexibility, (iii) greater satisfaction and (iv) improved student performance. To follow is a discussion of these benefits.

2.6.1 Improved pedagogy

Graham (2006, p. 8) found more effective pedagogical practices is one of the reasons why people would opt for blended learning. It is no secret that most current teaching and learning practices in higher education training environments are still focused on transmissive rather than interactive strategies for teaching and learning, he remarked. Earlier research conducted by Dzuiban *et al.* (2004, p. 3) and Reasons *et al.* (2005, p. 83) also indicated that blended learning approaches are likely to see an increase in the employment of active learning strategies, peer-to-peer learning strategies and learner-centred strategies. In 2011, a COHERE study conducted at Canadian universities revealed that students enjoyed and found the increased opportunities for interacting with classmates and the lecturer through the integration of new technologies very useful in their learning experiences (COHERE, 2011, p. 9). In their article titled "Pedagogical and design aspects of a blended learning course" Percel *et al.* (Precel et al., 2009) too found that blended learning could be considered the "best of both worlds" as many students expressed dissatisfaction with the loss of face-to-face contact in fully online courses. This sentiment is yet again echoed in the COHERE report (2011, p. 10), where respondents placed a high value on face-to-face interactions with their lecturer and classmates.

However, despite the fact that the literature indicates improved pedagogy in blended learning, a gap evidently exists in the pedagogical design of blended learning courses since many approaches simply adapt traditional face-to-face learning processes. As a result, assuming that blended learning courses always adopt suitable approaches to cater for the online component would be untrue (Precel et al., 2009).

2.6.2 Increased access and flexibility

Access to learning is one of the key factors contributing towards the growth in online and blended learning environments. Furthermore, the increase in mature students seeking further education who

may also have to cater for external commitments, such as obligations towards a family and/or a full-time career, marked a growing demand for flexibility and convenience. Undoubtedly, blended learning environments could offer the opportunity for increased access to and flexibility in terms of education.

According to the COHERE report (2011, p. 10), students attending universities are of the opinion that blended learning creates flexibility in as far as students can control the pace of their learning whilst simultaneously decreasing the time spent commuting (Garnham & Kaleta, 2002). It ought, however, be noted that although university students appreciate the flexibility blended learning courses offer in terms of time, place and pace, they nevertheless placed a high value on face-to-face interactions with instructors and classmates, yet again reiterating the importance of maintaining a balance between online and face-to-face components. Most studies indicate that although students desire the convenience offered by an online learning environment, they are reluctant to sacrifice the social interaction and human aspects characteristic of face-to-face environments (COHERE, 2011, p. 9; Lloyd-Smith, 2010, p. 1; Osguthorpe & Graham, 2003, p. 232).

As Garrison (2006, p. 30) suggested, students' perceived course interaction and their satisfaction with a blended learning environment could well have a direct bearing on one another. This notion is supported by several studies where findings indicated that course interaction and course satisfaction are directly related (Stodel, Thompson, & MacDonald, 2006; Vonderwell, 2003, p. 83).

2.6.3 Greater student satisfaction

It goes without saying that it would be impossible to evaluate the effectiveness of the educational process in a blended learning environment without taking the satisfaction, attitudes and expectations of students into account. The study conducted by COHERE (2011, p. 9) on the effects of blended learning from students' perspectives revealed that students have positive experiences with and attitudes towards blended learning and that they would recommend a course offered in a blended format to others. The principle reason for their high level of satisfaction was the flexibility provided by a blended mode of delivery (Garnham & Kaleta, 2002). Nevertheless, if the level of student satisfaction is to be enhanced, the importance of promoting interaction in blended settings should not be discounted (Chen & Chen, 2007, p. 80; Harris et al., 2009, p. 158; Swan, 2004, pp. 1-3).

2.6.4 Improved student performance

Several studies demonstrated that blended learning designs contribute to improved learning outcomes for students (Akyol & Garison, 2011, p. 240; Dziuban et al., 2004, p. 6; Lim, Morris, & Kupritz, 2010; Vaughan, 2007, p. 85). In particular, the study conducted by COHERE (2011, p. 9) noted a higher level of active and collaborative learning in blended learning courses, with a resultant increased success rate as illustrated by final course grades. Furthermore, research conducted at a Spanish university found that blended learning had a positive effect on a reduction in dropout rates and an increase in exam pass rates (Lopez-Perez, Perez-Lopez, & Rodriguez-Aruza, 2011, p. 822).

Reflecting on over a decade of experience in blended learning, Hartman (2010), too, reported a consistent 85% student success rate in modules thus offered.

Other studies seem to echo the notion of improved student performances, provided blended learning courses have been structured with pedagogical issues, such as adequate and well-managed resources, in mind. In sum, students who spend more time online following web links that are not central to the aims of the course might find it a waste of time and effort, while students who access the online resources regularly and use the online material to support the work done face-to-face might report improved results (Garrison, 2009, p. 96; Harris et al., 2009, p. 159).

Although interrogating the benefits of blended learning as a mode of delivery is not the main purpose of this study currently being conducted at the North-West University, it will be of great value to establish whether the study's outcomes will also be in keeping with the findings reported in 2.6.1-2.6.4.

Although certain benefits are to be gained from blended learning courses, as mentioned in section 2.6, specific barriers and challenges need to be overcome at the same time. These challenges and barriers will now be discussed.

2.7 CHALLENGES AND BARRIERS TO BLENDED LEARNING

Despite its novelty, and especially since little is known about what constitutes a successful blended learning environment, this mode of instruction poses specific challenges, especially with regard to the complexity, unique identity and acceptance of the two environments: on-line and face-to-face.

Since blended learning is distinguished from that of technology-enhanced classrooms or fully online learning experiences, Garrison and Kanuka (2004, p. 97) hold that the real test of blended learning would be the effective integration of the two main components without the one (online) being a mere add-on to the existing dominant approach (face-to-face). As such, blended learning presents a fundamental opportunity to re-conceptualise and reorganise educational experiences, starting with specific contextual needs. In this regard, though, no two blended learning designs could ever be the same, hence the complexity of these designs. In short, blended learning necessitates educators to ask questions about what is important and to consider how much time should be spent in the classroom (Garrison & Kanuka, 2004, p. 99; Garrison & Vaughan, 2008, p. 6).

Despite its versatility and potential, blended learning poses daunting challenges in as far as the design (administration and development) of blended learning environments is concerned. According to the COHERE (2011, p. 12) report, the two main challenges regarding a blended mode of delivery are recognition and support. To this, several authors such as Garrison &Kanuka (2004, p. 100), Walace & Young (2010) and Dzuiban *et al*. (2004, p. 10) added policy, the scheduling of blended courses, support for development and delivery, time commitment, the acquisition of new teaching and technology skills and the risk factors associated with blended course design as potential obstacles to the creation of a blended learning environment.

To follow is a discussion of the challenges and obstacles listed above.

2.7.1. Policy implications

Walace and Young (2010) identified a pressing need to formulate an unambiguous policy on the targets to be attained by way of blended learning against the backdrop of the declared goals and priorities of the institution, faculty and/or department. For example, traditional universities such as the North-West University offer some form of technology-mediated education to students based on individual academic interests, and these courses are managed by individual academics. Even though the NWU's teaching and learning policy clearly states that programmes are to be delivered by means of a blended mode (North-West University, 2011), clear strategic plans to provide an unambiguous vision and action plan to indicate the way forward are yet to be finalised. According to Walace and Young (2010), a situation such as this could cause frustration and result in learning outcomes being inadequately achieved. Situations such as the one currently being experienced at the North-West University highlight the need for a more formal approach to the development of

policies and operations required to support blended learning (Garrison & Kanuka, 2004; Walace & Young, 2010).

Walace and Young (2010) argue that if blended learning is to be developed and implemented successfully, policies such as these will have to be updated in order to provide the criteria and processes whereby classroom contact hours could be reduced in instances where some teaching components are moved online. Here cognisance should, however, be taken of the fact that although it may be relatively easy to quantify the time lecturers spend in class, negotiating an acceptable figure for blended courses along with other issues relating to workload will be far more challenging (Walace & Young, 2010).

Clearly, as far as scheduling is concerned, blended learning approaches require considerable thought in terms of the manner in which courses are to be offered with a view to ensuring a more flexible format that will benefit both lecturer and student. As has been stated on numerous occasions, although the proportion of face-to-face and online learning activities may vary, blended learning's distinguishing feature is the unique integration of face-to-face and online learning (Garrison & Kanuka, 2004, p. 97; Garrison & Vaughan, 2008, p. 7).

2.7.2 Support

Introducing blended learning would herald new responsibilities and roles for lecturers, which could impact their already demanding workloads negatively and could result in fewer lecturers being willing to adopt blended learning environments. For this reason, the COHERE report (2011, p. 13) proposes that the efforts of those faculty members who pursue innovative teaching practices be recognised and supported in an attempt to encourage others to follow suit.

Naturally, lecturers willing to adopt a blended learning environment would require support services, but according to Garrison and Kanuka (2004, p. 102), these support systems are often not in place. In particular, in addition to technical assistance, lecturers will require assistance with course development and time management. Perhaps at this stage it would be prudent to point out that, as indicated by Dzuiban *et al.* (2004, p. 8), blended learning is not a solo activity. Hence, in my opinion, the most effective support system for lecturers who are prepared to apply blended learning in their modules would be a system that involves course development teams.

In sum, to ensure successful blended experiences, departmental support for course redesign is imperative. The course redesign support should involve assistance on deciding which course objectives can be achieved best by means of online learning and which objectives can be achieved more effectively by means of face-to-face learning (Harris et al., 2009, p. 158).

In a study by Dzuiban *et al.* (2004, p. 8), lecturers also indicated that they needed to acquire new teaching skills such as how to foster online learning communities, how to facilitate online discussion forums and how to address and manage students' online learning problems. With reference to technology, many lecturers stated that they had to overcome their own fears and resistance by gaining hands-on experience with various technology tools and applications. In addition, these lecturers hosted professional programmes on the development of blended learning courses as well as on how to offer continuous support during the initial delivery phase.

Clearly, providing support for lecturers involved in designing and implementing blended learning courses is a critical component in this mode of instruction. However, providing such support will necessitate an understanding of the course management environment students and lecturers will resort to when addressing contextual barriers. With this in mind, I will, as a matter of priority, attempt to establish the principles relevant to the pedagogical implementation of new teaching skills as well as those dealing with the establishment of online communities, the facilitation of online discussions and the management of students in online teaching and learning environments.

2.7.3 Resources

Walace and Young (2010) argue that embracing a blended learning environment will, as a matter of course, have implications in as far as a need for new or additional staffing, technology and training resources is concerned. In their study, challenges and barriers relating to resources were found to have a bearing on both the faculty and the students and related in particular to the capacity, knowledge and skills of lecturers as well as the development of students' ability to use a variety of ICT's in the online component of courses. The same authors (Walace & Young, 2010) concluded that formulating criteria and policies that support the accessibility of resources for the purpose of developing blended learning environments is imperative.

2.7.4 Different approaches to blended learning

In their study conducted at various Canadian universities, Walace and Young (2010) found little consistency in practice amongst the different departments and stated that at least three different approaches to blended learning initiatives existed: (i) individual initiatives, often without any formal approval or quality-control processes and without any resource support, (ii) faculty initiatives whereby an instructor is afforded time to develop blended courses and (iii) initiatives whereby faculty members collaborate to develop blended courses. Only in the last instance could lecturers count on support in the form of course development expertise and resources.

As illustrated earlier, blended-delivery modalities impose different demands on instructors. Consequently, given the demands on time and resources and the need to reconsider reward structures and priorities, approaches to blended learning will require serious consideration.

2.7.5 Time commitment

Results from previous studies (Dziuban et al., 2004; Garrison & Vaughan, 2008; Walace & Young, 2010) reveal that lecturers regard the increased time they are required to commit to blended courses as the most significant challenge simply because, compared to similar courses delivered face-to-face, courses with online components place far greater demands on their time, excluding demands imposed in the developmental and administrative phases. Without a doubt, when opting to utilise both face-to-face and online learning for courses, the time demands on the instructor or trainer will increase simply because instructional materials need to be developed for both environments. In addition, though, within a blended learning environment, the time at lecturers' disposal to interact with students increases dramatically because in this mode of instruction, the assumption is that constructive feedback and guidelines will be offered by the lecturer in person on a 24/7-basis. Naturally, such an increased demand on lecturers' time could result in academic stress (Harris et al., 2009, p. 160; Swan, 2003; Walace & Young, 2010).

As is evident from the above discussion, despite the potential benefits of blended learning, certain challenges still need to be addressed. A successful response to these challenges would involve the creation of clear institutional direction and policy, the recognition of the potential of blended learning, the establishment of support for lecturers and students alike and the development of instructional design support.

2.8 CONCERNS REGARDING THE ONLINE COMPONENT OF BLENDED LEARNING

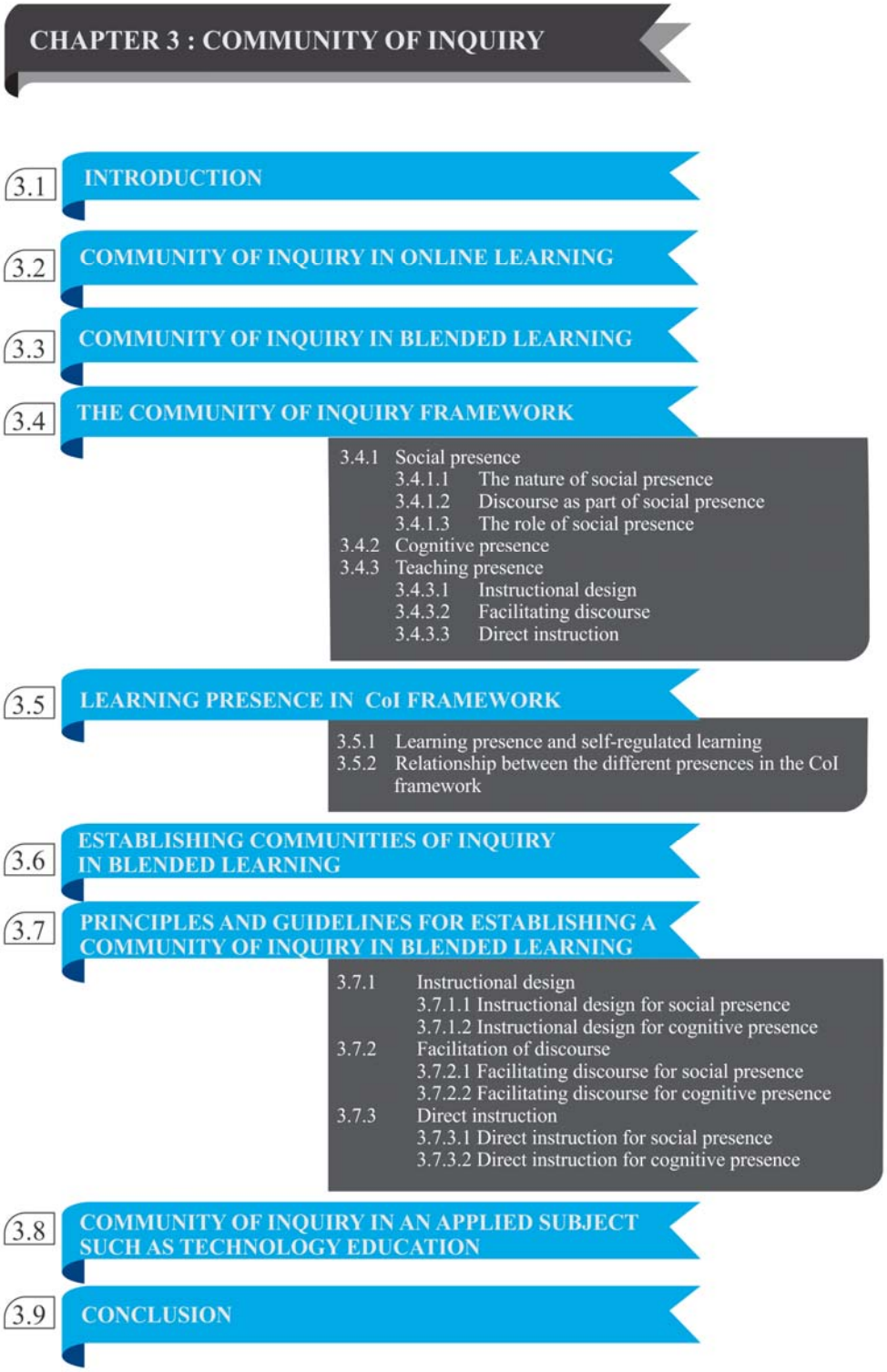
Despite the many promising features of blended learning, certain pitfalls are associated with online instruction. Online instruction may have a limited capability to engage students in learning experiences, unless students are self-motivated, active learners who demonstrate strong organisational skills in their learning habits. As pointed out above, research indicates that many students have expressed dissatisfaction with the loss of face-to-face contact in online courses. Students also often report a limited sense of belonging or community during online learning, which inhibits the development of shared feelings and emotions between students and the instructor. As is often the case with any online or virtual environment, participants may easily become "disengaged", with potential negative impacts on learning (Dziuban et al., 2005, p. 10; Reasons et al., 2005, p. 83; Richardson & Swan, 2003, p. 69). When students experience social interaction, they experience higher levels of mastery as well as the opportunity to reposition and redefine themselves in the world (Baker & Taylor, 2012, p. 6; Swan, 2003, p. 4). The abovementioned variables are important factors that influence student satisfaction and learning effectiveness. The argument is that in order to deliver effective learning experiences, a sense of presence, a feeling of immediacy and a feeling that students are part of a community must be created (Garrison et al., 2000, p. 5; Lim et al., 2010; Picciano, 2006, p. 90; Richardson & Swan, 2003, p. 69).

The CoI model offers a means to study blended teaching and learning in higher education. According to this model, creating and sustaining a community is framed by the core elements of a community of inquiry, namely social presence, cognitive presence and teaching presence. Social presence reflects the ability to connect with members of a community on a personal level; whereas cognitive presence is the process of constructing meaning through collaborative inquiry. Teaching presence is the integrating force that structures and leads the educational process in a constructive, collaborative and sustained manner (Garrison & Arbaugh, 2007, p. 159; Garrison & Cleveland-Innes, 2005, p. 135; Garrison & Vaughan, 2008, p. 53). Although there is a strong face-to-face component in blended learning that will help create a community, it is important that this community be sustained in the online component of the blended course.

Prior research has not yet fully examined the sense of community in higher education in the online component of blended learning environments (Garrison & Kanuka, 2004, p. 103; Rovai & Jordan, 2004, p. 4). In chapter 3 of this study, the CoI will be discussed as well as the effect the principles of such a community would have on the development, implementation and evaluation of a blended mode of delivery for TE.

CHAPTER 3

LOGIC



CHAPTER 3
COMMUNITYOF INQUIRY

3.1 INTRODUCTION

It has long been recognised that meaningful and worthwhile learning is associated with collaborative communities of inquiry, with the latter inevitably being described as the ideal learning environment for higher education (Garrison et al., 2000, p. 1; Garrison & Vaughan, 2008, p. 14). In this chapter, I will provide a critical discussion of what a CoI entails. I will also investigate the historic development, composition and nature of such a community. The research presented here has been approached from a pragmatic paradigm (Chapter 1 § 1.5); therefore, each of the presences will be related to this worldview. Furthermore, I will detail the rationale behind a CoI as well as the impact it has on the online component of a blended mode of delivery, paying particular attention to its implications for this mode of delivery and how a CoI can be sustained in the applied discipline Technology Education.

3.2 COMMUNITY OF INQUIRY IN ONLINE LEARNING

An educational community is a formally constituted group of individuals whose connection is that of academic purpose and interest and who works collaboratively towards attaining intended learning goals and outcomes (Garrison & Vaughan, 2008, p. 17). It has been a decade since Randy Garrison, Terry Anderson and Walter Archer pioneered the Community of Inquiry model. This team of authors initially developed the CoI framework to conceptualise the essence of a new online graduate programme in which computer discussion forums played a central role. The fundamental pedagogy underlying online learning assumes that students will work together and not independently as in traditional distance education. Consequently, the need for a new theoretical model that would explain and explore online educational experiences arose – resulting in the birth of the CoI framework.

In the context of higher education, *community* is seen as essential for deep and meaningful learning. Community is regarded as the setting that stimulates and facilitates critical discourse and reflection, which is the foundation for constructing meaning and confirming understanding (Garrison, 2006, p. 26; Garrison & Cleveland-Innes, 2005, p. 137; Garrison & Kanuka, 2004, p. 99). According to

Garrison (2006, p. 26), to establish a community takes time and direction, however, once it has emerged, it can be a powerful learning catalyst and support system.

Inquiry points to support for open-ended participatory engagement. Thus, a community of inquiry can be explained as a learning process that brings theory and action together in an experimental and critical manner (Bertram, 2007, p. 9; Dewey, 1955, pp. 5-6). However, meaning is not constructed in isolation, and according to Garrison, Anderson and Archer (2000, p. 3), the educational experience is a collaborative, constructivist process that has inquiry at heart. In relation to pragmatism, *community* emphasises support for collaborative activity and for creating knowledge which is connected to people's lived experiences.

3.3 COMMUNITY OF INQUIRY IN BLENDED LEARNING

Since the initial construction of the CoI framework, it has been modified in various ways in order to improve the online component in blended learning. The openness of blended learning redesign demands a strong theoretical framework. Without order and the means to construct a rationale for adopting a particular technique, searching for what may work in practice could become a random exercise with little understanding as to why something was successful. A useful blended learning framework must ultimately inform the integration of face-to-face and online learning. Against this background, I will be using Garrison, Anderson and Archer's CoI conceptual model to frame this study to investigate CoI in a blended mode of delivery for TE. Although it was originally developed for online courses, Garrison *et al.* (2000) indicate that this model can be applied to all educational experiences and is, therefore, regarded as a suitable point of departure in this instance.

3.4 THE COMMUNITY OF INQUIRY FRAMEWORK

The CoI framework (Figure 3.1) is available as a means to investigate effective learning environments in higher education (Garrison et al., 2000, p. 5). This framework is a valid and dependable instrument to measure the quality of online learning by focusing on three important presences that contribute to the quality of courses (Shea, Pickett, & Pelz, 2003, p. 63; Shea et al., 2005, p. 62) and can, therefore, be used by lecturers to design and evaluate effective learning environments.

Creating and sustaining a CoI is framed by the three presences[8]: social presence, cognitive presence and teaching presence (Garrison & Arbaugh, 2007, p. 158). In an effort to further elucidate the framework within which I am to structure this study, these presences within a CoI will be discussed in paragraphs 3.4.1 to 3.4.3. In sum, though, social presence reflects the ability to connect with members of a community of learners at a personal level. Cognitive presence is the process of constructing meaning through collaborative inquiry, and teaching presence is the integrating power that structures and leads the educational process in a constructive, collaborative and sustained manner. It is the intersection of these elements that creates the core of a CoI where collaborative constructivist educational experiences can be achieved (Garrison, 2006, p. 26). The framework, thus, suggests that online learning experiences unfold in the interaction between the abovementioned presences.

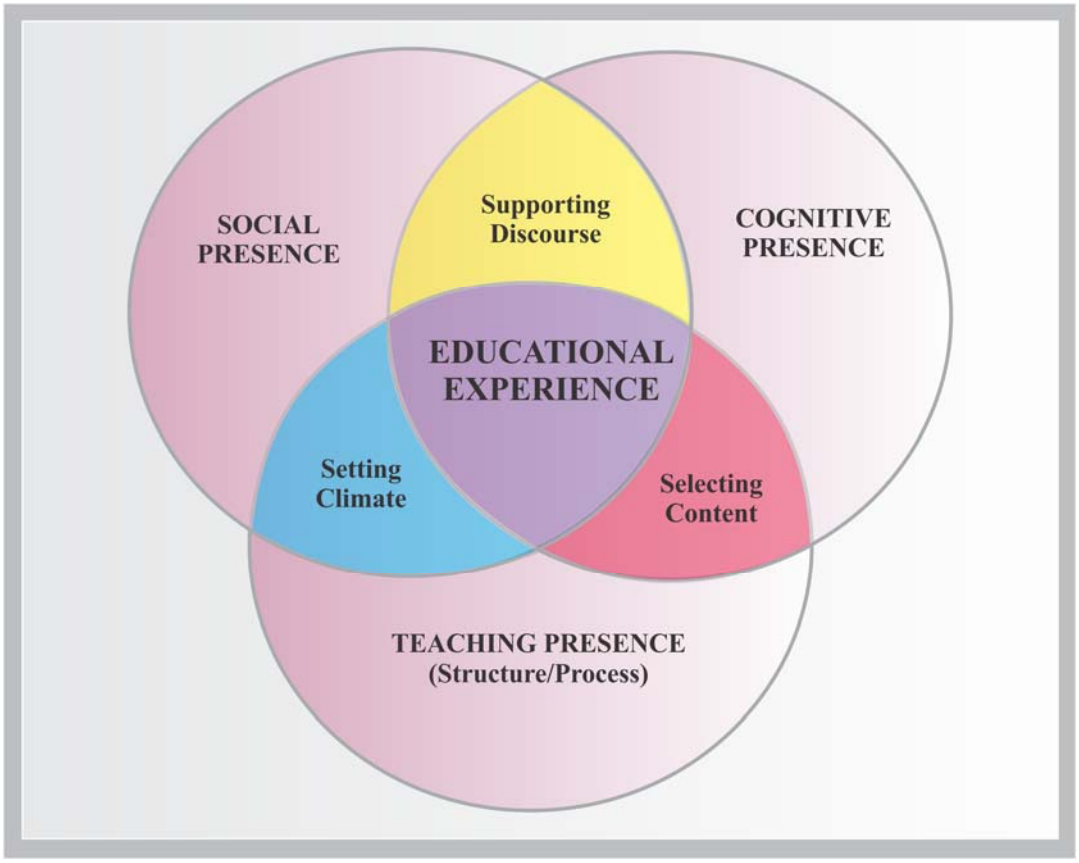


Figure 3.1: Community of Inquiry Framework (Garrison et al., 2000)

As is evident from Figure 3.1 above, the community of inquiry is a recursive model in that the three presences support each other.

8 Presence refers to the state or fact of being present, current or occurring in immediate proximity in time or space (Collins, 2003).

3.4.1 Social presence

3.4.1.1 The nature of social presence

Dewey (1955, p. 5) reasons that learning results from experiences that are contextually based and socially situated. According to Garrison and Arbaugh (2007, p. 159), of the three presences, social presence has been studied the most extensively in both online and face-to-face settings. Garrison (2006, p. 27) defines social presence as *"the ability of participants to identify with the community, communicate purposefully in a trusting environment, and develop inter personal relationships by way of protecting their individual personalities"* (p. 27).

Gunawardena and Zitte (1997, p. 10) add to the above definition of social presence the degree to which a person is perceived as real in mediated communication. Picciano (2002, p. 24) refers to social presence as a student's sense of being and belonging to a course, and Rourke *et al.* (2001) define it as *"the ability of learners to project themselves socially and effectively into a community of inquiry"*

Social presence is developed when students in a course feel free to express themselves openly in a risk-free manner and are able to develop the personal relationships necessary to help them to commit to, and pursue, intended academic goals (Garrison & Vaughan, 2008, p. 19). According to Swan and Shih (2005, p. 120), social presence should move beyond merely establishing socio-emotional presence and relationships since cohesion crucially requires open and purposeful communication and respect. In his study on the process of building communities, Brown (2001, p. 24) identified three stages in the sense of belonging to a community. In the first stage, students will become acquainted with one another. In stage two, after thoughtful exchange of ideas, participants will start to feel part of a community. Finally, in stage three, after intense association with others, camaraderie is achieved. These three stages are in line with the categories of social presence which include *meaningful communication, cohesive responses/discourse* and *affective/personal connections* (Garrison & Arbaugh, 2007, p. 159; Garrison & Vaughan, 2008, p. 19). In other words, social presence evolves from meaningful communication (interaction) to purposeful academic exchange (discourse) and, finally, to personal connection (camaraderie) (Brown, 2001, p. 25).

3.4.1.2 Discourse as part of social presence

Purposeful academic discourse is important to create social presence in an online environment. For this reason, it is necessary to clarify the concept "discourse". Discourse can be defined as verbal expressions in speech or writing where verbal exchange takes the form of conversations or lengthy

discussions on a subject, either verbally or orally (Collins, 2003). In the field of social sciences and humanities, discourse refers to a recognised method of thinking that is evidenced either by the use of language or by social boundaries which define what can be thought in relation to a particular topic. In addition, discourse is also observed in multimedia methods of communication which include written, signed and spoken language in contexts ranging from textbooks to instant-message conversations (Whisnant, 2012).

Discourse is at the heart of a meaningful educational experience, and in order to ensure that students are meaningfully engaged and that the discourse is relevant, care should be taken to maintain a sense of belonging to the CoI (Garrison & Vaughan, 2008, p. 38). To this end, Garrison and Arbaugh (2007, p. 161) advise that with establishing social presence, social interaction ought to be encouraged in order to improve structure and support early on in a course. However, social presence should not be measured simply in terms of the number of interactions it generates. The purpose of social presence in an educational context is to create the conditions for quality interaction, for example through reflective and threaded discussions, with the intention to achieve meaningful educational goals collaboratively.

Only where conditions for quality interaction have been created can a CoI successfully evolve through its three formative stages as outlined below:

- Meaningful communication

  Meaningful communication begins when students can communicate openly (Garrison & Vaughan, 2008, p. 20). According to these authors, a community is established when students are encouraged to project themselves personally and academically, especially in view of the fact that interpersonal interaction is a very important instrument in the creation of trust. Although students may, during this stage, feel secure enough to engage and free to comment, the community may still lack cohesiveness and discourse (stage 2) to begin working collaboratively.

- Cohesive responses

  A community is inherently collaborative. For this reason, social presence must provide the cohesive tension or purposeful academic exchange to sustain participation and focus (Garrison, 2006, p. 27; Garrison & Vaughan, 2008, p. 20). Research by Garrison and Arbaugh (2007, p. 160) also suggests that group cohesion has a bearing on attaining outcomes of a higher quality.

- Affective/personal connections

  Affective or personal connection constitutes the first stage of establishing social presence in an educational institution (Garrison, 2006, p. 27; Garrison, Anderson, et al., 2010, p. 7; Garrison & Arbaugh, 2007, p. 160; Garrison & Vaughan, 2008, p. 20). Brown (2001, p. 24) in particular reported that after intense association with other members in a group, personal relationships will develop and camaraderie may emerge, and it is these personal connections and camaraderie that constitute a true social presence in an educational community.

Theoretically, the CoI framework suggests that social presence is a mediating variable between teaching presence and cognitive presence, a variable which research found to be a crucial element in online learning communities (Garrison, Cleveland-Innes, et al., 2010, p. 32). With this in mind, a more detailed discussion on the role of social presence will follow.

3.4.1.3 The role of social presence

Several scholars (Kupczynski, Ice, Weisenmayer, & McCluskey, 2010; Rourke & Kanuka, 2009, p. 24; Shea et al., 2010, p. 14) recently critiqued the role of social presence as defined by the CoI framework. According to these scholars, research evidence questions the role of social collaboration and discourse in the construction of knowledge, thus challenging the framework's underlying assumption of the need for sustained and purposeful social communication (social presence) in online learning environments. Annand (2011) confirms the above research evidence and argues that social presence does not have an impact on cognitive presence in a meaningful way. Rather, according to Annand, appropriately structured learning materials, timely one-on-one instructor-learner communication and a teaching focus that enhances individual student's attributes and efforts ought to be credited for creating a cognitive presence. In turn, Garrison and Cleveland-Innes (2005, p. 134) argue that social presence alone will not ensure the development of critical discourse in online learning, although they do acknowledge the importance of social presence in the sense that, in their opinion, it will be difficult for critical discourse to develop without a foundation of social presence.

A study conducted by Shea and Bidjerano (2009, p. 548) on structural equation modelling (SEM) to investigate, amongst others, the impact of social presence on cognitive presence as measured by a CoI survey found that although social presence did not in itself directly affect cognitive presence, it does indeed serve as a mediating variable between teaching presence and cognitive presence. Conversely, Garrison and Anderson (2003) reason that social presence is critical to collaboration and discourse because it facilitates the achievement of cognitive objectives by initiating, sustaining and supporting

critical thinking in a community of learners. Their respective findings despite, without exception, all authors nevertheless reported that students value social presence as a means to share ideas and express views.

From the above discussion, I conclude that although social presence does indeed have an indirect effect on cognitive presence since it seemingly sets the environmental conditions for higher-order learning, some critical questions regarding the role and importance of social presence for cognitive presence still need to be answered. In this study, I attend to address some of these critical questions, paying particular attention to how they would impact the way in which the original CoI framework is structured and presented.

3.4.2 Cognitive presence

Cognitive presence refers to higher-order levels of learning and unavoidably requires purposeful discourse in order to construct, critically reflect upon and confirm understanding in a collaborative manner (Garrison & Vaughan, 2008, p. 19). Adding to this notion, Garrison, Anderson and Archer (2001, p. 9) refer to cognitive presence as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse. Clearly, the focus of cognitive presence is on higher-order thinking processes and is basic to the inquiry process (Figure 3.2) (Garrison & Vaughan, 2008, p. 21).

Going back, cognitive presence had its genesis in Dewey's work (Dewey, 1933) and his notion of reflective thinking, which provided the foundations for critical thinking as the hallmark of higher education. More recently, the development of the cognitive presence construct by Garrison, Anderson and Archer (2000) had its grounding in the practical inquiry model (Figure 3.2) which depicts the knowledge-building process.

This model is framed along two dimensions focusing on the pragmatic dynamics of the inquiry process. The vertical axis represents the sociological side or private world of the educational process as opposed to the community's shared world of discourse. Practical inquiry iterates invisibly between these two worlds. It is a process that includes both deliberation and action and is shaped by the rigorous and purposeful process of reflection and discourse to construct meaning and confirm knowledge. The horizontal axis represents the opposing process of perception (awareness) contrasted by the convergent process of conception (ideas) which constructs meaning from experience.

The four phases represented in the practical inquiry model begin with a triggering event in the form of an issue, problem or dilemma that requires resolution. As a result of this triggering event, a natural shift to exploration occurs, being the search for relevant information that can provide insight into the challenge. As ideas mature, there is a move towards the third phase, integration, where connections are made and the quest for a viable explanation commences. In the final phase, the resolution phase, the most viable solution is selected and tested (Swan, Garrison, & Richardson, 2009, pp. 47-48). The four phases depicted here represent the phases of reflective thinking Dewey (1933) described as essential to the process of understanding. Despite the fact that these dimensions are abstract processes, the phases are a true reflection of the educational experience (Swan et al., 2009, p. 48).

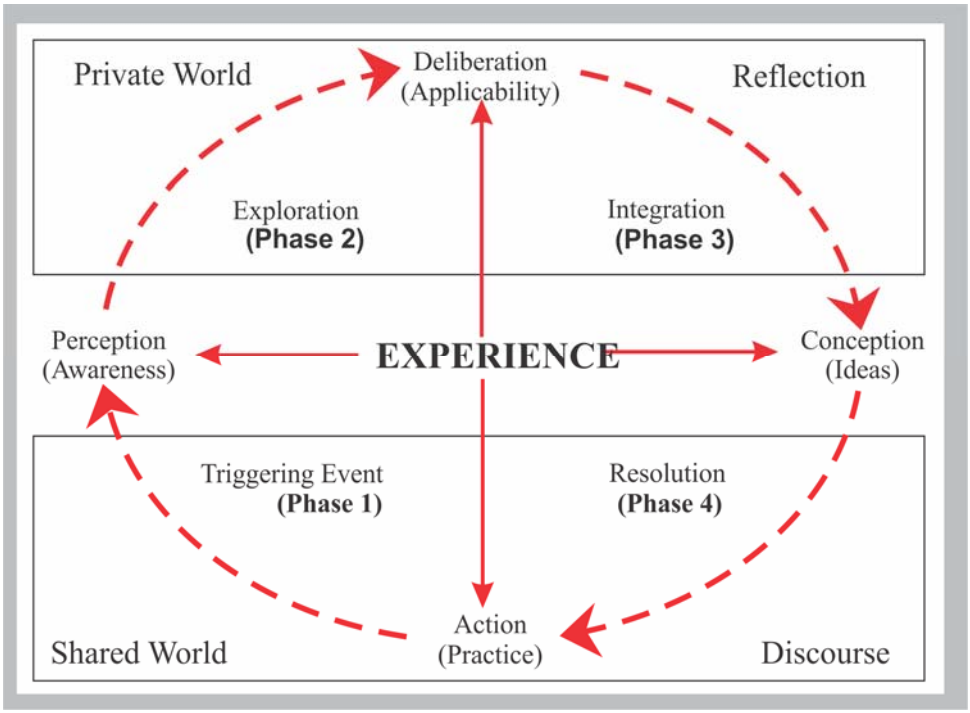


Figure 3.2: Practical Inquiry Model, adapted from Garrison *et al.* (2001)

Initial studies of cognitive presence suggest that most online postings in an online discussion forum focussed mainly on the exploration phase where participants shared information and brainstormed ideas, which implies theoretical exercises (Garrison & Arbaugh, 2007, p. 162). According to the literature, the existence of cognitive presence is the most difficult to study and to develop in online courses because the process of inquiry has great difficulty moving beyond the exploration phase to the integration phase where connections are made and, finally, to move to the resolution phase where selecting and testing the most viable solution take place. Several explanations for this phenomenon have been investigated, with the most likely being that the difficulty in transformation has to do with

the nature of the assignments and instructional direction provided. Yet again, in as far as this study is concerned, further reflection on this phase would be justified (Garrison & Arbaugh, 2007, p. 162).

Nevertheless, since Shea and Bidjerano (2009, p. 544) found that in studies which challenged students to resolve a problem where explicit facilitation and direction have been provided, students did, indeed, progress to resolution. In my opinion, this reflects positive on the applied discipline TE where the focus is on technological problem-solving in real-life contexts. The implication here is that with explicit facilitation and direction, transformation from the exploration to the resolution phase in a blended mode of delivery for TE would be quite attainable.

3.4.3 Teaching presence

In a transactional approach to education, the teacher is expected to assume certain responsibilities and fulfil an important role. Regardless of the mediated nature of the communication, it is the teacher's responsibility to precipitate and facilitate learning that is purposeful and focused on essential concepts and worthwhile goals. Fulfilling these complex responsibilities ascribed to a teacher necessitates sustained and authentic communication between and among teachers and students. In short, even where a transactional approach towards education is followed, the inherent implication being that control is shared, communication must be guided towards higher levels of learning through reflective participation as well as by challenging assumptions and by pointing to misconceptions (Anderson, Rourke, Garrison, & Archer, 2001, p. 3). According to Swan *et al.* (2009, p. 53), a teacher will precipitate and facilitate purposeful and focused learning by maintaining a teaching presence.

In short, within an educational context, teaching presence is critical to provide structure, facilitation and direction for the learning process to be cohesive, stable and progressive. Accordingly, Anderson, Rouke, Garrison and Archer (2001, p. 5) describe teaching presence as the "*design, facilitation and direction of cognitive and social processes for the purpose of realising personally meaningful and educationally worthwhile learning outcomes"* (p. 5).

A number of researchers have also referred to teaching presence as the obligatory element in creating a community of inquiry and the source of online instructional orchestration (Garrison et al., 2000, p. 5; Shea et al., 2010, p. 17). Garrison *et al.* (2000, p. 10) report that although both social and cognitive interactions among participants are necessary in online learning environments, interactions by themselves are not sufficient to ensure effective online learning. In this regard, teaching presence fulfils a regulatory and mediating role, merging all the elements of a community of inquiry in a

balanced and purposeful relationship that is congruent with the intended outcomes as well as the requirements and capabilities of the students (Akyol et al., 2009, p. 68; Garrison, Cleveland-Innes, et al., 2010, p. 35). Here it ought to be noted, though, that according to most studies, teaching presence have been found to occur outside threaded discussion areas – the latter being areas which, to date, have not been included in investigations concerning teaching presence (Rourke & Kanuka, 2009, p. 22).

The concept "teaching presence", according to Anderson *et al.* (2001, pp. 5-10), encompasses three categories, namely instructional design, facilitation of discourse and direct instruction. It is by means of these three categories that lecturers can measure their presence in the online classroom environment. However, a large-scale factor analysis conducted by Shea *et al.* (2006, p. 180) indicated only two categories, namely instructional design and direct instruction. This team of researchers found that the three categories first identified by Anderson and colleagues failed to cohere as three separate constructs. According to Shea *et al.* (2006, p. 180), students could not distinguish between direct instruction as a construct different from facilitation of discourse. Naturally, the findings of Shea *et al.* (2006, p. 180) raise the question as to whether the categories that signify teaching presence need to be revised.

