Computerised lesson planning for innovative curriculum development

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DECLARATION

I, the undersigned, herewith declare that the work contained in this dissertation / thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature

May 2016

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DEDICATION

I dedicate this dissertation to my brother, Leon Meyer (1988-2010), who has always believed in me.

ABSTRACT

Teachers tend to plan lessons and develop curricula using linear and other rigid approaches. This research study sets out to explore a more flexible approach, using technology to devise lesson plans. Computerised lesson planning is the focus of this research study. It is explored in relation to three curriculum development theories: curriculum as product, process and praxis.

The primary question is: To what extent, if any, can computerised lesson planning promote innovative curriculum development?

In exploring this, the following secondary questions are addressed:

- What need is there for a computerised lesson planning program?
- What dimensions might a computerised lesson planning program have?
- When the lesson planning program is implemented by lower-primary teachers, final year education students and lower-primary lecturers, what improvements to the design of the computerised lesson planning program do they suggest?
- What implications could a computerised lesson planning program have for innovative curriculum development?

The participants and the research environments are purposefully selected. The participants are lower-primary teachers, final year students and lecturers in the lower-primary course at a university in Namibia. All of whom who are involved in implementing the curriculum for basic education in Namibia.

Qualitative design-based research methodology is used and situated in a pragmatic paradigm. Two data generation methods are employed: qualitative open-ended questionnaires and reflective journals. These are used to generate data on the participants' experiences and perceptions during the time they implemented the computerised lesson planning program, as well as their suggestions for improvements to the program.

Content analysis is used to deductively and inductively analyse the data and derive themes. The themes include: competence, comfortableness, attitude, experience, training, as well as access and availability of computers as related to the use of the technology; computerised lesson planning improves the lesson planning experience; the computerised lesson planning program enhances curriculum development and implementation; training and support are requirements for the successful implementation of the computerised lesson planning program; technical suggestions to improve the current computerised lesson planning program; practice makes perfect; and fostering innovative curriculum development.

The need for a computerised lesson planning program is explored in two ways. The first is to examine the importance of lesson planning, and the second is to recognise the need to make it less time consuming by using technology such as computers and a lesson planning program. The main research findings make it evident that the computerised lesson planning program participants applied in this research study promotes innovative curriculum development in ten main ways. (1) It facilitates dynamic and vigorous lesson planning; (2) it promotes curriculum knowledge and skills; (3) it facilitates the creation of knowledge, problem solving and collaboration; (4) it optimises teaching and learning and developing teachers' and learners' potential; (5) it facilitates personalised, accessible and creative teaching and learning experiences; (6) it encourages teachers to be actively involved; (7) it creates positive attitudes amongst teachers to curriculum development and implementation; (8) it facilitates reflection in order to enable change; and, (9) it provides a professionalisation tool for educators; and (10) it fosters competence, growth, change and innovation.

This research study demonstrates that the computerised lesson planning program has the potential to promote innovative curriculum development.

Keywords: Lesson plan, computerised lesson planning, innovative curriculum development, technology and education technology, teaching and learning technologies (TLT), Information Communication Technology (ICT), computer-based learning.

OPSOMMING

Onderwysers is geneig om lesse te beplan en kurrikula te ontwikkel deur liniêre en rigiede benaderings. Hierdie navorsingstudie poog om ‘n meer buigbare benadering te ondersoek wat tegnologie inkorporeer by lesbeplanning. Gerekenariseerde lesbeplanning is die fokus van hierdie navorsingstudie. Dit is ondersoek in verwantskap tot drie kurrikulumontwikkelingsteorieë: kurrikulum as produk, proses en praksis.

Die primêre vraag is: Tot watter mate bevorder gerekenariseerde lesbeplanning innoverende kurrikulumontwikkeling?

In die ondersoek van die primêre vraag, is die volgende sekondêre vrae ook aangespreek:

- Watter behoefte is daar vir ‘n gerekenariseerde lesbeplanningsprogram?
- Watter dimensies kan ‘n gerekenariseerde lesbeplanningsprogram bevat?
- Wanneer die lesbeplanningsprogram geïmplementeer word deur laer-primêre onderwysers, finale jaar onderwysstudente en laer-primêre dosente, watter verbeterings tot die ontwerp van die gerekenariseerde lesbeplanningsprogram stel hulle voor?
- Watter implikasies kan ‘n gerekenariseerde lesbeplanningsprogram inhou vir innoverende kurrikulumontwikkeling?

Die deelnemers en die navorsingsomgewing is doelbewus gekies. Die deelnemers sluit in: laer-primêre onderwysers, finale jaar onderwysstudente en dosente in die laer-primêre kursus by ‘n universiteit in Namibië. Al hierdie deelnemers is betrokke in die implementering van die kurrikulum vir basiese onderrig in Namibië.

‘n Kwalitatiewe ontwerpsgebaseerde-navorsingsmetodologie, vervat in ‘n pragmatiese paradigma, onderlê hierdie navorsingstudie. Twee data insamelingsmetodes is gebruik: kwalitatiewe oop-einde vraelyste en reflektiewe joernale. Hierdie genererings metodes is gebruik om data te genereer rakende die deelnemers se ervarings en persepsies gedurende die tyd wat die gerekenariseerde lesbeplanningsprogram deur hulle geïmplementeer was, asook hul voorstelle vir verbeterings tot die program.

Inhoudsanalise is ook onderneem om die data deduktief en induktief te analiseer om sodoende temas vir die hoof data bevindings te identifiseer. Hierdie temas sluit in: bevoegdheid, gemak, ingesteldheid, ervaring, opleiding asook toegang tot en beskikbaarheid van rekenaars en of dit verband hou met tegnologie gebruik; gerekenariseerde lesbeplanning verbeter die lesbeplanningservaring; die gerekenariseerde lesbeplanningsprogram bevorder kurrikulumontwikkeling en -implementering; opleiding en ondersteuning is voorvereistes vir die suksesvolle implementing van die gerekenariseerde lesbeplanningsprogram; tegniese

voorstelle om die huidige lesbeplanningsprogram te verbeter; probeer is die beste geweer; en bevordering van innoverende kurrikulumontwikkeling.

Die behoefte vir ‘n gerekenariseerde lesbeplanningsprogram was uiteengesit in eerstens, die belangrikheid van lesbeplanning en tweedens, die behoefte om dit minder tydrowend te maak deur die voordele van tegnologie soos rekenaars te kombineer met lesbeplanningservaringe. Vanuit die hoofnavorsingsbevindings was dit duidelik dat die gerekenariseerde lesbeplanningsprogram van hierdie studie innoverende kurrikulumontwikkeling bevorder op tien prominente maniere: (1) Dit fasiliteer dinamiese en aktiewe lesbeplanning; (2) dit bevorder kurrikulumkennis en –vaardighede; (3) dit fasiliteer kennisskepping, probleemoplossing en samewerking; (4) dit optimaliseer onderrig en leer en ontwikkel onderwyser- asook leerderpotensiaal; (5) dit fasiliteer verpersoonlikte, toeganklike en kreatiewe onderrig en leer ervaringe; (6) dit moedig aktiewe onderwyserbetrokkenheid aan; (7) dit bevorder ‘n positiewe ingesteldheid by onderwysers teenoor kurrikulumontwikkeling en –implementering; (8) dit fasiliteer ’n reflektiewe benadering ten einde verandering mee te bring; (9) dit voorsien ‘n professionionaliseringinstrument vir onderwysers; en (10) dit bevorder bevoegdheid, groei, verandering en innovering.

Hierdie navorsingstudie demonstreer dat die gerekenariseerde lesbeplanningsprogram die potensiaal het om innoverende kurrikulumontwikkeling te bevorder.

Sleutelbegrippe: Lesbeplanning, gerekenariseerde lesbeplanning, innoverende kurrikulumontwikkeling, tegnologie en onderwystegnologie, onderrig- en leer tegnologieë, Inligting- en Kommunikasie-Tegnologieë, rekenaar-gebaseerde/-begeleide leer.

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GENERAL ORIENTATION TO THE STUDY

1.1 Introduction

Curriculum development can refer to planning, implementing and evaluating on different levels, from the macro level of large scale curriculum reform to the micro level of planning of an individual lesson plan (Van den Berg, 2014:91). Webster and Son (2015:92) view teaching and education as future-orientated endeavours and therefore suggest that researchers, teachers and administrators re-examine the relationship between technology and education. This would make it possible to reach a more equitable balance between the real, technology-laden world that we inhabit and the learning environment used to prepare learners for tomorrow's world (ibid.).

It is therefore important that we know how education can be enhanced by technology, in particular how technology can be used to design and develop the curriculum. During the time I spent doing practical teaching at schools as part of my academic programme, as well as my experience as a teacher, I became interested in exploring the extent to which computerised lesson planning could promote innovative curriculum development. This in-depth investigation resulted.

This chapter provides a basic orientation to this study. The aspects that are addressed in this chapter are: a clarification of concepts (1.2); the background to the study (1.3); the general problem statement (1.4); the research questions (1.5); the aim of the study (1.6); the research design, methods and processes (1.7); and a summary and outline of the chapters in this study (1.8).

1.2 Clarification of concepts

To provide a better understanding of this study, the following key concepts are identified and briefly defined: lesson plan (1.2.1), computerised lesson planning (1.2.2), language of the computerised lesson planning program (1.2.2.1), curriculum design (1.2.3), innovative curriculum development (1.2.4), and technology (1.2.5). In order to explain the technological context of this study, other technology related terms are then defined. These are:

- Teaching and learning technologies (TLT) (1.2.5.1)
- Instructional management system (IMS) (1.2.5.2)
- Information Communication Technology (ICT) (1.2.5.3)
- Computer-based learning (1.2.5.4)
- Digital technologies (1.2.5.5)
- e-Learning (1.2.5.6)

- Web 2.0 technologies (1.2.5.7)
- Web-based technologies (1.2.5.8)
- Technology applications (Apps) (1.2.5.9).

1.2.1 Lesson plan

Jensen (2001:403) defines a lesson plan as

> ... an extremely useful tool that serves as a combination guide, resource, and historical document reflecting our teaching philosophy, student population, textbooks, and most importantly, our goals for our students. A lesson plan is essential for novice teachers and convenient for experienced teachers.