Despite the controversy surrounding the categories that constitute teaching presence, for the purpose of this study, I will make use of the three categories as indicated by Anderson *et al.* (2001, pp. 5-10) namely instructional design and organisation, the facilitation of discourse and direct instruction. Each of these categories will now be examined in greater detail and, in particular, in as far as they impacted the recasting of the module TECD 421.

3.4.3.1 Instructional design

Anderson *et al.* (2001, p. 5) describe the instructional design and organisational aspect of teaching presence as the planning and design of the structure, process, interaction and evaluation of an online course. Activities characterising this aspect of teaching presence include setting curriculum, designing teaching methods, establishing time parameters and establishing etiquette.

In the case of TECD 421, setting curriculum activities included building and restructuring study material as well as planning the course schedule. Whereas the latter stipulated the dates of face-to-face contact sessions, the resources to be used as preparation for such meetings as well as the activities to be completed online were outlined in a study guide. This study guide, together with all

additional resources and the course schedule, were made available electronically via the LMS, the eFundi[9] learning platform.

In addition to specifying the broad purpose of the module, the module outcomes, the assessment criteria and the outcomes per study unit, the study guide was divided into weekly activities based on the nature of the content. Furthermore, the outlined curriculum thus outlined clearly communicated to students which activities needed to be completed in class and which activities needed to be completed online (Addendum A: module planning document and Addendum F).

As much as redesigning instructional methods involves restructuring study material the likes of lecture notes and study guides with the intention to incorporate online commentaries, mini-lectures and personal insights, the restructured study material should also facilitate customised views of course content and be designed to accommodate group and individual activities that will take place in the course of a module. For this reason, instructional methods were incorporated in the module TECD 421's eFundi e-study guide. (Addendum F: e-guide)

The purpose of an e-guide is to provide an interactive electronic support mechanism which will guide students in a structured way to achieve relevant outcomes. With this purpose in mind, the e-guide in question was created with the intention to integrate face-to-face teaching and learning with web-based teaching and other online components in order to improve teaching and learning in a blended mode of delivery (Academic Support Services, 2013, p. 1).

Establishing time parameters allowing the instructor to set timelines for activities and student projects is an important aspect of teaching presence. In addition to furnishing students with a course schedule with timelines for the submission of assignments, the lecturer will typically also post reminders on the forum to help students keep to the timeframes.

Of equal importance is establishing etiquette, which encompasses setting guidelines for the appropriate use of post- and reply functions to avoid communication breakdowns, such as inappropriate posting or postings placed on the wrong discussion forum. In addition, by modelling

[9] eFundi is a SAKAI-based learning management system for web-based e-learning, collaboration and research management. It is designed to help lecturers and researchers create different types of courses and projects. eFundi offers a broad spectrum of features including tools for administration, assessment, assignments, communication, resource sharing and collaborative learning.

appropriate etiquette and correct use of the online medium, the lecturer will typically help reinforce these guidelines.

Of the three categories resorting under teaching presence, instructional design is most likely to be performed exclusively by the leturer (Anderson et al., 2001, p. 6; Garrison & Arbaugh, 2007, p. 163; Shea et al., 2005, p. 61).

3.4.3.2 Facilitating discourse

Facilitating discourse during an online course is especially critical in order to maintain the interest, motivation and engagement of students during active learning. This category is also referred to as establishing a knowledge-building community (Anderson et al., 2001, p. 7). The role of the lecturer in this category of teaching presence relates to identifying areas of agreement and disagreement, seeking to reach consensus and understanding, setting a climate for learning, drawing participants and promoting discussion as well as assessing the efficacy of the process (Anderson et al., 2001, p. 7).

Cognitive development requires that individuals encounter others who contradict their own ideas and notions, thereby creating cognitive conflicts. To this end, identifying areas of agreement and disagreement involves the identification of points of agreement and disagreement, for example when students are debating a topic online.

Lecturers are required to help students find matching linkages when apparent opposing or consistent opinions are being expressed by helping students to articulate consensus and shared understanding. Since the lecturer shares responsibility with each individual student for the attainment of agreed objectives, the lecturer should support and encourage participation by modelling appropriate behaviours as well as by commenting on and encouraging participation. As such, the lecturer is an active member of the community of inquiry, but his/her role is more demanding than that of other participants since it carries a high level of responsibility to maintain discourse. To this end, the lecturer has to monitor and probe the discussion whilst ensuring effective and efficient use of time.

Facilitating discourse requires the instructor to review and comment upon student responses, raise questions and make observations to move discussions in a desired direction. In this way, discussions will continue to flow efficiently, whilst encouraging inactive students and limiting the activities of dominating posters when they become detrimental to the learning of the group (Akyol et al., 2009, p. 68; Anderson et al., 2001, p. 7; Shea et al., 2006, p. 177; Shea et al., 2005, p. 62).

3.4.3.3 Direct instruction

Direct instruction is the final category within the teaching presence and can be described as the instructor's provision of intellectual and scholarly leadership, in any context, by sharing his/her knowledge of the subject matter with students and utilising his/her pedagogical expertise (Anderson et al., 2001, p. 8). As subject matter expert, the lecturer is expected to provide direct instruction by interjecting comments, referring students to information resources and organising activities that allow the students to construct the content within their own minds and personal contexts.

For the purpose of analysing teaching presence, the following indicators of direct instruction apply: presenting content and questions, focussing discussion on specific issues, summarising discussion, confirming understanding, diagnosing misconceptions, injecting knowledge from diverse sources and responding to technical concerns (Anderson et al., 2001, p. 9; Shea et al., 2005, p. 62). Presenting content to and directing students' questions is an important, traditional role of the lecturer. Lecturers also need to provide focus and direction by focussing students' attention on particular concepts or content necessary to facilitate knowledge growth. For this reason, the lecturer's summary of a discussion ought to encompass more than a mere neutral conclusion of postings but should develop and explicitly outline the context in which knowledge growth had occurred. Direct instruction also takes the form of statements that confirm understanding through assessments and explanatory feedback.

Another critical task of the online lecturer is to diagnose misconceptions. Often, students hold misconceptions that impair their capacity to form accurate conceptions and construct valid knowledge. By referring students to a wide variety of resources, the lecturer can help to enrich students' knowledge further, keeping in mind that within an online environment, the number, quality and accessibility of these resources will be enhanced considerably since more information is available on the web. However, in this regard, the lecturer may be expected to provide direct instruction on technical questions related to gaining access to and operating online tools and resources.

Shea *et al.* (2006, p. 180) are of the opinion that students are unable to distinguish between direct instruction and facilitation of discourse as two distinctive categories of teaching presence. For this reason, they hold that teaching presence ought to encompass only two categories, namely instructional design and organisation, and direct instruction. Certain similarities and overlapping aspects can, indeed, be found in both direct instruction and facilitation of discourse. One such example includes seeking to reach consensus and understanding (facilitating discourse) and confirming understanding (direct instruction). In my opinion, though, there are sufficient distinctive differences between the

two categories to justify the existence of both in teaching presence. Direct instruction represents the organisation of learning content versus facilitation of discourse which represents the critical discussion of and argumentation around the learning content.

Rapidly growing evidence confirms the importance of teaching presence for successful online learning (Garrison & Cleveland-Innes, 2005, p. 136; Garrison, Cleveland-Innes, et al., 2010, p. 35; Rourke & Kanuka, 2009, p. 22; Swan, 2003, p. 20). The consensus is that teaching presence is a significant determinant of student satisfaction, perceived learning and sense of community.

Research on the CoI framework suggested that not enough focus has been placed on the role, involvement and experience of students in the online component of blended learning (Shea & Bidjerano, 2010, p. 1723). Consequently, such studies aimed at further investigation of the CoI framework resulted in the identification of a fourth presence, learning presence, hitherto excluded from the original CoI framework (Bliss & Lawrence, 2009, p. 17; Shea & Bidjerano, 2010, p. 1724).

3.5 LEARNING PRESENCE IN THE COMMUNITY OF INQUIRY FRAMEWORK

Research conducted by Shea *et al.* (2010, p. 1723) indicated that previous studies on teaching, social and cognitive presence contained data, especially with regard to student discourse, that did not fit into the established CoI framework. These authors believe that the CoI framework may need additional emphasis on the roles of strategic learners in online environments. While this research is still in its infancy, seemingly, learner self-regulation can serve as a basis for a new form of presence within the model, described as learning presence, which led Shea *et al.* (2010, p. 1727) to suggest a revised CoI model (see Figure 3.3). In view of the above discussion, the need to reconceptualise the manner in which self-regulatory factors may affect students' performance in the online component of blended learning emerged. Consequently, this study also investigated the extent to which learning presence manifests itself in a blended mode of delivery for the applied discipline TE.

3.5.1 Learning presence and self-regulated learning

Shea *et al.* (2013, p. 427) refer to learning presence as the process of consideration and planning, monitoring and adapting strategies for learning and reflecting on results in the online environment.

They argue that knowing more about learner self-regulation will provide a strong foundation to articulate the role of online students (2010, p. 1723).

According to Shea *et al.* (2010, p. 1723), self-regulation refers to the degree to which students in collaborative educational environments are metacognitively, motivationally and behaviourally active participants in the learning process. Zimmerman (2002, p. 65) concurs with this by defining self-regulation as the self-directive process through which students transform their mental abilities into academic skills. Self-regulation, according to Zimmerman, refers to self-generated thought, feelings and behaviours that are oriented towards attaining goals. Given the online, social and self-directed nature of online learning, examining learner's self-regulation in online environments is imperative.

Indicators of self-regulation include engagement in strategic efforts such as dividing tasks, managing time and setting goals with a view to completing assignments successfully (Shea & Bidjerano, 2010, p. 1723). Thus learning presence, according to the afore-going authors, indicates the exercise of control rather than compliance and passivity and specifically articulates popular beliefs about the importance of self-direction in online and blended learning environments.

The rationale for investigating learning presence is to examine the distinct roles that successful online students may adopt. Although there are commonalities between the roles of the online instructor (described in the teaching presence) and students, their duties, expectations, motivations and mechanism for success differ. For example, students' planning, monitoring and strategising are quite distinctive from the concepts of instructional design, facilitation of discourse and direct instruction that characterise teaching presence (Shea & Bidjerano, 2012, p. 320). This suggests that there is a distinct learning presence in the online learning environment of blended learning.

Understanding the factors that influence the success of online environments has significant implications for designing productive online communities (Shea & Bidjerano, 2010, p. 1727). To this end, Shea *et al.* (2012, p. 93) identified a strong correlation between constructs within the CoI framework and self-regulation. Although teaching presence and social presence are important in their own right, the extent to which students believe that they are achieving significant learning and the effort they are willing to put in are largely dependent upon their sense of efficacy. In addition, the relationship between teaching presence and self-regulation is stronger for students in a blended environment. This finding supports the assumption that the absence of face-to-face classroom conventions may cause additional uncertainty, implying that more attention ought to be paid to supporting the relationship between teaching presence and student self-regulation in the online

component of blended learning. In a blended mode of learning, establishing learning presence can be accomplished via expanded teaching presence, a presence that acknowledges that successful online students are metacognitively, motivationally and behaviourally active participants in their own learning process (Shea & Bidjerano, 2010, p. 1727; Shea et al., 2012, p. 90). Findings also suggest that teaching presence and social presence are significantly correlated with student self-regulation (Shea & Bidjerano, 2012, p. 93).

Although Shea *et al.* (2012, p. 93) suggest that learning presence ought to be associated with teaching and social presence, I am of the opinion that cognitive presence should also be associated with learning presence. Garrison (2003, p. 50) clearly distinguishes self-regulatory learning as a phenomenon that embraces and entails cognitive processes and explains that it is important to understand the natural cycle of the learning processes if the learning process is to be regulated effectively. Given the phases in the practical inquiry model, paying due attention to cognitive presence (Figure 3.2) could be useful in understanding and selecting specific strategies and activities. In this instance, self-regulatory processes would refer to the students monitoring, controlling and regulating their own cognitive activities and actual behaviour. This implies that self-regulated learners are both active and reflective participants and assume appropriate responsibility and control in the cognitive learning process (Garison, 2003, p. 52). Zimmerman (2002, p. 65) concurs with this when he refers to the self-regulated learning process through which students transform their mental abilities into academic skills. Key dimensions of self-regulated learning are monitoring (reflection) and managing (action) of the learning process. Monitoring is the assessment of feedback information, while managing has to do with taking control of learning tasks and activities. Without self-monitoring and self-management, learning effectiveness will be reduced significantly.

It is the detachment of teaching presence from cognitive presence in the revised CoI model (Figure 3.3) which needs consideration.

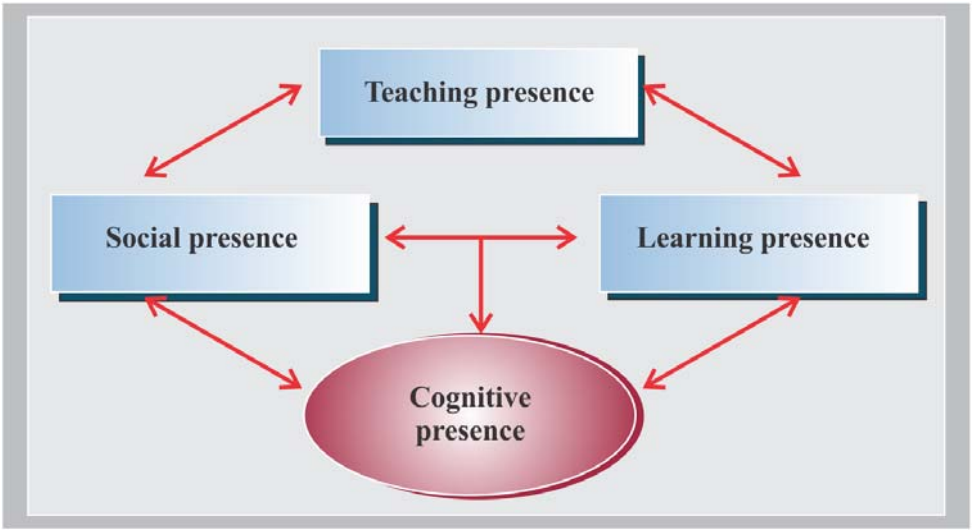


Figure 3.3: Revised Community of Inquiry model (Shea et al., 2012, p. 93)

I believe that the four presences (social, cognitive, teaching and learning) should be inter-connected and that these presences influence one another (Diagram 3.4). I therefore suggest a more effective model that inter-connects all the presences as presented in Chapter 6, Figure 6.1.

The relationship between the different presences in the CoI framework will now be explained.

3.5.2 Relationship between the different presences in the Community of Inquiry framework

The CoI framework outlines the processes required to enable knowledge construction in online environments through the development of a teaching, social and cognitive presence. Consistent with previous research, it is clear that the three presences (social, cognitive and teaching) are interconnected and have an influence on one another. The causal relationship among the three presences supports the finding that teaching presence has a regulatory and mediating role which merges all elements in a balanced and purposeful relationship. To this end, teaching presence is essential in establishing a sense of social presence by engendering an atmosphere of meaningful communication, cohesive discourse and personal connections. This sets the stage for purposeful discourse and reflective learning processes as indicated by the perceived relationship between social and cognitive presence. In this sense, social presence is a mediating factor that provides context for the educational process. The relationship between teaching presence and cognitive presence becomes

clear when students are assigned engaging tasks requiring from them to move through the phases of practical inquiry (triggering event, exploration, integration and resolution) in order to find solutions. Once students are engaged, teaching presence has a significant influence in facilitating and directing student learning. This has proven to be crucial to reach the resolution phase and to thus achieve a successful learning experience. I am of the opinion that the latter will only happen if the lecturer actively and effectively structure the course in such a way that the direct instruction and facilitation of discourse lead to higher-order learning, which would then result in practical inquiry (cognitive presence).

Learning presence has recently emerged as a powerful explanatory mechanism for the relationship between instruction and educational outcomes. According to Shea and Bidjerano (2010, p. 1727), self-regulated learning represents an important mediating link between teaching, social and cognitive presence, and aspects of learning presence, in particular self-regulated learning, cannot be considered separate from the CoI. In studies conducted during 2010 by the same authors, online students reportedly monitor their time and cognitive strategies, regulate their own study environment and exercise control over their interactions with peers to maximise learning. Further studies by Shea and Bidjerano (2012, p. 324) suggest teaching presence and social presence have a differential effect on cognitive presence, depending upon learners' self-regulation behaviour, in other words their learning presence. This is yet another reason why I believe a more effective CoI framework ought to include learning presence as depicted in figure 3.4.

Now that the presences in the CoI framework as well as the relationships between the different presences have been discussed critically, the next crucial step is to investigate the principles and guidelines governing the establishment of communities of inquiry in blended learning.

3.6 ESTABLISHING COMMUNITIES OF INQUIRY IN BLENDED LEARNING

At the heart of meaningful educational experiences are two integrated processes, namely reflection and discourse (see concept clarification § 3.4.1). According to Garrison (2006, p. 25), online and blended learning have the advantage of reflection that is not always possible in a fast-paced and free-flowing fully face-to-face environment. The face-to-face classroom experience requires verbal alertness, spontaneity and confidence to express oneself in a group setting which intensely limit reflection and dialogue in most campus-based classrooms. Blended learning designs, however, capitalise on the properties of media and the potential to maximise the educational experience

(Garrison & Vaughan, 2008, p. 31). However, interaction in itself is not sufficient: It must be purposeful and reflective. In order to establish and enhance CoI, students should be provided with opportunities for purposeful, open and disciplined critical discourse and reflection (Garrison & Vaughan, 2008, p. 14).

According to Dewey (1955, pp. 4-6) and Garrison and Vaughan (2008, p. 15), inquiry within the educational community focuses on intended goals and learning outcomes. It is a systematic process to define relevant questions, search for relevant information, formulate solutions and, in the final instance, to apply those solutions. Clearly, discourse is crucial to this process and has been explained (§ 3.4.1.2) as verbal expressions in speech or writing, verbal exchange in the form of conversations, or lengthy discussions of a subject, either in writing or verbally.

A community of inquiry depends on sustained communication and collaboration wherein participants share experiences and insights. In such a community, the process of inquiry goes beyond accessing or even assimilating information. Rather, inquiry joins process and outcomes in a unified, iterative cycle. It links reflection and content by encouraging students to collaboratively explore and reasonably question the meaning of subject matter. In other words, inquiry is both a reflective and a collaborative experience (Garrison, 2006, p. 25). Inquiry must be purposeful but also flexible and accustomed to exploring unintended paths of interest. For this reason, sustained communities of inquiry are dependent upon purposeful and respectful relations that encourage free and open communication (Garrison & Vaughan, 2008, p. 15).

Students must have the freedom to explore ideas, to question and to construct meaning, because if learning is a process of inquiry, it ought to focus on questions, not only on answers. According to Garrison and Vaughan (2008, p. 16), education does not easily advance to higher levels of inquiry when reflection and discourse are artificially detached. The inquiry method depends on interaction, and participants in the inquiry process ought to feel secure to reveal their private thoughts and to subject these to public scrutiny and critique. To inquire is to be awakened, informed and engaged to explore controversies within a discipline rather than to simply adopt the obvious and accepted truths (Garrison & Vaughan, 2008, p. 16).

Clearly, the process of inquiry requires considerable intellectual discipline. However, since participants acquire the attitudes and skills to become critical thinkers in the process, discipline is essential to ensure deep and meaningful learning. In short, a community of inquiry requires discipline if it is to provide a sense of connection and support in the systematic and purposeful pursuit of shared

educational goals and knowledge. Through purposeful, open and disciplined interaction and discourse, a community of inquiry can support inquiry and the development of both the individual and the community (Garrison, 2006, p. 26; Garrison & Vaughan, 2008, p. 17).

In the section to follow, some principles and guidelines to aid the establishment of a community of inquiry in a blended learning environment will be suggested.

3.7 PRINCIPLES AND GUIDELINES FOR ESTABLISHING COMMUNITY OF INQUIRY IN BLENDED LEARNING

Education is a learning experience aimed at achieving intended outcomes in a systematic manner, and it is the lecturer's responsibility to provide the environment that will structure, support and shape a meaningful learning experience. As mentioned earlier (§ 3.4.3), teaching presence has a regulatory and mediating role, bringing together all the elements of a community of inquiry in a balanced and purposeful relationship in keeping with the intended outcomes as well as the requirements and capabilities of the students (Akyol et al., 2009, p. 68). Given the regulatory function of teaching presence and given that interaction is shaped into reflective discourse through this presence, I will now discuss the principles and guidelines for creating and sustaining social and cognitive presence in a blended learning environment based on the descriptors for teaching presence, namely *instructional design, facilitation of discourse and direct instruction* (§ 3.4.3.1-3.4.3.3) (Garrison & Vaughan, 2008, p. 32). (Also see the summary of principles and guidelines in table 3.1.)

3.7.1 Instructional design

Designing an online learning experience is a formidable challenge. When designing an online learning experience, the dominant mode is text-based communication; therefore, the designer must adjust to the strengths and weaknesses of this medium. However, in designing learning experiences of this nature, paying particular attention to social and cognitive issues that go well beyond deciding what content to cover is vital (Garrison, 2006, p. 26).

3.7.1.1 Instructional design for social presence

The goal of establishing social presence is to create a climate of trust and belonging that will support interaction. As such, social presence is an essential precondition for establishing a sense of community and cognitive presence (Garrison, 2006, p. 27; Garrison & Vaughan, 2008, p. 40).

Evidence in the literature suggests that there is a link between instructional design and the establishment of social presence, meaning that courses that intentionally build a sense of community and incorporate collaborative activities will demonstrate increased social presence. Because establishing social presence is associated with the degree of interaction among students, the implication is that learning situations must be designed so that students have an opportunity to interact formally and informally with their peers (Swan & Shih, 2005, p. 117; Tu & Mclsaac, 2002, p. 145).

Online social presence requires special consideration because communication in online contexts is less frequent and more deliberate and intentional, compared to a face-to-face context where physical presence stimulates the expressions of social presence in a more naturalistic manner. Some guidelines for instructional design with a view to establishing social presence within a blended learning environment include activities where participants introduce themselves and share something about their personal interests. Ideally, a special forum should be created for these postings, and it may be appropriate to share a digital picture. Furthermore, students should be assigned to small groups to discuss their formal expectations of the course and also to identify any concerns they may have. Along a similar vein, creating a "chat room" for informal communication which affords students the opportunity to get to know one another is equally important, while all involved – lecturer and students alike – ought to be open to online office hours. An important word of advice for instructors would be not to overshadow online discussions but rather to provide some thought-provoking questions, thereby allowing space for students to interact and to build their understanding through collaboration with their classmates (Garrison, 2006, p. 27).

3.7.1.2 Instructional design for cognitive presence

Cognitive presence is created as students inquire course content in a systematic and meaningful manner. Designing instructional material and processes to ensure cognitive presence encompasses the process of inquiry that moves from problem definition to exploration of relevant content and ideas, the integration of those ideas into a meaningful solution and, in the final instance, testing the validity or usefulness of the outcomes (§ 3.4.2). According to Garrison (2006, p. 28), the main objective of instructional design for cognitive presence is to establish critical reflection and discourse that will support systematic inquiry. From a design perspective, the main issues to consider here are the phases of inquiry and the selection of learning activities congruent with the particular phase students are expected to operate in. The main challenge when designing for cognitive presence will, thus, be to ensure that students continue to progress through the inquiry phases. For this reason, activities ought to be designed in such a way that they will encourage students to move from awareness to knowledge

construction and application in a manner that represents the intended goal (Garrison, 2006, p. 28; Garrison & Vaughan, 2008, p. 41).

Some guidelines associated with instructional design for cognitive presence include setting clear goal expectations. Furthermore, as indicated above, it is important to structure curriculum content in such a way that a significant proportion of time is devoted to discourse and reflection so that students can progress through the phases of inquiry. For this reason, an opportunity for applicable, curriculum-focused discourse ought to be provided in the early stages of the course, and all activities ought to be problem-based with a view to engaging students in reflective discourse. Another important aspect of designing for cognitive presence is creating opportunities for small-group discussions to set the stage for team-based collaborative projects. However, when groups report back, the lecturer must support students in gaining an understanding of the expectations and values associated with a culture of collaboration (Garrison, 2006, p. 28).

3.7.2 Facilitation of discourse

Discourse is the essence of a collaborative constructive approach to teaching and learning (Garrison, 2006, p. 29). To ensure that students are engaged and the discourse is rich and relevant, care must be taken to maintain a sense of belonging to a community of inquiry and that students are meaningfully engaged. The challenge, according to Garrison (2006, p. 29), is to sustain social presence while simultaneously creating cognitive presence. As a result, strong teaching presence is required in as far as knowing when and how to challenge students to guide discussion collaboratively. Clearly, facilitating discourse requires that both social and cognitive presences be intertwined (Swan & Shih, 2005, p. 120).

3.7.2.1 Facilitating discourse for social presence

The goal in the learning situation is to enhance and sustain social presence that will provide an environment for collaborative and reflective discourse. In the online component of blended learning, it is important to realise that although students are in virtual contact with their community, physically, they find themselves alone at the computer – a state that reflects a strong sense of independence. According to Shea *et al.* (2006, p. 180), this is why students in blended learning environments do not show the same degree of social presence as those in exclusively face-to-face environments. This emphasises the importance of maintaining and enhancing a sense of group cohesion, collaboration and

support in the online experience. In addition hereto, the facilitator must be a content expert with the ability to employ effective facilitation skills if the community of inquiry is to be sustained.

Some guidelines to ensure and facilitate discourse in order to warrant social presence within blended learning environments include the incorporation of collaborative activities since these provide the best means to build and maintain group cohesion. Here it ought to be noted, though, that group cohesion extends beyond mere polite conversation, the proviso being that the group should be the focus of the discourse. Therefore, activities must be structured in such a way that students ought not only to engage but, simultaneously, be dependent on one another to accomplish a specific goal. In instances such as these, the lecturer must model appropriate facilitation skills since proper facilitation holds the key to the success of students' collaborative activities (Garrison, 2006, p. 30).

3.7.2.2 Facilitating discourse for cognitive presence

Facilitation is essential to keep discourse on track and for the inquiry to evolve. In blended learning, facilitation of discourse for cognitive presence ought to focus on and guide the progression of the discourse whilst simultaneously providing timely input and information (Garrison, 2006, p. 30).

As a collaborative community of inquiry moves to more challenging cognitive activities, facilitation of discourse will become increasingly important to ensure that students' contributions are acknowledged and remain constructive. Actively sharing, testing and confirming ideas are a crucial phase in establishing cognitive presence. Students must feel that they are contributing members within the community and must gain a sense of accomplishment; however, at the same time, they should never lose sight of the lecturer's presence (Garrison, 2006, p. 30).

Some guidelines associated with the facilitation of discourse for cognitive presence in blended learning include constructing stimulating questions, keeping discussions focused, identifying issues that need to be clarified and being prepared and capable to move discussions forward in a timely manner. Case studies and debating or critiquing an article are good examples of activities for facilitating discourse. Since case studies are based on real-life contexts, students find them easy to relate to, while their effectiveness in involving all members of a group is undisputed. Nevertheless, in a collaborative environment, it is important that students should respond to other contributions and build upon the ideas of other members of the community. In turn, the lecturer must facilitate the discourse as a member of the community and model the inquiry process, emphasising the importance of moving towards a resolution (Figure 3.2) (Garrison, 2006, p. 30)

3.7.3 Direct instruction

Direct instruction concerns academic and pedagogical leadership that provides disciplinary focus and structure for a meaningful educational experience (Garrison, 2006, p. 31; Garrison & Vaughan, 2008, p. 41).

3.7.3.1 Direct instruction for social presence

The main goal of direct instruction for social presence is the development of collaborative relationships where students are supported to assume increased responsibility for their learning. Direct instruction can increase confidence and respect by managing conflict and ensuring that students are collaborating constructively. Direction is important, though, if the group is to remain productive and provide a welcoming context for individuals that will entice them to stay engaged and to continue developing (Garrison, 2006, p. 31). In an online environment, students will have an increased sense of independence; consequently, direct instruction may, at times, be necessary to reinforce collaboration and to ensure a cohesive community of inquiry. In this regard, timely intervention when factors begin to threaten the cohesiveness of the community is crucial (Garrison, 2006, p. 31).

Some guidelines associated with this principle include not only supporting for but also expecting students to be self-regulated and to work collaboratively to complete tasks. In terms of group dynamics, tension and conflict are likely to surface during certain stages. In such instances, it is important that the lecturer should address these situations directly and help to resolve conflicts where necessary. On the other hand, it is also important for the lecturer not to become too involved. Rather, he/she should mediate the situation in a manner that will encourage the students to address and resolve their own conflicts. Along a similar vein, it is important that students must feel that they can question the lecturer and still be treated with respect. Furthermore, activities such as team building will afford students the opportunity to develop a connection with and to gain the support of the community to accomplish assigned tasks (Garrison, 2006, p. 31; Garrison & Vaughan, 2008, p. 43).

3.7.3.2 Direct instruction for cognitive presence

Direct instruction has an important place in blended learning environments to ensure that discourse and collaboration result in resolution and metacognitive development. Importantly, though, the lecturer should find the right balance in the application of direct instruction. Too little direct instruction may result in students losing focus and purpose, while too much direct instruction could undermine students' willingness and ability to assume responsibility for their own learning (Garrison,

2006, p. 31; Garrison & Vaughan, 2008, p. 43). Seemingly, students value direct instruction when online discussions become fragmented and show a lack of insight. For this reason, diagnosing misconceptions and providing explanations still constitute an essential responsibility in teaching and learning. The mode despite, though, direct instruction from the subject matter expert (the lecturer) is needed to guide students towards the essence of the discipline and to avoid students becoming frustrated and, as a result, disengaging from the learning process. Furthermore, confirmation of understanding will often require direct instruction to ensure student success (Garrison & Vaughan, 2008, p. 43).

Some guidelines associated with direct instruction for cognitive presence in a blended learning environment are to be prepared to contribute ideas and perspectives that will shape discourse constructively. Likewise, misconceptions ought to be diagnosed early on to prevent students from becoming side-tracked and confused. As the subject expert, lecturers are also required to connect and integrate ideas and to summarise discussions before moving on. Including activities such as setting goals, planning and managing tasks and assessing progress could help ensure that students become self-directed and increase their awareness of metacognitive processes. Another activity that could help to foster metacognitive awareness would be requiring students to keep a learning journal in which they reflect on their learning processes and the outcomes they have attained (Garrison, 2006, p. 32).

Using teaching presence as a regulatory function, Table 3.1 provides a summary of the principles and guidelines for establishing social and cognitive presence discussed in the preceding paragraphs.

Table 3.1: Principles and guidelines for establishing social and cognitive presence

Teaching presence	Social presence	Cognitive presence
Instructional design	*Principle:* Establish a climate that creates a community of inquiry *Guidelines:* • Have students introduce themselves • Assign students to small groups • Establish "chat rooms" for teaching and communication • Establish online office hours • Avoid being the centre of every discussion	*Principle:* Establish critical reflection and discourse that will support systematic inquiry *Guidelines:* • Stipulate clear goal expectations • Allow time for discourse and reflection in the course structure • Include activities that are problem-based • Create opportunities for small-group discussions • Respond to and model respectful discourse • Establish a friendly environment
Facilitation of discourse	*Principle:* Sustain community through expression of group cohesion *Guidelines:* • Structure collaborative activities to maintain group cohesion • Create opportunities for students to engage and rely on one another to reach goals • Model appropriate facilitation skills to ensure student engagement	*Principle:* Encourage and support the progression of inquiry through resolution *Guidelines:* • Ask stimulating questions • Keep discussions focused • Clarify issues • Move discussions forward in a timely manner • Make use of activities such as case studies, debating and critiquing of articles

Teaching presence	Social presence	Cognitive presence
	• Hold a class "debriefing" • Design activities to ensure students can moderate a discussion	• Structure activities in a way that contribute to the ideas of other members in the group • Model the inquiry process
Direct instruction	*Principle:* Develop collaborative relationships where students are supported to assume responsibility for their learning *Guidelines:* • Provide support, but expect students to be self-regulated • Address conflict situations directly when necessary • Treat students with respect, even when challenged • Create opportunities for team-building activities	*Principle* Ensure that discourse and collaboration progress towards resolution and metacognitive development *Guidelines:* • Contribute ideas and perspectives that will shape discourse constructively • Diagnose misconceptions • Make connections, integrate ideas and summarise discussions • Be explicit as far as expectations and guidelines are concerned • Plan activities in such a way that students become self-directed

Having analysed and discussed the principles and guidelines applicable to establishing communities of inquiry in blended learning, an overview of TE as an applied discipline is called for before moving on to a discussion on why I believe a move away from a face-to-face mode of delivery to a blended mode would be is warranted in this discipline.

3.8 COMMUNITY OF INQUIRY IN AN APPLIED SUBJECT SUCH AS TECHNOLOGY EDUCATION

TE is the study of technology whereby students are provided with the opportunity to use a variety of materials and processes to solve real-life problems, to develop technological skills and concepts as well as the ability to use tools, to acquire an understanding of various technological systems and processes, to evaluate the impact of technology on people and the environment, and to develop the confidence to be risk takers in the process of technological problem solving (Hill, 1998, p. 204). For the purposes of this study, technology is defined as an action as per the following definition provided by the South African Department of Education (DoE) (Department of Education, 2003, p. 4): *Technology is the use of knowledge, skills and resources to meet people's needs and wants by developing practical solutions to problems, taking social and environmental factors into consideration* (p. 4).

TE is regarded as an applied discipline because knowledge acquisition in this field of study is a constructive process which focuses on the development of practical skills. In applied disciplines, transferrable skills as well as reflective practices are emphasised (Lambert & Fisher, 2013, p. 4). From an analysis of the philosophy of technology, TE is essentially a composition of an array of fields such as craft, industrial arts, design technology, technology as an applied science, technology as integrated within Science, Technology, Engineering and Mathematics and technological literacy (Jones & Moreland, 2004, p. 1; Mitcham, 1997, p. 153; Stevens, 2003). TE is further regarded as an applied subject due to the integration and application of pedagogy, educational theories and discipline-specific content (Jones, Bunting, & De Vries, 2013, p. 199).

Nationally and internationally, several challenges with regard to TE teacher training exist, all of which need to be addressed in order to improve pre-service teacher training in this discipline (Villegas-Reimers, 2003, p. 52). Challenges identified by Pool (2010, p. 127) include a lack in the development of subject knowledge, subject-specific pedagogical content knowledge and technological skills as well as a deficit in as far as suitable curricula and a knowledge-base regarding appropriate teaching strategies are concerned. Some challenges experienced in pre-

service training programmes for Technology Education teachers could well be ascribed to the limitations associated with the face-to-face mode of delivery currently used at most South African universities. These challenges include insufficient time devoted to reflection, problem solving and the development of critical thinking skills as well as a lack of time to do practical work.

Accordingly, Hatting and Killen (2003, p. 39) identified the need to incorporate experiences that combine theoretical, practical and reflective aspects in training programmes for pre-service Technology Education teachers. Ankiewicz *et al.* (1998, p. 2) are of the opinion current training programmes lack the opportunity to develop procedural and conceptual knowledge as well as problem-solving strategies and critical-thinking skills. Clearly, given the nature of the discipline, acquiring such knowledge and skills ought to figure more prominently in pre-service training programmes. Since the online component of blended learning lays the foundation for the development of critical-thinking skills, the increased reflective thinking (a component of cognitive presence) inherent to a blended mode of delivery could well address the current pre-service training programmes' inability to develop problem-solving and critical-thinking skills as identified by Ankiewicz *et al.* (1998, p. 2). As elaborated upon earlier (§ 3.6), blended learning has the advantage of reflection, which is not always possible in a fast-paced and free-flowing fully face-to-face environment.

Practical teaching is an important component of any teacher training programme because it exposes the students to the real context of teaching and learning and allows them to use a variety of resources and methods to ensure effective teaching and learning take place (Forret, Jones, & Moreland, 2003, p. 39). However, a previous study conducted by this Pool (2010, p. 108) indicates that very little practical teaching actually takes place in the classroom due to time constraints. Since the nature of the online environment enables students and lectures to interact beyond the classroom, the online component of blended learning could, potentially, provide ample additional opportunities to facilitate practical teaching.

Research conducted by Biggs (1998, p. 147) strongly suggests training programmes sourly lack constructivist approaches, arguing that Technology Education ought to extend well beyond the collection of knowledge and skills and should rather focus on the development of understanding how to apply knowledge critically to authentic situations. The result is that when teachers start teaching, they mainly transfer knowledge in a behaviouristic manner with very little understanding of how the knowledge ought to be applied in practice. Blended learning as well as the application of CoI principles could address this issue because it provides the opportunity for students to improve their knowledge through discussion, dialogue, collaboration and information sharing, all

of which are common practice in the online component of blended learning (Alsonso et al., 2005, p. 219; Hadjerrouit, 2007a, p. 112).

3.9 CONCLUSION

Blended learning with its online component is becoming a powerful resource for HEIs given the abundance of innovative information technologies being introduced almost daily, thereby enabling education to shed the constraints of time and place (Hadjerrouit, 2007a, p. 107). In short, blended learning as mode of delivery opens up new opportunities for the implementation of pedagogical innovations in an environment where students are expected to function as active, independent, self-reflecting and collaborative participants.

The Faculty of Educational Science at the NWU's Potchefstroom campus, in its strategic priorities for teaching and learning (2011-2013), identified the need to finalise a framework for innovative learning through the intensified implementation and use of electronic media, new technologies and social media with a view to enhance the teaching and learning experiences of graduate teachers attending the faculty (Faculty of Educational Sciences, 2011, p. 157). Furthermore, the NWU's teaching and learning policy clearly states that programmes are to be delivered by means of a blended mode, which can include a combination of face-to-face and online contact between lecturer and student (North-West University, 2011).

Given that TE as an applied subject already poses challenges in the face-to-face environment, changing the current face-to-face mode of delivery to a blended one will require a well-researched, thoughtful approach. Nevertheless, if a successful transition in applied subjects the likes of TE is to be engineered, the principles of CoI should never be discounted.

As held by Garrison and key (Garison & Vaughan, 2008a, p. 53; Garrison & Kanuka, 2004, p. 96), the effectiveness of blended learning is dependent upon the ability to facilitate a community of inquiry – a CoI. Such a CoI consists of three presences: social, cognitive and teaching. As has been revealed in this chapter, students in a CoI must feel free to express themselves and be able to develop the necessary personal relationships to gain a sense of belonging to the community. That, in sum, is social presence. Cognitive presence, in turn, is basic to the inquiry process, which includes the integration of reflective and interactive processes. Teaching presence, as the third and final presence in the existing framework for CoI, is essential to provide structure, facilitation and direction for cohesion, balance and progression of the inquiry process. As such, teaching presence

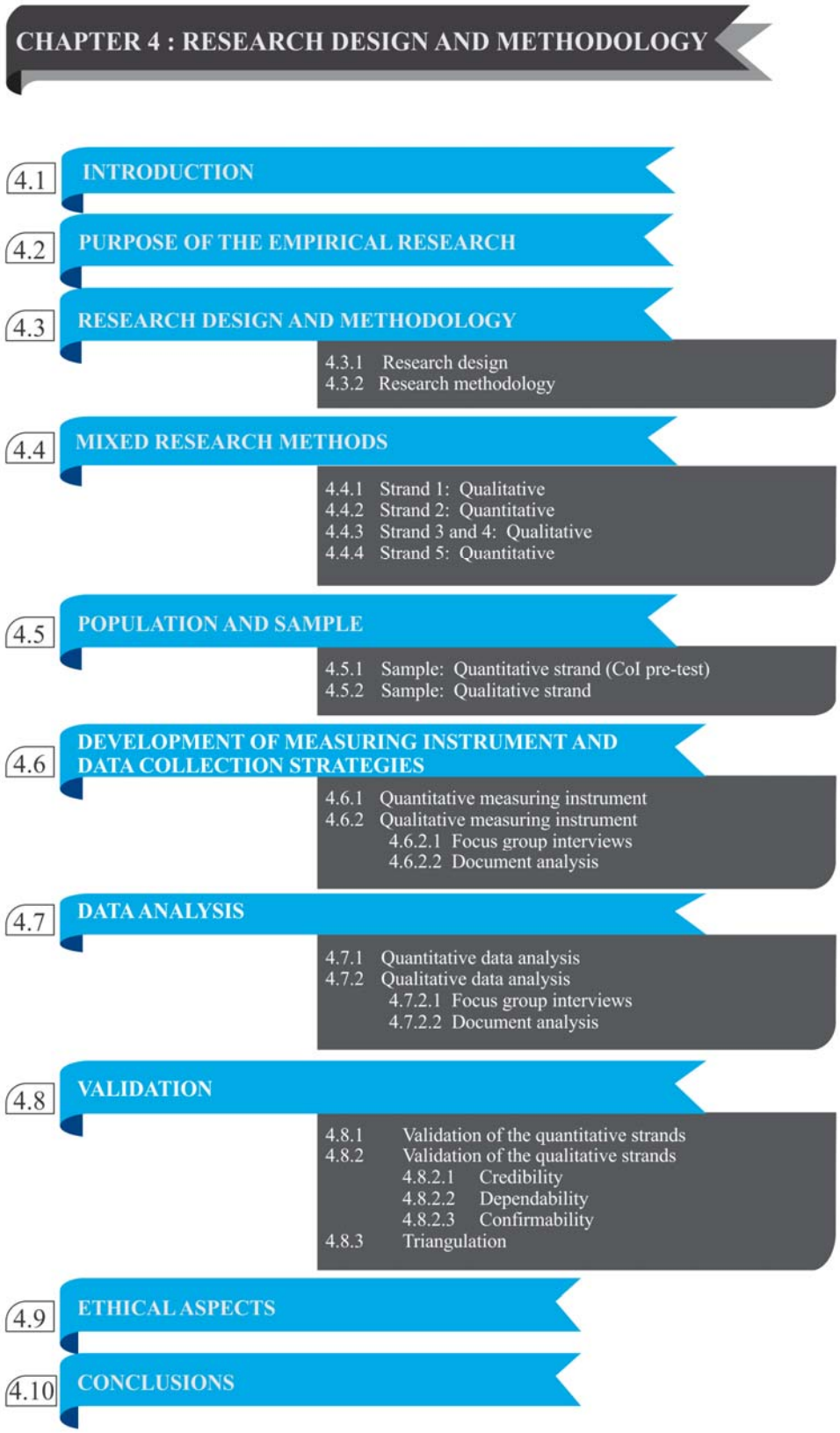
has a regulatory function, and it is through this function (*instructional design, facilitation of discourse and direct instruction*) that interaction is shaped into reflective discourse. Further to the three presences highlighted here, learning presence recently emerged as a powerful explanatory mechanism for the relationship that exists between instruction and educational outcomes. Since self-regulated learning represents an important mediating link between teaching, social and cognitive presence, this study purports that learning presence ought to be considered an integral part of the CoI.

Given the shortcomings in TE teacher training referred to earlier, combined with the fact that little is known about what construes a successful blended learning environment, investigating CoI in the applied discipline TE clearly has its merits. Furthermore, to date, the CoI model has been applied almost exclusively to online contexts. Undoubtedly though, extending this model to incorporate both face-to-face and online learning could potentially add considerably to educators' understanding of the sense of community in higher education learning environments in general (Vaughan & Garison, 2005, p. 3; Yuen, 2011, p. 6).

Against this background, the empirical process followed to adapt a face-to-face Technology Education module to an effective blended learning module by applying the CoI framework will be discussed in detail in the chapter to follow.

CHAPTER 4

LOGIC



CHAPTER 4
RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

Chapter 4 elucidates a detailed discussion on the research design and methodology applicable to this study. The empirical research, as stipulated in this chapter and Chapter 5, aims to address sub-question 2 and 3 (§ 4.2) of this study. The sub-aims relevant to the empirical part of the research will be explained, followed by an overview of the research paradigm.

This study has evolved around a mixed research, multi-strand design. To arrive at this mixed-method design, a design-based research approach was followed. In this chapter, this mixed research design will be discussed based on the respective quantitative and qualitative strands. The different aspects, such as the selection of the population, development and validation of the measuring instruments and methods employed to analyse the data as well as the ethical issues applicable to each strand of the study will be clarified.

As indicated in preceding chapters dealing with the literature review and the purpose of the study, the need to investigate the effect of CoI on teaching and learning as well as the development, implementation and evaluation of a blended mode of delivery for TE, based on CoI principles, has been identified. The module that was selected for the purpose of the empirical research, and which was adapted and changed to a blended mode of delivery, was the final-year module Learning Area Technology Methodology: Senior Phase (TECD 421). This module is a second-semester module during which the knowledge, skills and experience that students have accumulated in the previous three years of the programme must be applied in subject-based and practice-orientated teaching and learning experiences. TECD 421 is a 16-credit module, which implies that the students need to devote at least 160 notional hours to master the predetermined outcomes. In this module, it is expected of students to apply self-regulated learning skills and to take full responsibility for their own learning.

The outcomes for the module TECD 421 focus on the methodology of TE and require the student to:

- Display competence with regard to curriculum development in the learning area Technology;
- Display a comprehensive and critical understanding of the nature and practice of organisational and management skills in the technology classroom, specifically in terms of practical workspace for the planning and execution of practical lessons in the senior phase; and
- Demonstrate the ability to integrate knowledge and skills gained in the previous modules and to integrate these in order to present a technology teaching project.

See Addendum F for the TECD 421 e-study guide which was re-structured and re-designed from a face-to-face mode of delivery to a blended mode of delivery for the purpose of this study following the guidelines described in Chapter 2 § 2.5.1.

4.2 PURPOSE OF THE EMPIRICAL RESEARCH

The purpose of the empirical research is to examine the development and manifestation of CoI in a blended mode of delivery for the applied discipline TE.

This research aimed to address the following compelling research question:

- What is the value of CoI in a blended mode of delivery for TE?

To fully address the main research question, three sub-questions were posed to provide additional insight into the main research question. Of the three sub-questions, two are of particular relevance to this chapter, namely:

- Sub-question 2: To what extent does CoI manifest itself in a blended mode of delivery in a TE graduate course?
- Sub-question 3: What is required in a blended mode of delivery to ensure the existence of CoI for effective learning within a TE graduate course?

4.3 RESEARCH DESIGN AND METHODOLOGY

4.3.1 Research design

A research paradigm gives meaning to the world as we see it, and as Morgan (2007, p.54) stated, the paradigm of a researcher should be reflected in all processes followed during research, such as design, data collection and report writing. Accordingly, it can be said that a research paradigm lays down the intent, motivation and expectations for the research.

Paradigms develop through theoretical questions that arise from different concepts and interpretations. These paradigms define the criteria through which the researcher approaches theoretical questions. As such, a paradigm is a theoretical framework which is based on assumptions and implies working models for scientific activities (Bandura, 2001, p. 20). Potgieter (2008) describes a paradigm as *"an agreed and deep-seated sense, a way of seeing the world and how it should be studied, and this view is shared by a group of scientists"* (Potgieter, 2008, p. 303). According to Hatch (2002, p. 229), a paradigm represents a set of integrated and independent concepts and variables that is attached to related methodological approaches. Morgan (2007, p. 49) adds to the above discourse that a paradigm is a way for researchers to demonstrate the key content of their field, reflected as a set of shared beliefs about both the research questions as well as the methods that ought to be employed to answer these questions.

I have approached this study from a pragmatic paradigm. The ontology from a pragmatic paradigm is characterised by a view that the world has singular and multiple realities. Thus, with a pragmatic approach, emphasis is placed on shared meaning and joint action (Morgan, 2007, p. 67). In this research, I have collected data as explained by Creswell (2009, p.231) by considering 'what works' in order to address my research questions, which is also consistent with mixed research approaches. Philosophically, mixed research is pragmatic by nature because it is an approach to knowledge (theory and practice) that attempts to consider multiple viewpoints, perspectives, positions and standpoints (Johnson et al., 2007, p. 113). To this end, pragmatic research utilises mixed methods within the same study and is, therefore, able to delve further into a dataset to understand its meaning and to use one method to verify findings from the other method (Onwuegbuzie & Leech, 2005, p. 384).

I have also worked within the perspective of design-based research which is well-aligned with the philosophy of pragmatism. This perspective argues that theories are tools for action and that their meaning and value are defined when all these theories are jointly integrated in practice (Dewey,

1955, p. 93). Design-based research is an approach that is gaining in popularity in educational technology and pedagogy research (Leech & Onwuegbuzi, 2009, p. 270). Wang and Hannafin (2005, p. 9) describe design-based research as a systematic but flexible methodology aimed at improving educational practices through iterative analysis, design, development and implementation, based on collaboration among researchers and practitioners in real-world settings. This leads to contextually sensitive design principles and theories.

The rationale behind design-based research is to construct and improve the relationship between educational research and real-world problems. According to Hadjerrouit (2007b, p. 284), design-based research is specifically suitable for designing and evaluating blended learning through successive cycles of refinement. This type of research specifically embodies theoretical claims about teaching and learning and helps one to understand the relationships between learning theory, information technology and educational research (Hadjerrouit, 2007b, p. 284). The design-based approach used in this study is consistent with the summary of Anderson and Shattuck (2012, p. 18) who noted that design-based research:

- Is situated in real educational contexts;
- Is focused on the design and testing of significant interventions;
- Employs mixed methods;
- Involves multiple interventions;
- Involves collaborative partnerships between researchers and practitioners; and
- Evolves in design principles.

The essential characteristic of design-based research is that it describes a continuous cycle of gradual refinement of a learning model. Figure 4.1 illustrates the process of design-based research according to Amiel and Reeves (2008, p. 34):

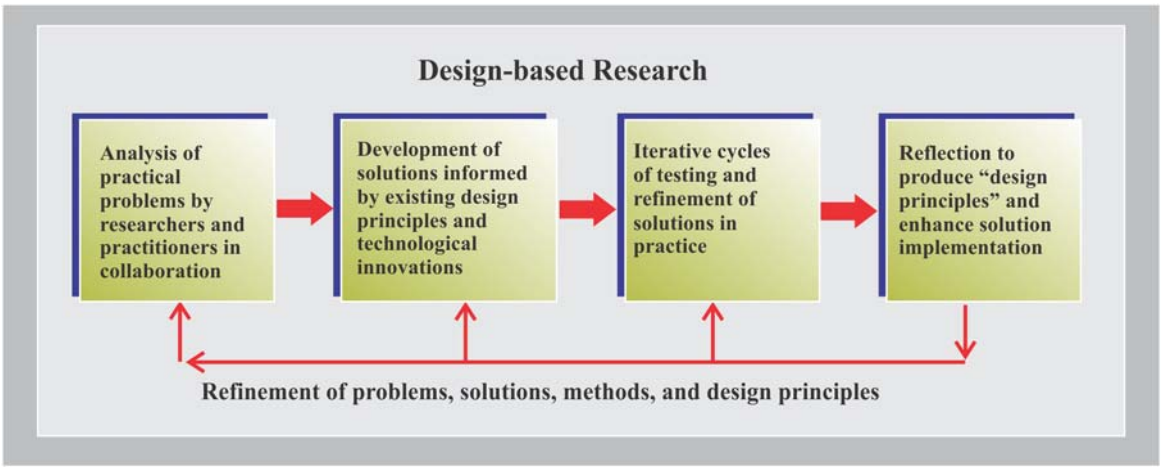


Figure 4.1: Four phases of design-based research (Amiel & Reeves, 2008, p. 32)

As illustrated in Figure 4.1, design-based research is conducted in four phases (iterative) (Amiel & Reeves, 2008, p. 32; Hadjerrouit, 2007b, p. 284). As such, it was applied to a blended learning programme in the following manner:

- Design-based research begins with the analysis of the problems and deficiencies of current educational practices, the formulation of research questions and the review of relevant literature. In this study, the shortcomings in Technology teacher training, as well as the fact that very little is known about what construes a successful blended learning environment in Technology teacher training, created the need to investigate CoI in the applied discipline TE. In essence, it became necessary to investigate the effect of CoI on teaching and learning as well as the development, implementation and evaluation of a blended mode of delivery for TE, based on CoI principles.

- In this study, the research continued with a discussion of the blended learning model that was implemented to investigate problems experienced with current educational practice in the Technology module. The chosen model supported the designer's work and formed the foundation for evaluation and research.

- The implementation phase (continuous cycles of testing and refinement of solutions in practice) concerned the application of the blended learning model for the applied discipline TE, using multiple methods such as questionnaires and interviews to collect empirical data.

- The evaluation phase (Figure 4.2) concerned the evaluation of the blended learning programme by means of the systematic analysis and critical evaluation of as well as reflection on collected data.

In design-based research, the analysis, design, implementation and evaluation steps are interdependent and reciprocal, and refinements are made continuously through successive cycles of experimentations where the shortcomings of each cycle are identified, redesigned, re-implemented and re-evaluated. By way of this iterative process, it is possible to gain practical insights and to generate pragmatic design principles that help educational researchers to improve blended learning and its theoretical foundations (Hadjerrouit, 2007b, p. 285).

Figure 4.2 illustrates the iteration of steps within a design cycle.

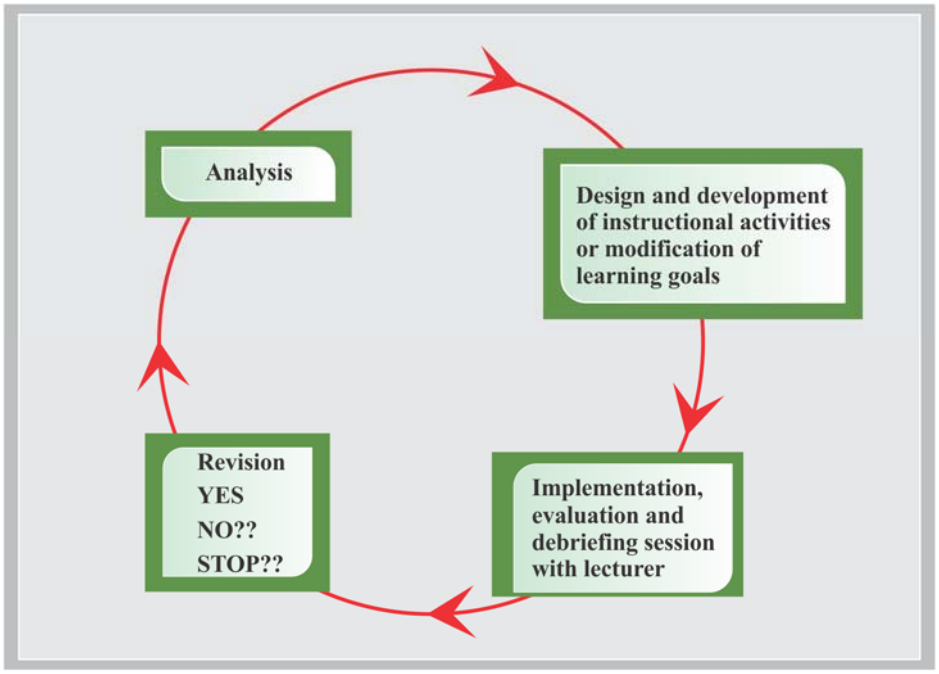


Figure 4.2: Iterations of steps within design cycles

The iterative cycles require that the researcher engages in an on-going analysis of an individual student's activities and of the social classroom processes to inform new anticipatory thought experiments, the design or revision of instructional activities and, sometimes, the modification of learning goals.

4.3.2 Research methodology

Seemingly, a mixed research approach is most suitable for design-based research. Design-based research is intrinsically linked to, and developmentally nourished by, multiple design and research

methodologies which utilise many data collection and analysis methods, making these methodologies suitable for qualitative, quantitative or mixed-method research (Wang & Hannafin, 2005, p. 6).

For the purpose of this study, a mixed research, multi-strand design was followed in that a partially mixed sequential dominant status design was used. A study is considered mixed research when the investigator collects and analyses data, integrates the findings and draws conclusions using both qualitative and quantitative methods in a study or programme of inquiry (Johnson et al., 2007, p. 113; Teddie & Tashakkori, 2006, p. 14). Partially mixed sequential dominant status involves conducting a study in two phases that occur sequentially, such that the qualitative or quantitative phase has the greater emphasis (Leech & Onwuegbuzi, 2009, p. 270). The conclusions that are made on the basis of the results of the first strand lead to the formulation of questions for and data collection and data analysis in the next strand. The final conclusions are based on the results of both strands of the study, and the purpose of the second strand is either to confirm or contest the conclusions of the first strand or to provide further information for the findings from the first strand (Teddie & Tashakkori, 2006, p. 22).

By way of explanation, Table 4.1 presents a summary of aspects pertaining to the purpose, population and sample, instrument, development of instrument, validity and trustworthiness, ethics and analysis of each of the strands of the mixed research design followed in this study. These aspects will be discussed in more detail in sections 4.4.1-4.4.4.

Table 4.1: Methodology of the study

	Qualitative Strand 1	Quantitative Strand 2	Qualitative Strand 3	Qualitative Strand 4	Quantitative Strand 5
	Interview	Pre-test	Interview – students	Document analysis (Facebook threads) and reflective journaling)	Post-test
Purpose	Gain understanding Baseline for developmental and re-design process	Identify strengths and weaknesses in current online part of the blended learning environment at the start of the semester	Clarify findings of quantitative strand to improve online activities	Revising and developing the module structure to improve CoI	Re-assess students' experiences of online activities in blended learning Measure the change in CoI presences
Population and sample	Lecturer responsible for TECD 421	All students registered for the module TECD 421 (N=58)	Random sample of 16 students	All students registered for the module TECD 421 (N=58)	All students registered for the module TECD 421 (N=29)
Instrument	Semi-structured interview schedule	CoI survey (pre-test)	Focus-group interviews Interview schedule	Rubrics, Facebook posts and all other online communication between student and lecturer	CoI survey (post-test)
Development of instrument	Questions emerging from literature review	CoI survey – adapted for the context of this study	Questions emerging from findings of the quantitative strand	Re-designing and developing of course materials	CoI survey – adapted for the context of this study

	Qualitative Strand 1	Quantitative Strand 2	Qualitative Strand 3	Qualitative Strand 4	Quantitative Strand 5
Data **analysis**	Recording and transcribing of lecture interview Coding of data Organising themes Classifying of main categories	Cronbach's alpha frequencies Mean values	Recording and transcribing of interviews Coding of data Organising of themes Classifying of main categories	Coding of data Organising of themes Classifying of main categories	Cronbach's alpha frequencies Mean values Practical significance and effect size
Validation		Content-related validity – Selection of students to establish level of understanding Appropriateness of language Establishing whether data collected will be appropriate, meaningful and correct Critical evaluation of questionnaire by colleagues and experts in the field to establish face-validity of questions Adapt CoI survey accordingly			Critical evaluation of questionnaire by colleagues and experts in the field to establish face-validity of questions Adapt CoI survey accordingly

	Qualitative Strand 1	Quantitative Strand 2	Qualitative Strand 3	Qualitative Strand 4	Quantitative Strand 5
Credibility	Spending extensive time in the field Member checking		Using thick description and feedback from students Using a of variety of activities and instruments to collect data	Using thick description and feedback from students Using a variety of activities and instruments to collect data	
Dependability	Verification through step-by-step transcription of interview Peer coding		Verification through step-by-step transcription of interviews Peer coding		
Confirmability	Member checking		Member checking	Member checking Triangulation	
Ethical issues	Ethics clearance number: NWU-00122-12S2 Letter of consent Voluntary participation Withdrawal at any stage with no harm Confidentiality of information	Ethics clearance number: NWU-00122-12S2 Letter of consent Voluntary participation Withdrawal at any stage with no harm Confidentiality of information	Ethics clearance number: NWU-00122-12S2 Letter of consent Voluntary participation Withdrawal at any stage with no harm Confidentiality of information	Ethics clearance number: NWU-00122-12S2 Letter of consent Voluntary participation Withdrawal at any stage with no harm Confidentiality of information	Ethics clearance number: NWU-00122-12S2 Letter of consent Voluntary participation Withdrawal at any stage with no harm Confidentiality of information

4.4 MIXED RESEARCH METHODS

In this study, the design-based research approach included qualitative and quantitative methods in a multi strand design.

4.4.1 Strand 1: Qualitative

Qualitative research is based on an approach that seeks to understand certain phenomena in a real-world setting in general and is associated with constructivism. Qualitative strands in design-based research are pragmatic and have a strong commitment to intervention in real-world settings in order to address and solve problems by designing and enacting interventions. This can be achieved by extending theories and refining design principles to promote fundamental understanding (Amiel & Reeves, 2008, p. 35).

During the first strand of this mixed method study, I conducted a semi-structured interview with the lecturer currently responsible for presenting the TECD 421 module. The purpose of the semi-structured interview was to gain an understanding of the manner in which the module is currently presented in a face-to-face mode of delivery. The data obtained during this interview was used as a baseline for the developmental process aimed at redesigning the module for a blended learning environment based on CoI principles (Addendum B - interview schedule and transcription of interview). In collaboration with the lecturer and campus academic support staff (Information Technology in Education Division), I then redesigned the module to include a larger online and virtual component in order to create a blended learning environment.

4.4.2 Strand 2: Quantitative

For the purpose of this study, the quantitative phase of the research process was conducted by means of a CoI survey. The survey instrument was completed by TECD 421 students three weeks after the onset of the semester to determine the extent of existing presences as described in the CoI framework. The aim of the questionnaire (pre-test) was to identify strengths and weaknesses in the limited online part of the course as well as to determine previous experiences with online activities in order to assist with the development of improved online activities as well as to improve the structure of the course.

4.4.3 Strand 3 and 4: Qualitative

In strand three of the mixed sequential status design, focus group interviews were conducted with a random sample of 16 students seven weeks into the 12 week course. The purpose of these semi-structured focus group interviews was to confirm as well as to strengthen concepts and themes that emerged from the pre-test (Creswell & Clark, 2011, p. 10). The focus group interviews also provided information on the challenges students experienced in the online environment, which guided the re-design of the module even further. Strand 4 of the mixed sequential status design, document analysis (Facebook threads) as well as reflective journaling kept by myself, was used to strengthen findings from both the qualitative semi-structured focus-group interviews as well as the findings from the quantitative survey

Two primary documents (datasets) were loaded into the hermeneutic unit of Atlas.ti®: The Facebook dataset refers to primary document 1 (P1), and the focus group interview dataset refers to primary document 2 (P2). In the process, I worked deductively to establish categories, implying that I have started off with a list of categories and indicators that have been identified clearly in the literature study as indicators for the establishment of CoI. These categories and sub-categories provided direction as to what I was looking for in the data. In the reporting section of this study, direct quotations or sections from the interviews and Facebook postings will be printed in italics as evidence of data. Referencing to the line number and document where these direct quotations can be found in the transcribed documents will be provided in brackets. Although some of the data (P1) is in Afrikaans, it will be reported in English with the original Afrikaans provided as screenshots. (Addendum E.)

In strand three of the mixed sequential status design, I conducted focus group interviews with a random sample of 16 students. A focus group is an interview on a topic with a group of people who have knowledge of the topic (Merriam, 2009, p. 93). The purpose of these semi-structured interviews was to confirm as well as to strengthen concepts and themes that emerged from the quantitative findings (Creswell & Clark, 2011, p. 10).

Strand 4 of the mixed method research also encompassed a qualitative strand. Document analysis and reflective journaling of classroom and online activities were used as measuring instruments to collect qualitative data during the implementation of the blended learning module. According to topic Fraenkel and Wallen (2003, p. 484), document analysis is a form of qualitative research involving the interpretation of a variety of relevant documents to give voice and meaning to a central topic. As a research tool, document analysis enabled me to access ‘rich sources’ of raw data

for analysis such as assessment rubrics, Facebook posts, surveys, discussion forums, assignments, portfolios and other communication threads between student and lecturer. Reflective journaling, on the other hand, is a method employed to think in a critical and analytical manner about work in progress. It provides a channel for inner-communication that connects beliefs, feelings and actions and allows knowledge and understanding of course content to develop (Pavlovich, 2007, p. 284). Document analysis and reflective journaling were used concurrently as qualitative research methods to enable the continuous planning, development and evaluation of course content in order to establish CoI, guided by the principles found in the literature.

4.4.4 Strand 5: Quantitative

The CoI survey instrument (post-test) was completed for the second time by the TECD 421 students at the end of the semester to determine quantitatively to what extent CoI manifested itself within this specific blended mode of delivery of a TE graduate course. The purpose of the post-test was to re-assess students' experiences of the online activities and blended learning as a mode of delivery. The results from the post-test were compared with the pre-test conducted at the onset of the semester to measure the changes with regard to CoI presences as students participated in the blended learning environment.

4.5 POPULATION AND SAMPLE

A sample in research refers to a subgroup of the target population that the researcher plans to study for the purpose of making generalisations about the target group (Fraenkel & Wallen, 2003, p. 96). The population for this study is the final year Technology Education students studying full time for a BEd degree at the Faculty of Educational Sciences of the North-West University. These students served as the population from which the samples for both the qualitative and quantitative strands were taken.

4.5.1 Sample: Quantitative strand (CoI pre-test)

Due to the limited size of the population (n=58), all students registered for the module were included. All students were asked to complete the CoI survey at the onset of the semester. For the pre-test, 38 surveys were returned (N=38), and for the pos-test, 29 surveys were returned (N=29).

4.5.2 Sample: Qualitative strand

In the qualitative part of strand 3 of the mixed sequential status design, I randomly sampled students from the population for voluntary participation in semi-structured interviews to clarify students' experience of CoI in a blended learning module for TE. A simple random sample gives each and every member of a particular population an equal chance to be selected (Fraenkel & Wallen, 2003, p. 93). In this instance, a total of 16 students partook in the focus group interview.

For document analysis of online as well as face-to-face activities, use was made of teaching and learning documents such as assessment rubrics, Facebook posts, discussion forums, assignments, portfolios and other communication threads between all registered students and the lecturer as well as the reflective journal kept by myself.

4.6 DEVELOPMENT OF MEASURING INSTRUMENT AND DATA COLLECTION STRATEGIES

Instrumentation generally refers to the entire process involved in preparing to collect data. It encompasses not only the selection or design of the instruments but also the procedures and the conditions under which the instruments will be administered. Since the conclusions to be drawn from this study are to be based on information gleaned by way of a specific instrument, namely the CoI survey (Fraenkel & Wallen, 2003, p. 118), choosing instruments that would deliver the desired quality was of paramount importance.

4.6.1 Quantitative measuring instrument

The CoI survey used in this study was originally developed by a group of of CoI researchers (Arbaugh et al., 2008). Nevertheless, when items are formulated to measure a certain construct, high levels of similarity amongst the respective items ought to be apparent. A measure of this degree of similarity is an indication of the internal consistency of the instrument. Cronbach's alpha coefficient is used to measure this internal reliability and is based on inter-item correlations. If the items are strongly correlated, their internal consistency is high and the alpha coefficient will be close to one, but if the items are poorly formulated and do not show a strong correlation, the alpha coefficient will be close to zero. The following figures for Cronbach's alpha coefficient are suggested and generally accepted by researchers: ≥ 0.90 (high reliability), 0.80 (moderate reliability) and ≤ 0.70 (low reliability) (Pietersen & Maree, 2007, p. 221).

The CoI survey referred to above was recently validated by a collaborative group of researchers comprised of Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson and Swan (Arbaugh et al., 2008, p. 134). Findings by this collaborative group were that the instrument is valid, reliable and an efficient measuring instrument to establish the dimensions of social, cognitive and teaching presence in the construction of effective online learning. The CoI survey in this instance encompassed teaching presence perception (13 items), social presence perception (9 items) and cognitive presence perception (12 items). Taking the acceptable figures for Cronbach's alpha into account, the Arbaugh study attained 0.94 for teaching presence, 0.91 for social presence and 0.95 for cognitive presence.

For this study and its context, Cronbach's alpha for the respective constructs of the CoI survey was calculated, revealing the following: teaching presence 0.94, social presence 0.92 and cognitive presence 0.93 (Table 4.2). As is evident from the Cronbach alpha coefficient for this study, all the constructs tested ≥ 0.90, which is indicative of a high degree of reliability between all the different constructs of the CoI survey.

Table 4.2: Cronbach's alpha coefficient (reliability)

CoI survey constructs	Cronbach's alpha
Teaching presence	0.94
Design and organisation	0.75
Facilitating discourse	0.88
Direct instruction	0.87
Social presence	0.92
Affective expression	0.85
Open communication	0.89
Group cohesion	0.82
Cognitive presence	0.93
Triggering event	0.91
Exploration phase	0.70
Integration phase	0.83
Resolution phase	0.84

It ought to be noted, though, that the original instrument was developed and tested in contexts that differ from those applicable to this study. For this reason, the available CoI instrument was also adapted for and tested amongst a group of students in a context similar to that of the population for this study. (See validating measures employed to ensure content-related validity in § 4.8.1). The questionnaire consisted of three sections, namely teaching presence, social presence and cognitive presence. (Addendum I – CoI Survey.) Students had to indicate on a scale of 1-5 their agreement with the items in the questionnaire, with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree.

4.6.2 Qualitative measuring instrument

4.6.2.1 Focus group interviews

In order to fully understand the research questions and to strengthen quantitative findings stemming from this study, I conducted interviews with the students to gain an in-depth knowledge of the true lived-experiences and realities regarding the development and establishment of CoI in a blended mode of delivery for TE. Although the questions used for the interviews mainly emerged from findings of the quantitative strand, I also integrated the literature review to formulate questions that related directly to the research aims (Addendum C – focus group interview schedule). In the main, though, the purpose of the interviews was to confirm, strengthen and clarify concepts and themes that emerged from the quantitative findings.

4.6.2.2 Document analysis

In the course of this study, document analysis was also utilised as a measuring instrument. Given the wide array of documents on hand, I searched through all available documentation with the inclusion of assignments, assessment rubrics, portfolios, Facebook conversations and e-mails in an attempt to find information that would be useful to answer the research question. Moreover, the categories and indicators as furnished by Garrison and Vaughan (2008, p. 19) provided clear criteria for the development and establishment of the three presences within a CoI and were thus used as criteria for the purpose of document analysis.

4.7 DATA ANALYSIS

Data analysis is the process of making sense from the data that constitute the findings of a study (Fraenkel & Wallen, 2003, p. 150). Data analysis procedures for this study will now be discussed.

4.7.1 Quantitative data analysis

To determine to what extent CoI manifested itself in the blended mode of TE, students were asked to complete the adapted CoI survey questionnaiafter four weeks after the onset of the module. Subsequently, descriptive statistics were used to organise and summarise the resultant data in a meaningful way (Creswell et al., 2007). One of the numerical tools employed to summarise data stemming from this study involved looking at frequency distribution, in other words simultaneously displaying the different response categories alongside the frequency of respondents, with each of the frequencies being expressed as a percentage of the sample size in each category.

Yet another numerical method employed to summarise the data involved calculating the mean of responses which describes the central location (arithmetic average) of the data, implying in this context the average student responses to each question with regards to the occurrence of CoI in a blended mode of delivery for TE. On a scale of 1-5, the mean of responses above 2.5 was regarded as above average. When looking at mean differences, the effect size is denoted by *d* and, as per the explanation to follow, the significance of the effect sizes ought to be interpreted in accordance with this *d* value:

d	**Meaning**
0.2	Small effect
0.5	**Medium effect**
0.8	Large effect

4.7.2 Qualitative data analysis

4.7.2.1 Focus-group interviews

Once the interviews had been transcribed, these transcripts were checked by an independent researcher for correctness (Merriam, 2009, p. 217). In terms of data analysis, a thematic method of analysis was employed in order to find similarities with regards to incidents and respondent experiences. Here it ought to be noted that the purpose of the qualitative interviews was to uncover

themes (concepts, trends, issues, ideas, problems) in an attempt to clarify findings stemming from the quantitative data with a view to further refining the module's re-design.

In analysing the data, steps included coding the data, sorting and organising themes where common characteristics could be detected and classifying the latter into main categories. To code and organise the data, use was made of the computer-aided qualitative analysis program Atlas.ti®.

My first objective in analysing the qualitative data was to identify categories pre-identified as per the literature review (Garrison & Vaughan, 2008, p. 38) that were also consistent with the orientation of the study. Taking due cognisance of the dangers associated with the use of borrowed classification schemes, as pointed out by Merrriam (2009, p. 185), I allowed categories and codes of specific relevance to the context of the data to emerge. To help clarify my thinking patterns further, each code was assigned a memo describing the nature and content of the category and code. In this way, I was able to assign codes consistently throughout the dataset.

4.7.2.2 Document analysis

Reflective journaling, document analysis and an assessment of students' online and face-to-face activities were all utilised for thorough qualitative data analysis. In order to create and sustain CoI in the selected module, continuous planning, development, implementation and evaluation were also incorporated in the analysis process. This is typical of a design-based research approach. In this setting, the qualitative research shed further light on the development and manifestation of CoI in a blended mode of delivery for the applied discipline TE.

4.8 VALIDATION

Validity refers to the appropriateness, meaningfulness, correctness and usefulness of the inferences researchers make based on the data they collect. Consequently, validity depends on the amount and type of evidence available to support the interpretations to be made concerning the data collected (Fraenkel & Wallen, 2003, pp. 159-161). Reliability, on the other hand, refers to the consistency of these inferences over time, location and circumstances (Fraenkel & Wallen, 2003, p. 463).

4.8.1 Validation of the quantitative strands

To ensure content-related validity and to establish the clarity of each item in the CoI survey, I randomly selected six students taking the module TECD 321 to establish their understanding of the questions in the survey, appropriateness of language and clarity of direction. In this way, I also ensured that the data to be collected in the main study would be appropriate, meaningful, correct and useful.

The questionnaire was also subjected to critical evaluation by colleagues and curriculum experts in the field of TE in order to address and establish content validity as well as the face validity of the questions. After deliberation, I re-formulated some of the questions to ensure that all questions were clearly understood. See Addendum I for adaptations made to the original CoI survey as well as the motivation for these changes.

4.8.2 Validation of the qualitative strands

In qualitative research, the perspective of the researcher plays a significant role. For this reason, qualitative researchers use various techniques to check their perceptions in order to ensure that they are not being misinformed. Qualitative researchers also prefer to use different terms for validity and reliability. To fit the unique nature of qualitative research, Shenton (2004, p. 64) revised the terms 'validity' and 'reliability', predominantly used within the positivistic paradigm, to 'credibility', 'conformability' and 'dependability'. These three terms are collectively known as trustworthiness.

In order to ensure credibility, dependability and conformability in the qualitative strands, specific measures, as stipulated by Poggenpoel and Myburgh (2004, p.421), was followed in this study.

4.8.2.1 Credibility

Credibility refers to the extent to which a study measures what it is supposed to measure (Poggenpoel & Myburgh, 2004, p. 421). Strategies to ensure credibility in this study included:

- Spending extensive time in the field:
    - In this study, I spent the entire semester with the lecturer in the face-to-face contact sessions and during online activities.

- I was also directly involved in the design and continuous redesign of the module in terms of study material, resources and assessment to create and sustain CoI.

- Using thick description and feedback from others:
  - In this study, I made use of focus group interviews to capture participants' true lived-experiences with regards to CoI.

- Using a variety of instruments to collect data:
  - Interviews as well as an analysis of a variety of documents were used to collect data in this study.

- Recording personal thoughts while conducting observations and interviews:
  - In this study I meticulously recorded my personal thoughts and experiences by means of a reflective journal.

- Member checking and interviewing individuals more than once:
  - Individuals were interviewed more than once, and information was discussed with and affirmed by the lecturer responsible for the module for confirmation of interpretations.

4.8.2.2 Dependability

The dependability of a study indicates the consistency of data collected (Poggenpoel & Myburgh, 2004, p. 421; Shenton, 2004, p. 64). During this study, dependability was obtained by means of the following steps:

- I recorded and transcribed all the interviews. Evidence hereof can be found in Addendum K.
- I also made use of an independent person to verify the codes and analysis of the data. This independent coder was selected on grounds of her exposure to the context of pre-service teacher training of TE students. In addition, peer coding was performed on two datasets (document analysis and focus-group interview). After careful consideration of the document analysis dataset, the two coders agreed on 167 codes out of a total of 172. (Addendum G - Change log — which depicts a 97% agreement with regards to the coding process.) In the second dataset (focus group interview), the two coders agreed on 195 codes out of a total of 202, which represents a 96% agreement with regards to the coding process. This high incidence of agreement confirms the dependability of the data.

4.8.2.3 Confirmability

Confirmability of a study refers to the neutrality of the data (Poggenpoel & Myburgh, 2004, p. 421). Confirmability in this instance was obtained by means of:

- Asking more participants in the study to review the accuracy of the research report (member checking);
- Reaching consensus between myself and an independent coder and analyser to confirm the authenticity of the qualitative findings which were reported;
- Including direct quotations in the findings to serve as confirmation; and
- Triangulating different qualitative data sources.

4.8.3 Triangulation

Denzin and Lincoln (1994, p. 215) distinguish between data triangulation, where a variety of data sources are used to address a single research problem, and methodological triangulation, where a variety of methods are used to research a single problem. In this study, a combination of data sources (interviews, document analysis, reflective journaling and questionnaires) as well as different methods of research was employed to enable triangulation, thereby increasing the validity of the study. For methodological triangulation qualitative and quantitative research methods were used, with data from both informing the design based research process.

4.9 ETHICAL ASPECTS

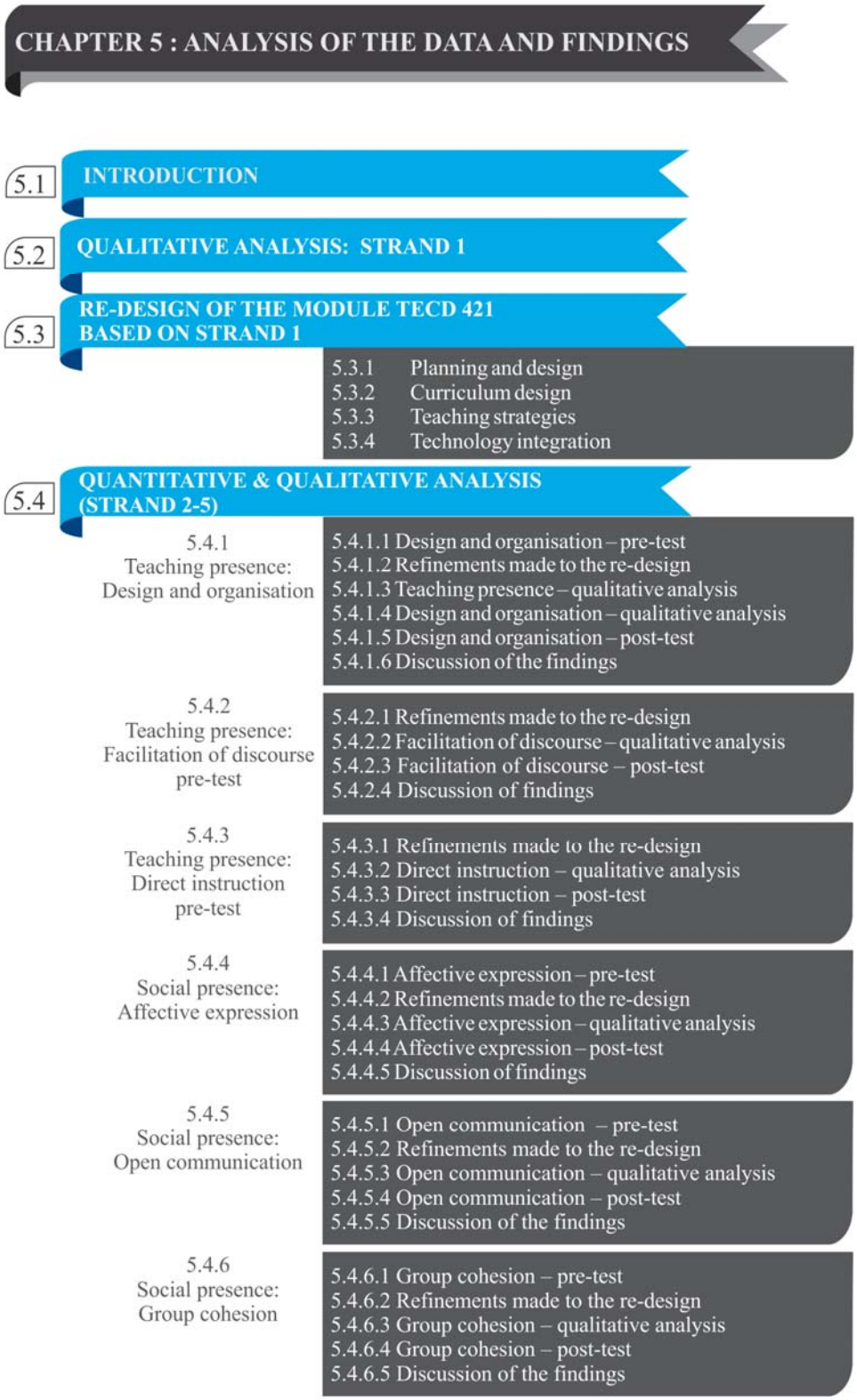
Ethics can be defined as norms for conduct that distinguish between acceptable and unacceptable behaviour (Resnik, 2010). The ethical principles as stipulated by Frankel and Wallen (2003, pp. 57-60) were applied throughout this research project. These principles encompass professional competence, professional relationships with participants, privacy and trustworthiness (Fraenkel & Wallen, 2003, p. 57). The requisite ethical applications were submitted to the North-West University's Ethics Committee and permission was obtained to commence with the research (ethics clearance number NWU-00122-12S2). Each student also signed a letter of consent, furnishing the researcher with permission to include the student in the research (Addendum J). This consent letter also confirmed that a student's participation would be voluntary, that he/she could withdraw from the study at any time, and that all information would be treated as confidential.