Carl (2012:87), Estes *et al*. (2011:34-35), Jacobs (2011:52), and Nieuwoudt and Nieuwoudt (2011:323) take the view that a lesson plan is made up of the following elements: objectives, context, content, method and assessment. All of these elements should be considered during lesson planning.

For the purpose of this study the term ‘lesson plan’ refers to a tool used by teachers in order to plan for teaching-learning sessions. It takes into account aspects such as objectives, context, content, method and assessment and thus informs curriculum development and design.

1.2.2 Computerised lesson planning

In this study computerised lesson planning is based on the definition of lesson plan given above (see 1.2.1). The term ‘computerised’ means a system, device etc. that has been converted so it can be operated by computer’ (Oxford Dictionaries, 2015a). See 1.2.2.1 below for clarification.

1.2.2.1 Language of the computerised lesson planning program

The language in which the computerised lesson planning program is programmed is C# (C-sharp). Microsoft (2014) explains that C# is an elegant and type-safe object-oriented language that enables developers to build a multiplicity of secure and robust applications. C# can be used to create Windows client applications such as XML Web services, distributed components, client-server applications, and database applications.

1.2.3 Curriculum design

‘Curriculum design’ refers to the way a curriculum is conceptualised, arranged and orchestrated (Thornton, 2010:199). This gives direction to the curriculum development process and therefore informs lesson planning (ibid.).

1.2.4 Innovative curriculum development

'Curriculum development' can be regarded as "the process of selecting, organizing, executing and evaluating the learning experiences on the basis of the needs, abilities, and interest of learners, and on the basis of the nature of the society or community" (Alonsabe, 2012:1). Hlebowitsh (2010:203) explains that curriculum development is organic and comprehensive. This implies that any decision on how to teach has to be done in relation to what gets taught and any decision on what gets taught has to be understood in relation to wider learning purposes and supplementary learning effects (ibid.).

In this study, the term 'innovative curriculum development' is used to refer to an original or new process of creating learning, arranging content and providing experiences that take account of the abilities, needs and wider learning purposes of learners as well as the effects on them.

1.2.5 Technology and Education Technology

According to Merriam-Webster's Online Dictionary (2015a), the term 'technology' could be defined as "a manner of accomplishing a task especially using technical processes, methods, or knowledge", and as "the specialized aspects of a particular field of endeavour" such as educational technology. Fink (2012) contends that the empowerment of educators to use new advances in technology could result in better education and a brighter future for all. According to Vahedi (2015:3), technology has colossal power to transform teaching and learning in and beyond the classroom. Therefore educational stakeholders need to address, understand and define the relationship between technology and improved teaching-learning processes (ibid.).

Other terms related to the technology context employed in this study are defined below:

1.2.5.1 Teaching and learning technologies (TLT)

'Teaching and learning technologies' (TLT) refers to technology that can "significantly enhance teaching and learning" (Reimer, 2014). The Association of Learning Technology (ALT) (2015) defines 'learning technology' as "...the broad range of communication, information and related technologies that can be used to support learning, teaching, and assessment". This study focuses on teaching technologies rather than learning technologies. In this study the term 'teaching technology' is used to refer to technologies used by the teacher to enhance teaching. This should enhance learning.

1.2.5.2 Instructional management system (IMS)

The term 'IMS' refers to technologies used to support teachers' various roles and activities. These roles could include developing lesson plans, tracking learner progress on assessments, and recording learner's instructional experiences (Peneul, 2010:133). For the purpose of this study, 'IMS' refers to the use of computer ICT to assist the teacher to develop lesson plans. An example of an IMS is the Aspen IMS. This IMS provides teachers with a tool to streamline the

curriculum and sync it with resources (Follett, 2015). Features of the Aspen IMS include fast access to curricula as an aid to lesson planning, building of a database of sample lesson plans, easily accessible task tools for assignments, and documents and digital materials such as tests (ibid.).

1.2.5.3 Information Communication Technology (ICT)

ICT is the acronym for Information and Communications Technology (Oxford Dictionaries, 2015b). TechTarget (2015) defines ICT as

> ... an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning.

ICT includes technology used to handle telecommunications, broadcast media, intelligent building management systems, audio-visual processing and transmission systems, and network-based control and monitoring functions (Techopedia, 2015). In terms of education, ICT means teaching and learning with ICT. It is also common practice to refer to ICT as technology in the same context.

It is also necessary to clarify the differences between the commonly used acronyms ICT, IT and CT. According to Techopedia (ibid.), ICT is often seen as an extended synonym for Information Technology (IT), but its scope is broader than that of IT. IT refers to “anything related to computing technology, such as networking, hardware, software, the Internet, or the people that work with these technologies” (TechTerms.com, 2015b). Communications Technology (CT) refers to the technology of the transmission and exchange of information (as by print or telecommunication) (Merriam-Webster’s Online Dictionary, 2015b).

1.2.5.4 Computer-based learning

Computer-based learning is one of numerous terms used to describe the use of computers to aid learning and training of people (Daintith, 2004). Other terms include computer-aided (or -assisted) instruction, computer-based learning, and computer-managed instruction. The term ‘computer-based learning’ denotes the use of a computer and hardware, software, input and output devices as key components of the educational environment (Ifenthaler, 2012). However this does not necessarily mean that there is a connection to a network; any electronic medium can be used (Pool, 2014:20).

1.2.5.5 Digital technologies

According to the Department of Education and Training, Victoria (2014) digital technologies such as computers are

> ... electronic tools, systems, devices and resources that generate, store or process data ... Digital learning is any type of learning that is facilitated by [digital] technology or by instructional practice that makes effective use of [digital] technology.

1.2.5.6 e-Learning

e-Learning is considered an important ICT tool (Wu & Liu, 2015:382). According to Amweelo (2014), electronic learning (e-learning) refers to the use of electronic media and information communication technologies in education. It is a concept that is "broadly inclusive of all forms of educational technology in learning and teaching" (ibid.). Amweelo (ibid.) explains that alternative names, which are broadly synonymous, such as multimedia learning, computer-based instruction, computer-assisted instruction, computer-managed instruction, computer-based training, online education, digital educational collaboration, web-based training and other learning platforms can be differentiated by the aspect, component or delivery method that is emphasised. According to Hadjerrouit (2007:110), e-learning concepts can be explained in simple terms 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.

1.2.5.7 Web 2.0 Technologies

'Web 2.0 Technologies' are defined by Kale and Goh (2014:42) as a term that refers to

> ...various emerging web-based technologies that allow users to (1) share knowledge though collaborative editing, communicating, publishing and commenting and/or to (2) dynamically change the content of knowledge published on the web.

1.2.5.8 Web-based technologies

PCMag (2015) defines the term 'web-based technologies' as having two dimensions. Firstly it refers to the "communications infrastructure of the Internet, which is based on the IP protocol"; and secondly, it refers to "[a]ny service on the Internet such as the Web, e-mail and voice over IP" (ibid.).

1.2.5.9 Technology applications (Apps)

TechTerms.com (2015a) defines an application or application program as "a software program that runs on your computer.... The word application is used because each program has a

specific application for the user". Applications software (also called end-user programs) includes such things as database programs, word processors, web browsers and spreadsheets (Webopedia, 2015).

For the purpose of this study, the term *technology (or education technology)* is used because it refers to the use of technology in this study as well as most of the other technology-related terms that have been defined in this section.

1.3 Background to the study

A curriculum is a series of activities where learners engage with knowledge or content. These activities have to be organised in some way because it would be almost impossible for everything to be studied at once. Thornton (2010:199) defines this arrangement as curriculum design and refers to it as one of the most powerful tools educators can use to influence what learners learn. 'Curriculum design' thus suggests conscious planning and careful consideration of the knowledge or content and instructional arrangements that count as educationally significant (ibid.).

Petrina (2007:252) explains that learner experiences are shaped by the design of the curriculum. Curriculum designs shape the process of teaching and learning, they allow teachers to make valuable judgments on what knowledge is of most worth, its scope and the sequence in which it should be taught, and how learner desires and needs will be met (ibid.). There are several curriculum design types that could be considered in order for the teacher to know what content to choose and how to develop and design their curricula. According to Thornton (2010:199-202) these include: school subject designs, Dewey's design, social designs, designs based on personal relevance, intellectual development designs and hidden designs. Van den Berg (2014:95) states that curriculum design is of the utmost importance at all levels on which curriculum development occurs, micro, meso or macro.

Over the years, curriculum development processes have been driven by an ultimate goal: to determine what knowledge and skills are important in society and to find the most effective way to teach these (ibid.). According to Hlebowitsch (2010:202), the formalisation of curriculum development can be traced to the early 20th century and to the defining principles embodied in the work of John Fanklin Bobbit (1918). According to Flinders and Thornton (2009:60) Bobbit's way of "scientific" curriculum making was criticised because of its underlying assumption that the aim of schooling is to prepare learners to lead productive lives as adults, without taking the interests and needs of the children into consideration. Critics contend that scientific approaches to curriculum and other aspects of education continue to pervade and shape educational thought and practice, making them just as germane today as they were in the 1970s (Flinders & Thornton, 2009:13). Tyler's scientific method (product approach), which was influenced by the

industrial era and based on Bobbit (1918), is linear and therefore rather rigid. This study takes account of three prominent approaches to curriculum development. An in-depth discussion of the three approaches (product, process and praxis) to curriculum development is provided in Chapter 2.

Jacobs (2011:33) argues that curriculum development involves "… consulting curriculum statements issued by the government, defining objectives, finding information about topics, deciding on suitable teaching methods and choosing ways in which the learning would be assessed". Jacobs's (2011) makes the link between curriculum development and lesson planning apparent when she describes the close relationship between the various aspects that are considered during lesson planning. The lesson plan has five distinct elements and these are: objectives, context, content, method and assessment (Carl, 2012:87; Estes *et al*. 2011:34-35; Jacobs, 2011:52; Nieuwoudt and Nieuwoudt, 2011:323).