4.10 CONCLUSION

During the empirical research, information was collected from a pragmatic paradigm following a mixed research, multi strand design. To this end, a mixed method design-based research approach was followed. Design-based research is well-aligned with the philosophy of pragmatism which places the emphasis on shared meaning and joint action in order to establish what works optimally in practice. The methodology of design-based research for this study aimed to improve educational practices through iterative cycles of analysis, design, development and implementation based on collaboration between the practitioner and myself. Overall, the purpose of the empirical research was to study the value of CoI in a blended mode of delivery for the applied discipline TE. The results of this research process will be discussed in Chapter 5.

CHAPTER 5

LOGIC



5.4.7 Cognitive presence: Triggering event

- 5.4.7.1 Triggering event– pre-test
- 5.4.7.2 Refinements made to the re-design
- 5.4.7.3 Triggering event – qualitative analysis
- 5.4.7.4 Triggering event – post-test
- 5.4.7.5 Discussion of the findings

5.4.8 Cognitive presence: Exploration phase

- 5.4.8.1 Exploration phase – pre-test
- 5.4.8.2 Refinements made to the re-design
- 5.4.8.3 Exploration phase – qualitative analysis
- 5.4.8.4 Exploration phase – post-test
- 5.4.8.5 Discussion of findings

5.4.9 Cognitive presence: Integration phase

- 5.4.9.1 Integration phase – pre-test
- 5.4.9.2 Refinements made to the re-design
- 5.4.9.3 Integration phase – qualitative analysis
- 5.4.9.4 Integration phase – post-test
- 5.4.9.5 Discussion of findings

5.4.10 Cognitive presence: Resolution phase

- 5.4.10.1 Resolution phase – pre-test
- 5.4.10.2 Refinements made to the re-design
- 5.4.10.3 Resolution phase – qualitative analysis
- 5.4.10.4 Resolution phase – post-test
- 5.4.10.5 Discussion of findings

5.5 LEARNING PRESENCE

- 5.5.1 Qualitative analysis of learning presence: Self-regulation
- 5.5.2 Learning presence: Discussion of findings

5.6 CHALLENGES

- 5.6.1 Newness of the online environment
- 5.6.2 Time management
- 5.6.3 Skills in arrangement of group work
- 5.6.4 Accessibility of technology
- 5.6.5 Lack of technology skills
- 5.6.6 Discussion of findings on challenges students experienced in this blended mode of delivery

5.7 CONCLUSIONS

CHAPTER 5
ANALYSIS OF THE DATA AND FINDINGS

5.1 INTRODUCTION

Chapter 4 provided a detailed outline and discussion of the methodological choices exercised with regards to the design and methodology of my study and elaborated on participant selection as well as the development of measuring instruments, data collection strategies and methods of analysis.

In Chapter 5, I will expound on the data collected as well as on the resultant analysis and findings. In an attempt to address my main research question, "*What is the value of CoI in a blended mode of delivery for TE?"*, the three sub-questions posed in this study focused on (i) how CoI could contribute to the effectiveness of online learning, (ii) the extent to which CoI would manifest itself in a blended mode of delivery in a TE graduate course and (iii) how a blended mode of delivery ought to be designed if the existence of CoI is to be ensured to support effective learning in a TE undergraduate course.

The first sub-question was addressed in Chapter 2 and 3 of this study and will be used as cross-reference for the data presented in this chapter. To address sub-questions two and three, data will be presented and the resultant analysis of the findings discussed in an attempt to gain an understanding of the value of CoI in a re-designed blended mode module called TECD 421.

Since design-based research incorporates continues cycles of refinement, and given that the mixed-sequential dominant-status design method involves various strands, the analysis of the data presented in this chapter will be discussed according to multi-strands as well as the cycles of intervention and refinement typical of design-based research (Chapter 4: Figure 4.1 and 4.2).

5.2 QUALITATIVE ANALYSIS: STRAND 1

As the first strand of the mixed-research approach followed in this study, I conducted a semi-structured interview with the lecturer currently responsible for planning and facilitating the full-time, contact-based module TECD 421 (Addendum B). Analysing this interview allowed me to gain an understanding of the way this module has been structured to accommodate face-to-face

learning and teaching, the intention being to restructure the module for a blended learning environment based on CoI principles.

At the time of the interview, my analysis revealed that typical practices were being followed as currently prescribed by the NWU in as far as a face-to-face mode of teaching and learning is concerned. My findings in terms of these practices can be summarised as follows:

- Mode of delivery

The traditional mode of delivery is face-to-face interaction with most of the content being covered in physical contact sessions. In the case of TECD 421, these face-to-face interactions took the form of two one-hour contact sessions per week, with all sessions being formally planned, structured and facilitated by the lecturer, albeit with active student participation during the sessions. In fact, some contact sessions are used for micro-teaching[10], the intention being to create an opportunity for peer feedback and critiquing of lessons prepared by students themselves.

- Study aids

In accordance with the NWU's teaching and learning policy, each student is handed a hardcopy of the relevant module's study guide[11] which, in itself, must adhere to specific principles and criteria as stipulated in the policy. In essence, this booklet is intended to serve as a guide towards successful completion of the module and contains information with regards to the nature of the module, its learning outcomes and assessment methods, requisite study material, nominal hours allocated for successful completion and details as to what is expected of both lecturer and student during contact sessions (Faculty of Educational Sciences, 2011, pp. 9-10).

- Requisite preparation

A typical face-to-face contact session requires students to prepare certain work beforehand, and these requests are communicated via a LMS known as eFundi. Study notes and additional resources, supplementary to the hardcopy study guide and requisite textbooks, are also made available via eFundi. Students use these resources to complete activities and assignments but are also expected to find additional sources on their own.

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[10] "Micro-lessons/teaching is organized practice teaching with the purpose to give student teachers confidence, support and feedback by letting them try out a short slice of a lesson they plan to do with their students" (Derek Bok Centre for Teaching and Learning Harvard University 2006).

[11] A study guide is a structured document that guides students through course material and that provides support to students in order to attain the identified module outcomes.

Although eFundi has many functionalities, this LMS platform has, up to the time of my semi-structured interview with the lecturer in question, mainly been utilised to remind students of due dates or to forward documents. In the main, communication and discussions between student and student and lecturer and student occurred during face-to-face contact hours. However, students did occasionally make use of instant messaging or e-mails to enquire or to seek advice when uncertain about issues regarding the module.

- Assessment

In a typical face-to-face module, students write tests (formative assessment) during contact sessions and receive feedback from the lecturer in the form of marked answer sheets. In the rule, memoranda for tests are made available on eFundi. To assess assignments, the lecturer would mostly focus on formative feedback in the form of marks, supported by comments. In these instances, too, rubrics would be used.

In the case of TECD 421, theoretical assignments were being submitted, marked and returned with online feedback being offered via the eFundi site. In cases where the assignment included a physical artefact, for example a model or structure, students had to submit the assignment in hardcopy together with the artefact.

- Critical interaction

As with any typical face-to-face module, opportunities for critical thinking and reflection are limited to group discussions during contact sessions when students provide oral feedback on a given topic. In the case of TECD 421, my interview with the lecturer in question revealed that although the need for students to share knowledge and to support one another has been recognised, students seemingly did not communicate academically with one another and, in the process, discounted the importance of a community of learning.

Having analysed the findings stemming from my semi-structured interview with the lecturer in question, I set about changing the, then, contact-based, face-to-face TECD 421 module to a blended learning module. This process involved considerable re-thinking and re-designing, a phase Cronje (2013, pp. 5-6) explained as a developmental process in which design and research ought to be regarded as two parallel streams, connected by testing and application.

5.3 RE-DESIGN OF THE MODULE TECD 421 BASED ON STRAND 1

The next strand in this study involved redesigning the module TECD 421 based on the findings from the semi-structured lecturer-interview in collaboration with the lecturer in question as well as the NWU's academic support staff (Division Information Technology in Education). In this phase of the study, an attempt was made to enhance the on-line and virtual components in the existing TECD 421 module to the extent that this hitherto face-to-face module would satisfy the criteria for blended learning and teaching, First and foremost, in redesigning the module, my intention was to combine the best features of face-to-face teaching with the best features of online learning in order to promote active, self-regulated learning and to reduce face-to-face class time (Chapter 2 § 2.3), all for the sake of establishing CoI (Chapter 3).

To follow is a brief outline of the steps followed in re-designing TECD 421 for a blended mode of delivery based on CoI guidelines.

5.3.1 Planning and design

The first step in the restructuring of the module was to move a significant portion of the learning activities to an online environment whilst simultaneously reducing, but not eliminating, time spent on face-to-face interaction (Figure 5.1 and 5.2; Addendum A: Course re-design and Addendum F: e-Guide).

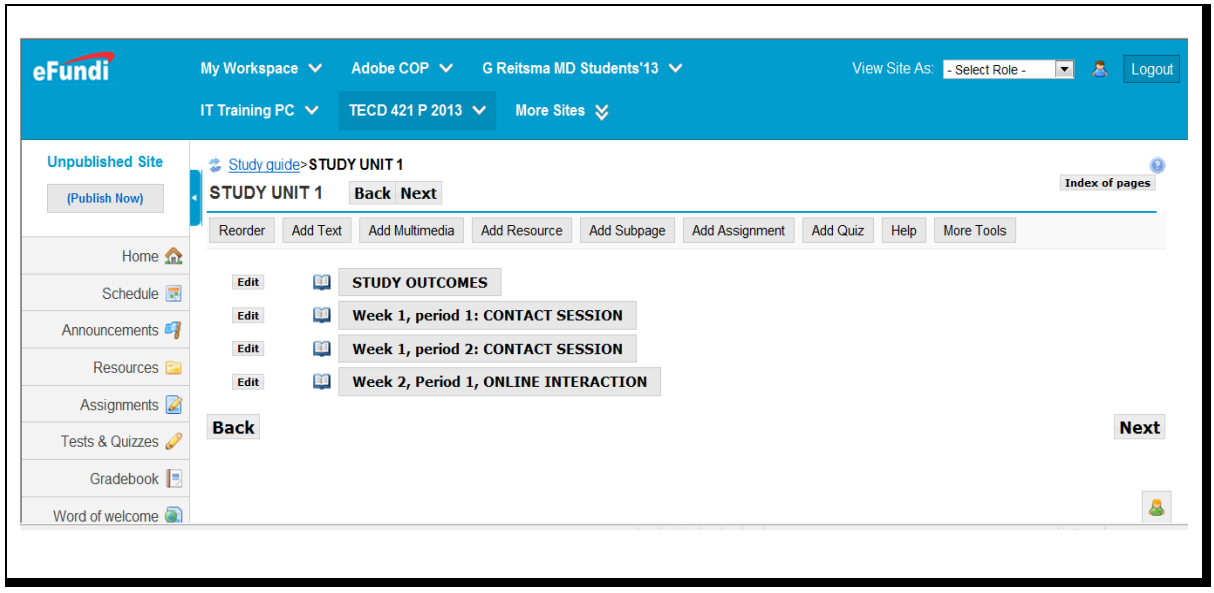


Figure 5.1: Screenshot of the e-guide (Addendum F)

TECD 421 Studyunit 1: The philosophy of Technology

Week 2 period 1: ONLINE INTERACTION

CONTENT	RESPONSIBILITIES OF STUDENTS	RESOURCES	GOALS	EXPECTED ONLINE INTERACTION
•	• Answer questions in study unit 1 in the Study guide • Send/Post final answers on FB/efundi	• Owen-Jackson, 2009:bl. • Articles on efundi • Collect 2 additional resources per group	•	• Group to formulate a well-structured answer. • Heading and sub headings
•	• Group 1 to criticize group2's answer, group 2 criticize group3's, group 3 to criticize group 4 etc.	• Place/post answers on efundi / FB		• Group to place a comment on FB and group leader to place paragraph to comment as the final reaction • The group that has received the criticism has to react/defend/ and make adjustments
•	•	•		

Figure 5.2: Screenshot of the course re-design document (Addendum A)

Having moved a significant portion of the learning activities in the existing module TECD 421 to an online environment, I then followed the guidelines proffered by Garrison and Vaughan (2008, pp. 181-183) in as far as entrenching CoIs are concerned. With these guidelines in mind, my re-design focused specifically on curriculum design, teaching strategies, and technology integration, all of which will be explained in the sub-sections to follow.

5.3.2 Curriculum design

The redesign of the curriculum commenced with the formulation of a specific vision for a blended approach and aimed to create a community of inquiry where students are fully engaged and collaboratively construct meaningful knowledge. Various online activities were developed to supplement and be integrated with the face-to-face sessions (Addendum A: Course re-design document). Evidence of teaching presence emerged when the lecturer informed the students of the re-structured course syllabus which stipulated the week, mode of delivery, lesson content, the responsibility of the student, resources and expected online interaction. In addition, a set of student interaction forums, such as Facebook and eFundi, was launched as communication tools. All students registered for the module were invited to and accepted on the secure page on Facebook. These forums were established to promote social presence as well as teaching presence in the online environment. Additional activities specifically designed to establish social and

cognitive presence such as online group work were also included, while strategies for student support (for example online office hours during which students could reach the lecture with almost immediate feedback) were introduced to establish teaching presence (Figure 5.3).

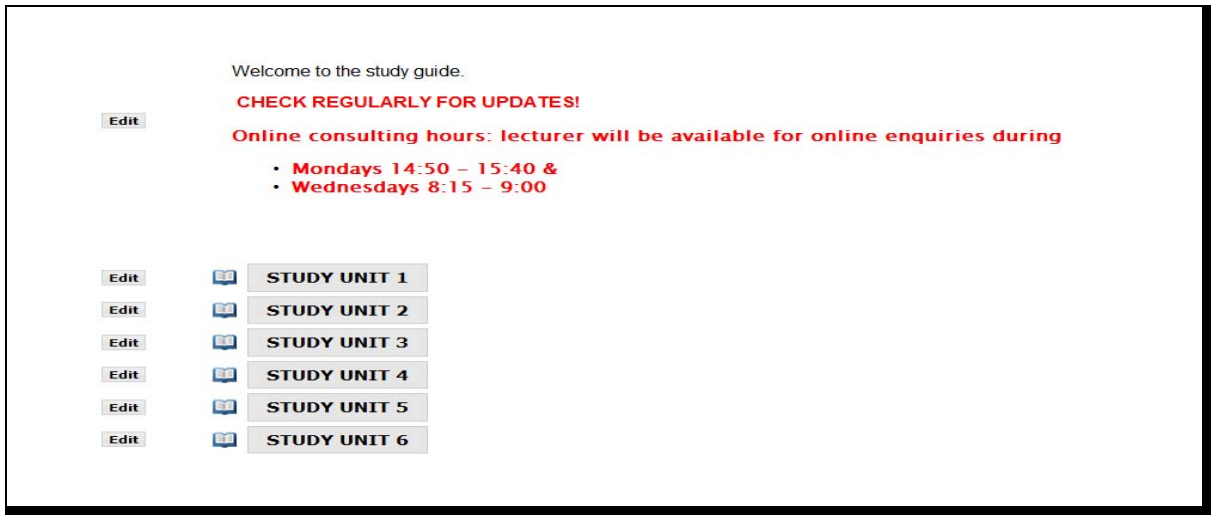


Figure 5.3: Screenshot of e-guide illustrating online office hours

5.3.3 Teaching strategies

As suggested by Garrison and Vaughan (2008, pp. 181-183), the lecturer deliberately incorporated effective face-to-face and online teaching strategies. These included the facilitation of online discussions by posing stimulating questions (e.g. "*provide detailed critique and comments on group members' micro-lessons and own reflection"*), keeping the discussions focused and moving forward in a timely manner (e.g. *"be careful not the confuse Technology Education with Technology for education"),* stimulating online communication between students and lecturer (e.g.*" ...is it good or bad? What do YOU think?"*); managing online group work by means of group activities so that students contribute to the ideas of other members in a group (e.g. "*write a short report where you comment on each of your groups' lessons*") and, finally, assessing online work with the aid of a variety of assessment tools, for example rubrics.

5.3.4 Technology integration

Extensive use was made of eFundi in the re-design of the module. Where previously a hardcopy study guide was used, an e-study guide (Figure 5.4) was now developed to navigate through the following features in the module:

- Course content: Adding and revising course content such as announcements, course info, course documents and links to external resources;

- Tools: Communication and collaboration features such a digital drop box, Facebook and VideoANT for the analysis and critiquing of other students' micro-lessons; and

- Assessment features: Online testing, quizzes and rubrics.

Teaching presence was once again evident through the lecturer's purposeful explanations to the students on how to integrate the technology, for example:

> ***Lecturer:*** *The PowerPoint presentations must be done electronically and placed on VideoAnt. You can start preparing for the recordings; I will prepare VideoAnt this afternoon for recordings. Good luck!) (P1:218)*

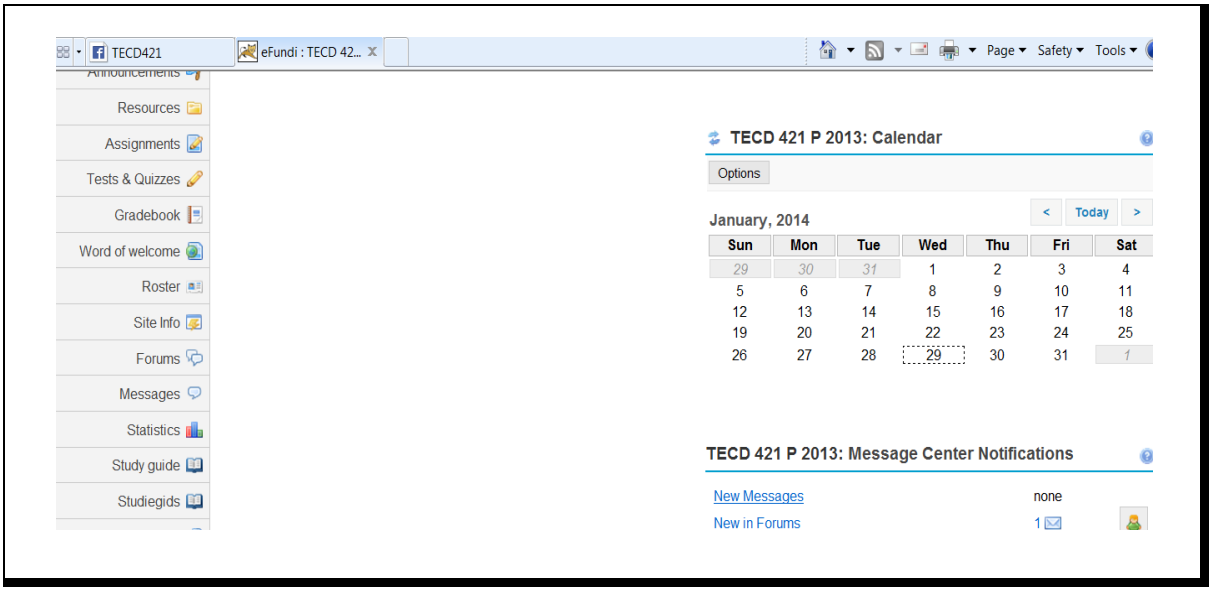


Figure 5.4: Screenshot illustrating technology integration as illustrated in the e-guide

In the section to follow, the qualitative and quantitative results of strands 2 to 5 will be discussed.

5.4 QUANTITATIVE AND QUALITATIVE ANALYSIS (STRAND 2 – 5)

The quantitative phase of the research process consisted of a CoI survey that students had to complete at the onset of the semester (pre-test) and again at the end of the semester (post-test) (Chapter 4 § 4.4.2).

In Chapter 4 § 4.6.1, the reliability of this study was addressed and explained. As is evident from the Cronbach alpha coefficient for this study, all constructs tested ≥ 0.90 which indicates a high reliability between all constructs in the CoI survey.

The aim of the pre-test was to establish students' experiences of blended learning over the first three weeks of the course. Although students had worked with eFundi to some extent in previous modules, they had very little exposure to a blended learning environment. Students were also unfamiliar with the use of social media such as Facebook as an academic forum.

Relating indicators of CoI, as discussed and suggested by Garrison and Vaughan (2008, p. 19), was examined collectively in order to create a coherent picture of the students' responses to the questions. Indicators of teaching presence included design and organisation, facilitation of discourse and direct instruction. Indicators of social presence included open communication, group cohesion, and affective/personal expression. Cognitive presence was highlighted by triggering event, exploration, integration and resolution.

5.4.1 Teaching presence: Design and organisation

5.4.1.1 Design and organisation – pre-test

Design and organisation aspects of teaching presence describe the planning and design of the structure, process, interaction and evaluation of this online course. The pre-test responses from the students on the four questions regarding design and organisation of the module are presented in Table 5.1.

Table 5.1 Results of pre-test for teaching presence - design and organisation

Item		PRE-TEST N=38				
		Disagree	Neutral	Agree	Mean	Standard deviation
T1	The lecturer clearly communicates online course content.	15.79%	36.84%	47.37%	3.37	1.0
T2	The lecturer clearly communicates important module outcomes online.	7.89%	42.11%	50%	3.53	0.89
T3	The lecturer provides clear instructions on how to participate in the learning activities of the online course.	26.31%	31.58%	42.1%	3.16	1.0
T4	The lecturer clearly communicates important due dates/timeframes for learning activities of the online course.	13.15%	23.68%	63.15%	3.68	1.1
	Total mean and standard deviation for this construct				**3.43**	**0.75**

The results of the pre-test showed that students were not yet sure about the extent to which teaching presence is evident in the course, as indicated by the large number of neutral responses. The majority of students did experience clear communication from the lecturer on aspects such as module content, module outcomes and instructions regarding online participation and timeframes. It was, however, interesting to note that 26.31% of the students did not feel that clear instructions regarding activities was provided. This was expected, as the online environment is new to them and they may have felt that they needed extra guidance from the lecturer. Conversely, the majority of students (63.15%) agreed that the lecturer communicated timeframes clearly.

The mean for design and organisation is 3.43 (against a maximum value of 5) which is an indication that aspects of design and organisation as part of teaching presence were already evident after the initial re-design of the module. Since this was the first time that the selected students functioned within a fully blended learning environment, the high *neutral* response rate is not surprising. Students were accustomed to face-to-face contact with traditional teaching and learning

methods which differ largely from the online component established in the blended learning module. Taking the results from the pre-test into consideration, the lecturer and I discussed and applied further refinements to the re-designed module, as will be explained in the following section.

5.4.1.2 Refinements made to the re-design to increase teaching presence – design and organisation

The aim of the refinements to the re-design with the intent to enhance design and organisation was to assist and encourage students to feel more comfortable using the available technological tools and, ultimately, to ensure that they function successfully in the online environment.

The pre-test revealed that not all students agreed on the quality of the instructions on how to participate in the online learning activities. This was an area of concern and needed refinement. Up to this point, instructions on how to participate online were communicated by means of the e-guide (Addendum F). It seems that students were unsure about how to use the e-guide for online activities, and this contributed to students experiencing the lecturer's instructions as unclear. To address this issue, the lecturer and I scheduled an additional contact session for the students to explain and demonstrate the navigation and use of the different tools available on eFundi as well as how to use the e-guide optimally (Figure 5.2 and Addendum D for the complete PowerPoint). The Power Point that the lecturer used in the course of this contact session was made available to the students on eFundi for further reference.

Figure 5.5: Additional instructions on how to use the eFundi site

The e-guide (Figure 5.3) clearly indicated the scheduled online office hours, but because not all students agreed (23.68%) that due dates and timeframes had been clearly communicated, further refinements were made. The lecturer also continuously reminded students on Facebook about the value of utilising the online office hours (Addendum E, Screenshot 3, for authentic text).

Lecturer > TECD421:

> *Hello all! Just a quick reminder that ONLINE OFFICE HOURS are NOW! So, for immediacy of feedback, this is your chance! The second set of ONLINE OFFICE HOURS is scheduled for Wednesday, between 9 and 10 in the morning. PLEASE utilise this option to ask all your questions online – you will probably find that someone else has the same questions as you do, or that you did not think of something in a certain way. Also: No online office hours for Monday, 9th September, since it will be replaced by a contact session (C6G19) to provide overall feedback regarding portfolios. (P1:415)*

After five weeks, students were invited to participate in focus group interviews to determine how CoI manifested itself during the semester (Chapter 4 § 4.4.3). In the following section, I will discuss the results of these interviews regarding teaching presence – design and organisation.

5.4.1.3 Teaching presence – qualitative analysis

The first interview question focussed on students' experiences with regard to teaching presence in the blended learning environment (Addendum C: Interview schedule.) Three pre-set categories (design and organisation, facilitation of discourse and direct instruction) and three pre-set sub-categories (setting curriculum and methods, shaping constructive exchange and focusing and resolving issues) were used for the category teaching presence (Chapter 4 § 4.4.3). Figure 5.6 depicts the linkage between the respective categories and sub-categories constituting teaching presence.

In the following sections, results for each of the categories and sub-categories will be explained.

5.4.1.4 Design and organisation: Qualitative analysis of focus group interviews and document analysis

The students were asked how the online design and the lecturer's instructions assisted them to complete the online activities (question 1 – Addendum C). They were also requested to provide examples of the type of instructions they found helpful.

Analysis of students' responses revealed that the design and organisation aspect of teaching presence was well executed by the lecturer. Students commented that the e-guide was detailed and user-friendly with easy access through the links that directed them to the different resources. One student commented that the instructions and support provided during contact sessions together with the design and organisation of the online environment made it possible to complete activities successfully.

> ***Drew:*** *I think the design and organisation of the module was very successful because if you could read, then you could understand. (P2:24)*
>
> ***Taylor:*** *I think the e-guide was very successful, very practically and simply designed, because if you clicked on the various links it took you exactly to where you had to go next. It steered you to the right places. So it was very practical and I think that if it was not there, then we would have had no idea what to do. So it was quite thoroughly laid out. (P2:25).*
>
> ***Tino:*** *The help [assistance] provided in the contact lectures, along with the online instructions, made it really easy to complete activities successfully. (P2:34)*
>
> ***Carrie:*** *At the start of the semester, we were missing a group member when we had to sort out the groups. I then commented on Facebook that we were looking for her and the lecturer helped us by providing all possible information so that we could get hold of her. (P2:42)*

On the other hand, a student highlighted that the design and organisation of the module, at times, were confusing and that too much happening at different places, which made it easy to miss important information.

> ***Emma:*** *The e-guide was very handy and the hyperlinks worked very well, but I feel, there were so many places you had to go and look. Then I had to look on eFundi; then I had to look on Facebook, and then I am busy with WhatsApp on my phone. At one stage I really felt that if I did not sit with my laptop open on Facebook, on the TECD group, then I would miss something. That is how it felt for me.*

The lecturer also contributed further to the design and organisation by way of on-line communication. Evidence included here indicates how the lecturer clearly communicated course content, important course outcomes and instructions on how to participate in the learning activities as well as reminded students of important due dates for learning activities (Addendum E, Screenshot 4 – 7, for authentic raw data).

Lecturer > Dear students

> *A friendly reminder that you asked to move Monday's lesson from 14:50 to 14:00, in C6 G19. PLEASE MAKE A NOTE so you don't miss out. Also: if you haven't mailed me your comments on the group experience up to now, please do so as a matter of urgency.*
>
> *Have a HAPPY weekend! (P1:331-334)*

Lecturer > TECD421

> *The PowerPoint recordings must be done electronically and uploaded on VideoAnt. You can start preparing as I will get VideoAnt ready today for your recordings. Good luck! (P1:483)*

Lecturer > TECD421:

> *May I please remind you to start getting your micro-lessons, and all that should accompany that, in to me so I can start assessing? (P1:483)*

Lecturer > TECD421:

> *There is a link in the e-guide that will take you directly to the article of Anderson. Otherwise you can find it under resources of study unit 1. Let me know it you have a problem. (P1:32)*

At the end of the semester, students completed the CoI survey for a second time (Chapter 4 § 4.4.4). The purpose of the post-test for teaching presence – design and organisation was to determine how the students experienced this aspect of CoI throughout the semester.

The results of the post-test for teaching presence – design and organisation will be discussed in the following section.

5.4.1.5 Design and organisation – post-test

The post-test responses of the students on the four questions regarding design and organisation of the module are presented in Table 5.2.

Table 5.2 Results of post-test for teaching presence – design and organisation

Item		POST-TEST N=29				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
T1	The lecturer clearly communicates online course content.	6.90%	41.38%	51.72%	3.59	0.82
T2	The lecturer clearly communicates important module outcomes online.	10.34%	27.59%	62.06%	3.62	0.82
T3	The lecturer provides clear instructions on how to participate in the learning activities of the online course.	13.79%	31.03%	55.17%	3.55	0.91
T4	The lecturer clearly communicates important due dates/timeframes for learning activities of the online course.	10.34%	24.14%	65.52%	3.79	0.94
	Total mean and standard deviation for this construct				3.64	0.71

The post-test results indicated that more students agreed on items T1-T4 in comparison to the pre-test. In item T2 relating to the lecturer's clear communication of important module outcomes, an interesting shift occurred. During the pre-test, 42.11% of students (Table 5.1) indicated that they felt neutral about this aspect of teaching presence. The post-test, on the other hand, revealed that a much higher percentage of the students (62.06%) felt more positive about the teaching presence, with a significant decline in the neutral category indicating more effective communication from the

lecturer regarding module outcomes. In item T3 in the pre-test, 26.31% of the students had indicated that they did not find the instructions on how to participate in the online learning activities helpful. In the post-test, this percentage dropped to 13.79% which implies a positive increase in social presence.

Cohen's *d*-values calculated for the design and organisation indicated that there was a small significant effect from pre-test to post-test. However, as Shea *et al*. (2013, p. 443) explained, a definite movement was suggested in their study although the patterns within a single module were not significant. This is also evident in this study. Although the d-values did not prove significant effect, a definite movement towards CoI was observed in the means and standard deviations, and this was supported by the qualitative results. It seems possible that with a larger sample size and a longer period of exposure to the blended learning module, the significance may improve.

5.4.1.6 Discussion of the findings – design and organisation

Activities characterising this aspect of teaching presence for this module included setting curriculum, designing teaching methods, establishing time parameters and establishing etiquette (Addendum F: e-Study guide).

Setting curriculum activities for design and organisation for this module included building and restructuring study materials as well as planning the course schedule. The course schedule stipulated the dates of face-to-face contact sessions, the resources to be used in preparation for face-to-face meetings as well as activities to be completed online (See Addendum A: Course planning document and Addendum F: e-Guide.) Details on the design and organisation of the module TECD 421 can be found in Chapter 3 § 3.4.3.1.

Results from all three datasets (pre-test, interviews and post-test) led me to conclude that students already experienced high teaching presence in the design and organisation of the module at the beginning of the semester, but there were specific aspects that still needed attention. Consequently, refinements were made to further enhance the students' experience of this aspect of teaching presence. Qualitative analysis indicated that most students found the design and organisation of the module simple and easy to use and that the online instructions, together with the contact sessions, enabled them to complete the online learning activities. The post-test indicated that the teaching presence in the form of design and organisation remained high with a slight increase in the mean-value of this construct.

Song *et al.* (2004, p. 67) stated that it takes good design and organisation to make good online instruction. It was, therefore, imperative that the face-to-face module had to be re-designed and organised effectively to promote effective blended learning.

In the following section, facilitation of discourse, the second sub-category of teaching presence, will be discussed.

5.4.2 Teaching presence: Facilitation of discourse (pre-test)

Facilitating discourse during an online course is especially critical in order to maintain the interest, motivation and engagement of students during active learning. Determining teaching presence with special reference to facilitation of discourse was addressed in six questions (Table 5.3) in the CoI survey.

Table 5.3: Results of the pre-test for teaching presence – Facilitation of discourse

Item		PRE-TEST| N=38				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
T5	The lecturer is helpful in summarising the different viewpoints on course topics in the online module.	21.05%	34.21%	44.73%	3.24	1.05
T6	The lecturer structures the online material in such a way that it helps me to clarify my thinking.	18.42%	28.95%	52.63%	3.39	1.10
T7	I can hear my lecturer's voice in the way the online module content was structured.	28.94%	31.58%	39.48%	3.16	1.15
T8	The lecturer provides online guidance to help keep students focused on online discussions	18.42%	28.95%	52.64%	3.42	0.98
T9	The lecturer helps to keep the students focused on the task in the online environment.	21.05%	34.21%	44.74%	3.37	1.05
T10	The lecturer encourages students to explore new concepts during online interaction.	18.42%	26.32%	55.26%	3.53	106
	Total mean and standard deviation of this construct				**3.35**	**0.84**

Once again, as with design and organisation (Table 5.2), a large number of students were neutral about these items (T5-T10) although the mean score indicated a positive perception in general. A number of students did not form an opinion, possibly because of the novelty of the territory they were embarking on. More than half of the students agreed in items T6, T8 and T10 and, by implication, this indicates that the online material was well structured, that there was good

guidance to keep students focussed and that students received positive encouragement to explore new concepts. A number of students (28.94%) disagreed in item T7, indicating that some students felt distant and removed from the lecturer in the online component of blended learning and were unable to hear the lecturer's voice. This might be because students are accustomed to face-to-face contact sessions where there is direct contact and bi-directional communication between student and lecturer. Lack of a one-on-one relationship with the lecturer is not a new challenge experienced by students in the online environment, as reported in a study conducted by Vonderwell (2003, p. 83). The mean for facilitation of discourse is 3.35, which is an indication that facilitation of discourse as a construct of teaching was already evident after the initial re-design of the face-to-face module. However, there were still a number of students who did not experience teaching presence as expected, which necessitated further refinement of this construct.

5.4.2.1 Refinements made to the re-design to increase teaching presence – facilitation of discourse

The results from the pre-test were used to make certain refinements to the module. The role of the lecturer during facilitation of discourse has been discussed in Chapter 3 § 3.4.3.2. The implementation of the Facebook page for the TECD 421 students aimed to provide a platform for both the lecturer and students to facilitate discourse. However, an analysis of the pre-test revealed that students especially felt that they could not hear the lecturer's voice given the way in which the online content of the module has been structured. In order to address this concern, the lecturer implemented the following actions: keeping discussions focussed (e.g. "*Remember, practical periods also have an introduction and closing phase, but is longer, see CAPS requirement*…"), moving discussions forward in a timely manner (e.g. "*I want to hear your voice, and your opinion from now on*") and clarifying issues that arose (e.g. "*focus on Technology as subject and not Technology as object. I see a lot of you get confused*.")

The qualitative data regarding facilitating discourse will now be presented and discussed.

5.4.2.2 Facilitation of discourse: Qualitative analysis of focus group interviews and document analysis

Question 2 of the interview aimed to determine whether students felt a personal connection with the lecturer in the online environment of this blended learning course. They were asked if, during online activities, they could "hear" their lecturer's voice in the way activities have been structured.

Analysis from the qualitative responses regarding facilitation of discourse indicates that students did not experience a personal connection with the lecturer in the online environment. Students rely heavily on the face-to-face guidance of the lecturer during contact sessions, as is evident from the students' responses. Considering that the online environment was a new experience for students, it is clear that they missed the face-to-face interaction with the lecturer.

> ***Susan:*** *No. I am a very uncertain person, so I like going to a contact session where the lecturer can say to me: "You must do this and this or that." Not necessarily to show me step by step, but to give me a few more guidelines. It gives me self-confidence to finalise my work. I sometimes get very good ideas in a lecture situation where I can hear how other students approach an activity. (P2:31)*

> ***Sandy:*** *I missed the personal aspect of the lecturer because we were not used to completing most activities online. The online environment caused frustration because we thought we had to do everything by ourselves, and we are not used to doing everything by ourselves. For four years, we only had contact lessons and saw the lecturer face-to-face and now everything feels different. (P2:33)*

> ***Sandy:*** *In a lecture, you can raise your hand and you can give your opinion, and the lecturer can maybe support what you said with supplementary information or use follow-up questions to lead you until it becomes clear what you actually mean. The lecturer can, thus, help you so that you can clearly articulate yourself. (P2:88)*

Despite evidence of the lecturer's online guidance, one student commented on the lack of an expert to guide them in an online environment. This indicates that students did not experience the lecturer as the expert in the online environment. This finding is reflected in the results of another study conducted by Stodel *et al.* (2006) on learners' perspectives as to what was missing in online learning. In this study, the students also did not link the online guidance provided by the lecturer with lecturer expertise. The following comments explain the students' experiences:

> ***Peter:*** *In the online environment, you didn't, for example, have an expert, the lecturer, that could lead you to the correct answers. (P2:90)*

It is important to note that this is blended learning which combines face-to-face with online learning. Students had the opportunity to attend face-to-face sessions in order to hear and confirm the lecturer's voice. One student commented that the confusion in the online environment was not

due to a lack of guidance by the lecturer, but rather the failure of students to attend the face-to-face contact sessions.

> ***Tino:*** *Many students did not understand what to do because they weren't in class. The assistance provided in the contact lectures, along with the online instructions, made it really easy to complete activities successfully. (P2:34)*

Facilitation of discourse also addresses issues such as the lecturer offering online guidance to help keep students focused on discussions (e.g. *"remember you have to include all content regarding the theme mechanisms which is included for grade 7"*), the structuring of material to clarify students' thinking (e.g. "*use the CAPS as guideline as explained in the study guide*") and encouraging students to explore new ideas (e.g. "*Google VideoANT. There are heaps of information; for example, look under technology for teachers*"). To glean insight into these aspects of facilitation of discourse, students were asked if the online materials and guidance provided by the lecturer helped them to stay focused in online discussions and encouraged them to explore new ideas.

Students responded positively to constructs such as the lecturer providing guidance that helped to keep students focused on the tasks in the online environment and the lecturer structuring online material in such a way that it helped students to clarify their thinking.

> ***Drew:*** *I received very good feedback from the lecturer. She regularly directed our group toward specific resources in order for us to successfully complete our activities. (P2:43)*

> ***Susan:*** *I was very unsure about the portfolio or whether I could use a year grade that differed from the group in which I was working in. My lecturer gave me the assurance that I may indeed do so, which really helped me. I could not continue with my portfolio 2 before I knew whether I could take a different grade than that of my group members. (P2:41)*

Evidence included from the document analysis (Facebook threads) shows how the lecturer reviewed and commented upon students' responses, raised questions and made observations to move discussions in a desired direction. For example, students were asked to provide a critical opinion on the rational of TE in South Africa by providing a concept description of the philosophy of TE. They had to post their opinions on the secure Facebook page. Each student then had to critically comment on one other person's concept description. From the Facebook postings, it is evident that the students did, indeed, engage in peer critiquing. More importantly, evidence of how the lecturer raised questions, identified misconceptions and moved discussions in the right direction

can also be found. Examples of these communications are provided below. Addendum E (screenshot 8 to 10) contains the authentic screenshots as evidence.

> ***Niki:*** *Technology change every day and learners must be aware of that. Therefore, it is important to incorporate key elements, goals, aims, outcomes and factors in our daily life and learners' learning experiences. Learners must be kept up to date to what have changed from yesterday to today and what can possibly happen in the future. The problems created today are the challenging problems that we need answers for. Learners must keep track with technological changes.*
>
> ***Lecturer:*** *What are the fundamentals of Technology? You are talking about Technology FOR education. Focus on the fundamentals of TECHNOLOGY EDUCATION. (P1:65-67)*
>
> ***Dorothy:*** *My opinion is that technology should be incorporated in all aspects of education. Not just as a subject but as part of other subjects as well, because we live in a digital era. Technology is our now and not just learners but educators should be trained to use it. Technology is a continuous process in our daily lives and never stops developing, so people should keep adjusting and improve themselves.*
>
> ***Chloe:*** *Hi you. I agree that it is a good idea that technology should be incorporated with other subjects; currently, it has been incorporated with Natural Sciences.*
>
> ***Anna:*** *I like that you refer to, that it is not only learners that should be trained to use technology. Some teachers, according to my experience, are very scared of changes when it comes to technology. Honestly, everyone should be open for change.*
>
> ***Lecturer:*** *Be careful not to confuse Technology Education with Technology for Education (media etc.).*
>
> ***Anna****: I struggle to distinguish between the two?*
>
> ***Lecturer:*** *Technology Education: teaching technology for all the right reasons. Technology FOR education: using certain types of technology (e.g. smart boards, PowerPoints, etc.) to teach any subject. Clear? :o)*
>
> ***Anna:*** *Yes thank you mam. It helped a lot. (P1:72-75)*
>
> ***Bonny:*** *My opinion on philosophy of technology is that technology teachers should, at times, inform themselves about the changes of technology so that the learners can benefit from their knowledge. I believe that technology is dynamic, and integrating technology in the*

classroom curriculum is very vital in a way that the learners will be able to succeed in this society of computers and appliances. Technology teachers need to adequately gain knowledge of the new technology in order to deliver the correct skills to the learners. Teaching technology is very essential because it gives the learners an opportunity to form their own knowledge through their personal experiences, and in this way, learners will be able to construct their own knowledge "constructivism". As technology teachers, we need to produce and build women and men who will be able to do things.

Lecturer: *that sentence starting with "I believe..." THAT is what I wanted to see! Well done!*

Tracey: *Thank you for referring to computers; I believe Technology teaching and Computing Teaching go hand in hand.*

As explained earlier, students completed a post-test to determine to which extent CoI (in this case facilitation of discourse) was evident throughout the semester. In the following section, the post-test results for this construct will be discussed.

5.4.2.3 Facilitation of discourse – post-test

The students' post-test responses to the four questions regarding the facilitation of discourse in the module are presented in Table 5.4.

Table 5.4: Results of the post-test for teaching presence – facilitating discourse

Item		POST-TEST N=29				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
T5	The lecturer is helpful in summarising the different viewpoints on course topics in the online module.	10.34%	24.14%	56.34%	3.66	0.81
T6	The lecturer structures the online material in such a way that it helps me to clarify my thinking.	17.24%	17.24%	65.52%	3.66	1.27
T7	I can hear my lecturer's voice in the way the online module content was structured.	27.58%	37.93%	34.48%	3.10	1.18
T8	The lecturer provides online guidance to help keep students focused on online discussions	18.42%	28.95%	52.6%	3.83	0.89
T9	The lecturer helps to keep the students focused on the task in the online environment.	6.90%	27.59%	65.52%	3.66	0.81
T10	The lecturer encourages students to explore new concepts during online interaction.	6.90%	24.14%	68.97%	3.45	1.09
	Total mean and standard deviation of this construct				**3.56**	**0.80**

The quantitative data analysis (post-test, table 5.4) indicated that more than half of the students (53.34%) agreed with the statement on the lecturer being helpful in summarising different viewpoints on course topics. Nearly two-thirds of the students agreed in items T6, 8, 9 and 10 that they are satisfied with the way materials are structured, the degree of online guidance provided by the lecturer, the help offered by the lecturer to focus on the task at hand and that they did, indeed, receive encouragement to explore new ideas. In item T7, however, only 34.48% agreed that they

heard the lecturer's voice in the online environment. This was also found in the pre-test (39.48%) (Table 5.3). It seems that the students experienced a lack of personal connection and a degree of isolation in the online environment for the duration of the course.

Cohen's *d*-values calculated for the facilitation of discourse indicated that there was no significant effect from pre-test to post-test. The same argument presented in paragraph 5.4.1.5 for organisation and design is valid here. Nevertheless, the means derived from the quantitative data together with the results from the qualitative data indicated a definite movement towards CoI.

5.4.2.4 Discussion of the findings – facilitation of discourse

Findings from all three datasets led me to believe that students felt isolated and disconnected from the lecturer in the online environment to a certain extent. Despite the lecturers' purposeful review and comments on student responses and the posing of questions in an attempt to move discussions in the desired directions, students indicated in all three datasets that they experienced a lack of teaching presence in the facilitation of discourse. Garrison *et al*. (2010, p. 35) found that students do perceive face-to-face and online learning differently. These authors explain that face-to-face learning experiences are more teacher-oriented; whereas the online learning experience is more cognitive by nature. They also observed that the face-to-face educational experience involves transmission of information in contrast to online learning where students are expected to be more cognitively involved in the learning process. This may also be true for the TECD 421 students as they had to start thinking and take decisions on their own without the lecturer being readily available for assistance. According to Stodel *et al*. (2006), a lot of the weaknesses regarding the facilitation of discourse can be addressed by more actively facilitating online discussions.

Lack of a sense of community and feelings of isolation have also been reported as challenges in other studies where participants indicated a lack of connection with the instructor (Song et al., 2004, p. 62). Clearly, integrating strategies for community building, with special reference to the student-lecturer relationship, warrants further investigation.

The final category of teaching presence – direct instruction – will now by analysed and discussed.

5.4.3 Teaching presence: Direct instruction

Direct instruction can be described as the instructor's provision of intellectual and scholarly leadership by sharing subject matter knowledge with students. Teaching presence with special reference to direct instruction was addressed in four questions (Table 5.5).

Table 5.5: Results of the pre-test for teaching presence – direct instruction

Item		PRE-TEST N=38				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
T11	Lecturer's actions in the online section reinforce the development of community (working together and supporting one another) among students.	10.81%	27.03%	61.53%	3.68	0.97
T12	The lecturer helps to focus discussions during online activities on relevant issues.	10.52%	28.95%	60.53%	3.58	0.89
T13	The lecturer provides online feedback that helped me in this module.	28.94%	28.95%	42.11%	3.21	1.12
T14	The lecturer provides online feedback in a timely fashion.	28.94%	21.05%	50%	3.26	1.18
	Total mean and standard deviation for this construct				**3.42**	**0.89**

The results from the pre-test revealed that the majority of the students agreed that the lecturer reinforced collaboration in online activities (T11) and, very importantly, focused discussions on relevant issues in the online environment (T12). It was, however, concerning to note that only 42.11% of students felt that the lecturer provided helpful online feedback (T13). Half of the students felt that the lecturer did not provide online feedback in a timely fashion (T14). This was to be expected, since the online environment was new to the students and, although they may have found the online feedback to be just as helpful as face-to-face guidance, it was not as immediate as they would have preferred.

Despite the lecturer sharing subject matter knowledge with learners by providing synthesised text-based content as resources and detailed feedback on assignments, answering questions by way of e-mail or postings on discussion forums and participating in online discussions, it seems a large number of students did not experience the online feedback they received very positively or did not link these contributions to direct instructions. This assumption is confirmed by research indicating that although students received more meaningful feedback in online activities than in face-to-face sessions, the participants still felt that they did not receive the full benefit of the lecturer's expertise (Stodel et al., 2006).

5.4.3.1 Refinements made to the re-design to increase teaching presence – direct instruction

The means of the pre-test indicated that teaching presence in the form of direct instruction was present as the beginning of the semester. However, there were still students who did not agree on the quality of the feedback provided in the online environment and did not experience feedback as being as immediate as they would have liked. This prompted further re-design for teaching presence – direct instruction. The aim of the refinements made to the re-design of teaching presence was to improve active facilitation of online academic discussions (e.g. "*you must include everything that has to do with the theme mechanisms which is taught in grade 7, except for hydraulic and pneumatic systems*"), confirmation that students are heading in the right direction (e.g. *that sentence starting with "I believe..." THAT is what I wanted to see! Well done!")* and to promote online consulting hours for immediate feedback on issues or problems students may be experiencing ("*Just a quick reminder that ONLINE OFFICE HOURS are NOW! So, for immediacy of feedback, this is your chance!*").

Student experiences of direct instruction as an aspect of teaching presence were further investigated through the focus group interviews, which will be discussed in conjunction with the qualitative analysis of the on-line documents in the following section.

5.4.3.2 Direct instruction: Qualitative analysis of focus group interviews and document analysis

The fourth interview question (Addendum C) aimed to determine whether students felt that the lecturer's actions in the online environment helped them to focus discussions on relevant issues and whether the feedback helped them with the module content. They were asked how they experienced the feedback on questions that they had about module content and what their uncertainties were.

Analysis revealed that although students experienced a lack of immediacy in terms of feedback and communication in the online environment, they did experience the feedback as helpful. The interviews were conducted six weeks after the pre-test and after the refinements have been implemented. It is evident that the refinements did, indeed, improve students' experience of teaching presence.

The following comments provide insight as to why students still experienced a lack of immediacy in feedback:

> ***Carrie:*** *I think that when you are busy working on an activity, you kind of want to know immediately if something is right or wrong. When I had a question and posted it on Facebook, I sometimes had to wait a while to get feedback. I then felt I was wasting time and could not continue until I received feedback from the lecturer. (P2:36)*

> ***Jennifer:*** *Sometimes I would ask other members of the group for feedback, but because not all the members of the group were always online and on Facebook, I had to wait for feedback. (P2:56)*

Despite the lack of immediacy in the online environment, students indicated that the feedback was helpful with regard to module content:

> ***Susan:*** *Yes, the feedback helped even if it sometimes took long before you got feedback from other students or the lecturer. (P2:41)*

> ***Emma:*** *I was very unsure about the portfolio or whether I could use a year grade that differed from the group in which I was working. My lecturer gave me the assurance that I may indeed do so, which really helped me. I could not continue with my portfolio 2 before I knew whether I could take a different grade than that of my group members. (P2:42)*

In contrast, one student pointed out that she did not feel that the feedback was up to standard and that she experienced unwillingness in terms of feedback when she contacted the lecturer later on.

> ***Emma:*** *The feedback was sometimes not what it should be [not up to standard]. I am not a person that will just ask; I first struggle on my own and, as a last resort, I go to the lecturer to get help and then, sometimes, it felt as if there was an unwillingness to help.*

The following document analysis (Facebook threads) is provided as evidence of direct instruction in the module TECD 421 (Addendum E, Screenshots 11-16).

Margie: *Hallo mam, I have two questions I want to ask. Number one, what is meant by the effectively of the CAPS in a certain theme?*

Lecturer: *Do you think the theme is covered in detail with regards the CAPS guidelines. If there are gaps, what are they? And does it provide enough support for teachers so that they will be able to present it effectively?*

Lecturer: *You don't have to include a PAT if you are doing mechanisms for grade 7. You just have to make sure that your portfolio 2 include a detailed PAT. You are most welcome to develop a PAT for mechanisms for grade 7. Enjoy! (P1:357)*

Lauren: *Please help? What is it precisely that the learners must do in the practical periods? Not a PAT? Must they be able to apply new content?*

Lecturer: *It depends on how the teacher structures the practical. According to the CAPS, weeks are spent at the end on the PAT. Practical tasks, applications, group work, games, research and other learner-centred activities in a double period each week. (P1:437)*

Margie: *Can anyone tell me whether a lesson plan for a practical period looks different than a theoretic period? Except for that it is a double period. And if the PAT of grade 7 is about hydraulics and pneumatics, is it still part of simple mechanism?*

Lecturer: *Practical periods also have an introduction and a closing phase but are longer. It usually contains more planning and organisation (see point 7 and 8 about guidelines in your study guides). (P1:411)*

Lecturer > TECD421:

Online office hours open!

Anyone who have questions about the micro-lessons?

Who needs help? Post your questions for immediate response!

Elda: *May it be any micro-lesson on any of the themes? Do you have to physically stand in front of a class or can you just explain what you should have done in the class situation?*

Lecturer: *You must present a lesson. It can be done in front of a class or a computer audience (e-lesson). Your group members can be your learners or you can use real learners (remember the ethical issues). Please don't just explain what you would have done.*

Christa: *How must we evaluate the lessons of our group members? Must we construct our own rubric or is there an existing one?*

Lecturer: *You must critically comment. If you construct your own assessment rubric, you still have to include constructive critique which the presenter can use to reflect on his/her presentation. (P1:487-495)*

Although students did make use of the online office hours, in my opinion, they did not use this facility to its full potential, as is evident from the following post:

Lecturer > TECD 421

No online questions today? (P1:441)

The extent to which direct instruction proved successful or was sustained throughout the semester was measured in the post-test. Analysis of the post-test results for direct instruction will now be discussed.

5.4.3.3 Direct instruction – post-test

Table 5.6 Results of the post-test for teaching presence – direct instruction

Item		POST-TEST N=29				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
T11	Lecturer actions in the online section reinforce the development of community (working together and supporting one another) among students.	6.9%	20.69%	72.42%	3.86	0.96
T12	The lecturer helps to focus discussions during online activities on relevant issues.	17.24%	24.14%	58.62%	3.55	1.06
T13	The lecturer provides online feedback that helped me in this module.	20.69%	10.34%	72.41%	3.72	1.07
T14	The lecturer provides online feedback in a timely fashion.	24.14%	6.90%	68.96%	3.69	1.29
	Total mean and standard deviation for this construct				**3.71**	**0.91**

The post-test results revealed that direct instruction as a construct for teaching presence was evident in the module throughout the semester. A large number of students agreed that lecturer actions reinforced the development of community and that they received helpful and timely feedback. Although the mean is still high, slightly fewer students agreed that the lecturer helped them to focus on online discussions.

Cohen's *d*-values calculated for direct instruction indicated that there was a small effect from pre-test to post-test. Once again, the same argument presented in § 5.4.1.5 is presented here. Although effect sizes were small, as Shea *et al*. (2013, p. 443) explained, a definite movement in study patterns within a single module ought not to be regarded as significant. This is also evident in this study. Although the d-values did not prove significant effect, a definite movement towards CoI

was observed in the means and standard deviations. This movement was also supported by the qualitative data.

5.4.3.4 Discussion of the findings – direct instruction

Direct instruction has been described in Chapter 3 § 3.4.3.3 as the instructor's provision of intellectual and scholarly leadership by sharing subject matter knowledge with students. The role of the lecturer in this instance included direct instruction that utilised subject matter and pedagogical expertise by interjecting comments, referring students to information resources and organising activities that allowed the students to construct the content within their own minds and personal contexts. The literature review on direct instruction, as discussed in Chapter 3 § 3.4.3.3, made the observation that students find it difficult to distinguish between direct instruction and facilitation of discourse as two distinctive categories of teaching presence. Consequently, it has been suggested only two categories, namely design and organisation and direct instruction, ought to be included in teaching presence. Certain similarities and overlapping aspects are, indeed, present in both direct instruction and facilitation of discourse. Seeking to reach consensus and understanding (facilitating discourse) and confirming understanding (direct instruction) would be but one such an example. In my opinion, sufficient distinctive differences between the two categories came to the fore in this study to justify the existence of both in teaching presence.

Participants and respondents indicated in both the quantitative and qualitative analysis that they experienced a lack of immediacy in the online environment. Refinements implemented to improve immediacy included confirmation that students are heading in the right direction and the promotion of online consultation hours for immediate feedback on issues or problems students might be experiencing.

It seemed that students had an unrealistic expectation with regards to online feedback and the immediacy thereof. Even in the traditional contact mode of delivery, students would not experience the immediacy in feedback they seemingly expect from the online environment. In fact, students would have to wait until the next face-to-face session to get feedback or schedule a meeting with the lecturer. To address the issue of immediacy in the online environment, online consultation hours were scheduled where students could ask questions. Despite the fact that the lecturer was online for these sessions and available for immediate responses to problems, these sessions were not effectively utilised. There even were occasions when no questions were posted during online office hours.

Figure 5.6 depicts the linkage between the respective categories and sub-categories constituting teaching presence. As illustrated in this figure, it can thus be deduced that the category design and organisation in teaching presence forms part of the setting of the curriculum and methods for the presentation of the blended learning module. Facilitation of discourse is evident when constructive exchange of information occurs in the online learning environment. As a sub-category direct instruction is equally important in the online environment since it forms part of focussing and resolving issues that students might have.

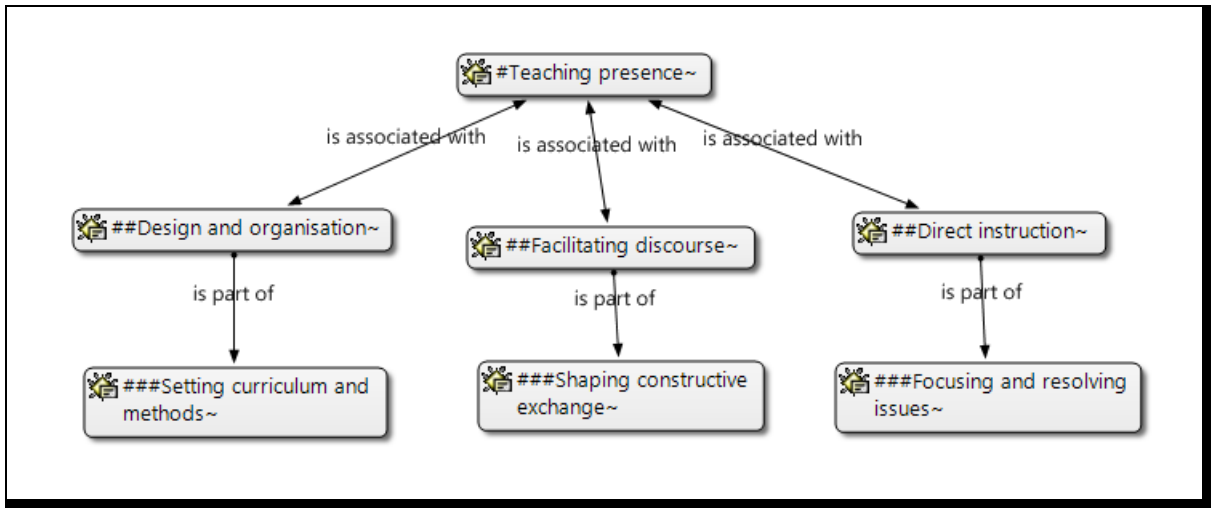


Figure 5.6: Categories and sub sub-categories of teaching presence

The second CoI presence, namely social presence, and its associated sub-categories affective expression, open communication and group cohesion will now be analysed and discussed.

5.4.4 Social presence: Affective expression

5.4.4.1 Affective expression – pre-test

Affective expression refers to the development of personal relationships that are necessary to help students commit to, pursue and attain the intended academic goals. Affective or personal connection constitutes the ultimate stage of establishing social presence in an educational institution, as was discussed in Chapter 3 § 3.4.1.2. Students' responses to the four questions regarding affective expression within the module TECD 421 are presented in Table 5.7.

Table 5.7 Results of the pre-test for social presence – affective expression

Item		PRE-TEST N=39				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
S1	Getting to know other online module participants gave me a sense of belonging in the module.	26.31%	28.95%	44.74%	3.29	1.20
S2	I was able to form new impressions of some students during online interaction.	15.79%	18.42%	65.79%	3.66	1.1
S3	I was able to confirm previous impressions of students during online interactions.	13.15%	31.58%	55.26%	3.53	1.03
S4	I think online communication is a good medium for social interaction.	28.95%	31.58%	39.47%	3.16	1.22
	Total mean and standard deviation for this construct				**3.41**	**0.95**

Results from the pre-test indicated that students were not yet sure about the extent to which social presence manifested itself in the module, as is evident from the large number of neutral choices. The majority of students (65.79%) indicated that they were able to form new impressions of other students (S2) and that they were able to confirm previous impressions of other students during online interaction (55.26%) (S3). In contrast, it is interesting to note that only 39.47% of students thought that online communication was a good medium for social interaction (S4) and only 44.74% of students indicated that getting to know one another online created a sense of belonging (S1). The students were not totally unfamiliar with one another, seeing that they were fourth-year students who have previously shared certain core modules in the course of their studies.

5.4.4.2 Refinements made to the re-design to increase social presence – affective expression

Although the pre-test indicated that students did form new impressions of their peers and were able to confirm previous impression, to some extent, they did not really experience a sense of belonging in the online environment. This was an area of concern and needed refinement in order to enhance social presence – affective expression by encouraging students to express themselves emotionally.

Consequently, methods suggested by Aragon (2003, p. 65) to increase affective expression were implemented in an attempt to improve affective expression, resulting in the lecturer making use of humour and emotions, addressing students by name and posting welcoming and inspiring posts. Aragon (2003, p. 65) also suggested that working with smaller groups would likely improve affective expressions. Although students in this instance had already been divided into small groups, these groups had been composed by the lecturer and not the students. In order to improve social interaction, students were allowed to constitute their own small groups with whom they could work collaboratively for the remainder of the course.

5.4.4.3 Affective expression: Qualitative analysis of focus group interviews and document analysis

The extent to which social presence manifested itself in the blended module TECD 421 was addressed in question 5 of the interview schedule (Addendum C). Three categories (open communication, group cohesion, personal/affective) and three sub-categories (learning climate/risk-free expression, group identity/collaboration, self-projections/expressing emotions) were used to analyse the data. In the following section, the focus group interview as well as the documented Facebook threads will be analysed and discussed.

Question 5 of the focus group interview (Addendum C) aimed to establish to what extent personal/affective expression manifested itself in the blended mode of delivery in the TE graduate course. According to Garrison and Vaughan (2008, p. 19), indicators of affective expression include both self-projection and the expression of emotion.

Evidence from the document analysis as per Facebook threads suggests that students did express emotions in the online environment, as is evident from the following comments explaining students' experiences. (Addendum E, screenshots 17-20).

> ***Joan:*** *I am totally lost!!! (P1:17)*
>
> ***Margaret:*** *This stuff is all over the place. Where must we submit the work now? Then it is on FB, then on eFundi and then VideoAnt. It is so frustrating, because nobody knows what's going on.*
>
> ***Bonny:*** *the feeling is mutual hey!*
>
> ***Sharon:*** *you are not the only one trust me. (P1:250-252)*

Ben: *I also feel frustrated to sit in front of the computer for a whole day to wait for a video to load. (P1:275)*

Tom: *Frustrating hey...Everyone in the same boat...*

Dorothy: *My boat is busy sinking.*

Chris: *Ha ha, I want to see how this boat will be rescued. We have nothing to swim with! (P1:259-263)*

Further analysis of the qualitative data confirmed that students felt more comfortable to communicate in person when choosing their own groups:

Tayler: *The whole online learning thing was new for us; we were outside our comfort zone…and then I had to work with people in a group, which tremendously frustrated me. I think, allow us to choose who we want to work with in a group. (P2:140)*

Even though students did manage to express their emotions, seemingly, these self-projections did not develop further into camaraderie. Respondents point out that although people in groups communicated well with one another, shared information and offered their support, they did not really become friends:

Drew: *I won't exactly say that we became friends, but [we got] a little more involved and to share cool inventions with other members of the group. (P2:67)*

Analysis also revealed that students did, indeed, learn new things about one another. Two respondents commented that, contrary to expectations, they got to know one another on a different level:

Drew: *So, as a group, we got to know each other on a different level. (P2:67)*

Susan: *We worked well together and I also think we were different types of people with different academic standards and we brought it together and we really surprised each other. (P2:97)*

The lecturer also contributed further to affective expression by way of online communication that made use of humour and emotions, addressed students by name and welcomed and inspired posts:

Lecturer: *You are all so cute, I am impressed ;0). (P1:455)*

Lecturer: *Have a HAPPY weekend! ;0 (P1:334)*

Lecturer: *Emma is so clever – well done! (P1:410)*

Lecturer: *Hallo people! Hope you all had some rest during the holiday... now for that final uphill stretch!"). (P1:483)*

In the following section, the post-test will be analysed and discussed.

5.4.4.4 Affective expression – post-test

In Table 5.8, students' post-test responses to the four questions regarding affective expression in the module TECD 421 will be presented.

Table 5.8 Results of the post-test for social presence – affective expression

Item		POST-TEST N=29				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
S1	Getting to know other online module participants gave me a sense of belonging in the module.	27.59%	31.03%	41.38%	3.10	1.01
S2	I was able to form new impressions of some students during online interaction.	24.13%	13.79%	62.07%	3.48	1.27
S3	I was able to confirm previous impressions of students during online interactions.	17.24	20.69%	62.07%	3.52	1.09
S4	I think online communication is a good medium for social interaction.	24.13%	27.59%	48.27%	3.28	1.28
	Total mean and standard deviation for this construct				**3.34**	**0.96**

The large number of neutral choices indicated that students were unsure about the extent to which affective expression has manifested itself in the module. Although a large number of students

agreed (41.38%) that they did experience a sense of belonging to some extent in the online environment, more than half were unsure or disagreed. The majority of students indicated in items S2 and S3 that they agree that they were able to form new impressions of students and were able to confirm previous impression of students during online interaction. Item S4 revealed an increase, from the pre-test's 39.47% to the post-test's 48.27%, in the percentage of participants who agree that online communication is a good medium for social interaction, meaning that nearly half of the class agreed that online communication is a good medium for social interaction.

Cohen's *d*-values calculated for affective expression indicated a small significant effect from pre- to post-test. However, as Shea *et al*. (2013, p. 443) explained, although a definite movement could be regarded as suggestive, the patterns within a single module were not significant. This is also evident in this study. Although the d-values did not prove significant effect, a definite movement towards CoI can be observed in the means and standard deviations, and this is supported by the qualitative results. Quite likely, with a larger sample size and a longer period of exposure to the blended learning module, the significance may improve.

5.4.4.5 Discussion of findings – affective expression

Data analysis of all three datasets indicated that students did not feel comfortable expressing themselves personally / affectively online. Getting to know other participants online also did not give students a sense of belonging. This is confirmed in a study by Stodel *et al.* (2006) where students reported they experienced that other members of the group did not portray themselves accurately through online communication and also that students were of the opinion that other students came across differently in the online environment compared to the face-to-face environment. The findings from the study referred to above may provide answers as to why students in this study struggled to express themselves affectively online and also did not experience a sense of community.

The second category of social presence, namely open communication, will now be analysed in the section to follow.

5.4.5 Social presence: Open communication

5.4.5.1 Open communication – pre-test

Open communication is developed when students in a course feel free to express themselves openly and in a risk-free manner. Students' responses to the four questions regarding open communication in the module TECD 421 are reflected in Table 5.9.

Table 5.9 Results of pre-test for social presence – open communication

Item		PRE-TEST N=38				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
S5	I feel comfortable conversing by means of online medium for academic purposes.	39.47	34.21	26.31	2.74	1.16
S6	I feel comfortable participating in the online discussion in this module.	31.58	34.21	34.21	2.97	1.22
S7	I feel comfortable interacting with other students online in this module.	28.95	34.21	36.84	3.16	1.24
S8	I feel comfortable disagreeing with other students online.	36.84	26.32	36.84	2.92	1.15
	Total mean and standard deviation for this construct				**2.95**	**1.04**

The results of the pre-test showed clearly that students did not agree that open communication manifested itself in this module because of the large number of disagree choices made. In item S5, the majority (39.47%) of students did not feel comfortable or were neutral (34.21) about conversing by means of an online medium for academic purposes. In item S6, only 34.21% of students agreed that they felt comfortable participating in online discussions. Only a third (36.84%) of the students felt comfortable interacting with other students online (S7) and were comfortable disagreeing with other students online (S8), while there was a very high percentage of neutrality and disagreement in this sub-category of social presence. This was expected, as the online environment is new to the students and they may have felt out of their comfort zone communicating, participating and

interacting online. The mean value for the sub-category is 2.95 which indicate a satisfying but not very good manifestation of open communication in the module.

5.4.5.2 *Refinements made to the re-design to improve social presence – open communication*

The pre-test revealed that not all students agreed that they felt comfortable communicating, participating and interacting online with other students in this module. This was an area of concern and needed refinement. The aim of the refinements was to assist students to communicate with greater confidence in the online environment. Furthermore, the lecturer also tried not to overshadow the online discussions but to rather provide some thought-provoking questions to allow space for students to participate, interact and build their understanding through collaboration with their classmates. The following scenario illustrates an activity where students were encouraged to communicate meaningful and openly (Addendum E, screenshot 38):

Each group has to plan and decide on a submission and assessment schedule for micro-lessons. Each student is going to record 1 lesson and place it on VideoANT. Group members will assess 4 other group members' lessons and comment thereon (online). All lessons have to have be recorded and assessed by 11th October 2013 at the latest. Each student will also write a comprehensive, critical reflection regarding his/her lesson's presentation, as well as the comments he/she received.

After these refinements were implemented, the focus group interviews were conducted with students. The qualitative analysis of these interviews and document analysis (Facebook threads) with regard to open communication will now be discussed

5.4.5.3 *Open communication: Qualitative analysis of focus group interviews and document analysis*

Question six to eight of the interview schedule (Addendum C) aimed to provide answers to determine whether open communication established itself in the online environment of this module. Students had to reflect on how they felt communicating academic matters online, whether they felt comfortable taking part in online discussion and whether they felt comfortable disagreeing with other members of the group.

Analysis of the focus group interviews and document analysis of the Facebook threads revealed that students felt uncomfortable conversing by means of an online medium for academic purposes. Students commented that the lack of body language can easily lead to misinterpretations that are not good for group relationships. Some students did not feel that they could express themselves academically as clearly in the online environment as in a face-to-face environment.

> ***Carrie**: I didn't feel comfortable talking about academic stuff online. There isn't something like body language in the online environment. Then someone says something and then you are kind of offended by it, or it may seem harsh. We once had such an instance in our group. I did something wrong and then some of the other group members were unhappy about it. The way messages were conveyed did not exactly promote good relationships. It was only when we physically got together that we were able to resolve the misunderstandings and I understand that things weren't meant as it appeared in the online communication. (P2:59)*

> ***Susan:** The fact that someone else has to comment on your work, especially if they haven't personally communicated with you…sometimes people entirely misread it. People can't always express themselves through writing. So that's what was difficult. When you speak to someone [in person] then you can better express yourself. (P2:66)*

> ***Catelyn:** I am, personally, someone who wants to communicate with someone face-to-face, because I want to see how you express yourself. People can easily misinterpret written communication. (P2:71)*

Students felt that communicating academic issues on Facebook lowered the academic standards because too many private issues are shared on the forum. One participant commented that the standard of communication was much lower than what it used to be with face-to-face sessions.

> ***Sandy:** I don't think Facebook is the place for academia at all. If someone could establish a place [site] that has the same functions to communicate academically, for academics, then I would agree, but, there are plenty of private matters that occur on Facebook which have nothing to do with academia. I think the academic level dropped because the academic conversations took place on Facebook. (P2:59)*

> ***Mandy:** Comparing the quality of communication and the manner in which we used to communicate with each other to how we communicate with each other on Facebook now. It is lower. (P2:63)*

In contrast to the above, one student commented that communication of academic matters online and specifically Facebook resulted in the students becoming more critically involved in the content of the module and that academic issues should not necessarily be kept apart from social issues.

> ***Drew:*** *My opinion is that online communication via Facebook made the class a little more involved with the content of the subject. I don't necessarily think academia and social should be kept separate from one another; for example, one person in the class uploaded something for us about teaching media which I found very interesting. Someone else posted something about a tour that takes place in Stellenbosch. (P2:67)*

Other reasons why students felt uncomfortable communicating, participating and interacting online include students feeling self-conscious, being uncomfortable with the openness and permanency of the communication, being afraid of being judged, posts not sounding academic enough, finding it much harder to communicate academically online, having difficulties with debating, finding the responses to be fake and experiencing a lack of interactivity.

> ***Jennifer:*** *No, not on Facebook, because I noticed during these discussions that if I discussed something on the Facebook page, I felt self-conscious. I wondered if other members of the group would understand what I mean or would they think I am crazy. So I didn't actually get involved with the online discussions. (P2:73)*

> ***Jennifer:*** *I think to myself, how must I convey it so that it sounds academic? And no it wasn't; it didn't sound academic. And the fact that it wasn't just our group members that could read it; it was open for everyone. (P2:75)*

> ***Sandy:*** *It is much harder to communicate academically online. With the online communication it sometimes happened that by the time I wrote my discussion, a bunch of others already posted their discussions online. I could go and read a bunch of other members' discussions and then base my opinion on theirs, so that it looks as if I agree with others' arguments. Or I can structure my information so that it more or less looks similar to the others'. I think the online communication can really be fake. (P2:80)*

> ***Susan:*** *Just to add to what Sandy said, I think it is more about you are afraid people will judge you. Now others read your comments and then they maybe think: "Hmmm…you are a bit stupid." It's actually about that. The people will judge you. (P2:81).*

> ***Drew:*** *You can't really debate too well with others online. For example, we are communicating with each other on Facebook and everyone agrees with your interpretations.*

My question is, is what I just said correct or incorrect? Did I actually give the right answer or not? (P2:83)

The TECD 421 group was a compilation of two specialist phases: design and technology and information technology. Students indicated that they felt they could disagree more easily with the students that they knew from previous courses than with students they have not worked with before. Familiarity was an important factor in online communication:

Emma: *We came from different specialist phases. The people that normally have lectures with me know me and know what I mean. So in case I disagree with them, they will know that I mean it in a constructive manner. We feel comfortable enough to disagree with each other. But if I have to disagree with someone I don't know too well, they might think I am attacking them on a personal level. (P2:69)*

The post-test for open communication will now be discussed.

5.4.5.4 Open communication – post-test

The post-test of social presence with special reference to open communication was addressed in items S5-S8 of the CoI survey (Table 5.10).

Table 5.10 Results of post-test for social presence – open communication

Item		POST-TEST N=29				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
S5	I feel comfortable conversing by means of online medium for academic purposes.	37.93	31.03	31.03	2.83	1.0
S6	I feel comfortable participating in the online discussion in this module.	37.93	27.59	34.48	2.86	1.03
S7	I feel comfortable interacting with other students online in this module.	24.14	37.93	37.93	3.10	0.98
S8	I feel comfortable disagreeing with other students online.	31.03	20.69	48.27	3.07	1.33
	Total mean and standard deviation for this construct	**2.97**			**0.92**	

Analysis of the post-test compared to the pre-test did not project a much improved picture as the respondents reacted very similar to the items as in the pre-test. Only 31.03% of students felt comfortable conversing by means of online communication for academic purposes (S5). The number of students who felt comfortable participating in online discussion (S6) stayed the same from the pre-test (34.21%) to the post-test (34.48%). Similarly, in item (S7), 37.93% felt comfortable interacting online with other students, compared to the 36.84% tested in the pre-test (S7). More students felt comfortable disagreeing with other students online (S8) at the end of the course in the post-test (48.27%) compared to the start of the course in the pre-test (36.84%). The mean value for direct instruction (2.97) is a score slightly above the mean of 2.5 on the 5-point scale, which is satisfying but not a good score for open communication.

Cohen's *d*-values calculated for the facilitation of discourse indicated that there was no significant effect from pre-test to post test. The same argument presented in par 5.4.1.5 for organisation and design is valid here. The means from the quantitative data and the results from the qualitative data indicated a definite movement towards CoI.

5.4.5.5 Discussion of findings – open communication

Students find open communication in the online component of this blended learning module difficult for a variety of reasons, including self-consciousness, fear of being judged, lack of value added by online participation, the fear of misinterpretations and the openness and permanency of the comments. These reasons for a lack of open communication have also been echoed in the study conducted by Stodel *et al.* (2006).

Students did not seem comfortable interacting or participating in online discussions and were reluctant to disagree with other students in the online environment if they did not know the students from previous classes. It could be that students did not feel inspired by the online discussions or did not have the confidence to communicate online because of the permanence of the communication. These possible explanations were echoed by Stodel *et al.* (2006) who documented that students felt that they have to put a lot of thought into online communication in order to sound academic since they will be judged by others. This perceived judgements and expectations may discourage students from participating in online communication. The link between cognitive and social presence is apparent here and, therefore, the educational experience should include both social and reflective elements.

According to Garrison and Vaughan (2008, p. 16), students often become disengaged because they do not feel challenged or inspired by the communication that is occurring. Garrison and Vaughan also noted that there is a link between the absence of social presence and the inability of students to express disagreement, share view points and explore differences. Students need to be awakened and engaged to explore the controversies of a discipline (Garrison & Vaughan, 2008, p. 16).

In the next section, the last category of social presence, namely group cohesion, will be analysed and discussed.

5.4.6 Social presence: Group cohesion

5.4.6.1 Group cohesion – pre-test

It is important that social presence amongst members of the community move beyond open communication towards group cohesion. Social presence, with special reference to group cohesion, was addressed in questions S9-S10 (Table 5.11).

Table 5.11 Results of the pre-test of social presence – group cohesion

Item		PRE-TEST N=38				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
S9	I feel that other students "listened" to me and reacted on my comments during online discussions.	21.05%	39.47%	39.47%	3.18	1.0
S10	Online discussions help me to develop a sense of collaboration (working together with other students).	26.79%	26.32%	47.37%	3.21	1.17
	Total mean and standard deviation for this construct				**3.20**	**0.98**

The results of the pre-test showed that students were not yet sure about the extent to which group cohesion manifested itself at the start of this module, as the large number of neutral choices indicate. In item S9, only 39.47% of students felt that they were listened to or that other students

reacted to their posts in the discussion forum. Although the majority of students indicated that the online discussions helped them to develop a sense of collaboration, there were still a number of students who disagreed or who were neutral to this item (S10). The results also indicate that there were still a number of students who did not feel that their opinions mattered online and who experienced difficulty developing a sense of collaboration.

5.4.6.2 Refinements made to the re-design to improve social presence – group cohesion

The pre-test revealed that not all students agreed that their comments were valued and that they are being listened to in the online environment. This was an area of concern and needed refinement. Certain refinements have already been made to improve social presence (affective expression), such as allowing students to choose their own groups, to see if personal expression would improve. Potentially, this refinement could also contribute towards improving group cohesion. Furthermore, the lecturer designed activities in such a way that collaborative activities were promoted in order to maintain group cohesion whilst simultaneously creating opportunities where students would have to engage with and rely on one another to reach goals. The following activity serves as an example and is but one of the many activities designed in order for groups to engage and rely on one another to reach a goal and, ultimately, to promote group cohesion:

> *Summarise the content of the indicated resources "Productive Pedagogies" and other resources allocated to your group. Groups within a theme now communicate with each other and develop EITHER a brain chart, OR a table regarding their theme from these resources. The final product is submitted under "Assignments" on eFundi BEFORE 10:00 on Thursday 22nd Augustus. [20 marks]*

The lecturer also monitored the group experiences throughout the course of the module to detect any problems they may be experiencing in a timely manner:

> *Lecturer: If you haven't mailed me your comments on the group experience up to now, please do so as a matter of urgency. (P1:333)*

The qualitative data on group cohesion will now be discussed.

5.4.6.3 Group cohesion: Qualitative analysis of focus group interviews and document analysis

The goal with establishing social presence, especially in as far as group cohesion is concerned, is to create a climate of trust and belonging that will support interaction. Question 8 of the focus group interview (Addendum C) focussed on students' experiences with regard to the extent to which collaboration manifested itself among students in the online environment, keeping in mind that indicators of group cohesion include group identity and collaboration.

Analysis of students' answers revealed that online communication created a lot of challenges, such as the impact it had on time and the difficulties experienced with coordinating and managing a group's work arrangements. Despite the challenges, students also reported on successful group work and collaboration that took place. Seemingly, group work helped students with different academic standards to complete activities to a good and satisfying standard.

> ***Susan:*** *It was difficult sometimes, time issues and to get everyone at the same place, but the group did cooperate. There was good group work. (P2:96)*
>
> ***Drew:*** *We were in the same boat and I think that when we got our feedback from other members of the group, it showed that we wanted to help each other. (2:134)*
>
> ***Drew:*** *I think our group worked very well together, because we came from different subject backgrounds. We were three from the learning area [of] technology (design and technology) and then two that came from CAT (information technology). We helped each other. (P2:97)*
>
> ***Tino:*** *Our group worked well together and I also think we were different types of people with different academic standards and we brought it together and we really surprised each other. (P2:98)*
>
> ***Sandy:*** *Our group made good use of the internet to give feedback without having to physically meet with other groups. I think we succeeded very well with that. (P2:50)*
>
> ***Drew:*** *So, as a group, we got to know each other on a different level. (P2:67)*

The document analysis also provided plenty of evidence that students listened to one another, reacted on comments during online discussions and offered support to one another. It is clear from the data threads that students did developed a sense of collaboration and group identity (Addendum E, Screenshot 23-25).

The following examples show how students took the first steps to establish online contact and communication:

Pieter: *Just want to say welcome to all members of group 6!! (P1:22)*

Anna: *Just want to say hallo to group 2!!*

Annemarie: *Helloooo, I think we are going to work really well together!!*

Margaret: *Hi all, I am glad to see that everybody is sorter with the TECD 421 group **

Botha: *Hallo, I also think that we will work well together.*

Anna: *We need to get together to do the question for Tuesday's online session. When do you want to meet and where?*

Margaret: *Let's try that!*

Jess: *Thank you for the good collaboration. Good e-communication. (P1:104-110)*

As is evident from the following online discussion threads, students also supported one another online:

Chris: *Where can we find the article that we have to read?*

Zinzi: *Look in the study guide on eFundi. Follow the link under week one, session one to the article.*

Chris*: Thank you Zinzi. I found it.*

Zinzi*: And remember to complete the reading reflection and the excel sheet with the 5 questions. Good luck (P1:27-31)*

Tom: *Hope this link helps. If any one finds a different way, please let the others know. (P1:270)*

Nikki *– TECD 421: Can I just ask on behalf of most of us…How many weeks must the planning be for?? How many hours?? How many lessons?? Everyone has their own ideas…*

Sharon: *Use the CAPS guidelines.*

Margaret: *You must work it out according to the CAPS content and time per week.*

Niki: *For grade 7 the hours is 7.*

Margaret: *Just follow the CAPS technical guidelines then you will be fine.*

Joan: *The hours [are] indicated along the side in the CAPS.*

Nikki: *Thanks everyone for the help, I think I am fine now. (P1:386-395)*

The post-test for social presence referring to group cohesion will now be analysed and discussed.