Education had been slow to embrace new technology (such as online courses) (Garner, 2014). Even in the most advanced schools in industrialized countries, technology applicable to education is rarely considered a core component of the teaching and learning process (Kaul, 2014:48). It seems that

> [c]ountries everywhere are facing similar challenges in the implementation of ICT in their education systems. Unfortunately, many local, national and regional government bodies are still not giving ICT the attention and priority it deserves despite the benefits it brings.
>
> (Kaul, 2014:56)

In the African context, education has been slow to take advantage of ICT. As Fiona Beal (2012), the Technology Integration Facilitator with SchoolNet, argues "South Africa is slow to get on to the technology integration boat, especially in the large number of under-resourced schools that make up the bulk of public education". She explains that the reason for this may be that schools are without electricity, internet or computers (ibid.). Referring to the situation in Namibia, Ndamanomhata (2014) suggests that the main causes of the digital divide in Namibia are basic factors such as economic resources, education, information literacy skills and personal motivation. In addition to these factors, the integration of technology into education could be impeded by resistance to adopting new methods. Ndemo (2014:9) explains that resistance to change and resistance in adopting new teaching and learning methods could be ascribed to the teachers' fear that something new will replace them. They fail to see "[t]echnology was created for Africa and can remedy its many shortfalls, helping it to 'leapfrog' to join developed nations ... [T]echnology can transform our schools" (Ibid.). Callahan *et al.* (2014) found in their research that despite factors such as resistance to innovation, low self-efficacy, pre-dispositions, low

expectations, technological affordances and lack of support that often discourages teachers from adopting innovative practices, teacher's beliefs and practices can be influenced and changed. This can be done by providing teachers with opportunities to identify ways that innovation could help to address their individual needs and solve their specific problems (Callahan *et al*., 2014:130). This suggests that technology has the potential to create a number of new and more flexible approaches to curriculum and lead to more innovative education practices. However, for a number of reasons such as those mentioned above by Kaul (2014), Ndemo (2014) and Callahan *et al*. (2014), technology is not always embraced by those in the field.

According to Hammond (2011:1), the first use of computers in education dates back to the early 1970s when programming was taught and there were experiments in using main frame computers to provide for learning support. Neer (2014) argues that digital technology offers teachers and learners the opportunity to unleash their creativity and for learners to learn more, learn faster and learn more easily (Ibid.). According to Francescone (2014:100), teachers need to take serious account of what technologies offer in order to rethink and remodel their teaching processes.

According to Neer (2014) and Francescone (2014:100), progress and improvement in the field of curriculum development require new approaches to education and learning. This study explores the use of new education technology in the form of a computerised lesson planning program. This study will explore the potential use of technology such as computers in planning processes by lower-primary teachers, final year education students and lower-primary lecturers. Computerised lesson plans will be seen as the key to applying, implementing and adapting curricula.

In addition to rethinking approaches to learning and education, the relationship of technology to education needs to be re-examined (Webster & Son, 2015:92). Despite having made some real progress, Africa still faces many educational challenges (Boateng, 2014:20). The best technologies available should be used to create appropriate and innovative solutions to meet these challenges (Boateng, 2014:22). Technologies offer the opportunity to use approaches that are less linear and rigid. As Amweelo (2014) argues, "[e]ducation is the key to everything and has proven to be one of the most critical building blocks for societal transformation". The need to meet the crucial challenge of providing equitable and quality access to education for all could be met, at least in part, in the new learning spaces proposed by applicable educational technologies (Isaacs *et al*., 2013:9).

Van den Berg (2014:107) argues that imagination is the key to making curriculum development theories more appropriate for a rapidly changing society and introducing approaches that make

full use of educational technological advancements. Van den Berg (2014:106) also states that if there is a desire to make educational progress and to prevent retrogression, there is an urgent need to adopt postmodern perspectives to curriculum making. Therefore new learning spaces should be considered. To describe what these might be from a technology perspective, trends in South African and Namibian education and the relevant technology are outlined.

Goodman (2014) remains positive about the use of technology in education in South Africa despite those who say that the digital divide is too big a challenge for South Africa to overcome. He feels that if technology were properly implemented in education, it could assist learners to enter a digital world because "proper implementation lies in using educational technologies that span the online and offline worlds" (ibid.). There is a need for increased growth and very strong public and private partnerships in order to move South Africa towards full acceptance of e-learning (ibid.). There are approximately 1,500 schools in Namibia at present. Beukes-Amiss (2014:16) explains that in comparison to neighbouring countries, Namibia's telecommunications developed very slowly during the 1990s and early 2000s. However, as a result of greater competition, this situation has changed. For example, in April 2012, President Pohamba announced that schools, other educational institutions, clinics and hospitals would have access to free internet. In May 2012, the Minister of ICT, Kapanda, met his promise to have cables laid that would provide free access to internet (Amweelo, 2014). There seems little doubt that there is a political will to provide e-learning in Namibia, but to make it a reality, every school will need to have access to e-learning systems (Ibid.). This means that existing technology infrastructure will need to be continually upgraded and policies will have to be effectively implemented (ibid.). Although the concepts of e-learning and the Internet are not of central concern in this study, they require some attention because of their relevance to the concept of technology.

In the *eLearning Africa Report 2013*[1], Isaacs *et al*. (2013:15, 52) state that the majority of the respondents were positive towards and optimistic about digital technologies. They saw the need for growth and progress in the diffusion of ICTs for learning in Africa. On the other hand, the report also reflects the voices of those who are more conservative in their approach to digital technologies because of less experience in using it. However, Isaacs *et al*. (2013:52) report that the proponents of digital technology predominated.

Fink (2012) argues that empowering educators to take advantage of the new advances in technology could ensure better education and a brighter future for all:

[1] I draw on the eLearning Africa Report 2013 because this study is set in Africa and I want to make it clear that I have no bias towards Western theories.

> Technology is evolving at a dizzying pace and schools need to stay abreast of these developments because they nurture the workforce of tomorrow. By embracing technology, certain areas such as the curriculum and flagging interest by both pupils and teachers can be addressed and resolved. In doing this, education can be made relevant once more by giving the pupils and their teachers the skills needed to become productive members of a highly technology driven society.

By embracing the benefits of the technological age, educators can interpret and apply the curriculum in a more flexible way and use alternative curriculum development approaches.

I have always been passionately interested in alternative curriculum development approaches. I did my BEdHons in Curriculum Studies at the North-West University, Potchefstroom Campus in 2013. The title of my research project was: *Fostering divergent thinking in lesson planning: implications of computerised lesson planning for curriculum development*. I wanted to establish whether a computerised lesson planning framework could incorporate divergent thinking into planning and instruction, in contrast to written lesson plans. The study was based on the computerised lesson planning framework which I developed in 2012. My overall finding was that lesson planning is important and valuable. Another finding was that some of the participants resisted using technology such as computers (with applicable software) in their planning and teaching because of their limited competence in using it. I felt that it was necessary and valuable to integrate technology such as computers (with the applicable software and applications) into areas of education, more specifically into teachers' curriculum planning processes. These findings led me to explore the contribution computerised lesson planning could make to innovative curriculum development, which informed the general problem statement of this study.

1.4 General problem statement

As mentioned earlier, lesson plans have been used in education since Tyler's (1949) *Basic Principles of Curriculum and Instruction* was published. Farrell and Pate (2014:58) criticise Tyler's description of lesson planning, saying that it is too rigid and does not take educational changes into account. In their view, the ideal lesson plan is all-inclusive in that it includes objectives, context, content, method and assessment of learning as well as reflection on the learning experience (Farrell & Pate, 2014:61). Lesson planning is thus a process of planning, implementation and reflection.

A lesson plan is used as a way of ensuring that all of the content in the curriculum is covered. Auala *et al*. (1998:9), state that planning leads to greater flexibility, fewer classroom management problems, and greater learning. Teachers need to plan in order to ensure successful teaching-learning (ibid.; De Lange, 2009:38). Planning also allows the teacher to

present the content prescribed in the curriculum clearly. As Benjamin Franklin rightly said (cited in Goodreads, 2013), “if you fail to plan, you plan to fail”. Lesson planning has an effect on the quality of teaching and learning. Olivier (2012) argues that challenging lesson plans can engage learners in creative and productive learning. They enable learners to discover prescribed content while developing thinking skills and they allow teachers to find ways in which the curriculum can be used to empower learners (Olivier, 2012:43).

In contrast to the statements above on challenging lesson plans, Schubert (2010:575) refers to a “mindless curriculum” that implements policy without cautious, reflective study, thought, or consideration of the consequences. He encourages teachers to use intelligent judgement rather than mindlessly following a given set of rules: in his view, the use of unimaginative procedures will not stimulate the human imagination (ibid.).

It is not only the use of unimaginative procedures, but also resistance to change that hinders innovative curriculum development. Clearly, there is a need for an alternative means of planning, implementing and reflecting on curriculum development. Schmid *et al*. (2014:271) makes the point that those outside the field of education must find it quite incredible that educators are still debating the benefits of using computers and associated computer technologies in teaching and learning in education. In similar vein, LeFevre (2014:56) notes that risk-taking has been closely associated with effective innovation, improvement, and change across many industries and disciplines for many years. Unwillingness to take risks even though change is desirable could be one of the factors that impede innovative curriculum development. Other factors could also include limited access to and/or availability of resources and poor computer-literacy levels of teachers (see 2.4.1.).

The research problem identified by this study arose from the idea of exploring the possibilities beyond written lesson plans: more specifically, computerised lesson plans. I also saw the need to highlight the value of a computerised lesson planning program, especially considering the rapid integration and growth of technologies in education and everyday living. Before this research was conducted, the computerised lesson planning program used in this study was limited to my practical experience. This study was able to explore the possibility of making the program more scientific. In addition, the possibility of using this program to promote innovative curriculum development could also be established. The problem which will be investigated is thus whether and to what extent computerised lesson planning can or cannot promote innovative curriculum development.

1.5 Research questions

This study is guided by the following primary question: To what extent, if any, can computerised lesson planning promote innovative curriculum development?

In exploring this, the following secondary questions are addressed:

- What need is there for a computerised lesson planning program?
- What dimensions might a computerised lesson planning program have?
- When the lesson planning program is implemented by lower-primary teachers, final year education students and lower-primary lecturers, what improvements to the design of the computerised lesson planning program do they suggest?
- What implications could a computerised lesson planning program have for innovative curriculum development?

1.6 Aims of the study

With reference to the research questions, this study's primary aim is to determine whether and to what extent computerised lesson planning promote innovative curriculum development. The following secondary aims were identified.

[1] to analyse the need for a computerised lesson planning program;

[2] to identify the dimensions that a computerised lesson planning program might have;

[3] to determine what suggestions lower-primary teachers, final year education students and lower-primary lecturers make to improve the design of the computerised lesson planning program; and

[4] to reflect on the implications that a computerised lesson planning program could have for innovative curriculum development.

1.7 Research design, methods and processes

According to Fouché *et al*. (2011:142), a research design focuses on the end product and all the steps in the process to achieve the expected outcome. Nieuwenhuis (2007a:70) defines a research design as a plan or strategy which is underpinned by the fundamental philosophical assumptions in the study.

A research design comprises five main elements; methodology, paradigm, sample, data collection methods and data analysis methods (Fouché *et al*., 2011:143, Nieuwenhuis, 2007a:70, Wellington & Szczerbinkski, 2007:29). The research design should therefore indicate: firstly, the strategy (methodology) to be employed; secondly, the framework (paradigm) in which

the study is positioned; thirdly, from whom and in what research environment the data is to be collected (sample); and fourthly, how the data are to be collected (data collection methods). Finally, the research design should indicate how the collected data are to be analysed (data analysis methods).

This study embraced a qualitative research approach. According to Nieuwenhuis (2007a:81), most qualitative research studies aim at research that probes for a deeper understanding of a phenomenon rather than merely being concerned to find causal relationships: they deal with "not so much an exact, measurable finding, but an emerging reality that [they] we describe[e] and analyz[e]" (ibid.). In the following sections, the design of this study will be explained in terms of the design-based research methodology (1.7.1); pragmatism: paradigmatic positioning (1.7.2); sample and research environment (1.7.3); data generation methods (1.7.4); data analyses method (1.7.5); and researchers' positionality (1.7.6). Thereafter, different strategies for ensuring validity and trustworthiness (1.7.7) will be discussed as well as the possible ethical considerations (1.7.8).

1.7.1 Design-based research methodology

The research methodology employed in this study is design-based research. Sandoval and Bell (2004:200) explain this kind of methodology, which is primarily used as a means of studying innovative learning environments. This includes for example, the use of new educational technologies.

Plomp (2013:11) states that design-based research incorporates the "systematic study of designing, developing and evaluating educational interventions such as programs, learning processes, learning environments, teaching-learning materials, products and systems".

Design-based research takes place in iterative cycles of analysis, design, development, evaluation and revision (Plomp, 2013:21; Van den Akker *et al*., 2006:5). Within each cycle there are four phases. These phases are described by Reeves (2006:59) as follows:

> Phase 1: Analysis of practical problems by research and practitioners in collaboration.
>
> Phase 2: Development of solutions informed by existing design principles and technology innovations.
>
> Phase 3: Cycles of testing and refinement of solutions in practice.
>
> Phase 4: Reflection to produce "design principles" and enhance solution implementation.

Design-based research was chosen because it provided a good fit for the research questions and aims. Design-based research leads to the emergence and development of new knowledge

that can inform practice and research design (Wang & Hannafin, 2005:7). Therefore, this methodology was used to introduce the computerised lesson planning program to the participants as well as to reflect on their perceptions of implementing it.

1.7.2 Pragmatism: paradigmatic positioning

The research paradigm that compliments this study's research design most is pragmatism. Dewey (1938) states that

> ... design-based research suggests a pragmatic philosophical underpinning, one in which the value of the theory lies in its ability to produce changes in the world. Such a system of inquiry might draw less from traditional positivist science or ethnographic traditions of inquiry, but more from pragmatic lines of inquiry where theories are judged not by their claims to truth, but by their ability to do work in the world.

Wang and Hannafin (2005:8) provide an explanation of pragmatic design-based research as refining both theory and practice, on the one hand, and informing and improving practice, on the other hand. Pragmatism informed this study that was concerned to develop and implement the computerised lesson planning program. This reflects Patton's (1990) explanation of pragmatism as "concern[ed] with applications – what works – and solutions to problems". Davis (2014b:78) explains that pragmatic research selects specific methods that are complementary to finding answers and solutions to problems. I chose the methods that would best help me to answer whether computerised lesson planning works and how well it works, as well as the extent to which computerised lesson planning enhances innovative curriculum development.

1.7.3 Sample and research environment

Sampling in qualitative research is described by Strydom and Delport (2011:391) as based on saturation, not on representivity. Therefore the sample size was not statistically determined.

For the purpose of this study, purposeful sampling was employed. According to Pascoe (2014:142) purposeful sampling means that the elements one wishes to include in the sample are purposely chosen, based on specific characteristics. These are the characteristics of the sample that emerge as important for the study (ibid.). According to Elo *et al*. (2014:4) purposeful sampling is suitable for qualitative studies where the researcher is interested in informants who have the best knowledge of the research topic. Denscombe (2007:26) suggests that researchers should ask the following question when making decision related to their sample: *Given what I already know about the research topic and about the range of people or events being studied, who or what is likely to provide the best information?*

In this study, the sample consisted of ten lower-primary teachers (five at each of the two participating primary schools), implementing the National Curriculum for Basic Education in Namibia; five final year education students and four lecturers who present courses to lower-primary (foundation phase) education students at a university in Namibia.

1.7.4 Data generation methods

A qualitative open-ended questionnaire (see Addendum F) and reflective journal (see Addendum G) were used to generate data in this study (see 3.6). These data generation methods enabled me to capture the participants' perceptions of computerised lesson planning for curriculum development before, during and after the implementation of the computerised lesson planning program.

First, the participants were asked to complete the open-ended questionnaire. Their answers enabled me to create profiles of the participants and to capture how they perceived lesson planning, the need for a computerised lesson planning program, as well as their perception of the ease and competency with which they are able to use technology such as computers. Dube (2010) explains that qualitative questionnaires can be used to gather data on people's beliefs, feelings, experiences in certain jobs, services offered, activities and so on. The participants have the freedom to express their views in response to the questions asked without being influenced or being given clues by the interviewer. In this study, the questions were open-ended. This was helpful for me because I wanted to understand how the participants felt about, perceived and experienced lesson planning and computerised lesson planning. Responses from the participants could influence the design. These responses could also influence the adjustments or changes made to the computerised lesson planning program. In my view, qualitative open-ended questionnaires were best suited to this study because of their flexibility. The participants were able to express their own feelings and use their own words to do so, as opposed to a close-ended yes or no answer. The participants were also able to complete the questionnaire in their own time and at a place of their preference.

After generating the data through the qualitative open-ended questionnaires, the participants were asked to keep a reflective journal during the time they were implementing the computerised lesson plan program. According to Vaninni (2008:764), reflective journals allow individuals to recount their experiences and share their perceptions. Since reflective journals are personal in nature (ibid.), I needed to consider the implications this would have for validity, trustworthiness and ethics. For the purpose of this study, 'a reflective journal' refers to the participants' recollection of and reflection on their personal observations and experiences while implementing the program. See section 3.6 for more details on how the data generation methods were conducted.

1.7.5 Data analysis method

For Denscombe (2007) data analysis comprises five main stages. These are: data preparation, initial exploration of data, analysis of the data, representation and display of data and validation of the data (Denscombe, 2007:252). These stages were used in this study.

The data analysis method employed by this study was content analysis. Content analysis is defined by Denscombe (2007:236) as "a method which helps the researcher to analyse the content of documents.... [This] method … can be used with any 'text', whether it be in the form of writing, sounds or pictures". Nieuwenhuis (2007b:101) explains that "content analysis is used … to analyse qualitative responses to open-ended questions on surveys, interviews or focus groups". Content analysis is explained as a process of viewing the data from different angles in order to identify key aspects in the text that will assist in understanding and interpreting the raw data (ibid.). Content analyses enabled me to gain better insight into and understanding of how the participants experienced computerised lesson planning and whether it affected the way they develop the curriculum.

Nieuwenhuis (2007b:107) distinguishes between inductive and deductive (*a priori*) coding. Inductive codes are developed by the researcher by directly analysing the data while deductive (*a priori*) coding involves identifying codes from the literature (or elsewhere) before analysing the data. This study employed content analysis through first deductive (*a priori*) analysis and then inductive analysis. Section 3.7 provides an in depth account of the data analysis phases adopted by this study.

1.7.6 Researcher's positionality

For the purpose of this study my role as a researcher included following a number of steps as proposed by Creswell (2009:177) and Maree and van der Westhuizen (2007:41). These steps were:

- Obtaining ethical clearance
- Gaining access to research sites and participants
- Formulating data generation questions
- Conducting the data generation methods
- Transcribing the data
- Analysing and interpreting the data

In my positionality as a researcher, I had to be aware of issues such as possible bias that could arise. See 3.9 for further clarification on my positionality in this study.

1.7.7 Validity and trustworthiness

Validity and trustworthiness are an integral part of any study because "[r]esearch should be based on mutual trust, acceptance, cooperation, promises and well-accepted conventions and expectations between all parties involved in a research project" (Strydom, 2011:113). Koonin (2014:253) explains that the term trustworthiness is the overarching term used to measure validity and reliability in qualitative studies. Trustworthiness was a vital aspect of this study because qualitative research is about promoting understanding of particular phenomena within a specific context rather than generalising results to the broad population (Koonin, 2014:258). In the case of this study, I had to use certain strategies to assess the validity of the findings (Creswell, 2014:201). The strategies used include: crystallisation, an audit trail, thick descriptions, peer briefing and member checking (see 3.10 for further clarification).

1.7.8 Ethical considerations

Researchers should generate data and analyse and disseminate the findings in an ethical manner (Denscombe, 2007:133). Participants' rights and dignity have to be respected and they should be protected against any harm that could arise from their involvement in the research and researchers have to conduct research with integrity and honesty (ibid.).

The following ethical requirements highlighted by Denscombe (2007:133-146) were met in this study to ensure that it was conducted ethically: obtaining permission and gaining informed consent, protecting participants' interest and privacy, ensuring confidentiality and anonymity of information, ensuring that there was no deception or misinterpretation and clearly informing participants that they could withdraw at any stage (see 3.11 for further clarification).