5.4.6.4 Group cohesion –post-test

Social presence, with special reference to group cohesion, was addressed in items S9-S10 (Table 5.12).

Table 5.12 Results of the post-test for social presence – group cohesion

Item		POST-TEST N=28				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
S9	I feel that other students "listened" to me and reacted on my comments during online discussions.	27.58%	27.59%	44.82%	3.17	1.17
S10	Online discussions help me to develop a sense of collaboration (working together with other students).	31.04%	31.03%	37.93%	3.10	1.11
	Total mean and standard deviation for this construct				**3.14**	**1.06**

Despite the refinements made to the course to improve group cohesion referred to earlier, responses from the post-test revealed only a slight increase in the number of students agreeing to item S9, with 44.82% students in the post-test agreeing that they felt listened compared to the 39.47% who agreed in the pre-test. Despite a slight increase in respondents *agreeing* in the post-test, the responses still indicated a low level of *agreement*. This implies that students did not feel listened to

and that their comments were not valuable. It is interesting to note that fewer students felt that online discussions helped them to develop a sense of collaboration in the post-test (37.93%) than in the pre-test (47.37%). Although a lot of collaborative activities have been built into the course structure to provide opportunities to engage and rely on one another to reach goals, responses to item S10 revealed that students did not feel that online discussions helped them to develop a sense of collaboration. The qualitative findings will explain this phenomenon further.

5.4.6.5 Discussion of findings – group cohesion

A community is inherently collaborative and, therefore, social presence must provide the cohesive tension or purposeful academic exchange to sustain participation and focus (Garrison, 2006, p. 27; Garrison & Vaughan, 2008, p. 20). Research by Garrison and Arbaugh (2007, p. 160) suggests that group cohesion also has a bearing on higher quality outcomes.

The qualitative data revealed that students did, to a large extent, develop a group identity and worked collaboratively to achieve academic goals. However, although the qualitative findings did provide evidence of how students offered academic support to other students online to help complete activities, this was not supported by the quantitative data analysis, which revealed fairly low response rates with regard to the development of group cohesion (S9: 44.82, S10: 47.37). Possible explanations for these low response rates could be that students are task-orientated and focused on completing activities rather than on engaging in conversation and forming social relationships.

Analysis of the group cohesion category indicated that students did not feel that other students really listen to their opinion online, which could possibly explain why students did not feel positive about online interaction. Possible explanations for this fairly low result of agreement and neutrality can be found in the literature. According to Garrison and Cleveland-Innes (2005, p. 40), some students perceive online learning as a convenient and efficient way to learn. Consequently, when they log onto the course, they are focussed on learning and completing activities and not on engaging in idle conversation and developing social relationships. Stodel *et al.* (2006) also explain that when students experience the online interaction as low-level information exchange, they disengage since they feel that they are wasting time getting to know one another instead of learning.

The re-design of the blended learning module TECD 421 was purposely designed around the building of communities. Most activities were designed in such a way that group members had to

work together supporting one another to achieve goals. (Re-design document: Addendum A.) That the lecturer consciously reinforced social presence through group work is evident from the feedback quoted below:

Students were asked to submit, in groups, a video of a PowerPoint presentation on VideoANT. This video had to be posted for assessment. Students were unfamiliar with the use of this technology. It was a conscious decision by the lecturer not to give instructions on the use of this technology, as students were expected to get involved with collaborative problem solving. Students did struggle completing this exercise and tried various other methods to post the video. Some of the groups managed to successfully post the video using VideoANT and provided help and support to other groups to successfully complete the task.

Groups have experimented with other methods as well to post their videos and have succeeded. Interesting is that the groups that first succeeded in posting their videos helped and advised other groups in how to successfully complete the online task.

Cohen's d-values calculated for group cohesion indicated that there was a small effect from pre-test to post-test. Once again, the same argument presented in § 5.4.1.5 is presented here. Although the d-values did not prove significant effect, a definite movement towards CoI was observed in the means and standard deviations. This movement was also supported by the qualitative data.

By way of conclusion, Figure 5.7 depicts the linkage between the respective categories and sub-categories constituting social presence. For open communication to manifest itself successfully, it is necessary to create a learning environment where students feel comfortable to express themselves without the fear of being judged. Group cohesion will only manifest itself when students are able to form group identities which will lead to better collaboration between students in the community. Likewise, for social presence to manifest itself, it is important for students to project themselves affectively within the online environment through the expression of emotions.

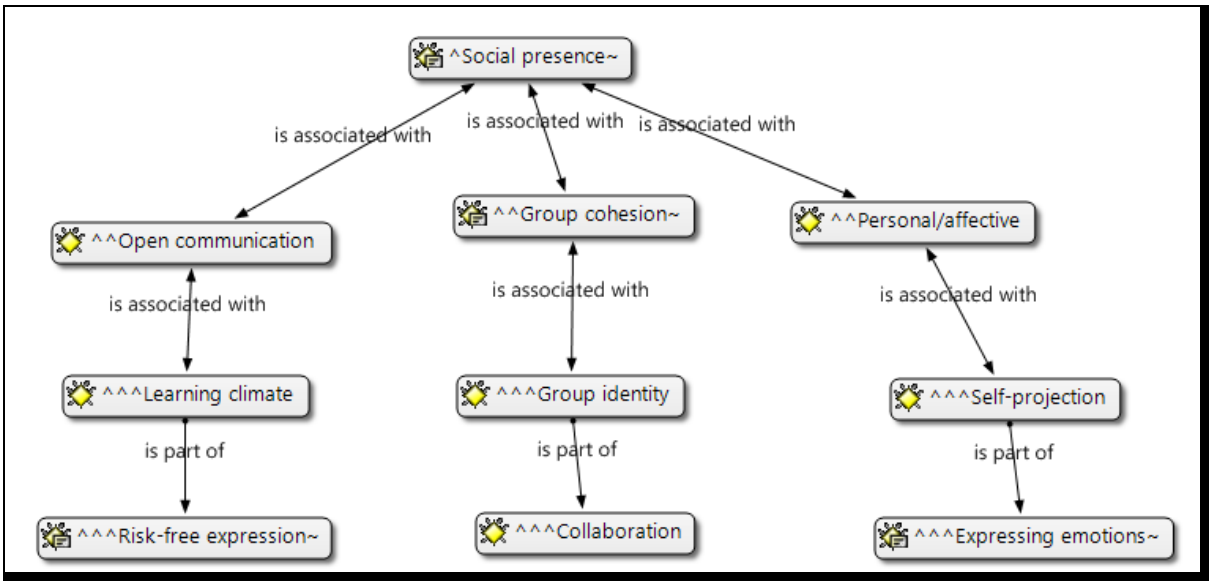


Figure 5.7: Categories and sub-categories of social presence

The third presence in CoI, namely cognitive presence, will be analysed and discussed in the next section by first investigating the triggering event before taking a closer look at the exploration phase, the integration phase and the resolution phase.

5.4.7 Cognitive presence: Triggering event

5.4.7.1 Triggering event – pre-test

Triggering events represent activities that are designed in the form of an issue, problem or dilemma that needs resolution. The purpose of the triggering event is to create a sense of intrigue amongst students to entice them to move through the process of inquiry, which represents cognitive presence. Cognitive presence, with special reference to the triggering event, was addressed in items C1 and C2 (Table 5.13).

Table 5.13 Results of the pre-test for cognitive presence – triggering event

Item		PRE-TEST N=38				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
C1	Online module activities increase my interest in the	42.11%	26.32%	31.58%	2.79	1.17

	module content.					
C2	Online module activities stimulate my curiosity.	36.84%	26.32%	36.84%	2.92	1.15
	Total mean and standard deviation for this construct				**2.86**	**1.11**

The results from the pre-test revealed that students were unsure about the extent cognitive presence could be perceived in the module, as the large number of neutral choices indicated. It was concerning to note that more students disagreed (42.11%) than agreed (31.38%) that the module's activities increased their interest in the module (C1). It was also interesting to see that an equal number of students disagreed (36.84%) as well as agreed (36.84%) that online module activities stimulate their curiosity (C2).

5.4.7.2 Refinements made to the re-design to increase cognitive presence – triggering event

The pre-test revealed that not all students agreed on the triggering events that were intended to increase their interest in the module content. The original re-design of TECD 421 from a fully face-to-face to a blended module (§ 5.3) before the onset of the module made provision for the structuring of activities that would act as triggering events. As suggested in Chapter 3 § 3.4.2, to improve cognitive presence, more online problem-based activities ought to be structured and implemented to act as a trigger for students to move on to the exploration phase of cognitive presence. Accordingly, the following activities were designed to act as triggering events and to develop cognitive presence:

- Problem solving

Students were asked to prepare a video of a PowerPoint using VideoANT. Since students have never worked with VideoANT before, they seemed to struggle to submit the assignment utilising this new technology. Groups tried different methods, and some of the groups managed to post their videos on VideoANT successfully. In this activity, students were expected to use problem-solving skills in order to complete the assignment successfully (Addendum E, Screenshot 39).

Lecturer > TECD421:

> *I see a lot of you are struggling to post your videos on VideoANT. Try other resources and methods as long as you send the link to the other group and to me. I want to see PROBLEM-SOLVING SKILLS! (P1:246).*

- Building a portfolio

Also in this module, students had to build an extensive portfolio that they can use when they have to teach a theme, find new resources, share these resources with other groups and focus on knowledge about various technology themes (Figure 5.8). The preparation to compile such a portfolio was designed to trigger students' interest and again required them to use problem-solving skills.

TECD 421 Preparation of portfolios and micro lessons

Week 4 period 1: CONTACT SESSIONS

CONTENT	RESPONSIBILITIES OF STUDENTS	RESOURCES	GOALS	EXPECTED ONLINE INTERACTION
• Feedback on what was learnt	• Each group must be a specialist in the area to be able to give feedback	•	• Class test – lesson planning	•
• PORTFOLIOS •	• In designated groups share resources, content, information and techniques	Look for own sources on eFundi • Attach Bibliography to portfolio • Report about cooperative learning	• Focus on knowledge on various technology teaching themes	• Exchange of resources • Communication on techniques and methods of application • Support from fellow students • Ask lecturer questions •

Figure 5.8: Triggering event

Having outlined the triggering events specifically devised for the re-designed module TECD 421, a discussion of the resultant findings will now follow.

5.4.7.3 Triggering event: Qualitative analysis of the focus group interviews and document analysis

Four categories (triggering event, exploration, integration, resolution) and three sub-categories (sense of intrigue, information exchange, connecting ideas, applying new ideas) as suggested by the literature from Garrison and Vaughan (2008, p. 19) were used to analyse the category cognitive presence. In Figure 5.9, the linkages between these categories are depicted.

The qualitative data regarding the triggering event will now be presented and discussed.

Question 10 of the interview schedule (Addendum C) aimed to determine whether online activities increased students' interest in and curiosity about the module content. Students' responses indicated that although the online environment was overwhelming at times, the method of delivery interested them and made them feel curious. Another student felt the portfolio work, together with e-learning as delivering mechanism, exited her. In addition, students seemed to realise that they, too, could use blended learning in their future teaching practices.

> ***Sandy:*** *The whole e-learning [aspect] stirred my curiosity. I am really interested in learning more about e-learning. I mean it is the future and it would be nice if one can maintain it in the entire curriculum. I just think we were completely overwhelmed and we focused on all the negative aspects. Overall, e-learning excited me. (P2:101)*

> ***Carrie:*** *I also think what excited me a little was the portfolio work. You can do your admin and lesson plans in a new manner and you can take away from it as it suits you. As Sandy just said, everything is moving towards e-learning. The schools are moving to e-learning, so now you will plan things differently by making use of e-learning in your own class. (P2:102)*

As explained earlier, the TECD 421 group consisted of students that came from different specialisation areas: Computer-aided Technology (CAT) and Learning Area Technology (TE). Students not familiar with TE as a specialisation area (the CAT students) found the online activities and content interesting and stimulating and felt that they could connect it to real-life contexts. The students who specialised in TE, and who were exposed to TE from their first year, found the online content and activities less stimulating because they were over-familiar with the content.

> ***Susan:*** *For me, I am a CAT student, so I had no background of technology as learning area. So for me mechanisms were interesting. (P2:104)*

> ***Jess:*** *It was very interesting to see, for example, mechanisms in real life. (P2:105)*

> ***Bob:*** *I think the technology students have worked so often with the subject content – from our first year to our fourth year – that it doesn't interest you that much anymore. (P2:107)*

> ***Carrie:*** *I think we have been developing lessons since our first year and we give classes in technology and, so, to write out lessons and to create portfolios is not so much fun anymore because we can now do it with closed eyes. (P2:109)*

One student also commented that the online environment made her feel rushed. Consequently, she did not feel a sense of intrigue:

Susan: *I think that because we were all so rushed, nothing really roused our curiosity. (P2:99)*

The development of cognitive presence (post-test) after the initial re-design, again with special reference to the triggering event, will now by discussed and analysed.

5.4.7.4 Triggering event – post-test

Determining cognitive presence with special reference to triggering events was addressed in two questions (Table 5.14):

Table 5.14 Results of the post-test for cognitive presence – triggering event

Item		POST-TEST N=29				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
C1	Online module activities increase my interest in the module content.	31.03%	34.48%	34.48%	2.97	1.24
C2	Online module activities stimulate my curiosity.	27.59%	31.03%	41.37%	3.17	1.10
	Total mean and standard deviation for this construct				**3.07**	**1.12**

Item C1 did not present a positive result regarding the triggering events required for cognitive presence, with the post-test (34.48%) responses revealing a very similar response to that of the pre-test (31.58%). Responses to item C2 indicate a slightly higher response rate of students agreeing (41.37%) in the post-test that online module activities stimulated their curiosity, compared to the pre-test's 36.84%.

Cohen's *d*-values calculated for the effective use of triggering events indicated that there was no significant effect from pre-test to post-test. The same argument presented in par 5.4.1.5 for organisation and design is valid here. The means from the quantitative data and the results from the qualitative data indicated a definite movement towards CoI.

5.4.7.5 Discussion of findings – triggering event

According to the literature, the existence of cognitive presence is the most difficult to study and develop in online courses (Chapter 3 § 3.4.2). The qualitative data indicated that some of the course content did, indeed, stimulate students' curiosity in the module content. The quantitative data, however, revealed that cognitive presence with special reference to the triggering event seems to be a problem in the online component of this blended learning module. A number of students did not feel that the module activities increased their interest or stimulated their curiosity in the module content. No specific refinements were made to the initial re-design before the onset of the module. In fact, the curriculum and learning outcomes as used for the face-to-face contact module were used and re-structured for the blended learning environment. I believe that the nature of the pre-set curriculum is to blame for the lack of a sense of intrigue in the online environment. Along a similar vein, MacDonald and Thompson (2005) argue that the delivery of a pre-set curriculum does not use the advantage of the benefits of technology-enhanced learning. Course design must have the flexibility to respond to emerging learning needs.

The nature of the module could be a possible explanation for the lack of curiosity and interest in the module content. TECD 421 is a fourth-year didactic module where students use the knowledge and skills they have accumulated over the past three years for application in a didactical context. As a result, students were not necessarily exposed to new content knowledge but rather to new ways of how to apply this knowledge. This was evident in the reaction of the CAT students who were not familiar with the content of TE. These students indicated that the activities interest and raised their curiosity, in comparison to the Learning Area Technology students who were over-familiar with the content.

The second sub-category of cognitive presence, namely the exploration phase, will now be discussed.

5.4.8 Cognitive presence: Exploration phase

5.4.8.1 Exploration phase – pre-test

The exploration phase refers to the search for relevant information that can provide insight into the challenge posed in the triggering event. Cognitive presence, with special reference to the exploration phase, was addressed in questions C3 and C4 (Table 5.15).

Table 5.15 Results of the pre-test for cognitive presence – exploration phase

Item		PRE-TEST N=38				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
C3	The online activities motivated me to explore content-related questions.	35.13%	35.14%	29.73%	2.84	1.07
C4	I utilise a variety of online information sources to complete activities.	26.31%	26.32%	47.37%	3.29	1.11
	Total mean and standard deviation for this construct				**3.08**	**0.96**

The results from the pre-test revealed that students were still unsure about the extent to which cognitive presence, with special reference to the exploration phase, manifested itself in the module. This can be seen in the high number of neutral choices made for construct C3 (37%). The majority (47.37%) of students indicated in construct C4 that they used a variety of online information sources to complete activities. Interestingly, only 29.73% of students felt that the online activities motivated them to explore content-related questions (C3). The mean value (3.08) out of a possible 5 still indicates a higher than average value with regard to the extent to which cognitive presence manifested itself in the blended course at the beginning of the semester.

5.4.8.2 Refinements made to the re-design to improve cognitive presence – exploration phase

No further refinements were made after analysis of the pre-test in this category. The original re-design of the module (§ 5.3) that took place before the onset of the module made provision for exploration in the way the activities had been structured. In figure 5.9, one can see that the activities were structured in such a way that students were encouraged to explore a variety of additional resources and content on the specific themes in order to answer questions in the study guide and to then prepare a presentation on the topic. They had to familiarise themselves with this additional content in order to assess other group presentations through online discussions. Figure 5.10 also illustrates how students had to explore additional content-related resources in order to build strong portfolios which can be used in practice.

THEME / CONTENT: STUDY UNIT 2 – THE ROLE AND RESPONSIBILITIES OF TECHNOLOGY TEACHERS

- **Expected task completion for this session:**

1. Formulate an answer for the question your group is responsible for. In your group, prepare (max) 4 powerpoint slides with which to convey your answer to the class. Use the information resources regarding "Presentation skills", "Presentation Tools" and "Presentation do's and don'ts" to ensure your group's work and presentation is of top quality.
2. The background information (expanded content of the slides) may not exceed 2 A4 folio'sand is also submitted (typed, references included).
3. Groups record their presentations and place it on videoANT BEFORE 10:00 on Thursday 15th Augustus. [20 marks]
4. Groups critisize and comment on each other's presentations according to the group divisions.
5. Complete only 1 "Presentation Feedback" form as a summary of your critique of the group you assessed. [5 marks]
6. Groups which presented, must reflect and comment on the assessment they received BEFORE 22:00 on Sunday 18th Augustus. [5 marks]

Figure 5.9: Exploration phase

Possible resources to use in your portfolios and micro-lessons:

Edit

Edit TEACHING ELECTRICAL SYSTEMS.docx

Edit Teaching Electrical Systems.pdf

Back

Figure 5.10: Exploration phase: Portfolio work

5.4.8.3 Exploration phase: Qualitative analysis of the focus group interviews and document analysis

Question 11 of the interview schedule (Addendum C) aimed to determine whether online activities motivated students to explore content-related resources and questions.

Evidence from the qualitative data shows that the online activities required students to use a variety of information sources to complete activities. Students also found the existing resources useful and helpful to complete online activities successfully. The CAT students who were quite new to TE indicated that they, especially, utilised a variety of online information sources to complete online activities. Searching for and using a variety of resources as well as exchanging information is an indicator that students had cognitively moved on from the triggering event to the exploration phase.

> ***Susan:*** *We made use of existing and new resources in order to better understand the content. (P1:122)*
>
> ***Emma:*** *The portfolios did definitely compel us to search for other resources. (P1:124)*
>
> ***Mark:*** *The CAT students had to look for plenty of resources in order to present a technology lesson. I first had to go find out what a lever is before I can teach kids what a lever is. (P1:125)*
>
> ***Susan:*** *The CAT students didn't have the resources as all the others, who specialised in learning area technology, so we couldn't just go and copy-and-paste from previous assignments. So the resources were very useful to us. (P2:119)*

Evidence from the document analysis clearly shows exploration and information exchange. Screenshots of real-time information can be found in Addendum E, Screenshots 27-30.

> ***Bonny****: My opinion on philosophy of technology is that technology teachers should inform themselves about the changes of technology so that the learners can benefit from their knowledge. I believe that technology is dynamic and integrating technology in the classroom curriculum is very vital in a way that the learners will be able to succeed in this society of computers and appliances. Technology teachers need to adequately gain knowledge of the new technology in order to deliver the correct skills to the learners. Teaching technology is very essential because it gives the learners an opportunity to form their own knowledge through their personal experiences and in this way learners will be able to construct their own knowledge "constructivism". As technology teachers we need to produce and build women and men who will be able to do things. (P1:80)*

Zinzi: *My opinion and philosophy about technology.*

I think the subject has tremendous value within the technological era that we find ourselves in. I think it is important to equip learners with the factual and procedural knowledge they will need to fully function within this era.

Marlien: *"Learning design and technology help to prepare young people for living and working in a technological world. This is done by teaching the technical understanding, design methods and making skills needed to produce practical solutions to real problems. It stimulates both intellectual and creative abilities and develops the personal qualities needed to complete a design project from initial to finished product." Newcomb, 2003. (P1:188)*

Bert: *Group 10: – Feedback:*

1. What did you learn from this presentation, or what did it make you think about?

We have learnt that budget is a significant aspect of planning. Not just for the teacher, but also so that effective learning can take place. We have also learnt guidelines for compiling such a budget. We know more about budgeting for the subject thanks to this presentation.

Jane: Thank you for our feedback! Will you please send us a copy of the presentation feedback sheet that you completed? We must use it to reflect on and also submit it! (P1:318-321)

The quantitative post-test of cognitive presence for the sub-category exploration phase will now by analysed and discussed.

5.4.8.4 Exploration phase – post-test

Determining cognitive presence with special reference to the exploration phase was addressed in two questions (Table 5.16):

Table 5.16 Results of the post-test for cognitive presence – exploration phase

Item		POST-TEST N=29				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
C3	The online activities motivated me to explore content-related questions.	24.13%	51.72%	24.14%	2.93	0.97
C4	I utilise a variety of online information sources to complete activities	6.90%	37.93%	61.07%	3.52	0.69
	Total mean and standard deviation for this construct				**3.22**	**0.66**

Results from the post-test indicated that the majority (61.07%) of students agreed that they used a variety of online information sources to complete activities which is a good indication that students are moving through the practical inquiry phases of cognitive presence to the exploration phase. Interestingly, less students agreed in the post-test (24.14%) compared to the pre-test (29.73%) that online activities motivated them to explore content-related questions.

Cohen's *d*-values calculated for the exploration phase indicated that there was a small effect from pre-test to post-test. Once again, the same argument presented in § 5.4.1.5 is presented here. However, as Shea *et al*. (2013, p. 443) explained, although a definite movement could be regarded as suggestive, the patterns within a single module were not significant. This is also evident in this study. Although the *d*-values did not prove significant effect, a definite movement towards CoI was observed in the mean and standard deviations. This movement was also supported by the qualitative data.

5.4.8.5 Discussion of findings – exploration phase

Evidence from the qualitative data analysis clearly shows exploration and information exchange regarding academic matters in the online environment. Students explored online resources and participated in online activities developed to encourage online exploration. This was, however, not measured in the pre- and post-test. A possible explanation for these responses may be that this is a fourth-year module in which the knowledge, skills and experience that students have accumulated

over the previous three years of the programme had to be applied in subject-based and practice-orientated teaching and learning experiences. Although the subject content is not new to students, the methodological content which enables students to apply previously accumulated knowledge to practice-orientate teaching experiences ought to warrant further exploration.

The third sub-category of cognitive presence, namely integration, will now be analysed and discussed.

5.4.9 Cognitive presence: Integration phase

5.4.9.1 Integration – pre-test

As content-related ideas mature, there is a move into the third phase, integration, where connections are made and viable explanation sought. The pre-test responses of the students to the two items on cognitive presence regarding integration in the module are presented in Table 5.17.

Table 5.17 Results of the pre-test for cognitive presence – integration

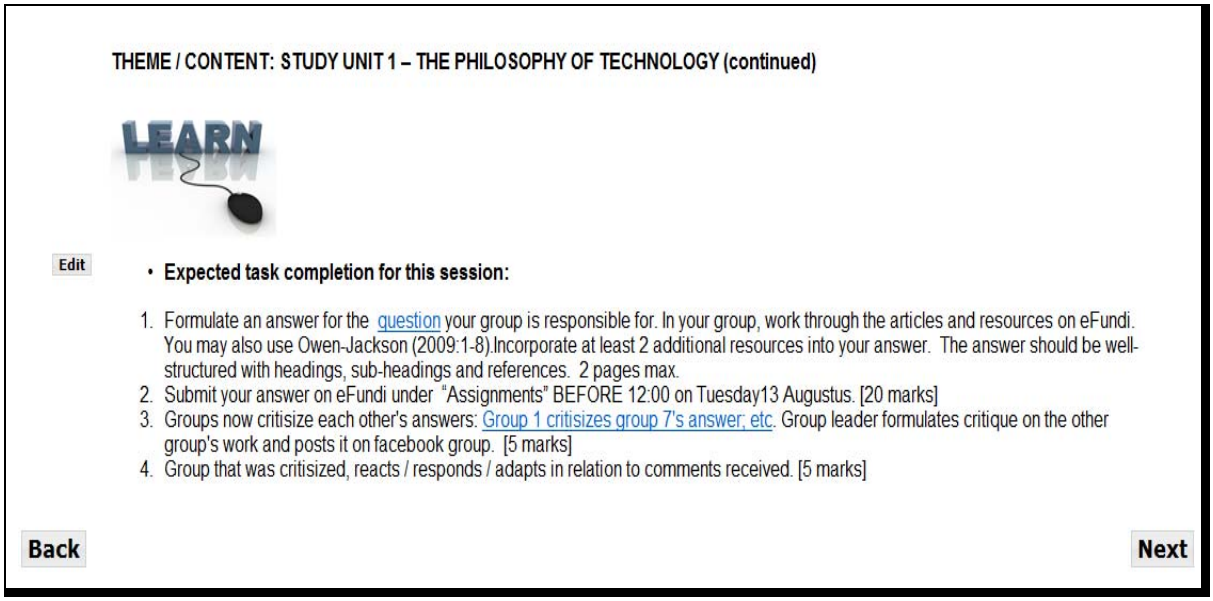
Item		PRE-TEST N=38				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
C5	Online activities such as discussion forums and feedback help me resolve content-related questions.	26.31	28.95	44.74	3.29	1.14
C6	Online discussions are valuable in helping me appreciate different perspectives.	18.42	36.84	44.73	3.29	0.90
	Total mean and standard deviation for this construct				**3.29**	**0.94**

In item C5, nearly half of students (44.74%) agreed that discussion forums and feedback from the lecturer helped them to resolve content-related questions. In item C6, the same number of students (44.73%) agreed that online discussions are valuable in helping them appreciate different

perspectives. The mean value (3.29) for the integration phase of cognitive presence indicates an above-average score which implies that integration was already evident in the blended course.

5.4.9.2 Refinements made to the re-design to improve cognitive presence – integration phase

The original re-design of the module (§ 5.3) that took place before the onset of the module already made provision for integration in the way that the activities have been structured. Figure 5.11 shows how activities were structured in a way that required students to move into the integration phase where connections are made and viable explanation are sought. Activities included case studies, debating and critiquing of articles. These types of activities are most likely to help students solve content-related questions and also help them to understand and appreciate different perspectives. Figure 5.11 (Addendum F: e-Guide) contains examples of activities where students had the opportunity to critique the different perspectives of TE, reflecting on and critiquing the work of other groups. For students to critique other students' work, reflection on their part as well as application of prior knowledge is required. These activities were specifically designed and refined in order for students to integrate the content of the module and to solve content-related problems.



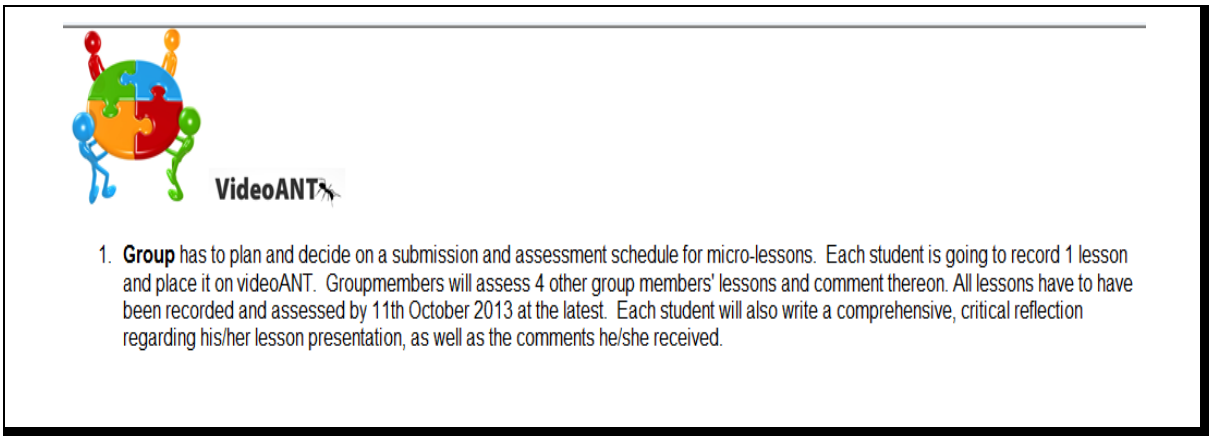


Figure 5.11: Study guide illustrating integration

In the following section, the qualitative analysis of the integration phase will be analysed and discussed.

5.4.9.3 Integration phase: Qualitative analysis of focus group interviews and document analysis

Question 12 of the interview schedule (Addendum C) aimed to determine whether the discussion forum and the feedback provided by the lecturer assisted students in finding solutions to content-related questions and also helped them to appreciate different perspectives.

Analysis of students' responses revealed that the feedback from the lecturer as well as from other students did, indeed, help them to resolve content-related questions. It seems that students were sometimes reluctant to join in on the online discussions and would, therefore, first see what other students' questions and perspectives were. The TE students relied on the CAT students to ask questions on the discussion forum in the hope that these might also provide the feedback that they required.

> ***Susan:*** *Yes the feedback helped even if it sometimes took long before you got feedback from other students or the lecturer. (P2:129)*

> ***Sandy:*** *I have never asked a question on Facebook. I am very inept when it comes to Facebook, but I often – before I asked a question online – first worked through the other questions and discussions on Facebook to see what other classmates asked. Frequently someone else has asked the same question which then answered my question. So, yes the online discussions worked. (P2:131)*

Jennifer: *What helped me, especially with the portfolios, was to go and see what the CAT people ask and what they were unsure about. Plenty of their questions were also things I was unsure of and the help that was then given also helped me a lot. (P2:133)*

Drew: *I agree with Jennifer that I was also sometimes unsure about aspects of the portfolio. So if there was something that the CAT people asked then we were very glad, because then we also got the answers. (P2:134)*

Document analysis also provides evidence (Screenshot 31-32) and insight into the integration phase where students had to make connections about course content and develop an understanding and appreciation of different perspectives. The context of this activity can be found in Figure 5.5.

Communication by the lecturer:

Lecturer: *Detailed critique and comments on group members' micro-lessons and own reflection:*

You must write a short report (paragraph or max half a page) where you comment on each of your groups' lessons. Group members will use your critique as part of their reflection. You will get a mark for the assessment of group member's lessons – this shows me if you understand the characteristics of a good / not so good lesson in practice. :0)

Example of students' critique and comments on group members' micro-lessons:

Ruan: *Introduction is short, aims are provided so learners know exactly what they will do in the period and what is expected of them. Unfortunately the introduction is not creative and original.*

Teaching phase: Suitable and relevant examples are used to teach new knowledge to learners. The basic work is well established before the assignment is given to learners. The assignment that learners must complete is practical and suitable for the lesson. It improves group work and is suitable for assessment by the teacher to assess weaknesses.

End phase: A detailed conclusion of the lesson is done and questions are asked to the learners.

Critique: The negative point is that the introduction phase did not attract learners' attention.

Positive: Good PowerPoint was used as well as good teaching-learning materials.

The quantitative post-test of the integration phase will now be analysed and discussed.

5.4.9.4 Integration phase – post-test

Cognitive presence with special reference to the integration phase was addressed in item C 5 and C6 (Table 5.18).

Table 5.18 Results of the post-test for cognitive presence – integration phase

Item		POST-TEST N=29				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
C5	Online activities such as discussion forums and feedback help me resolve content-related questions.	20.69%	37.93%	41.38%	3.24	0.95
C6	Online discussions are valuable in helping me appreciate different perspectives.	24.14%	34.48%	41.38%	3.28	1.07
	Total mean and standard deviation for this construct				**3.26**	**0.98**

Analysis of the post-test revealed similar results in item C5 as in the pre-test (Table 5. 18). Fewer students disagreed (20.69%) in the post-test than in the pre-test (26.31%), and more students felt neutral in the post-test (37.93%) compared to the pre-test (28.95%). Although there was a slight decrease in the agree category from the pre-test (44.74%) to the post-test (41.38%) in the number of students who agreed that online discussions and feedback helped them resolve content-related questions, the results were still high (C5). In item C6, a slight decrease in the agree category from the pre-test (44.73%) to the post-test (41.38) was measured. More than a third of the students agreed that online discussions are valuable in helping them appreciate different perspectives. The mean value of 3.26 for the integration phase indicated an above-average score which implies that cognitive presence – integration phase did manifest itself in this blended course.

Cohen's *d*-values calculated for the integration phase indicated that there was no significant effect from pre-test to post-test. The same argument presented in par 5.4.1.5 for organisation and design

is valid here. The mean from the quantitative data and the results from the qualitative data indicated a definite movement towards CoI.

5.4.9.5 Discussion of findings – integration phase

All three datasets led me to believe that cognitive presence relating to the integration phase has manifested itself to some extent in this blended mode of delivery.

According to the literature, the existence of cognitive presence is the most difficult to study and develop in online courses. The process of inquiry has great difficulty moving beyond the exploration phase to the integration phase where connections are made and, finally, to the resolution phase where selection and testing of the most viable solution take place. It is most likely that the difficulty in transformation has to do with the nature of the assignments and instructional direction provided. Consequently, this phase requires more time for reflection (Garrison & Arbaugh, 2007, p. 162). Shea and Bidjerano (2009, p. 544) reported that in studies where students were challenged to resolve a problem and explicit facilitation and direction were provided, students did progress to resolution.

I believe it would have been beneficial for the manifestation of cognitive presence – integration phase had more activities requiring reflection been included.

The fourth and final sub-category of cognitive presence, namely the resolution phase, will now be analysed and discussed.

5.4.10 Cognitive presence: Resolution phase

5.4.10.1 Resolution phase – pre-test

The resolution phase is where the selection and testing of the most viable solution take place. Cognitive presence, with special reference to the resolution phase, was addressed in items C7-C9 (Table 5.19) of the CoI survey.

Table 5.19 Results of the pre-test for cognitive presence – resolution phase

Item		PRE-TEST N=38				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
C7	Combining information received online with info received during face-to-face contact classes helps me to answer questions raised in module activities.	26.31%	34.21%	39.47%	3.37	1.15
C8	Online learning activities help me construct explanations and/or solutions.	21.16%	34.21%	39.47%	3.11	1.03
C9	Online refection on module content helps me to understand fundamental concepts in this class.	21.05%	34.21%	44.74%	3.18	0.98
	Total mean and standard deviation for this construct				**3.22**	**0.92**

The results of the pre-test showed that more than a third of the students agreed (39%) in item C7 that the combination of face-to-face and online activities helped them to answer questions as well as in item C8 (39.47%) that online learning activities helped them to construct solutions. Item C9 showed that more students (44.74%) felt that opportunities to reflect on the module content helped them to understand fundamental concepts of the module.

5.4.10.2 Refinements made to the re-design to improve cognitive presence – resolution phase

No further refinements were made after analysis of the pre-test. The ultimate goal for the re-design (§ 5.3) of this module was to improve students' progression to resolution. This was accomplished through explicit facilitation by contributing ideas and perspectives that constructively shaped discourse, scaffolding of content to ensure students' progress to higher levels of cognition, helping students to make connections, integrating ideas and summarising discussions and structuring activities that proved the opportunity to demonstrate the application of new knowledge (Figure 5.12).

During the conveying of micro lessons and portfolios

Micro lessons	Portfolios
• Online office hours for questions (learning of planning skills, time management, organising • Share resources, techniques etc. • Online participation, assessing with a rubric	• Scheduled submission • Co-operative learning between TECD 411 and non TECD 411 students • Lecturer available online during office hours for any questions • Bonus points used for the use of teaching technology/creativity • Additional skills o references o identifying and selection of resource o meaningful transfer of content o use and combination of content, methods and strategies o content knowledge o critical and creative thinking o co-operative learning

Once again complete SDL knowledgeable questionnaire of micro lessons

Figure 5.12: Example of activities structured to reach the resolution phase

The qualitative data analysis of the resolution phase will now be analysed and discussed.

5.4.10.3 Resolution phase: Qualitative analysis of focus group interviews and document analysis

Question 13 of the interview (Addendum C) aimed to determine whether the combination of online and face-to-face information helped students to construct solutions and understand fundamental concepts of the module.

Analysis of the focus group interviews indicated that the portfolio work helped students to solve problems from real-life situations and that they were able to apply knowledge, skills and experiences in practice.

> ***Susan:*** *When I started with the portfolio to develop my lessons and I finally understand…okay this is what mechanisms are and, wow, they can build these funky models…this is really cool. (P2:104)*

> ***Jess:*** *I was at the Hartebeespoort dam the weekend and I could see first-hand how mechanisms work. It helped me with the mechanism portfolio and it was interesting to see the cable station and how such a small mechanism had to carry all that weight. (P2:105)*

> ***Emma:*** *One of the ideas that I thought I would use in my class is to put all my lessons on videos, because if it maybe happens that I can't be at the school…and you really don't want*

these kiddies to miss out on work, then I play the video for them and you know the work gets done. (P2:113)

Tino: *I could resolve issues and problems because it was a practical exercise instead of theory. I could see how I can apply some of the strategies in my own classroom. I think we will be better able to apply the content in education. (P2:108)*

Quantitative analysis of the resolution phase will now be analysed and discussed.

5.4.10.4 Cognitive presence – resolution phase

Table 5.20 presents the post-test results for cognitive presence – resolution phase.

Table 5.20 Results of the post-test for cognitive presence – resolution phase

Item		POST-TEST N=29				
		Disagree	**Neutral**	**Agree**	**Mean**	**Standard deviation**
C7	Combining information received online with info received during face-to-face contact classes helps me to answer questions raised in module activities.	6.90%	37.93%	62.07%	3.62	0.82
C8	Online learning activities help me construct explanations and/or solutions.	20.69%	34.48%	44.82%	3.34	1.04
C9	Online reflection on module content helps me to understand fundamental concepts in this module	20.69%	41.38%	37.93%	3.24	0.87
	Total mean and standard deviation for this construct				**3.40**	**0.84**

Analysis of the post-test for item C7 indicated a much higher percentage of students agreed (62.07%) that the combination of face-to-face contact classes and online activities helped them to complete module activities successfully, compared to the pre-test (39.47%)experienced . In the

post-test, slightly more students (44.82%) indicated that learning activities helped them to construct solutions (C8) than in the pre-test (39.47%). Interestingly, more students felt neutral in the post-test (41.38%) rather than agreeing (37.93%) that reflection on module content helped them to understand fundamental concepts in the module (C9). However, the mean value of 3.40 indicates an above-average score that cognitive presence regarding resolution did manifest itself in this blended course.

Cohen's *d*-values calculated for the resolution phase indicated that there was no significant effect from pre-test to post-test. The same argument presented in par 5.4.1.5 for organisation and design is valid here. The mean from the quantitative data and the results from the qualitative data indicated a definite movement towards CoI.

5.4.10.5 Discussion of findings – resolution phase

All three datasets led me to believe that cognitive presence relating to the resolution phase has manifested itself to some extent in this blended mode of delivery.

It has been reported by Shea and Bidjerano (2009, p. 544) that in studies where students were challenged to resolve a problem and explicit facilitation and direction were provided, students did progress to resolution. I believe that activities such as portfolio work, which encompass skills such as identifying additional resources; meaningful transfer of content; using a combination of content, methods and strategies; developing content knowledge and critical- and creative-thinking skills and learning cooperatively, allowed students to reach the resolution phase. Compiling the portfolio required students to select and test the most viable solutions to teach a theme in TE (Addendum H for an example of portfolio work). The compilation of a portfolio did, indeed, provide an opportunity for problem solving, and evidence suggest that the lecturer did provide facilitation and direction to students in the online environment.