1.8 Summary and outline of chapters in this study

Chapter 1 provided an overview of the research that was undertaken. It provided the reader with a background to the study and presented the research problem, questions of aims of this study. This chapter also outlined the research design of this study. This is framed in empirical and qualitative research. Research methods include qualitative open-ended questionnaires and reflective journals. The generation and analysis of data were also considered. This chapter concludes with a statement on my positionality as a researcher as well as the measures taken to make the research valid, trustworthy and ethical.

Chapter 2 presents a review of the literature related to curriculum development, computerised lesson planning and innovative curriculum development.

Chapter 3 elaborates on the research design, methods and processes employed when the empirical part of this study was conducted.

Chapter 4 presents and discusses the data that were collected. This chapter concludes with a summary of the main themes that emerged from the data.

A summary of the main findings is discussed in Chapter 5 and conclusions are drawn. In addition, the possible limitations of the study and recommendations for further research are discussed.

CHAPTER 2
REVIEW OF THE LITERATURE

2.1 Introduction

Technology has enormous power to transform teaching and learning in and beyond the classroom (Vahedi, 2015:3). Educational stakeholders therefore need to address, understand and define the relationship between using technology and improved teaching-learning processes (ibid.).

To explore this relationship, this chapter first describes how lesson planning and its elements are viewed in this study. Particular attention is given to lesson planning as part of curriculum design in the curriculum development process (2.2). This is deemed necessary because curriculum development can be viewed in a number of ways and lesson planning can thus take various forms. Thereafter, the nature, elements and practice of the product, process and praxis theories of curriculum development are explained (2.3). In the penultimate section of this chapter, the link between use of technology and lesson planning, as well as the factors that could facilitate and/or hinder it, is presented (2.4). Next the implications of computerised lesson planning as part of curriculum development are discussed. To conclude this chapter (2.5), I explore innovative curriculum development in the context of this research study.

2.2 Lesson planning as curriculum development

Curriculum design, according to Carl (2012:66), is one of the levels or phases of curriculum development. Although many educators still equate curriculum development with subject matter organization (Hlebowitsh, 2010:203), Thornton (2010:199) prefers to use the term curriculum design, and stresses that it requires conscious planning.

Hlebowitsh (2010:203) argues that the notion of curriculum development is still closely linked to the operation of schools. He argues that

> [t]he desire to find a way to deliberately and consciously direct the conduct of the school became the driving principle behind the rise of the curriculum field and the valorizing of a process that has since become known as curriculum development (ibid.).

Curriculum development can refer to planning, implementing and evaluating on different levels, from large scale curriculum reform to the micro level of planning where one's own lesson plans are the focus (Van den Berg, 2014:91). Curriculum, seen as a collection of plans, includes plans on a national level (macro planning), institutional level (meso planning) and classroom-level (micro planning) (Jacobs, 2011:33). Curriculum-planners plan in order to teach desirable skills that will help learners to have successful careers and acceptable moral values (ibid.).

Planning on a classroom level includes consulting curriculum statements, defining objectives of lessons, searching for information about topics, choosing suitable teaching methods, deciding on ways in which assessment will be done best (ibid.). Curriculum development and design at classroom level (micro level) of planning thus refer largely to the teacher's lesson plans. As curriculum developers and designers, teachers are the holders, users, and producers of knowledge; they are also self-directed individuals who take the curriculum as specified and negotiate it in active relationship with learners in order to meet their needs and the requirements set out in the curriculum documents (Morris, 2010:867). The dimensions of a curriculum are related to the elements of lesson planning as is explained in this section.

Nieuwoudt and Nieuwoudt (2011:323) refer to the elements of lesson planning as 'building blocks' and use the following metaphor:

> [T]he elements of lessons are like parts of a car – without the parts you cannot build a workable car, but you can only have a functional car once the parts are fitted in the correct way. Furthermore, with a railway car, you first have to hook up various cars with a locomotive to form a train. Similarly, lessons often need to be 'hooked up' to form a functional unit that can facilitate the acquisition of intended learning objectives.

They argue that the success of teaching and learning depends to a large extent on the quality of this 'car-building' for lesson planning (ibid.). This metaphor highlights the 'building' part of lesson plans rather than the final lesson plan. Jacobs (2011:49) sees lesson planning as dynamic and illustrates this by using a metaphor to explain the elements of lesson planning:

> [T]he elements of a lesson are like a mixture consisting of four colours of paints ... when they are mixed, all the original colours disappear and in their place develops a completely new colour.... When one places the elements of a lesson together, each element ceases to exist as a separate element and all the elements together become a completely new whole.

As a result of good planning "lessons [become] vehicles to help learners achieve expected destinations of competence" (Nieuwoudt & Nieuwoudt, 2011:324).

Of interest to this research study are the five elements of lesson plans as explained by Carl (2012:87), Estes *et al*. (2011:34-35), Jacobs (2011:52), and Nieuwoudt and Nieuwoudt (2011:323). Although these scholars use different terms, they are in broad agreement on these five elements: objectives, context, content, method and assessment. Table 2.1 provides Jacobs' (2011:50-54) definitions of these five elements.

Table 2.1 Elements of lesson planning

Objectives	Observable demonstrations of learning that occur at the end of a significant set of learning experiences. They provide descriptors of knowledge, skills, attitudes and values that learners should have.
Context	Teaching that takes account of learners' needs, making it easier for learners to participate.
Content	Content is oriented towards preparing the learner to live in a civilised community. The content of different subjects is specified in curricula and is usually divided into topics and sub-topics.
Method	Method includes the approaches that teachers use to transfer knowledge to learners, such as lecturing, questioning or discussing.
Assessment	Assessment consists of a task or series of tasks set in order to obtain information about learners' competence.

These elements of a lesson plan inform curriculum development and design at classroom level. In other words, effective lesson planning is a way of ensuring effective curriculum development and design. The components of a curriculum comprise the parts of the planning processes when a course, unit or lesson is designed (Jacobs, 2011:50). Figure 2.1 was designed for the purpose to further highlight lesson planning as the heart of curriculum development and design.

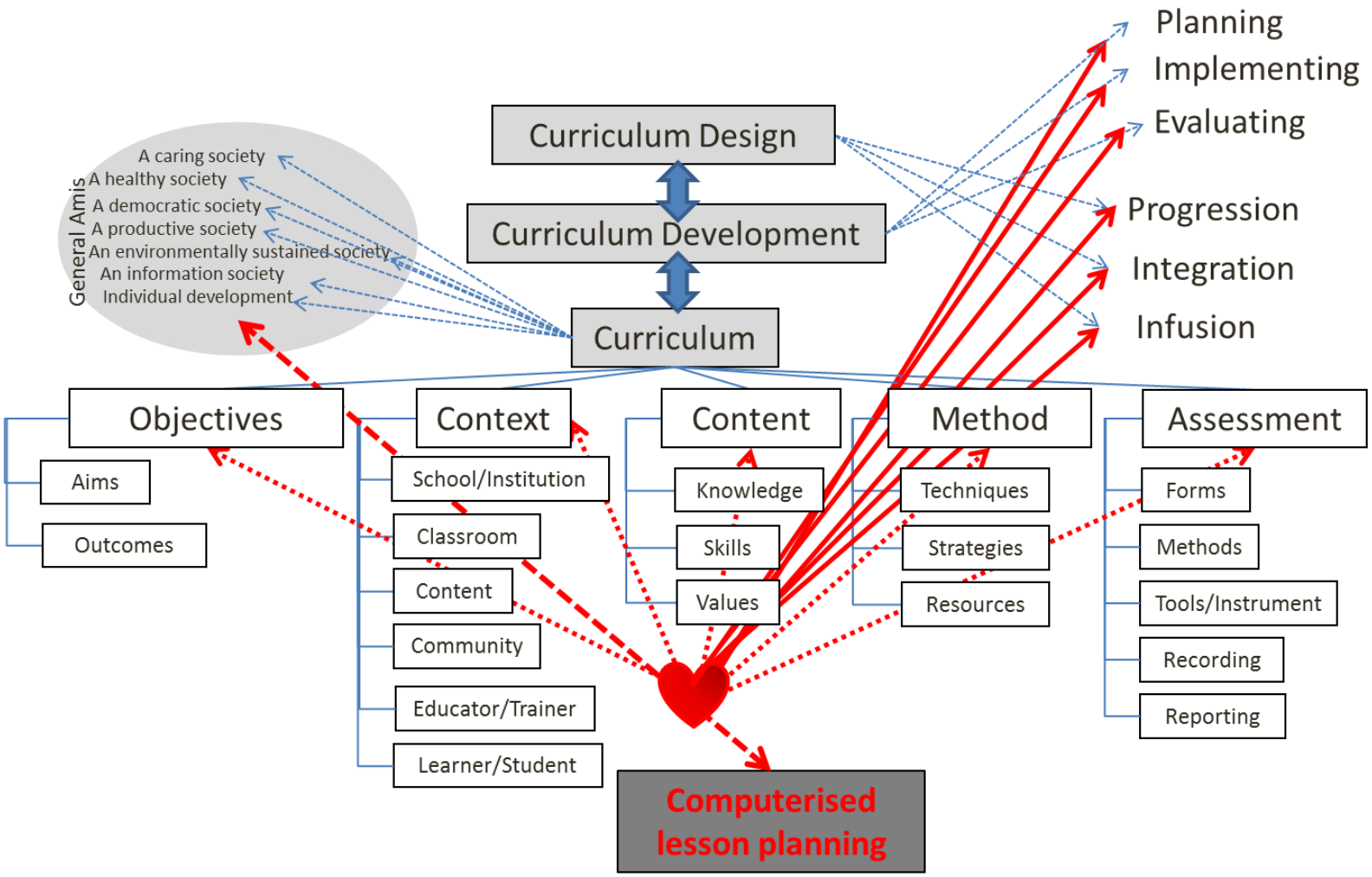


Figure 2.1 Computerised lesson planning in relation to curriculum design and development

The discussion of the elements of a lesson plan and its relation to curriculum design and development makes it clear the process of lesson planning allows a teacher to take account of the curriculum in all its complexity. Figure 2.1 illustrates this complexity with reference to the computerised lesson planning used in this study.

At this point it is necessary to emphasise that this study views lesson planning as an integral part of curriculum development. However, before the rationale for this view is provided, it is important to note that the aim of the study is to contribute to a conceptualisation of what innovative curriculum development entails. Section 2.3 uses the questions posed in Dillon's (2009) theory because of their valuable role in helping to understand, construct and generally implement the curriculum. This theory makes it possible to engage with curriculum development theories and at the same time to take account of the way curriculum design forms an integral part of curriculum development.

Lesson planning is an integral part of curriculum development as it gives attention to planning, implementing and evaluating on different levels (Van den Berg, 2014:91). The significance of this conception of curriculum development is illustrated in Figure 2.1. Lesson or micro level planning requires that all the elements of a curriculum are taken into account, namely objectives, context, content, method and assessment. After planning, the lesson should be effectively presented in terms of the plan. Its success needs to be evaluated in order to make the best informed choices in future lesson planning. Hlebowitsh (2010:203) emphasises that this view allows for agreement that *what is taught* intersects with teacher decisions on *how to teach* and *how to demonstrate whether learning has taken place*.

In order for teachers to be successful in implementing the curriculum, they have to be aware of the resources, time and insight it requires (Hlebowitsh, 2010:204). Planning can help teachers' to understand that their work should be rooted in an ongoing evaluation process in order to improve the school experience (ibid.). In short, for curriculum development to be effective, the whole curriculum needs to move through the steps of planning, implementation and evaluation: "The normative design and general operation of the school experience cannot be accomplished without engaging in the act of curriculum development" (ibid.).

Eryaman (2010:380) points out that the various curriculum development theories provide teachers with common starting points about what and how to teach and learn. O'Neill (2010) argues that it is valuable for teachers and curriculum makers to explore their views on the different theories of curriculum development as well as to employ them in the development, design and delivery of the curriculum. This is necessary to provide the best and most coherent educational experiences for both the teacher and the learner (ibid.). Graham-Jolly (2012:234) acknowledges the work of Grundy (1987) who draws a distinction between 'curriculum as

product', 'curriculum as process' and 'curriculum as praxis'. In the section to follow these theories will be discussed.

2.3 Curriculum development theories informing lesson planning

Carl (2012:78) argues that "successful dissemination, implementation and evaluation of the curriculum" will depend largely on planning the curriculum design systematically and thoroughly. Curriculum theories can guide the teacher in decision making when designing learning programmes (Jacobs, 2011:34). According to Kutu (2013:26), "... theory shapes, guides and gives meaning to the practice of curriculum". In this section of the chapter, the product theory, the process theory and the praxis theory of curriculum development are discussed.

I have chosen to draw on Dillon (2009) to present these curriculum development theories as he makes deep exploration and analysis possible. Dillon (2009:357) explains that a good scheme of questions can help to understand, to construct and generally to practise the curriculum. Dillon (2009:357-358) argues that these curriculum questions help teachers to think about the curriculum and to analyse its elements; to develop curricula, build theories, design courses, write textbooks, and so on; and to practise the curriculum with regard to planning, implementing and evaluating the curriculum. Dillon (2009:344) provides these three curriculum questions, which concern the nature, elements and practice of curriculum:

(1) Nature of curriculum – What is it?
    (1a) Essence or substance – What, is it basically?
    (1b) Properties or character – What is it like?
(2) Elements of curriculum – What things constitute it?
    (2a) Teacher – Who?
    (2b) Student – Whom?
    (2c) Subject – What?
    (2d) Milieu – Where and when?
    (2e) Aim – Why? To what end?
    (2f) Activity – How?
    (2g) Result – What comes of it? Who learns what?
(3) Practice of curriculum – How to think and act it?
    (3a) Action – What to do?
    (3b) Thought – How to think?

Dillon (2009:357) argues that curriculum consists of essential questions to which teachers' practices reflect specific answers. In other words, asking the right questions leads to constructing and finding the right answers. As these questions can provide guidance and clarity for teachers on the nature, elements and practice of curriculum, Dillon's (2009) theory provides

valuable insight into the three curriculum development theories that are discussed in the following subsections:

Table 2.2 Outline and discussion on curriculum as product, process and praxis

	Nature of curriculum	**Elements of curriculum**	**Practice of curriculum**
2.3.1 Curriculum as product	2.3.1.1 Technical paradigm	2.3.1.2 Ahistorical, objective and value-free	2.3.1.3 Enacting lesson planning rigidly
2.3.2 Curriculum as process	2.3.2.1 Practical paradigm	2.3.2.2 Socially constructed	2.3.2.3 Enacting lesson planning with flexibility
2.3.3 Curriculum as praxis	2.3.3.1 Critical paradigm	2.3.3.2 Authentic and critical	2.3.3.3 Enacting lesson planning transformatively

2.3.1 Curriculum as product

Curriculum as product is underpinned by theories such as Tyler's (2009:7). His theory is based on a view of curriculum development as technical. There are four key concepts in Tyler's model: aims and objectives, content, methods and assessment (Jacobs, 2004:50). This requires teachers to specify *why they will teach what they will teach* under aims and objectives, *what they will teach* under content, *the ways in which they will teach* under methods and *whether the purposes have been met* under assessment (Tyler, 2009:7).

There is a strong emphasis on manipulating and controlling the environment, but context and values are left out of account (Frame, 2003:19; McKenna, 2003: 217). Curriculum as product is thus seen as technical. Jacobs (2004:81) argues that Tyler's model is incomplete in the sense that context and the hidden curriculum are excluded. These aspects should be regarded as being as important as objectives, content, methods and evaluation. Bobbit's (1918) scientific approach to curriculum making is also criticised because of his exclusion of the interests and needs of learners (Flinders & Thornton, 2009:60). This criticism could be addressed by adding context and the hidden curriculum to objectives, content, methods and evaluation when developing the curriculum. Lindeque *et al*. (2011:97-122) explain that context deals with external and internal variables that affect teaching and learning. Examples of such external variables include: changes within the society and the needs and expectations of the country. Internal variables include: the age, abilities, needs of the learners; the socio-economic status of the parents; the teachers' beliefs, strengths, weaknesses, experience; the availability of resources and facilities such as equipment, buildings, learning materials; and class sizes (ibid.).

According to Hlebowitsh (2010:203), school curriculum design is based on Tyler's model. Posner (2012:245) points out that Taba (1962) later used Tyler's curriculum development process as a blueprint for her work. These include these six steps:

1. Diagnosis of need
2. Formulation of objectives
3. Selection of content
4. Organization of content
5. Selection of learning experiences
6. Determination of way to evaluate.

Eryaman (2010:380) argues that Tyler (1949) and Taba's (1949) curriculum design frameworks propose that curriculum development should be directed by information gained from industry, the students, educators, and society as a whole.

In the sub-sections that follow I elaborate on the nature, elements and practice of curriculum as product.

2.3.1.1 Nature of curriculum as product

Du Preez and Simmonds (2014:4) argue that Tyler's theory of curriculum development is a technical production procedure.

Frame (2003:19) describes the technical paradigm of knowledge development as permitting one to predict, control and manipulate the environment in order to achieve the outcomes of the curriculum. The assumption is that this holds true for any curriculum, regardless of its context or practice (Frame, 2003:20). This means that the same principles are applied to the content to be taught, teaching and learning methods and the assessment of teaching and learning in various educational contexts (ibid.). The focus on educational results holds for all school contexts (ibid.).

In this kind of linear curriculum, "[s]chooling is assumed to be a process whose main purpose is to promote or produce learning ... thus schooling is conceived as a production system" (Posner, 2012:244). According to Kelting-Gibson (2013:46), Tyler's theory stresses attainment or achievement as an essential element: "Curriculum planning is a technical (or 'scientific') rather than a political matter" (Posner, 2012:245). Tyler believed that he had provided all teachers with a basic model to use in preparing curricula.

Su (2012:153) positions conceptions of curriculum from narrow to broad starting with curricula as courses of study or content; followed by curricula as plans; followed by curricula as documents; and curricula as experiences. Graham-Jolly (2012:231) takes a similar view of a narrow conception of the term curriculum, describing it as a curriculum that refers to the

academic programme of the school, a course of instruction or a syllabus. In this view of curriculum, curriculum change is seen as a limited and technical exercise, as opposed to the broader conception of curriculum which implies a stronger sense of curriculum processes and change (Graham-Jolly, 2012:234). However, it is not sufficient to implement only the planned curriculum as provided on national level or what is termed the curriculum in its narrow sense (Graham-Jolly, 2012:231). As Murphy and Pushor (2010:657) note, a narrow curriculum that is rigid in nature does not make it possible to meet the needs of specific learning and teaching situations.

2.3.1.2 Elements of curriculum as product

McKenna (2003:217) explains that technical interest is served by control and manipulation of the environment. Great value is placed on objectivity and knowledge is seen to be value-free and neutral (ibid.). The technical view of curriculum is confined to being value-free rather than value-embedded (Frame, 2003:21). The technical paradigm does not see the context, goals and values expressed in particular situations as part of the teaching and learning processes. Knowledge is achieved by discovering knowledge that is 'out there' objectively by distancing the knower from the object of study in order to establish the truth (Frame, 2003:21). Therefore, knowledge is not only free of values and objectives but is also treated as ahistorical (Frame, 2003:22). This means that knowledge is independent of its context or history.

2.3.1.3 Practice of curriculum as product

According to Frame (2003:20), those who support this technical view of curriculum would teach the same knowledge and content in the same way, using the same teaching and learning resources with the focus on obtaining the same results. Curriculum inquiry focuses strongly on observable, analysable and measurable aspects and its documents are viewed as tangible products, which do not take account of reality and practice in various contexts (Frame, 2003:21). This implies that lesson planning is enacted rigidly. Smith (2000:8) is critical of this approach, arguing that if a lesson plan is rigidly adhered to, it limits opportunities to use interaction between teacher and learners to shape teaching and learning.

2.3.2 Curriculum as process

Stenhouse (2012:251-257) sees curriculum development as a process. Teachers are part of the curricula developing process and contextual factors are taken into account (Du Preez & Simmonds, 2014:5). Teacher must be experts, but also learners along with their learners. Learner choice is more evident in this theory than in curriculum as product (O'Neill, 2010). Teaching is based on discovery and inquiry rather than direct instruction. The aim of assessment in this model is the development of self-assessment. The process-based curriculum focuses on understanding rather than grades (Simmonds, 2010:55). Learners' interpretation therefore plays a significant role in the theory of curriculum as process. This

means that learners do not just accept knowledge, but question and deconstruct knowledge in order to generate meaning (ibid.). According to McKimm (2007), this theory assumes that information has an intrinsic value and that the focus of learning is not only the achievement of objectives.