In Figure 5.13, the linkages between these categories are depicted. For the practical inquiry process of cognitive presence to manifest itself, it is essential that purposeful triggering events are built into activities in order for students to feel a sense of intrigue in order to move on to the exploration phase. The exploration phase is evident when information exchange evolves in the online environment. When students connect academic ideas within a module, it can be assumed that the practical inquiry process has moved on to the integration phase. Resolution is evident when students are able to apply new ideas.

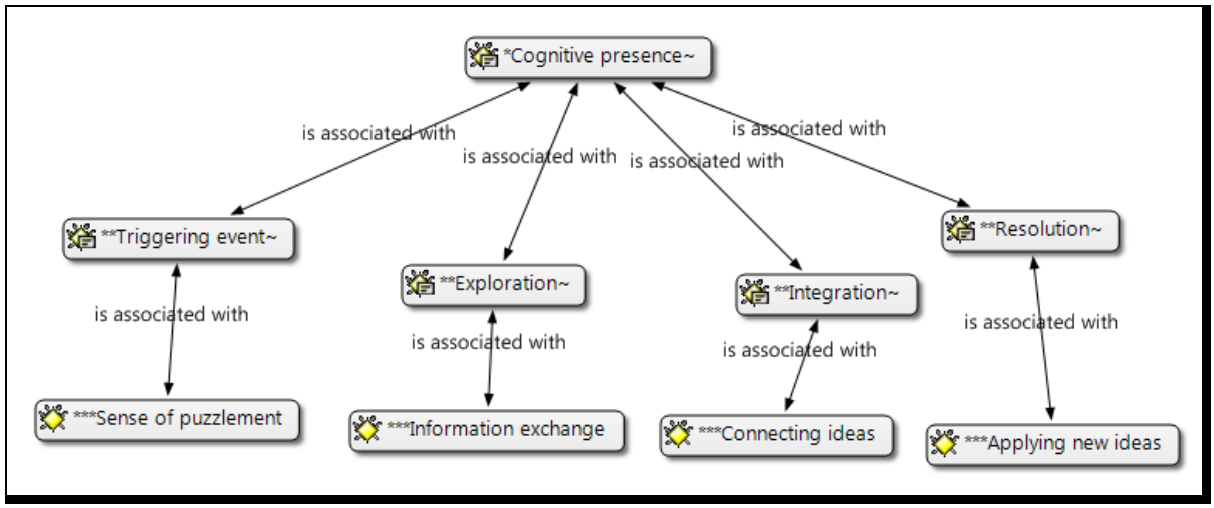


Figure 5.13: Categories and sub-categories of cognitive presence

In Chapter 3 § 3.5 of this study, I reported on a fourth presence which is not tested or reported on in the CoI framework. While research in this regard is still in its infancy, it seems that learner self-regulation can serve as a basis for a new form of presence within the model described as learning presence. I believe that a more effective CoI framework should include learning presence.

5.5 LEARNING PRESENCE

The qualitative analysis provides insight into learning presence in this module as an additional construct in CoI. In Figure 5.14, an overview of the categories and sub-categories that emerged from the data for learning presence and the relationship between them are provided:

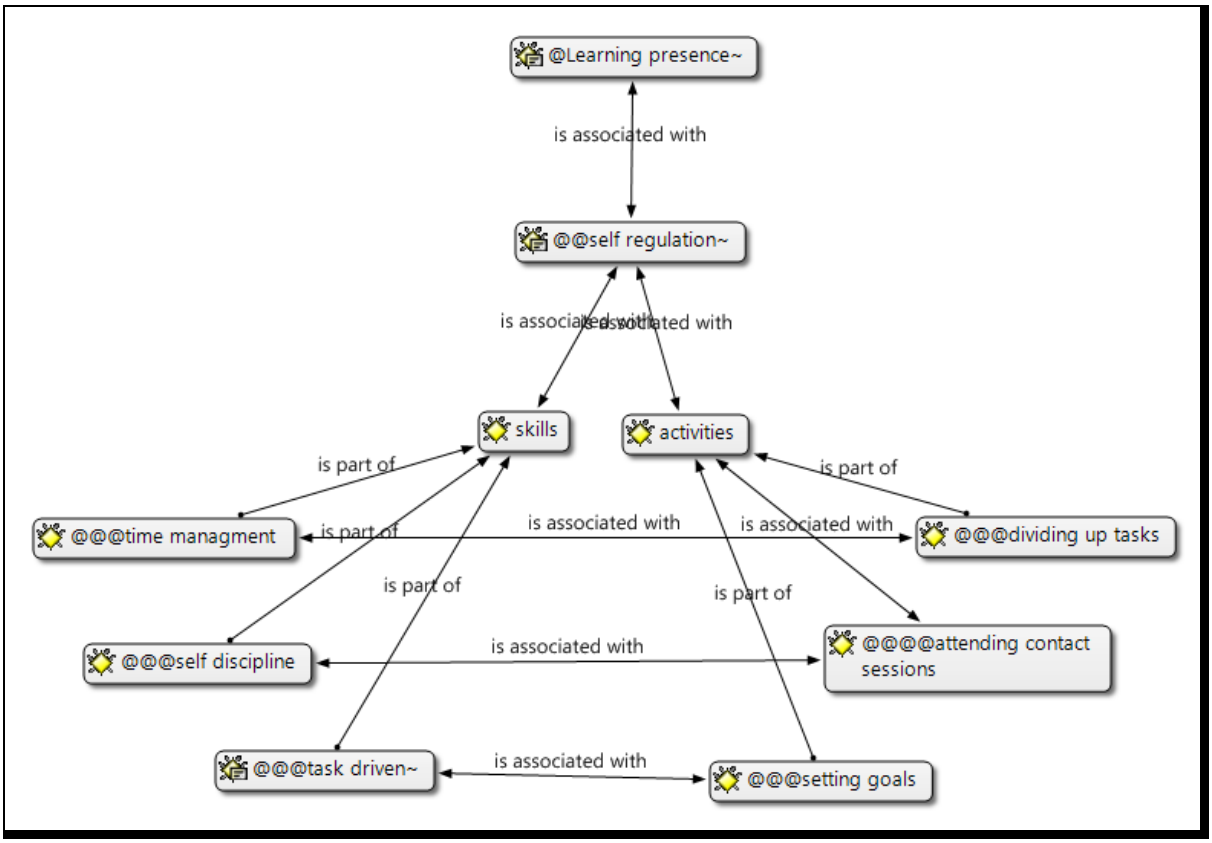


Figure 5.14: Categories and sub-categories of learning presence

In the next sections, learning presence as an added construct of the CoI framework will be analysed and discussed.

5.5.1 Qualitative analysis of learning presence: Self-regulation

Learning presence is associated with self-regulation which, in turn, can be associated with specific skills and activities. Self-regulation skills include time-management skills, self-discipline skills and task-driven skills. Typically, time-management skills are associated with dividing up tasks, self-discipline skills with the attending of contact sessions and task-driven skills with the setting of goals.

Analysis of the qualitative data provides strong evidence that students' struggled with the new requirements expected of them as active, cognitively involved learners in the blended learning environment. The qualitative analysis indicated that, in the online environment, students missed the personal attention of the lecturer that is typically part of the face-to-face environment. It is

clear that students felt lost in the online environment where they had to use self-regulation measures to complete online activities.

> ***Sandy:*** *I missed the personal aspect of the lecturer because we were not used to completing most activities online. The online environment caused frustration because we thought we had to do everything by ourselves and we are not used to doing everything by ourselves. For four years we only had contact lessons and saw the lecturer face-to-face and now everything feels different. (P2:33)*

> ***Bob:*** *I would open my phone and then close it to go back later to the group discussion, and then when I go back later it is too late to raise my opinion, because by then the other group members already decided what must be done. (P2:86)*

An important aspect of self-regulation is time management (Chapter 3 § 3.5.1). Students reported that time management was a very big challenge for them and, as is evident from the responses, students lack these skills:

> ***Susan:*** *So I believe time management was the problem. I just feel we always had eFundi with your other subjects as well. The problem was just time management. (P2:18).*

> ***Sandy:*** *I was very confused and it was very challenging in terms of time management. (P2:2)*

> ***Jennifer:*** *Time management had to be a hundred percent accurate. (P2:7)*

> ***Jennifer:*** *We go on eFundi then we see there that an assignment or something must be submitted now, but then it is eleven o'clock and I see it had to happen [be submitted] at twelve o'clock. (P2:9)*

> ***Bob:*** *I am a very busy person. So I don't always have time to go on Facebook or to WhatsApp. So I read, I see that I got a WhatsApp or Facebook message and I open it and close it and I go on with what I was busy with. Tonight, when I have time, then only do I go back [online] and read that there were things that I had to immediately respond to. So time was a big factor. (P2:84)*

Coordinating activities and dividing tasks is another challenging requirement for the students. Students felt that getting their groups together were time consuming and frustrating. Dividing up tasks is also associated with time-management skills and, therefore, learning presence. Responses from students explain their difficulties:

Mary: *The online component was not the problem, but to get portions of the work to other members of the group. That was a problem. (P2:16)*

Stephanie: *I think the arrangement of group activities was a challenge. Groups had to get together…it often fell during class time when we have other lectures. Not everyone has the same lectures. Now you have a lecture and the others do not have a lecture at that time, so they can use that time and now you can't join them. Then you arrive afterwards and then they have finished working. So it was kind of difficult because the normal, scheduled period for the subject was not sufficient to do a group assignment. (P2:50)*

Suzie: *Sometimes you arrange for the group to get together for example, meet at eleven; then it happens that only three or two of the five show up and then arranging group work was really difficult. (P2:48)*

Taylor: *I spent most of the time on my phone making arrangements with other group members and then they just don't show up. It was a bit frustrating, because not everyone wants to produce work of the same quality. For some it is important; for others it is not important. This made the group work a bit frustrating. (P2:49)*

In contrast, some student reported on the successful coordination, dividing of tasks and arrangement of group activities through the use of the LMS:

Bob: *We made plenty use of e-mails to divide the work. Each one sends the part he did back and then the other one just check if it is correct. Then it gets sent to the group leader and he/she submits it. (P2:57)*

Jess: *Can you mail me your group work to this email address... then I will email ours to you to send to the rest of the group.*

Bella: *Fine with us. You can mail us your comments then we can start working on the mind map. (P1:346-354)*

One student pointed out that some of the frustration and uncertainty on how to complete activities were due to the lack of self-discipline. Adequate support was provided to students to be able to function in the online environment in the form of scheduled contact sessions and online consultation hours. However, not all students made effective use thereof. During these contact sessions, students could experience the personal one-on-one attention and guidance provided by the lecturer. Self-discipline plays a big role in attending contact sessions in a blended learning module.

Many students also did not utilise the online office hours to their full extent as reported earlier in this chapter (§ 5.4.3.2). Self-discipline is an important skill needed to monitor one's use of the guidance provided:

> ***Tino:*** *You can also deduce, from the students' comments in the online environment, when students did not attend the scheduled contact lectures. Many students did not understand what to do because they weren't in class. The help [assistance] provided in the contact lectures, along with the online instructions, made it really easy to complete activities successfully. (P2:34)*

From the Facebook threads analysis, it is clear that students did engage in strategic efforts such as task-driven skills through the setting of goals as the next extract illustrates (Screenshot 40-41):

> ***Anna:*** *Hi all, we need together to discuss the question that need to be completed for the Tuesday online session. When do you want together and where?*
>
> ***Margaret:*** *Why can't we discuss it on Facebook?*
>
> ***Anna:*** *Go and read under week 2 period one in the study guide and tell me what you think.*
>
> ***Botha:*** *Hi all, my may have to get together on Sunday or Monday somewhere to finish the group questions.*
>
> ***Anna:*** *Yes definitely. Preferably Monday morning early, if you can because it needs to be submitted at 2.*
>
> ***Anna:*** *Okay let's get together at 9. Outside the education library.*
>
> ***Margaret:*** *Fine with me*
>
> ***Margaret:*** *Hi all, I have submitted the answer. It looks good! (P1:109-118)*

5.5.2 Learning presence: Discussion of findings

Given the online, social and self-directed nature of online learning, it seems imperative that learners' self-regulation in online environments be examined. From this study, it is clear that the presence of the lecturer is still very important for the students. What was also evident in the findings was the lack of self-discipline skills in utilising of the two forms of support provided (contact sessions and online consultation hours) effectively. Likewise, as is evidenced in the findings, learning in an online environment require specific time- and task-management skills

which students struggled with. The Facebook threads did indicate students engaging to some extent in strategic self-regulation activities, such as being task driven and setting goals.

As I have explained from the literature in Chapter 3 § 3.5.1, the relationship between teaching presence and self-regulation is stronger for students in a blended environment. This implies that more attention ought to be paid to supporting the relationship between teaching presence and student self-regulation in the online component of blended learning. This is an aspect deserving of further investigation.

Throughout the semester, I picked up on challenges that the students experienced. In the last question (Question 14) of the focus group interview, I investigated the type and extent of these challenges from the students' viewpoints.

5.6 CHALLENGES

Five categories and four sub-categories emerged from the analysis with regard to challenges (Figure 5.15). They are newness, time management, arrangement of group work and lack of technology skills. Sub-categories include negative attitudes, confusion, frustration and face-to-face work methods.

Figure 5.15 provides an overview of the categories and sub-categories that emerged from the data. In the next sections, each of the categories and sub-categories will be analysed based on the data.

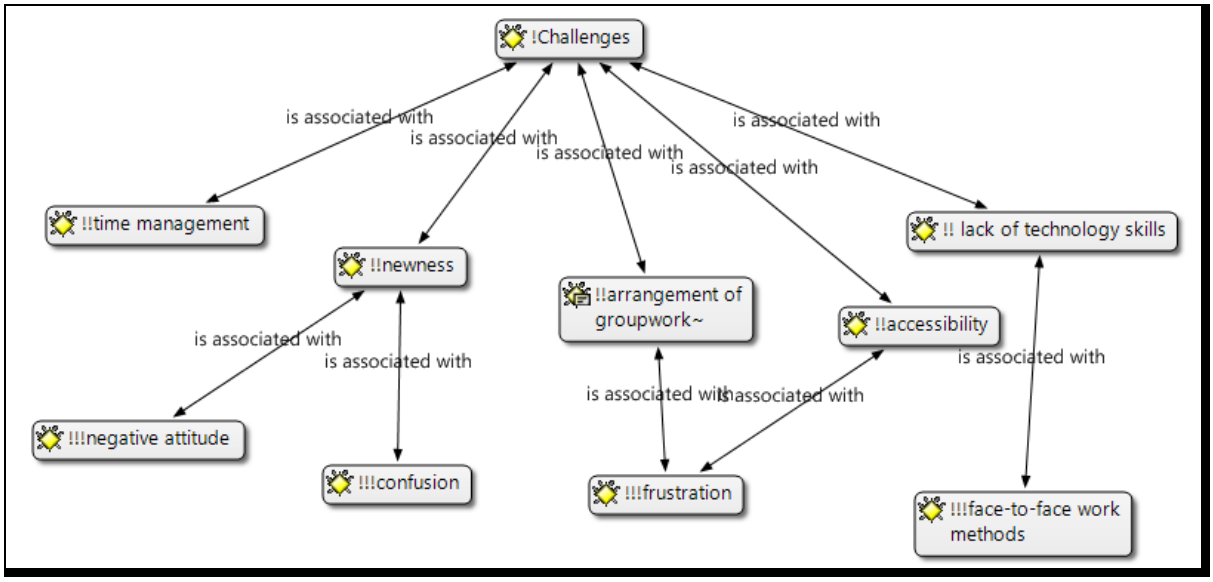


Figure: 5.15: Aspects relating to the category challenges

5.6.1 Newness to the online environment

From the data analysis, it was clear that students found the online component of blended learning to be challenging because it was new and unfamiliar which lead to confusion amongst students. The respondents were final-year Technology Education students, and this was the first time that these students functioned within a fully blended learning environment. Students were accustomed to face-to-face contact with traditional teaching and learning methods that differ largely from the online component established in this blended learning module even though they were used to eFundi as a support platform. From the responses received in the focus group interviews, the students struggled with the newness of the delivery of the course content which led to confusion and a negative attitude.

> ***Susan:*** *The whole online learning thing was new for us and we were outside our comfort zone. (P2:18).*
>
> ***Susan:*** *I think everyone was just confused. (P2:18).*
>
> ***Peter:*** *I think our attitude was the problem. (P2:19)*
>
> ***Susan:*** *We are fourth-year students and I think that we are maybe just tired and the big problem was attitude. (P2:18)*
>
> ***Tino:*** *Many students did not understand what to do because they weren't in class. The help [assistance] provided in the contact lectures, along with the online instructions, made it really easy to complete activities successfully. (P2:34)*

The concept of learning in a blended environment is thus not wholly unfamiliar, but this was the first time that it was identified and described as such to the students. This "new" name attached to the mode of delivery made them feel unsure:

> ***Susan:*** *I feel we've always had eFundi and previously you also got information and resources on eFundi. I just think the name, which was suddenly attached to this, gave us a fright. (P2:18)*

5.6.2 Time management

Time management has already been addressed in section 5.5 of this chapter in the discussion on learning presence.

5.6.3 Skills in arrangement of group work

Students with whom interviews had been conducted identified the arrangement of group work as challenging in the online environment. In particular, they felt that getting their peers together was time consuming and frustrating:

> ***Stephanie:*** *I think the group work was a challenge. Groups had to get together…it often fell during class time when we have other lectures. Not everyone has the same lectures. Now you have a lecture and the others do not have a lecture at that time, so they can use that time and now you can't join them. Then you arrive afterwards and then they have finished working. So it was kind of difficult because the normal, scheduled period for the subject was not sufficient to do a group assignment. (P2:50)*

> ***Suzie:*** *Sometimes you arrange for the group to get together for example, meet at eleven; then it happens that only three or two of the five show up and then arranging group work was really difficult (P2:48)*

> ***Taylor:*** *I spent most of the time on my phone making arrangements with other group members and then they just don't show up. It was a bit frustrating, because not everyone wants to produce work of the same quality. For some it is important; for others it is not important. This made the group work a bit frustrating. (P2:49)*

5.6.4 Accessibility of technology

Another challenge that emerged from the data is accessibility. Not all students had access to internet and computer facilities which made some of the online learning activities difficult to execute. Students felt frustrated due to a lack of accessibility to the internet:

> ***Susan:*** *I was not always at a place where I had [access to] internet. (P2:11)*

> ***Bob:*** *I don't even have Facebook, so I missed quite a bit. (P2:144)*

> ***Jennifer:*** *It was difficult to be online at a specific time to submit an assignment. (P2:5)*

> ***Stephanie:*** *I was not always at a place where I had [access to] internet. So my assignment was done and finished, but then I had to come to campus or, if I were at home, I had to get to somewhere where I could get a computer with internet so that I could submit my assignment. It was a challenge for me. (1:11)*

5.6.5 Lack of technological skills

The last code that emerged from the data with regard to challenges experienced by students in the online environment of blended learning was the lack of technological skills. Responses indicate that students did not know how to use the necessary tools to work effectively online. It also appears that students still rely on face-to-face work methods (e.g. meeting in person) to complete online activities, which is indicative of the lack of technological skills. Students required more guidelines and preparation to use the e-guide and other tools for online learning (e.g. online group meetings).

> ***Carrie:*** *No one has ever shown me how to use the chat function on eFundi. So I don't know how the chat room works on eFundi and that is why I didn't even bother to take a look. (P2:65)*

> ***Emma:*** *I just think it will be useful if you can maybe, in future, show us as students how some of the technology which we have to use works ahead of the time. (P2:21).*

> ***Stephanie:*** *Groups have to get together face-to-face for feedback on their work and then you must make the video recording. So in the end, the time you spent on TECD 421 is double the amount you would actually have spent on it. So it affects your other subjects and the rest of your week. (P2:50)*

5.6.6 Discussion of the findings on challenges students experienced in this blended mode of delivery

The use of blended learning can pose challenges for students as has been revealed in this study. From the analysis, it is clear that students registered for TECD 421 experienced specific challenges such as newness to the online environment, a lack of skills to arrange group work, accessibility to technology and a lack of technological skills. Vaughan (2007) and Song *et al.* (2004, p. 68) also reported on inadequate time-management skills of students registered for blended learning courses and suggested assisting learners with establishing strategies to manage time more effectively.

Although flexibility to learn online is perceived as an advantage of blended learning, this study shows that not all students have access to computers and the internet, which leaves students feeling frustrated because they still have to come to class in order to complete and submit online activities. Lack of accessibility creates frustration because it inhibits students' ability to engage in online discussions which can have a negative impact on learning (Smyth , Houghton, Cooney, & Casey, 2012).

Lack of technology skills is a challenge reported by students registered for TECD 421, but other studies also echoed this challenge (Stacey & Gerbic, 2008). The use of technology for learning has created challenges for a long time; therefore, these issues need to be minimised from the beginning of the course. This can be accomplished by including overviews of the tools to be used and presenting hands-on workshop with the technology that will be used in the online learning experience (Song et al., 2004, p. 68).

Two other challenges that emerged from the data analysis in this study were the arrangement of group work and newness to blended learning. However, I was unable to find any other research that also reported these two challenges experienced by students.

5.7 CONCLUSION

In this chapter, I have used the CoI inquiry framework proposed by Garrison *et al.* (2000) to interpret the findings and to help me understand to what extent CoI manifested itself within a blended mode of delivery. I also used this framework to establish what is required in a blended mode of delivery to ensure the existence of CoI for effective learning within a TE undergraduate course. From the analysis and discussions of the findings, it is clear that the design and organisational aspects of the module were a success. Of the three presences, social presence manifested itself the least within this blended mode of delivery, although findings suggest a movement towards the manifestation of such a presence. Cognitive presence manifested itself to some extent, but greater provision ought to be made for more reflection in the module in order for students to move from exploration to the integration and resolution phase.

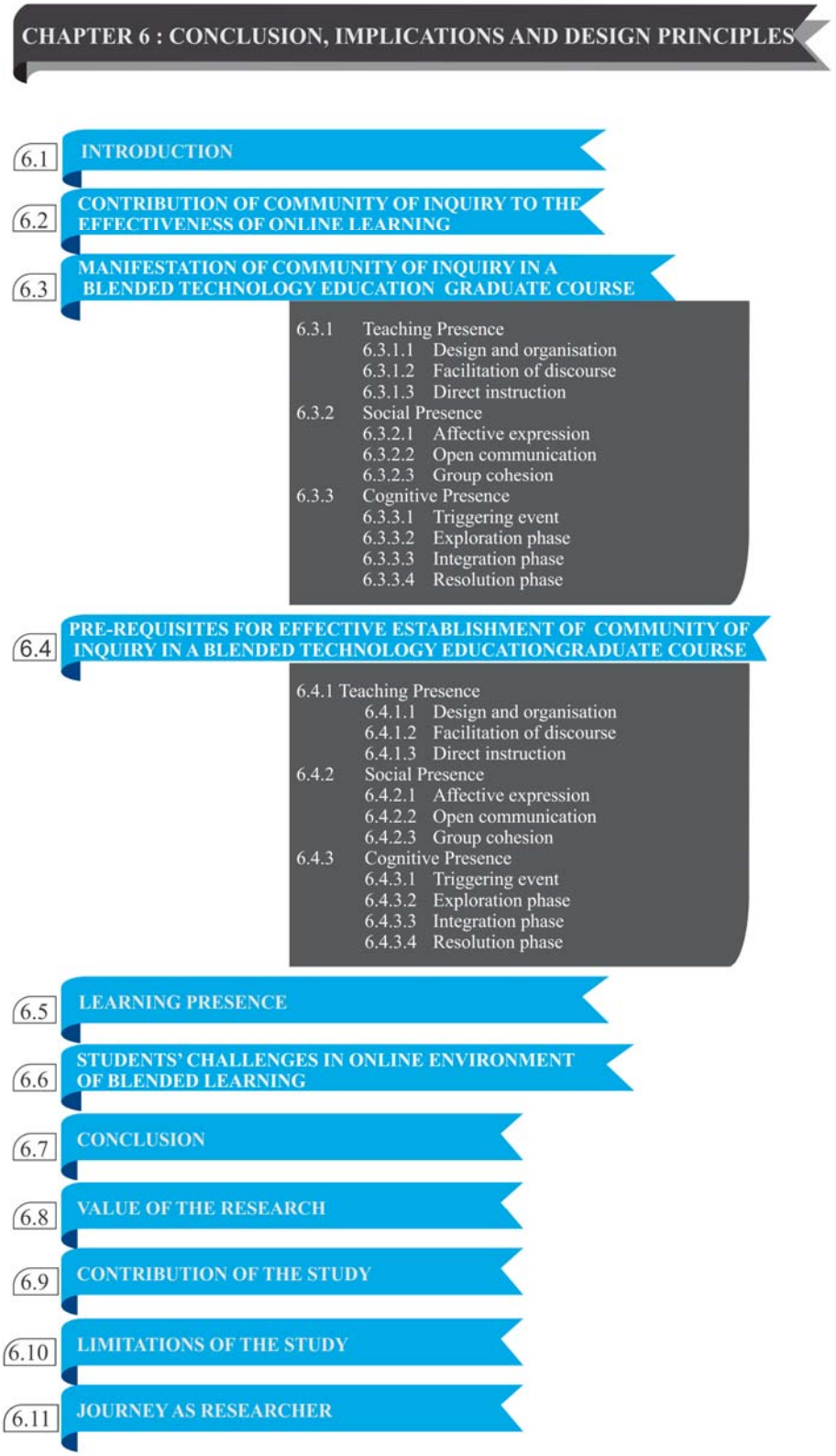
I have also addressed a fourth presence, namely learning presence. From the analysis, it is clear that students require more self-regulation skills in order to function within a blended learning environment as this environment requires additional skills from the students such as time-management skills, self-discipline and task-driven skills.

Also from the analysis it was clear that students experienced certain challenges working in a blended learning environment. These challenges include accessibility to technology, lack of technological skills, the newness of the mode and a lack of skills to arrange group work successfully.

In chapter 6 of this study, the conclusions from this study will be summarised and recommendations will be made. In addition, a range of design principles suitable for the manifestation and existence of CoI for effective learning in a blended learning environment will be published.

CHAPTER 6

LOGIC



CHAPTER 6
CONCLUSIONS, IMPLICATIONS AND DESIGN PRINCIPLES

6.1 INTRODUCTION

In Chapter 2 and 3 of this study, I aimed to develop an understanding of how the three presences noted in the CoI framework contribute to the effectiveness of online learning (sub-question 1). Stemming from this understanding, Chapter 4 covered the methodology relevant to developing, implementing and evaluating the delivery of a TE teacher training module called TECD 421. In Chapter 5, the CoI framework, as proposed by Garrison *et al.* (2000), guided my analysis and interpretation of the research findings, the intention being to gain insight into and to develop an understanding of the extent to which CoI would manifest itself in a blended-learning course for TE, with due consideration for the prerequisites that underpin the existence of such a CoI (sub-question 2 and 3). The notion to include a fourth presence, namely learning presence, in the CoI framework has also been discussed in Chapter 5, while the challenges experienced by students in a blended-learning environment have been outlined in detail.

In this, the final chapter, a summary of the research findings on the manifestation of the three presences identified in the CoI framework, namely social presence, teaching presence and cognitive presence, in the TE graduate course will be provided. Another important aim of this chapter is to report on re-design principles and refinement strategies required to manifest and ensure existence of CoI for effective learning.

In the following section, I will focus on answering research sub-question one: *How do CoI contribute to the effectiveness of online learning?*

6.2 CONTRIBUTION OF COMMUNITY OF INQUIRY TO THE EFFECTIVENESS OF ONLINE LEARNING

The CoI framework outlines the processes required to enable knowledge construction in online environments through the development of teaching, social and cognitive presence.

In short, teaching presence is the integrating power that structures and leads the educational process in a constructive, collaborative and sustained manner. Social presence reflects the ability to

connect with members of a community of learners on a personal level, and cognitive presence is the process of constructing meaning through collaborative inquiry. It is the intersection of these elements that creates the core of CoI – a point where collaborative constructivist educational experiences can be achieved (Garrison, 2006, p. 26). The framework, therefore, suggests that online learning experiences unfold through the interaction of the above-mentioned presences.

Teaching presence has a regulatory and mediating role, which merge all the elements of a community of inquiry in a balanced and purposeful relationship that is congruent with the intended outcomes as well as the requirements and capabilities of the students (Akyol et al., 2009, p. 68; Garrison, Cleveland-Innes, et al., 2010, p. 35). This presence is conceptualised in three categories, namely instructional design, facilitation of discourse and direct instruction. It is by means of these three categories that lecturers can measure their presence in the online classroom environment. It is the lecturer's responsibility to facilitate learning that is purposeful and focused on essential concepts and worthwhile goals. The complex responsibilities of a lecturer necessitate authentic communication between and among lecturer and students. Teaching presence contributes to the effectiveness of online learning through guided communication towards higher levels of learning through reflective participation as well as by challenging assumptions and diagnosing misconceptions (Anderson et al., 2001, p. 3).

Social presence is also conceptualised in three categories, namely open communication, group cohesion and affective connections. It has been suggested that this presence is the mediating variable between teaching presence and cognitive presence. Research evidence strongly supports the view that social presence ought to be established in online learning communities (Garrison, Cleveland-Innes, et al., 2010, p. 32). Social presence contributes to the effectiveness of online learning through collaboration and discourse because it facilitates the achievement of cognitive objectives by initiating, sustaining and supporting critical thinking in a community of learners (Garrison & Anderson, 2003, p. 33).

Cognitive presence is grounded in the practical inquiry model (Chapter 2, Figure 2.2) which represents the knowledge-building process. The four phases in the practical inquiry model begins with a triggering event in the form of an issue, problem or dilemma that needs resolution. As a result of the triggering event, there is a natural shift towards exploration – the search for relevant information that can provide insight into the challenge. As ideas mature, there is a move into the third phase, integration, where connections are made and a viable explanation is sought. The final phase represents the resolution phase where selecting and testing the most viable solution takes place (Swan et al., 2009, pp. 47-48). The four phases represent the phases of reflective thinking for

the purposes of understanding. The focus of cognitive presence is on higher-order thinking processes and is basic to the inquiry process. Cognitive presence contributes to the effectiveness of online learning in the way that it encourages students to move from awareness to knowledge construction and application which represents the intended goal (Garrison, 2006, p. 28; Garrison & Vaughan, 2008, p. 41).

Recently, the notion of a fourth presence, namely learning presence, came to light. Learning presence refers to students' proactive use of specific processes such as goal setting, selecting strategies and personally monitoring effectiveness. Given the online, social and self-regulated nature of online learning, it seems imperative for learners to have self-regulation skills in the online environment. It is important to understand the factors that influence the success of online environments as these have implications for the organisation and designing of productive online communities. Learning presence can be accomplished via expanded teaching presence and contributes to the effectiveness of online learning through the development of self-regulation skills in learners who are meta-cognitively, motivationally and behaviourally active participants in their own learning process (Shea & Bidjerano, 2010, p. 1727; Shea et al., 2012, p. 90). For this study, I suggested learning presence as an additional construct to contribute to and enhance the effectiveness of CoI in online and blended learning. Figure 6.1 illustrates this revised CoI model.

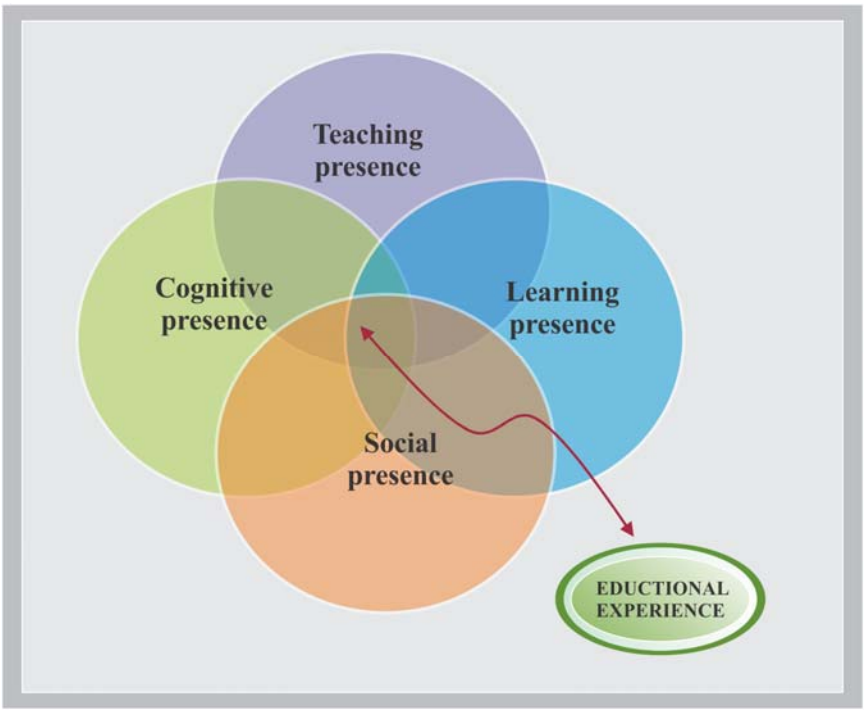


Figure 6.1: Illustration of the revised CoI model as suggested in this study

In conclusion, the effectiveness of blended learning is dependent upon the ability to facilitate a CoI. This study has illustrated that the application of the principles for CoI contributed to the successful transition from a face-to-face to a blended mode of delivery for the applied subject TE.

In the following section, I will focus on answering research sub-question two: *To what extent did CoI manifested itself in a blended mode of delivery in a TE graduate course?*

6.3 MANIFESTATION OF COMMUNITY OF INQUIRY IN A BLENDED TECHNOLOGY EDUCATION GRADUATE COURSE

6.3.1 Teaching presence

In an educational context, teaching presence is critical to provide structure, facilitation and direction for the cohesion, stability and progression of the learning process. The category teaching presence maintained a satisfying mean value (3.39) throughout the module which indicates that students experience teaching presence in the course of the module as design, facilitation of discourse and direct instruction manifested in the module.

6.3.1.1 Design and organisation

Detailed information regarding aspects of design and organisation were addressed in Chapter 3 § 3.4.3.1 and Chapter 5 § 5.4.1.1-5.4.1.6.

The results from this study revealed that students experienced a high teaching presence in the form of design and organisation in the module (Chapter 5 § 5.4.1.6). Seemingly, many of the design and organisation issues that could arise in an online module have been addressed prior to delivery in the initial re-design of the module from face-to-face to blended learning. Two areas that scored the lowest in the data analysis of design and organisation were insufficient communication with regards to course content and instruction on how to participate in online activities. Refinements were made, such as keeping discussions focussed, moving discussions forward in a timely manner and clarifying issues that arose (Chapter 5 § 5.4.1.2) to further enhance the students' experience of this aspect of teaching presence. Qualitative analysis indicated that most students found the design and organisation of the module simple and easy to use and that the online instructions together with the contact sessions helped them to complete the online learning activities. The post-test indicated

that the teaching presence in the form of design and organisation remained high with a slight increase in the mean-value of this construct.

6.3.1.2 Facilitation of discourse

Facilitation of discourse was addressed in detail in Chapter 3 §.3.4.3.2 and Chapter 5 § 5.4.2-5.4.2.4.

Evidence in the findings of this study indicate that the online material for the module was well structured, offering good guidance to keep students focused together with positive encouragement to explore new concepts. Despite the lecturer's purposeful facilitation of discourse, students still indicated that they experienced a lack of teaching presence in the online environment. I am of the opinion that this experience of isolation and disconnectedness might be ascribed to the fact that students were accustomed to face-face contact sessions during which personal communication occur between student and the lecturer, while the online environment was completely new to them.

6.3.1.3 Direct instruction

Detailed descriptions regarding facilitation of discourse can be found in Chapter 3 §.3.4.3.3 and Chapter 5 § 5.4.3-5.4.3.4.

The empirical results of the study indicated a satisfying manifestation of teaching presence with regard to direct instruction. However, there were still students who did not agree on the quality of the feedback provided in the online environment and did not experience feedback as immediate as they would have liked. The lecturer in this module provided intellectual leadership and shared subject matter knowledge with students by providing text-based content through feedback on assignments, answering questions by e-mail and on discussion forums and participating in online discussions. An important finding is that students did not link these contributions to lecturer expertise. This finding holds an important implication for practice and raises the question whether students' expectations of the online learning environment need to be revised.

6.3.2 Social presence

Social presence refers to the degree to which a person is perceived as real in mediated communication (Gunawardena & Zittle, 1997, p. 15). The category social presence maintained a satisfying mean value (3.18) throughout the module which indicates that students experienced

social presence in the module. Social presence manifested through affective expression, open communication and group cohesion.

6.3.2.1 Affective expression

Detailed descriptions regarding affective expression can be found in Chapter 3 §. 3.4.1.3 and Chapter 5 § 5.4.4.1-5.4.4.5.

Document analysis provides clear evidence of students expressing themselves affectively through emotions which indicates that social presence did manifest itself within this blended-learning module. However, two important findings from the data analysis indicated that (i) students do not feel comfortable expressing themselves personally/affectively online and (ii) getting to know other participants online did not give students a sense of belonging (Chapter 5 § 5.4.4.5). Refinements were made to enhance the students' experience of this aspect of social presence. According to Stodel (2006), social presence and, more specifically, affective expression appeared to be greater within small groups than for the class as a whole. This does not seem applicable for this study. Although students were allowed to choose and work in small groups during the blended-learning module, affective expression was strained.

6.3.2.2 Open communication

Detailed descriptions regarding open communication can be found in Chapter 3 §.3.4.1.1 and Chapter 5 § 5.4.4.6-5.4.4.10.

Evidence from the document analysis clearly revealed open communication occurring online between learners as they responded to each other's posts, quoting from previous messages and continuing with communication threads. Data analysis from the study revealed that not all students agreed that they felt comfortable communicating, participating and interacting online with other students. Although the category social presence maintained a satisfying mean value (2.97) throughout the module, it is clear from the findings that open communication was an aspect of social presence that students struggled with especially when conversing by means of an online medium for academic purposes (Chapter 5 § 5.4.4.8). This result was expected, as the online environment was completely new to these students and they may have felt unsure and exposed communicating, participating and interacting online in an academic context.

6.3.2.3 Group cohesion

Detailed descriptions regarding open communication can be found in Chapter 3 §.3.4.1.2 and Chapter 5 § 5.4.4.11-5.4.4.15.

The goal of establishing social presence with regard to group cohesion is to create a climate of trust and belonging that will support interaction. Many collaborative activities were built into the course structure to provide students with opportunities to engage and rely on each other to reach their goals. Group cohesion was evident (Chapter 5 § 5.4.4.13) in the Facebook data in the way students helped one another by answering questions both about design and organisation problems as well as module-related issues and sharing resources with members of the group. The CoI survey revealed that not all students felt that online discussions helped them to develop a sense of collaboration. The findings further suggest that not all students agreed that their comments were valued and that they were being listened to in the online environment.

6.3.3 Cognitive presence

Cognitive presence is evident when students inquire course content in a systematic and meaningful manner. Detailed aspects regarding cognitive presence were addressed in Chapter 3 § 3.7.1.2, 3.7.2.2 and 3.7.3.2 and Chapter 5 § 5.4.5–5.4.5.21.

The category cognitive presence maintained a satisfying mean value (3.12) throughout the module which indicates that students experienced cognitive presence during the course of the module. Cognitive presence was evident through the manifestation of a triggering event, exploration, integration and resolution as students engaged with the course content.

6.3.3.1 Triggering event

Qualitative findings (Chapter 5 § 5.4.5.4) indicated that some of the course content such as the portfolio work did stimulate students' curiosity to some extent, whilst findings from the quantitative analysis (Chapter 5 § 5.4.5.5) indicated that a large number of students did not feel that the module activities increased their interest or stimulated their curiosity in the module content. TECD 421 is a fourth-year, second-semester module in which the knowledge, skills and experience students have accumulated in the previous three years of the programme have to be applied in subject-based and practice-orientated teaching and learning experiences. I believe that the nature of this pre-set curriculum may have contributed to the lack of a sense of intrigue in the online

environment. This is confirmed by the qualitative findings of the study which indicated that students who were not previously exposed to TE (CAT students) found the course content stimulating, and this triggered their curiosity about the module. On the other hand, the TE students who have previously been exposed to the subject content found the portfolio work interesting since it required them to apply their subject knowledge in practical teaching and learning experiences. The portfolio focuses on problem solving and is designed in such a way that it will guide students through the inquiry process from triggering to resolution.

6.3.3.2 Exploration phase

Exploration refers to the search for relevant information that can provide insight into challenges.