2.3.2.1 Nature of curriculum as process

Curriculum as product or curriculum in a narrow sense has been referred to above (see 2.3.1). Curriculum as process moves away from this narrow conception to a broader conception. It rejects the notion that a curriculum is merely a syllabus. Instead it recognises the need to take account of the relationships, attitudes, behaviours and quality of life of a community as a whole along with the demands of the programme or course. The broader definition of curriculum acknowledges intended and unintended learning and views the curriculum as a social construct (Graham-Jolly, 2012:234).

Smith (2000:11) explains that curriculum as process is dynamic and that it is closely associated with the development of practical forms of reasoning. Behavioural objectives are not the focus as in a product approach to the curriculum. Rather than having specified objectives beforehand, content and processes are developed as teachers and learners work together (Smith, 2000:16).

2.3.2.2 Elements of curriculum as process

Stenhouse's (2012:251) theory approaches curriculum development as process orientated and socially constructed. In contrast to the technical paradigm, which views knowledge as objective, the practical paradigm that informs curriculum as process assumes that social reality involves agreement among different agents about what constitutes reality (Frame, 2003:24). Seeing knowledge as a social construction implies that "[k]nowledge is not seen as free of interests, beliefs and values of the human agents who create it, but rather [as] the process for deciding what is true requires that these agents reach consensus" (ibid.). This indicates that knowledge is based on interpretation, which involves reflection and deliberation, resulting in understanding and abilities to reason and make sound judgements rather than objectively discovered knowledge (ibid.). Practical curriculum development assumes that curriculum is context-specific; it therefore focuses on the site of curriculum practice (Frame, 2003:25). This is derived from Schwab's concept of curriculum that should be understood as involving teachers, learners, subject matter and milieu (Frame, 2003:26). As a result, curriculum development focuses on interaction which produces opportunities for learning (Frame, 2003:25).

2.3.2.3 Practice of curriculum as process

Teacher-centred pedagogy, which views learners as passive receivers of knowledge, is rejected by the process theory (Simmonds, 2010:57). Interaction, meaning making and understanding are attributes of curriculum as process (ibid.). The process theory rests on teacher judgement

rather than teacher direction (Stenhouse, 2012:257). Teachers implement the curriculum according to what will work best in their own contexts (Frame, 2003:26). This implies that lesson planning is enacted with more flexibility so it can be responsive to the needs of particular learners and shaped to suit specific environments and situations (Frame, 2003:20). Curriculum is thus interpreted in the context of each school and its understandings of the learners at that school (ibid.).

2.3.3 Curriculum as praxis

The praxis theory can be regarded as a development of the process theory (Smith, 2000:18). Curriculum planning in this model is viewed "as a political and ideological matter" rather than a technical matter, and its ultimate purpose is "liberation" (Posner, 2012:248-249). Posner (2012:249) argues that the main purpose of schooling is to facilitate learning in individuals. "Praxis is [thus] the union of action and reflection and of theory and practice" (McLaren & Crawford, 2010b:150). For example, curriculum development as praxis could use themes that address social, economic and/or political issues in order to answer ideological questions (Du Preez & Simmonds, 2014:5). Simmonds (2010:59) explains that "critical consciousness requires that the legitimacy of the construction and selection of knowledge for acquisition be placed under scrutiny by both the teacher and the learners".

2.3.3.1 Nature of curriculum as praxis

There is a degree of continuity of thought between the critical paradigm and the practical paradigm in that both acknowledge the socially constructed nature of knowledge (Frame, 2003:27). The critical paradigm cannot be restricted to the four commonplaces of Schwab (see Frame, 2003:26). The curriculum becomes a political question that has to be understood in its broader social, political and economic context (ibid.).

The critical perspective of Freire invites practitioners to question the authority of experts in curriculum planning and urges a more democratic relationship between the teacher and learner (Posner, 2012:248). The critical perspective is also known as the emancipatory or the praxis model. Critical educational praxis manifests itself in two main contexts: (1) authentic dialogue between learners in the classroom and (2) the social reality in which people exists (McLaren & Crawford, 2010b:150). McLaren and Crawford (2010a:147) explain that learners can, through self-reflective thought and action, problematise or interrogate their experiences and perceptions.

2.3.3.2 Elements of curriculum as praxis

Knowledge is socially constructed and handled within existing social structures (McKenna, 2003:219). Smith (2000:19) explains that teachers approach the schooling situation as an opportunity to develop the ability to think critically and to take action. This theory emphasises critical reflection and it requires dialogue in which teachers and learners are critical investigators

(Du Preez & Simmonds, 2014:5). The promotion of critical consciousness forms the focus of the emancipatory interest of curriculum as praxis (Frame, 2003:28). Knowledge is contestable and contested as a result of conflicts at the intertwined level of values, interests and beliefs (Frame, 2003:27).

Knowledge is also seen as authentic. Frame (2003:28) explains that acquiring authentic knowledge requires the learner to be the final arbiter over what is true rather than the teacher or the textbook. In order for knowledge to be authentic, questions of what knowledge is appropriate should be integral to the learning process (ibid.).

The implications of the elements of curriculum for curriculum as praxis can be explained using Freire's five constitutive elements of praxis in the curriculum. Grundy (1987:114-116) explores Freire's elements of praxis in the context of education briefly as follows: Firstly, curriculum development takes place through dynamic interaction of action and reflection. This means that curriculum is developed through active and integrated processes rather than through implementing a set of plans. Secondly, curriculum as praxis develops authentically in relation to the real world, considering the teaching and learning processes as integral to curriculum implementation. Thirdly, curriculum as praxis considers teaching and learning as a social act in which curriculum is developed in social environments and based on a dialogic relationship between the teacher and learner. Fourthly, knowledge is a social construction that takes place through interaction among teachers and learners where they engage critically in reflecting on knowledge. Lastly, curriculum as praxis views meaning-making and interpretation as a social process in which critical orientation to all knowledge is essential. This indicates that curriculum as praxis is an authentic and critical undertaking where knowledge is never straightforward; it is based on reflection.

2.3.3.3 Practice of curriculum as praxis

According to Kutu (2013:32), the implication of this theory is that teachers need to have the necessary knowledge and ability to engage learners in solving real-life problems to foster critical reasoning. Kutu (2013:31) explains that in this theory, every individual learner and every individual teacher are seen as potential knowledge contributors. Teachers and learners work collectively to solve the real-life problems and to construct knowledge based on critical reasoning (ibid.). Smyth (2010:157) explains that teachers allow and encourage learners to look beyond surface appearances and to see the ways in which social and political aspects shape groups.

Steinberg (2010:382) describes the critical praxis teacher as a learned scholar, community researcher, moral agent, philosopher, cultural worker and political insurgent, and a presenter of knowledge and insight that can change a learner's identity. Teachers and learners are critical

investigators who engage in problem-posing through dialogue (Posner, 2012:249). Simmonds (2010:61) explains that there are various elements of critical thinking that are embraced in the notion of curriculum as praxis theory. Learners develop skills, habits and dispositions which will allow them to question their reflections and actions and allow them to make critical judgements during the teaching and learning process (ibid.).

This makes it possible for lesson planning to be enacted transformatively. Simmonds (2010:58) explains that the potential for a lesson to develop into an emancipatory event lies in the "transformation of consciousness during which one's perceptions and actions of the world are transformed". Colyn (as cited in Carl, 2012:9) states, "[t]eachers can take charge of transforming their practice in order for change to occur in their classes.... [But that means] it is necessary [for] teachers [to] start reflecting on their practices". Carl (2012:51) explains that the transformative orientation to curriculum requires a high level of involvement by both the learners and the teachers as they interact with each other and the curriculum and give meaning to it. In this conception of curriculum as praxis, curriculum design principles of integration, progression and infusion must inform practice. Kutu (2013:44) states that design principles form an integral part of the theoretical foundation on which a curriculum design is developed. A short description of these curriculum design principles follows.

2.3.3.3a Integration

According to Kutu (2013:46) integration can be viewed as the conception of the level of boundaries that exist between and within subjects. McKimm (2007) explains that an integrated approach is still subject-centred but that it transcends traditional subject boundaries. There is a distinction between vertical integration and horizontal integration. Vertical integration occurs when boundaries between the subjects in the curriculum are blurred, whereas horizontal integration describes the process of drawing knowledge and skills from a number of subjects to focus on a theme or do an activity (ibid). Nieuwoudt and Beckley (2004:324) provide an example of integration by illustrating how learners could be required to use the knowledge acquired in the Natural Science curriculum and the skills acquired in Languages in order to create a poster aimed at the prevention of HIV/AIDS.

The computerised lesson planning program that was devised for this study invites users to apply the principle of integration in curriculum design to each lesson plan as well as in the weekly plan. This will be illustrated in Chapter 3 (3.8).

2.3.3.3b Progression

Kutu (2013:46) uses the complexity of the learning content to illustrate the concept of progression. For example: in Grade R learners learn to use natural numbers such as 1, 2 and 3 in order to count and sort objects; in Grade 1 addition and subtraction of natural numbers are

learned; later on division and multiplication are learned (Nieuwoudt & Beckley, 2004:327). This indicates that there is progressive development of a concept such as number operations from Grade R onwards.

The curriculum design principle of progression was not explicitly addressed in the development of the computerised lesson planning program presented in this study. However, it may be argued that progression is evident in a holistic overview of the teacher's plans, which start with simpler concepts and then move on to more complex concepts as the terms or weeks proceed.

2.3.3.3c Infusion

Infusion penetrates the boundaries between learning content (Kutu, 2013:46). Carrim and Keet (2005) distinguish between minimum infusion and maximum infusion. Minimum infusion occurs when issues are addressed by the curriculum indirectly, while maximum infusion occurs when the curriculum content directly or explicitly address issues (ibid.). For example, there is minimum infusion of language when language is addressed in the subject area of Language only. In contrast, maximum infusion of language occurs when the teacher infuses language into all the subject areas of the curriculum. In this study, the curriculum design principle of infusion is not explicitly addressed in the development of the computerised lesson planning program, but infusion of technology across all the subject areas takes place when the computerised lesson planning program is used for all subjects.