Evidence from the qualitative as well as the quantitative data shows that the online activities required students to use a variety of information sources to complete activities and that the existing resources were useful in helping them to complete online activities successfully. The students who were familiar with TE course content did not feel that online activities motivated them to explore content-related questions, resulting in lower levels of explorations. On the other hand, the CAT students who were new to TE indicated that they especially utilised a variety of online information sources to complete online activities. The search for information and use of a variety of resources as well as information exchange is an indicator that students had cognitively moved on from the triggering event to the exploration phase.

6.3.3.3 Integration phase

Findings from this research led me to believe that cognitive presence relating to the integration phase has manifested itself to some extent in this blended mode of delivery. Analysis of students' answers revealed that the feedback from the lecturer as well as from other students helped them to resolve content-related questions. Findings also suggested that students did make connections in the course content and did develop an understanding and appreciation of different perspectives. Moving through the practical inquiry phase to integration has a lot do with the nature of the assignments and instructional direction provided. Consequently, this phase requires more time for reflection to resolve a problem. Although the structuring of activities in this module required students to reflect on and solve problems, I believe it would have been more beneficial had there been more activities requiring reflection.

6.3.3.4 Resolution phase

Cognitive presence relating to the resolution phase has manifested itself to a certain extent in this blended mode of delivery. I believe that the structuring of activities such as portfolio work which encompassed skills such as the identification of additional resources; the meaningful transfer of content; the use of a combination of content, methods and strategies; the development of content knowledge; critical and creative thinking and cooperative learning allowed students to reach the resolution phase. Compiling the portfolio required students to select and test the most viable solutions for them to use in teaching a theme in TE.

In the above section, research sub-question 2 was answered. By looking at the design principles required in a blended mode of delivery to ensure the existence of CoI for effective learning, I will now discuss the findings with regard to research sub-question 3: *What is required in a blended mode of delivery to ensure the existence of CoI for effective learning within a TE graduate course?*

6.4 PRE-REQUISITES FOR EFFECTIVE ESTABLISHMENT OF COMMUNITIES OF INQUIRY IN A BLENDED TECHNOLOGY EDUCSTION GRADUATE COURSE

One of the main outputs of educational design research is to produce theoretical insights into a phenomenon, and these are referred to as design principles. Design principles recommend how to address specific issues in a range of settings (McKenney & Reeves, 2012, p. 19). In the following sections, I will present specific design principles that I have identified from the literature and empirical research that can improve CoI in a blended learning module.

6.4.1 Teaching presence

Teaching presence has a regulatory and mediating role, which brings together all the elements of a CoI (Akyol et al., 2009, p. 68).

6.4.1.1 Design and organisation

Design principles for establishing and ensuring the existence of teaching presence – design and organisation applied in this study:

- Building and re-structuring of study materials to blend both online and face-to-face environments;

- Compiling a schedule to stipulate the dates of face-to-face contact sessions, the resources to be used as preparation for face-to-face meetings as well as activities to be completed online;

- Restructuring of study material such as lecture notes and the e-study guide in order to include online commentaries, mini-lectures, personal insights and customised views of course content as well as designing of group and individual activities that will take place during the course;

- Establishing time parameters through which the instructor set timelines for activities and student projects;

- Scheduling an organisational service for students by modelling appropriate etiquette and correct use of the online medium;

- Incorporating additional contact session to explain and demonstrate the navigation and use of the different tools available on eFundi as well as how to use the e-guide optimally; and

- Scheduling consultation hours to offer additional help with online course activities.

6.4.1.2 Facilitation of discourse

The implementation of the secure Facebook page for the TECD 421 students aimed to provide a platform for both the lecturer and students to facilitate discourse. According to Stodel *et al.* (2006) as well as Vonderwell (2003, p. 87), the lecturer must maintain responsibility for the overall facilitation of the online experience. This required active facilitation and deliberate planning strategies for improved communication between lecturer and students and between students and students.

Design principles for establishing and ensuring existence of teaching presence – facilitation of discourse for TECD 421 included:

- Identifying areas of agreement and disagreement, for example when students are debating a topic online;

- Helping students find matching linkages when opposing or consistent opinions are being expressed;

- Helping students to articulate consensus and shared understanding;
- Supporting and encouraging participation by modelling appropriate behaviours, commenting and encouraging participation;
- Being an active member of the community of inquiry;
- Monitoring and probing the discussion by ensuring effective and efficient use of time;
- Keeping discussions focussed;
- Moving discussions forward in a timely manner; and
- Clarifying issues that arise.

6.4.1.3 Direct instruction

Direct instruction is the final category of teaching presence and can be described as the instructor's provision of intellectual and scholarly leadership through the sharing of his/her subject matter knowledge with students (Anderson et al., 2001, p. 8). In terms of direct instruction, the lecturer in this module provided intellectual leadership and shared subject matter knowledge with students by providing text-based content through feedback on assignments, answering questions by e-mail and on discussion forums and participating in online discussions.

Design principles for establishing and ensuring existence of teaching presence – direct instruction in this study included:

- Presenting content and questions;
- Focussing discussion of specific issues;
- Summarising discussions;
- Confirming understanding;
- Diagnosing misconceptions;
- Injecting knowledge from diverse sources and responding to technical concerns;
- Actively facilitating online academic discussions;
- Confirming that students are heading in the right direction; and

- Promoting online consultation hours for immediate feedback on issues or problems that students might experience.

These findings hold important implications for practice. According to Song *et al.* (2004, p. 69), the design and organisation of a module should not only focus on the technological components of a module but also the goals, objectives and expectations of students. This is an important design principle that ought to be integrated in blended learning modules.

In the following section, the design principles for social presence will be addressed.

6.4.2 Social presence

The goal in the learning situation is to enhance and sustain social presence that will provide an environment for collaborative and reflective discourse. In the online component of blended learning, it is important to realise that although the students are in virtual contact with their community, they are physically alone at the computer, and although this is indicative of a strong sense of independence, it can also contribute to feelings of isolation.

6.4.2.1 Affective expression

The manifestation of affective or personal expression (expressing emotion) constitutes the ultimate stage of establishing social presence in an educational institution.

Design principles for establishing and ensuring existence of social presence – affective expression for this study included:

- Creating a student profile on the secure Facebook page;
- Assigning students to small groups;
- Establishing "chat" rooms for teaching and communication on the eFundi site;
- Demonstrating the use of emotions and humour by the lecturer in online discussions to encourage students to express their own emotions;
- Addressing students by name;
- Expressing welcoming and inspiring posts; and

- Allowing students to choose their own small groups instead of being assigned to predetermined groups.

6.4.2.2 Open communication

Open communication is established when students are encouraged to project themselves personally and academically. Design principles for establishing and ensuring existence of social presence – open communication for this module included:

- Structuring of activities where students and groups were expected to comment on each other's posts;
- Critiquing other groups' postings;
- Promoting critical reflection on their own work, as well as on the comments received from other members of the module;
- Posting thought-provoking questions by the lecturer throughout the course of the module to allow space for students to participate, interact and build their understanding through collaboration with their classmates;
- Ensuring that the lecturer does not overshadow the online conversations; and
- Providing constructive feedback by the lecturer.

6.4.2.3 Group cohesion

The goal of establishing social presence – group cohesion is to create a climate of trust and belonging that will support interaction. Design principles for establishing and ensuring existence of social presence – group cohesion for this study included:

- Structuring collaborative activities to maintain group cohesion;
- Creating opportunities for students to engage and rely on one another to reach goals;
- Modelling appropriate facilitation skills to ensure students' engagement;
- Organising class debriefing sessions; and
- Providing activities for students to critically reflect on and critique opinions and discussions.

Although enormous efforts were made to establish social presence in this module using the strategies stated above, I think more can be done to enhance social presence in blended learning. Stodel *et al.* (2006) suggest that emerging technologies such as the integration of audio and video technologies will allow for a richer communication medium, thereby enhancing interaction. This ought to be explored in further studies.

6.4.3 Cognitive presence

Cognitive presence refers to higher order levels of learning and, therefore, requires purposeful discourse in order to collaboratively construct, critically reflect and confirm understanding (Garrison & Vaughan, 2008, p. 19).

6.4.3.1 Triggering event

Design principles for establishing and ensuring the existence of cognitive presence – triggering event for this study included:

- Stipulating clear goal expectations in respect of academic matters;
- Structuring problem-based activities; and
- Creating opportunities for small group discussions on academic matters.

6.4.3.2 Exploration phase

The original re-design of the module (Chapter 5 § 5.4.5.8, Figure 5.10) (Addendum A) that took place at the onset of the module made provision for exploration in the way the activities were structured. The search for relevant information that can provide insight into the completion of online activities is an important element of the exploration phase and is evident in the design of activities.

Design principles for establishing and ensuring existence of cognitive presence – exploration for this study included:

- Structuring activities such as portfolio work, case studies, debating and critiquing of articles and other group members' work;
- Structuring assignments and instructional direction that require more time for reflection;

- Structuring activities so students contribute to ideas of other members of the group; and
- Structuring assignments to resolve a problem by exploring a variety of content-related resources.

6.4.3.3 Integration phase

The original re-design of the module (Chapter 5 § 5.4.5.13, Figure 5.12) that took place before the onset of the module made provision for integration in the way the activities were structured. In this study, design principles for establishing and ensuring existence of cognitive presence for the integration phase included:

- Offering more explicit facilitation by contributing ideas and perspectives that constructively shape discourse;
- Diagnosing of misconceptions; and
- Connecting and integrating ideas and summarising discussions.

I believe it would have been beneficial for the manifestation of cognitive presence – integration phase had there been more activities requiring reflection.

6.4.3.4 Resolution phase

The ultimate goal for the re-design (see § 5.3) of this module was to improve students' progression through the inquiry process from triggering to resolution. The original re-design of the module (Chapter 5 § 5.4.5.17, Figure 5.4.17) made provision for integration in the way the activities were structured. For this study, design principles, very similar to the integration phase, for establishing and ensuring existence of cognitive presence – resolution phase included:

- Offering more explicit facilitation by contributing ideas and perspectives that constructively shape discourse;
- Scaffolding content to ensure students' progress to higher levels of cognition;
- Helping students to make connections;
- Integrating ideas and summarising discussions; and

- Structuring activities that provide the opportunity to demonstrate applications of new knowledge.

The structuring of the portfolio work focussed on challenging students to solve problems, and explicit facilitation and direction were provided to guide students to resolution.

A fourth presence which did not form part of the original CoI framework but has been identified as a crucial presence that is required for effective learning in online and blended environments is learning presence.

6.5 LEARNING PRESENCE

In an effort to make the CoI framework more comprehensive, Shea and colleagues (Chapter 3 § 3.5.1) suggested another presence in the framework, namely learning presence. Although learning presence is not tested in the CoI survey, I wanted to investigate the extent to which learning presence manifested itself in this blended module. The rationale for examining learning presence is to shed light on the distinct roles that successful online students may adopt in an online learning environment. The conceptual framing of learning presence by Shea *et al*. (2013, p. 429) reflects learner self-regulation processes in online educational environments.

Indicators of self-regulation include engagement in strategic efforts such as managing time, dividing up tasks and setting goals (Chapter 3 § 3.5.1). Although content analysis of the Facebook threads (§ 5.5.2) indicated that students did, to some extent, engage in strategic efforts such as managing time, dividing up tasks and setting goals, qualitative analysis of the interviews indicated that students felt lost in the online environment where they had to use self-regulation measures to complete online activities.

Findings from the study indicated that students struggled with the new expectations blended learning required of them. Students still rely heavily on the lecturer in the face-to-face environment for guidance and support and expect the same support in the online environment. The qualitative analysis of the interviews indicated that students lack time-management skills as well as regulation when it comes to dividing up task. Seemingly, students still rely heavily on traditional face-to-face methods to get together for the completion of tasks. In the online environment, information is received in a variety of formats at different times which can create time-management issues and, therefore, I am convinced there is a need to assist students in the development of effective time-management strategies. I also would have liked to see students use different

technology tools to divide and coordinate group activities instead of still relying on face-to-face methods to coordinate and divide tasks.

The lack of self-regulation, encompassing time-management skills, and the ineffective coordination and management of tasks were pointed out as challenges experienced by students in the online environment. In section 6.6, other challenges experienced by the students in the blended-learning module will be discussed. It is important to take cognisance of these challenges if the existence of CoI for effective learning within a TE undergraduate course is to be ensured.

6.6 STUDENTS' CHALLENGES IN ONLINE ENVIRONMENT OF BLENDED LEARNING

The use of blended learning can pose challenges for students as is revealed in this study (Chapter 5 §. 5.6.6). From the analysis, it is clear that students registered for TECD 421 experienced challenges regarding time management and the coordination and arrangement of group work (dividing up tasks). These two challenges are directly linked to self-regulation and have been discussed in Chapter 5 § 6.5 under learning presence. Other challenges that students experienced in the online environment included accessibility of computers, a lack of technology skills and newness to the online environment as a component of blended learning.

I believe that improving technology skills can be accomplished by including overviews of the tools to be used as well as hands-on workshops illustrating the technology that will be used in the online learning experiences. Taking into consideration that this was the first time that the selected students functioned within a fully blended-learning environment could explain why the "newness" of the method of delivery created daunting challenges. This finding illustrated the need to understand learners in order to help them develop coping and adaptation strategies in order to insure effective learning within a blended mode of delivery.

6.7 CONCLUSION

Having analysed and interpreted all the datasets on the value of CoI in a blended mode of delivery for TE, the following conclusions can be arrived at:

Firstly, teaching presence manifested itself to a good extent in the TE undergraduate course. The main findings that were of concern with regard to teaching presence included lack of clear

instructions and communication, feelings of isolation and disconnectedness, lack of immediacy and the inability to connect online feedback with lecturer expertise.

Secondly, although social presence did manifest itself to some extent in the TE undergraduate course, it was the most difficult to establish out of the three presences. The main issues arising from the manifestation and existence of social presence included lack of a sense of belonging in the online environment and students not feeling comfortable expressing themselves affectively as well as being uneasy about communicating, interacting and participating online with other module participants.

Finally, cognitive presence did manifest itself to a satisfying extent in the TE undergraduate course. I am of the opinion that the nature of the module will influence the movement through the practical inquiry phases of cognitive presence. Findings suggest that there was a lack of structured triggering events to create a sense of intrigue. Another finding suggests that more activities must be included that will encourage reflection, thereby improving the movement from integration to resolution.

Students experienced time management and the coordination and management of group activities as challenging. These challenges reflect a lack of self-regulation skills in learning presence. Other challenges included accessibility, lack of technology skills and the newness of blended learning.

6.8 VALUE OF THE RESEARCH

The outcome of this study was a TE module that can be presented effectively in a blended-learning environment. The lecturer did benefit from this research by being actively supported during the process of moving from fully face-to-face teaching to blended teaching. The students did benefit from the focussed and guided support that they have received during the research, as well as the development of their own computer literacy skills during the process of incorporating online aspects in the module.

The Faculty of Educational Sciences at the NWU benefitted from this study in the sense that design principles were developed for lecturers on how to develop, implement and evaluate a blended-learning module using e-learning tools as a support for the traditional classroom-based mode of delivery (specifically for the learning area Technology, but also applicable to other applied disciplines).

6.9 CONTRIBUTION OF THE STUDY

Blended learning has the potential to improve learning in higher education. Therefore, this study's contribution is that it may serve to evaluate the value of blended learning in higher education critically. This study may also contribute towards finalising a framework for innovative learning and the implementation and use of electronic media, new technologies and social media in order to enhance teaching and learning experiences for pre-service teachers attending the Faculty of Educational Sciences at NWU as well as contextually similar institutions.

The fact that little is known about what construes a successful blended-learning environment created the need to investigate CoI. The contribution of this study regarding CoI is that it may serve as a guideline for the development, implementation and evaluation of a blended mode of delivery for TE, based on CoI principles.

The contribution of the study regarding teacher training and TE as applied science involves the development, implementation and evaluation of a blended-learning module, based on CoI principles, for a module in TE, using online learning tools as enhanced support for the traditional classroom. The research contributed to the field by reporting on the process of how CoI can be enhanced in a blended-learning environment for a complex subject such as Technology and by providing evidence-based guidelines for the design and implementation of blended learning with CoI in mind.

This study also contributes in the sense that it provides a critical evaluation of the methodology of design-based research which may indicate the meaningfulness of such a methodology suitable to both research and the design of technology-enhanced learning environments.

6.10 LIMITATIONS OF THE STUDY

As this design-based research study unfolded, limitations became apparent. The quantitative findings indicated patterns that were suggestive of improved manifestation of CoI brought on by the refinements made throughout the course of the module, yet these patterns were not statistically significant. It seems possible that with a larger sample size, more definite quantitative supportive conclusions on the manifestation of CoI can be made.

6.11 JOURNEY AS RESEARCHER

The evolution of technology in the field of e-learning, online learning and blended learning took me on an unimaginably exciting journey well beyond my wildest expectations. Along my journey as a researcher, I followed my passion and explored new territories in understanding blended learning, using and managing digital resources in an online environment and developing CoI to ensure effective teaching and learning. The passion I have for my research was the driving force that inspired me to continuously expand my intellectual boundaries as well as to keep pushing the edges of my discipline towards new frontiers. For me, research has been a life-long journey of discovery of who I am, of the world around me, and of the meaning of life. This journey helped me to cross the boundaries of perceived tradition.

BIBLIOGRAPHY

Academic Support Services. (2013). Guidelines for designing and writing of an electronic study guide (e-guide): North West University, Potchefstroom Campus.

Akyol, Z., & Garison, D. R. (2011). Understanding cognitive presence in an online and blended community of inquiry: Assessing outcomes and processes for deep approaches to learning. *British Journal of Educational Technology, 42*, 233-250.

Akyol, Z., Garison, D. R., & Ozden, M. Y. (2009). Online and blended communities of inquiry: Exploring the development and perceptional differences. *International Review of Research in Open and Distance Learning, 10*(6), 65-83.

Alonso, F., Lopez, G., Manrique, D., & Vines, J. M. (2005). An instructional model for web-based e-learning education with a blended learning process approach. *British Journal of Educational Technology, 36*(2), 217-235.

Alsonso, F., Lopez, G., Manrique, D., & Vines, J. M. (2005). An instructional model for web-based learning education with a blended learning process approach. *British Journal of Educational Technology, 36*(2), 217-235.

Amiel, T., & Reeves, C. R. (2008). Design-based research and educational technology: Rethink technology and the research agenda. *Educational Technology & Society, 11*(4), 29-40.

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Online Learning and Teaching,* 5(2), 1-17.

Anderson, T., & Shattuck, K. (2012). Desig-based research: A decade of progress in educational research? *Educational Research, 41*(1), 16-25.

Ankiewicz, P., De Swardt, E., & Engelbrecht, W. (1998). *Technology education in South Africa since 1998: a shift from contents (conceptual knowledge) to process-based learning*. Paper presented at the PATT 15 Technology Education and research: twenty years in retrospect, Glasgow.

Annand, D. (2011). Social presence within the community of inquiry framework. *The International Review of Research in Open and Distance Learnng, 12*(5). http://www.irrodl.org/index.php/irrodl/article/view.924/1855

Aragon, S. R. (2003). Creating social presence in online environments. *New Directions for Adult and Continuing Education*(100), 57-67.

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garison, D. R., Ice, P., Richardson, J. C., & Swan, K. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *The Internet and Higher Education, 11*(3-4), 133-136.

Baker, C., & Taylor, S. L. (2012). The importance of teaching presence in an online course. In M. Bart (Ed.), *Faculty Focus: A special report. Online student engagement tools and strategies* (pp. 1-20): A Magna Publication.

Bandura, A. (2001). Social cognitive theory: an agentive perspective. *Annual Review of Psychology, 52*(1), 1-26.

Bertram, C. B. (2007). *From Hull House to Paseo Boricua: The theory and practice of community of inquiry*. Paper presented at the Philosophy of Pragmatism: Salient Inquiries in Section 3: Moral Theory, Law, Society, 26-29 September, Romania.

Biggs, J. (1998). Enhancing teaching through constructive alignment. *Higher Education, 14*, 141-157.

Bleed, R. (2001). A hybrid campus for a new millennium. *Educause Review, 36*(1), 16-24.

Bliss, C. A., & Lawrence, B. (2009). From posts to patterns: A metric to characterize discussion board activity in online classes. *Journal of Asynchronous Learning Networks, 13*(2), 15-32.

Brown, R. E. (2001). The process of community building in disitance learning classes. *Journal of Asynchronous Learning Networks, 5*(2), 18-35.

Campus Technology. (2012). Technology Transforming Education: 4 real-world models of success (pp. 1-13): Rosetta Stone Education.

Chen, Y. J., & Chen, P. C. (2007). Effect of online interaction on adult students' satisfaction and learning. *The Journal of Human Resources and Adult Learning, 3*(2), 78-89.

Cheung, K. S., Lam, J., Lau, N., & Shim, C. (2010). Instructional design practices for blended learning. Retrieved 17 September 2012, from http://ieeexplore.ieee.org/ie15/5676124/5676710.pdf

Clark, D. (2003). Blended Learning: An EPIC white paper. Retrieved 12 September 2012, from http://chip-chase.com/2012/3/21blended-learning-combining-online-technology-with-classroom-instruction-1-of3/

COHERE. (2011). Collaboration for online higher eduation and research. *Innovative practices Research Project: Cohere report on blended learning* (pp. 1-18). Canada.

Collins. (2003). English Dictionary *Free Online Dictionary, Thesaurs and Encyclopedia*: HarperCollins Publishers

Conole, G., Dyke, M., Olivier, M., & Seale, J. (2004). Mapping pedagogy and tools for effective learning design. *Computers and Education, 43*(1-2), 17-33.

Creswell, J. W. (2009). *Research Desing: Qualitative, quantitative, and mixed methods approaches* (3 ed.). Thousand Oakds, California: Sage Publications.

Creswell, J. W., & Clark, V. L. P. (2011). *Designing and Conducting Mixed Methods Research* (2nd ed.). California: Sage Publications.

Creswell, J. W., Ebersohn, I., Eloff, R., Ferreira, R., Ivankova, N., Jansen, J. D., . . . Van der Westhuizen, C. (2007). Statistical analysis I: Descriptive statistics. In K. Maree (Ed.), *First steps in research*. Pretoria: Van Schaik.

Cronje, J. (2013). What is this thing called "design" in design research and instructional design. *Educational Media International, 50*(1), 1-11.

Denzin, N. K., & Lincoln, Y. S. (1994). *Handbook of Qualitative Research*. Thousand Oaks: Sage Pulication.

Department of Education. (2003). *Revised National Curriculum Statement Grades R-9 (Schools): Technology: Teachers' guide for the development of learning programmes*. Pretoria: Department of Education.

Derek Bok Centre for Teaching and Learning Harvard University (2006). What is microteaching. Retrieved 20 June 2011, from Derek Bok Centre for Teaching and Learning http://isites.harvard.educ/fs/html/icb.topic58474/microteaching.html

Dewey, J. (1933). *How we think: A re-statement of the relation of reflective thinking to the educative process*. New York: Heath.

Dewey, J. (1955). *Democracy and Education: An introducation to the philosophy of education*. New York: Macmillan Company.

Driscoll, M. (2003). Blended Learning: Let's get beyond the hype. Retrieved 12 September 2012, from http://www.07.ibm.com/services/pdf/blended_learning.pdf

Dugger, W. E., Meade, S. D., Delarny, L., & Nichols, C. (2003). Advancing excellence in technology literacy. *Phi Delta Kappan, 85*(4), 316-320.

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004). Blended learning. *Educause Centre for Applied Reseach, 2004*(7), 1-12.

Dziuban, C. D., Moskal, P., & Hartman, J. (2005). Higher education, blended learnng and the generations: Knowledge is power-no more In Research Initiative for Teaching Effectiveness (Ed.), (pp. 1-16). Orlando: University of Central Florida.

Ebert, K. E. (2005). Behaviourism vs. costructivism in the technological secondary education classroom. *Theories of Educational Technology*. http://a/boisestate.edu/edutechteheories/behaviorism-vs-constructivism-in-the-techno

Eduviews. (2009). *Blended Learning: Where online and face-to-face instruction intersect for 21st century teaching and learning* Retrieved from http://www.k12perspectives.com/blended_learning.asp

European University Institute. (2009). Designing your Course. Retrieved 19 September 2012, from http://www.eui/programmesandfellowhips/academiCareersObservatory/CareerTips/CourseDesign.aspx

Faculty of Educational Sciences. (2011). Research Focus Area, Teaching-Learning Organisations, Strategic Priorities: 2011-2013. Potchefstroom Campus: North West University.

Forret, M., Jones, A., & Moreland, J. (2003). Technology education in New Zealand. *Journal of Design and Technology Education, 5*(1), 38-43.

Fowler, C., & Mays, T. (2005). Stage 2: Mapping theory to practice and practice to tool functionality based on the practitoners' perspective. *JISC e-Learning Models Desk Study*(1).

Fraenkel, J. R., & Wallen, N. E. (2003). *How to Design and Evaluate Research in Education* (5th ed.). New York: McGraw-Hill.

Friesen, N. (2012). Report: Defining blended learning. Retrieved 12 September 2012 http://learningspaces.org/papers/Defining_blended_learning_NF.PDF

Garison, D. R. (2003). Cognitive presence for effective asynchronous online learning: The role of reflective inquiry, self direction and metacognition. *Element of Quality Online Education, Practice and Direction, 4*, 47-58.

Garison, D. R., & Vaughan, N. D. (2008a). *Blended learning in higher education.* San Francisco: Jossey-Bass.

Garison, D. R., & Vaughan, N. D. (2008b). *Blended Learning in Higher Education: Framework, Principles and Guidelines*. San Francisco: Jossey-Bass.

Garnham, C., & Kaleta, R. (2002). Introduction to Hybrid Courses. http://uwsa.edu/ttt/articles/garnham.htm

Garrison, D. R. (2006). Online collaboration principles. *Journal of Asynchronous Learning, 10*(1), 25-34.

Garrison, D. R. (2009). Implications of online learning for the conceptual development and practice of distance education. *Journal of Distance Education, 23*(2), 93-104.

Garrison, D. R., & Anderson, T. (2003). *E-Learning in the 21st Century: A framework for research and practice*. London: Routledge/Falmer.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquirty in a text-based environment: Computer referencing in higher education. *Internet and Higher Education, 2*(2-3), 1-19.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence and computer conferencing in distance education. *The American Journal of Distance Education, 15*(1), 7-23.

Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the community of inquiry framework: A retrospective. *Internet and Higher Education, 13*, 5-9.

Garrison, D. R., & Arbaugh, J. B. (2007). Research the community of inquiry framework: Review, issues, and future directions. *Internet and Higher Education, 10*, 157-172.

Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *The American Journal of Distance Education, 19*(3), 133-148.

Garrison, D. R., Cleveland-Innes, M., & Shing Fung, T. (2010). Exploring casual relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *Internet and Higher Education, 13*, 31-36.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education, 7*, 95-105.

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in Higher Education: Framework, principles, and guidelines*. San Francisco: Jossey-Bass.

Graham, C. R. (2006). Blended learning systems: Definitions, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *The Handbook of Blended Learning: Global perspectives, local designs* (pp. 3-21). San Francisco: JosseyBass/Pheiffer.

Gunawardena, C., & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer mediated conferencing environment. *American Journal of Distance Education, 11*(3), 8-26.

Hadjerrouit, S. (2007a). Applying a system development approach to translate educational requirements into e-learning. *Interdisiplinary Journal of Knowledge and Learning Objects, 3*, 107-134.

Hadjerrouit, S. (2007b). *A Blended Learning Model in Java Programming: A design-based approach.* Paper presented at the Computer Science and IT Education Conference, Montreal, Canada.

Hannafin, M. J., & Kim, M. C. (2003). In search of a future: A critical analysis of research on web-based teaching and learning. *Instructional Science, 31*, 347-351.

Harris, P., Connolly, J. F., & Feeney, L. (2009). Blended learning: Overview and recommendations for successful implementation. *Industrial and Commerical Training, 41*(2), 155-163.

Hartman, J. (2010). The promise and practice of blended learning. Retrieved 23 January 2013, from http://hosted.mediasite.com/mediasite/viwer/?peid=b093b024bb349feae7ba771bd29db61d

Hatch, J. A. (2002). *Doing Qualitative Research in Educational Settings*. New York: State University of New York Press.

Hattingh, A., & Killen, R. (2003). The promise of problem-based learning for training pre-service technology teachers. *South African journal of higher education, 17*(1), 39-45.

Herrington, J. (2006). *Authentic e-learning in higher education: Design priniciples for authentic learning environments and tasks*. Paper presented at the World Conference on e-learning in Corporate, Healthcare and Higher Education, in October 2006, Honolulu, Hawaii.

Herrington, J., & Reeves, T. C. (2011). *Using design principles to improve pedagogical practice and promote student engagement.* Paper presented at the Ascilite 2011 Hobart.

Hill, A. N. (1998). Problem Solving in Real-Life Contexts: An alternative for design in technology educatiaon. *International Journal of Technology and Design Education, 8*, 203-220.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed research. *Journal of Mixed Methods Research, 1*(2), 112-133.

Jones, A., Bunting, C., & De Vries, M. J. (2013). The developing field of technology education: A review to look forward. *International Journal of Technology and Design Education, 23*, 191-212.

Jones, A., & Moreland, J. (2004). Enhancing practicing primary school teachers' pedagogical content knowledge in technology. *International Journal of Technology and Design Education, 14*, 121-140.

Kupczynski, L., Ice, P., Weisenmayer, R., & McCluskey, F. (2010). Student perception of the relationship between indicators of teaching presence and success in online courses. *Journal of Interactive Online Learning, 9*(1), 23-43.

Lambert, J. L., & Fisher, J. L. (2013). Communities of Inquiry Framework: Establishing community in and online course. *Journal of Interactive Online Learning, 12*, 11-16.

Leech, N. L., & Onwuegbuzi, A. J. (2009). A typology of mixed method research designs. *Qual Quant, 43*, 265-275.

Lim, D. H., Morris, M. L., & Kupritz, V. W. (2010). Online vs. blended learning: Differences in instructional outcomes and learner satisfaction. Retrieved 20 September 2012, from http://eric.ed.gov/ERICWebPotal/recordDetailaccno=ED492755

Lloyd-Smith, L. (2010). Exploring the Advantages of Blended Instruction at Community Colleges and Technical Schools. Retrieved 25 July 2012, from http://jolt.merlot.org/vol6no2/lloyd-smith_0610.html

Lopez-Perez, M. V., Perez-Lopez, M. C., & Rodriguez-Aruza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education, 56*(3), 818-826.

MacDonald, C. J., & Thompson, T. L. (2005). Structure, content, delivery, service and outcomes: Quality e-learning in higher education. *6*(2). http://www.rrodl.org/index.php/irrodl/article/view/237/321

Mayes, J. T., & Fowler, C. J. (1999). Learning technology and usability: A framework for understanding courseware. *Interacting with Computers, 11*(5), 485-497.

McKenney, S., & Reeves, T. C. (2012). *Conducting Educational Design Research*. New York: Routledge.

McMillan, J. H., & Schumacher, S. (2006). *Research in education: Evidence-based inquiry* (6th ed.). New York: Pearson Education.

Merriam-Webster's Online Dictionary. An Encyclopedia Britanica Company. Retrieved 25 July 2012, from http://www.websters-online-dictionary.org/definition/blend

Merriam, S. B. (2009). *Qualitative Research: A guide to design and implementation*. San Francisco: Jossey-Bass.

Mitcham, C. (1997). *Thinking Through Technology: The path between engineering and philosophy*. Chicago: Chicago press.

Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research, 1*(48), 48-76.

Mortimore, P. (1999). *Understanding Pedagogy and its Impact on Learning*. Thousand Oaks, California: Sage Publications.

North-West University. (2011). Teaching and Learning Policy of the NWU. Retrieved 12 November 2012, from http://www.nwu.ac.za/opencms/export/NWU/html/gov-man/policy/index/html.

North West University. (2011). Teaching-Learning Framework of the North-West University. Potchefstroom Campus: Institutional Office.

Onwuegbuzie, A. J., & Leech, N. L. (2005). On becoming a pragmatic researcher: The importance of combining quanititative and qualitative research methodologies. *International Journal of Social Research and Methodology, 8*(5), 375-387.

Osguthorpe, R. T., & Graham, C. R. (2003). Blended Learning environments, definitions and directions. *The Quarterly Review of Distance Education, 4*(3), 227-233.

Pavlovich, K. (2007). The development of reflective practice through student journals. *Higher Education Research and Development, 26*(3), 281-295.

Perdue Edu. (2009). APA formatting and style guide, Online writing lab

Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence and performance in an online course. *Journal of Asynchronous Learning Networks, 6*(1), 21-40.

Picciano, A. G. (2006). Blended learning: Implications for growth and access. *Journal of Asynchronous Learning Networks, 10*(3), 85-91.

Picciano, A. G. (2009). Blended with purpose: The multimodal model. *Journal of the Research Center for Educational Technology, 5*(1), 4-14.

Pietersen, J., & Maree, K. (2007). Standardisation of a questionnaire. In K. Maree (Ed.), *First Steps in Research* (pp. 215-222). Pretoria: Van Schaiks.

Poggenpoel, M., & Myburgh, C. (2004). The researcher as research instrument in education research: A possible threat to trustworthiness. *Education, 124*(2), 418-422.

Pool, J. (2010). *Effektiewe voordiensopleiding van onderwysers vir die leerarea Tegnologie.* (Magister Educationis Dissertation), Noordwes-Universiteit, Potchefstroom.

Potgieter, F. J. (2008). *Introduction to Educational Theories, Concepts and Ideas*. Paper presented at the MEd & PhD Research and Development and Support Training Programme Potchefstroom: NWU.

Precel, K., Eshet-Alkalai, Y., & Alberton, y. (2009). Pedagogical and Design Aspects of a Blended Learning Course. Retrieved 25 November 2011, from http://www.irrodl.org/index.php/irrodl/article/view/618/1221

Reasons, S. G., Valadares, K., & Slavkin, M. (2005). Questioning the hybrid model: Student outcomes in different course formats. *The Journal of Asynchronous Learning Networks, 9*(1), 84-94.

Resnik, D. B. (2010). What is ethics in research and why is it important. Retrieved 18 January 2012, from http://www.niehs.nih.gov/research/resources/bioethics/whatis/

Richardson, J. C., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning statisfaction. *The Journal of Asynchronous Learning Networks, 7*(1), 68-88.

Rourke, L., Anderson, T., Garison, D. R., & Archer, W. (2001). Assessing social presence in asynchronous text-based computer conferencing. *14*(2). http://cade.athabascau.ca/14.2/rourke_et_al.html

Rourke, L., & Kanuka, H. (2009). Learning in Communities of Inquiry: A review of the literature. *Journal of Distance Education, 23*(1), 19-48.

Rovai, A. P., & Jordan, H. M. (2004). Blended learning and sense of community: A comparitive analysis with traditional and fully online graduate courses. *International Review of Research in Open and Distance Learning, 5*(2), 1-13.

Segall, A. (2004). Revisiting pedagogical content knowledge: the pedagogy of content / the content of pedagogy. *Teaching and Teacher Education, 20*(5), 489-504.

Shea, P., & Bidjerano, T. (2009). Commuity of inquiry as a theoretical framework to foster "epistemic engagement" and "cognititive presence" in online education. *Computers & Education, 52*, 543-553.

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self regulation, and the development of communities of inquiry in online and blended learning. *Computers & Education, 55*, 1721-1731.

Shea, P., & Bidjerano, T. (2012). Learning presence as a moderator in the community of inquiry model. *Computers & Education, 59*, 316-326.

Shea, P., Hayes, S., Smith, S. U., Vickers, J., bidjerano, T., Gozza-Cohen, M., . . . Tseng, C. (2013). Online learner self-regulation: Learning presence viewed through quantitative content- and social network analysis. *The International Review of Research in Open and Distance Learnng, 14*(3), 428-461.

Shea, P., Hayes, S., Smith, S. U., Vickers, J., Bidjerano, T., Pickett, A., . . . Shoubang, J. (2012). Learning presence: Additional research on a new conceptual element within the Community of Inquiry (CoI) Framework. *Internet and Higher Education, 15*, 89-95.

Shea, P., Hayes, S., Vickers, J., Gozza-Cohen, M., Uzuner, S., Mehta, R., . . . Rangan, P. (2010). A rexamination of the community of inquiry framework: Social network and content analysis. *The Internet and Higher Education, 13*(1-2), 10-21.

Shea, P., Li, C. S., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. *Internet and Higher Education, 9*, 175-190.

Shea, P., Pickett, A., & Pelz, W. (2003). A follow-up investigation fo "teaching presence" in the Suny learning network. *JALN, 7*(2), 61-80.

Shea, P., Sau Li, C., Swan, K., & Pickett, A. (2005). Developing learning community in online asynchronous college courses: The role of teaching presence. *Journal of Asynchronous Learning Networks, 9*(4), 59-82.

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*, 63-75.

Siemens, S. (2004). Connectivism: A learning theory for the digital age. http://www.elearnspace.org/Articles/connectivism.htm

Smit, M. K., & Doyle, M. (2002). Globalization: The encyclopedia of informal eduaction. Retrieved 10 February 2012, from http://infed.oeg/biblio/globalization.htm

Smyth , S., Houghton, C., Cooney, A., & Casey, D. (2012). Students' experiences of blended learning across a range of postgraduate programmes. *Nurse Education Today, 32*(4), 464-468.

Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Students perceptions of useful and challenging characteristics. *Internet and Higher Education, 7*, 59-70.

Stacey, E., & Gerbic, P. (2008). *Success factors for blended learning.* Paper presented at the 2008 anual acilite conference, Melbourn: [Concise paper].

Staker, H., & Horn, M. B. (2012). Classifying K-12 blended learning *Innosight Institute* (pp. 1-17).

Stevens, A. (2003). *Getting technology into the FET.* Paper presented at the Technology Association Conference, Cape Town.

Stodel, E. J., Thompson, T. L., & MacDonald, C. J. (2006). Learners' perspectives on what is missing from online learning: Interpretations through the community of Inquiry framework. *7*(3). http://www.irrodl.org/index.php/irrod/article/view/325/743

Swan, K. (2003). Learning effectiveness online: what the research tells us. *Element of Quality Online Education, Practice and Direction*, 13-45.

Swan, K. (2004). Relationships between interaction and learning in online environments. *The Sloan Consortium. A Consortium of Institutions and Organizations Commited to Quality Education* 1-3.

Swan, K., Garrison, D. R., & Richardson, J. C. (2009). A contructivest approach to online learning: The community of inquiry framework. In C. P. Payne (Ed.), *Information Technology and Constructivism in Higher Education: Progressive learning Framework* (pp. 43-57): Hershey, PA: IGI Global.

Swan, K., & Ice, P. (2010). The community of inquiry framework ten years later: Introduction to the special issue. *Internet and Higher Education, 13*(1-4).

Swan, K., & Shih, L. F. (2005). On the nature and development of social presence in online course discussions. *Journal of Asynchronous Learning Networks, 9*, 115-136.

Teddie, C., & Tashakkori, A. (2006). A general typology of research designs featuring mixed methods. *Mid-South Educational Research Assosiation, 13*(1), 12-28.

Tu, C., & Mclsaac, M. (2002). The Relationship of Social Presence and Interaction in Online Classes. *American Journal of Distance Education, 16*(3), 131-150.

Ukpokodu, O. N. (2009). Pedagogies that foster transformative learning in a multicultural education course: a reflection. *Journal of Praxis in Multicultural Education, 4*(1).

Vaughan, N. D. (2007). Perspectives on blended learning in higher education. *International Journal on E-Learning, 6*(1), 81-94.

Vaughan, N. D. (2010). A blended community of inquiry approach: Linking student engagement and course redesign. *Internet and Higher Education, 13*, 60-65.

Vaughan, N. D., & Garison, D. R. (2005). Creating cognitive presence in a blended faculty development community. *Internet and Higher Education, 8*, 1-12.

Villegas-Reimers, E. (2003). *Teacher Professional Develpment: An international review of the literature*. Paris: UNESCO: International Institute for Educational Planning.

Vonderwell, S. (2003). An examination of asynchronous communication experiences and perspectives of students in an online course: A case study. *Internet and Higher Education, 6*, 77-90.

Walace, L., & Young, J. (2010). Implementing Blended Learning: Policy implications for universities. Retrieved 19 September 2012, from http://www.westga.edu/distance/ojdla/winter134/walace_young134.html

Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research & Development, 53*(4), 5-23.

Whisnant, C. J. (2012). Foucault & Discourse: A handout for HIS 389. Retrieved 13 February 2013, from http://webs.wofford.edu/whisnantcj/his/foucualt_discourse.pdf

Yuen, A. H. (2011). Exploring teaching approaches in blended learning. *Research and Practice in Technology Enhanced Learning, 6*(1), 3-23.

Zimmerman, J. B. (2002). Becoming a self-regulated learner: An overwiew. *Theory in Practice, 41*(2), 65-70.