It is important for teachers to be aware that no one theory is without flaws and that the product, process and praxis theories should not be seen in isolation (Simmonds, 2010:58; O'Neill, 2010). Reflecting on the discussion presented above (2.3.3.3a, 2.3.3.3b and 2.3.3.3c) curriculum planning, could help teachers make sure that content is related to previous content, that progression takes place in all teaching and learning of content and that content is infused within the curriculum.

This section has shown that the approach taken to curriculum planning is influenced by the theory that underlies curriculum development. Next, the possible factors affecting the use of technology are discussed followed by an exploration of the implications of computerised lesson planning and curriculum development.

Mathipa and Mukhari (2014:1214) argue that teachers in the 21st century need to be digitally competent so they can enable learners to share knowledge, to be problem solvers, to have higher order thinking skills, and to collaborate with other learners, as well as to manage and control their learning. There are, however, factors that could influence this. I will discuss these factors in the next section.

2.4 Use of technology, computerised lesson planning and curriculum development

In this section I first discuss the factors influencing the use of technology in education and then I discuss the implications for computerised lesson planning and curriculum planning. I am doing this so that I can better position curriculum development within computerised lesson planning program.

Blackwell *et al*. (2014) provide a model of the factors that could impede the implementation and incorporation of digital technologies (in this instance, specifically computerised lesson planning) in education. According to Blackwell *et al*. (2014:84), the relationship between these factors can be summarised as follows: the higher the levels of support and the more positive the policies of the schools are regarding technology, the higher the teachers' confidence and therefore the higher the use of technology. The socio-economic status (SES) of student teachers, together with the amount of experience with technology they have had, affects their attitude to the use of technology. This in turn affects their level of technology use. This is illustrated in Figure 2.2 below.

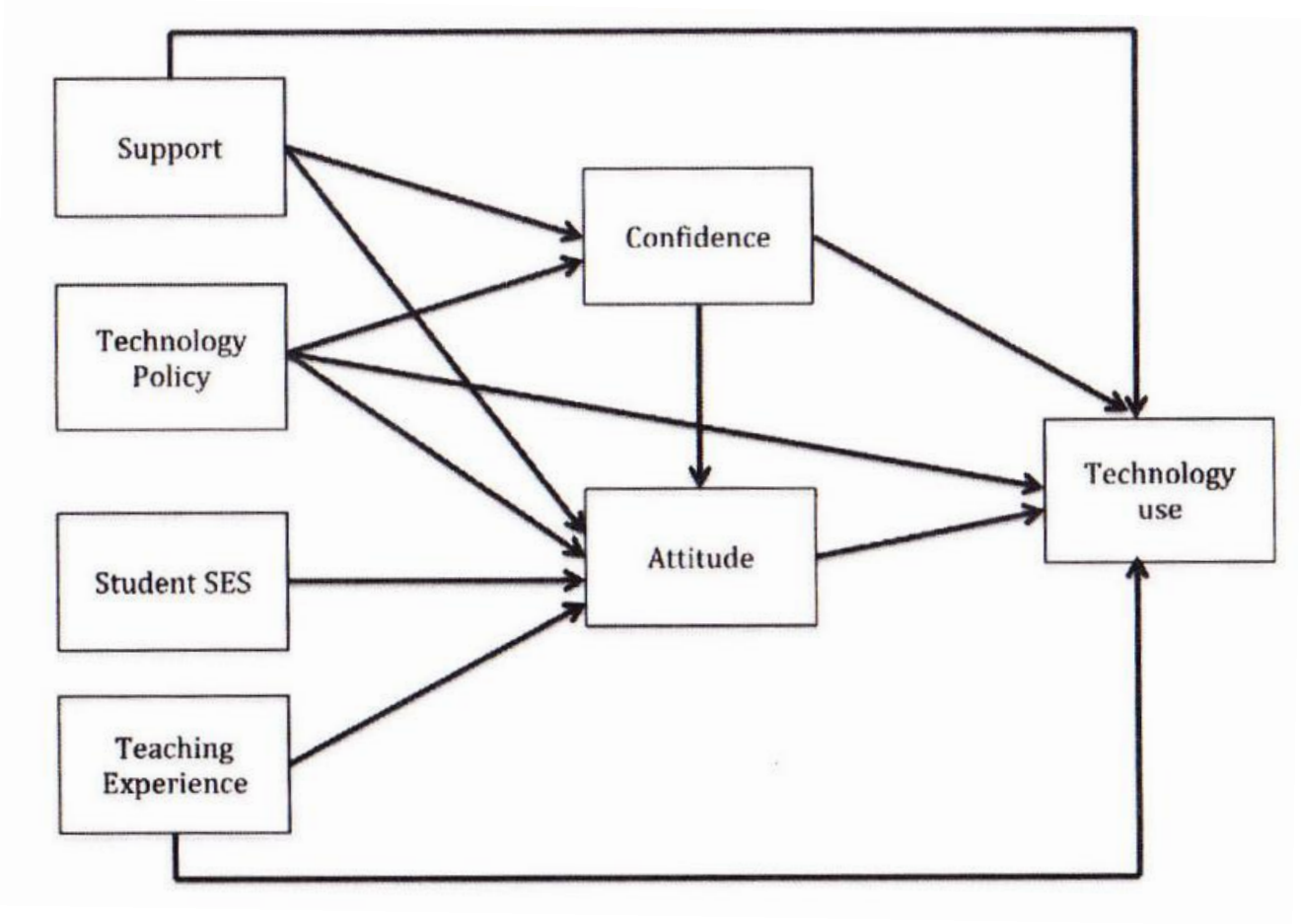


Figure 2.2 Model of factors that affect technology use (Blackwell *et al*., 2014)

In order for teachers to have more confidence and a more positive attitude towards using technology, schools need to ensure that they have clear policies and that there will be adequate support for teachers (ibid.). The socio-economic background and the experience teachers and learners have had in using technology need to be taken into account as well. These are among the factors that determine the extent to which technology will be used. It is safe to assume that teachers who are more confident about using technology and have a positive attitude towards incorporating it in their planning practices will be more likely to use technologies such as the computerised lesson planning program in this study (Grüneş *et al.,* 2010:1266, Lee & Lee, 2014:126). According to Webster and Son (2015:85), there are two types of factors that can affect the use of technology by teachers in schools, "intrinsic" and "extrinsic" factors, which are discussed below.

2.4.1 Extrinsic and intrinsic factors influencing technology use

According to Webster and Son (2015:85), researchers have researched the factors influencing the use of technology in teaching and learning for decades. Blackwell *et al*. (2014) divide the factors that impede the integration of technology into education into two types. The first type is extrinsic factors such as the lack of access to technology, time to learn and use technology, training and support, and professional development (Blackwell *et al.*, 2014:83). The second type is intrinsic factors that include teaching beliefs, comfortableness with using technology and perceived values of technology (ibid.). Some of the extrinsic and intrinsic factors that could hinder or facilitate technology integration will now be discussed. This discussion reveals the advantages and disadvantages of technology integration into education.

2.4.1.1 Extrinsic factors influencing technology use

Bates (2014) argues that technological trends in Africa are somewhat different from those in developed countries. This is largely related to a matter of access. Access to computers, internet and mobile phones is more limited in Africa than in developed countries, mainly because of high costs. According to Beukes-Amiss (2014) "Africa is still the continent where broadband is least affordable – that is where the cost of a subscription is highest compared to wages". Although connection to the internet is not a requirement for the computerised lesson planning program, the teacher might need to use the Internet to access the most recent information and resources for lesson plans.

In an article provided by SAPA (2014), the information was given that more than 20% of the schools in South Africa have no power supply whatsoever. Goodman states that "[e]lectricity is a critical issue if technology and internet integration (e-learning) is to take place and much work has gone into providing a stable electricity supple in all schools in the country" (as cited in SAPA, 2014). Although SAPA (ibid.) refers specifically to e-learning, this issue is also applicable to the use of computers. Without electricity in schools computers could not be switched on or

laptops could not be charged in order to function optimally. In Namibia, 58.3% of primary schools had electricity in 2012 (Elletson & MacKinnon, 2014:113).

In the *eLearning Africa Report 2014* Elletson and MacKinnon (ibid.), state that Namibia has ongoing issues related to social inequalities and high rates of poverty. Few teachers and learners have their own personal computers. Limited access to computers obviously means that many teachers do not have much experience of working on computers, which has a snowball effect on the rest of the factors discussed in this section. Poverty is one of the main factors that hinder access to computers. However, the possibility of integrating technology into the school curriculum is strong. At present 20% of Namibia's national budget is allocated to education and according to Elletson and MacKinnon (ibid.) the country is at the forefront of integrating technology into the education sector.

The cost of computer technology is mainly responsible for the limited access to and availability of computers. Alfreds (2015) states that the technology project in the Gauteng province in South Africa cost R17bn, approximately 10% of the entire country's education budget (R186.1bn). If computer technology projects and training are to succeed, equal amounts will need to be spent on each of these. Alfreds (2015) argues that "...the cost of technology should make up half of the capital outlay for a technology programme with the rest of the money being spent on training".

On the other hand, accessibility and availability of computers and other technologies could lead to the successful integration of technologies in education and could assist teachers and learners to acquire the skills necessary to meet the demands of the 21st century. According to Khan (2015), technology platforms can encourage skills such as metacognition, critical thinking, persistence and self-regulation.

Mathipa and Mukhari (2014:1217) argue that teachers do not integrate technology into education because they lack the time to do so. Ironically, teachers could gain time by using technology to do administrative tasks (Khan, 2015).

According to Alfreds (2015), educators need to be trained before technology is introduced into schools. In a News24 Live video, however, Kobus Van Wyk argues that the enterprise is doomed to fail if teachers do not see the value of technology in education before the training begins (cited by Alfreds, 2015). Mathipa and Muthari (2014:1217) recommend providing pedagogical training on using technologies across the curriculum. This will enable teachers to succeed in teaching the 'Net Generation' who will need these 21st century skills (ibid.).

2.4.1.2 Intrinsic factors influencing technology use

In addition to receiving training and recognising the value of using technology in education, teachers need to be open to change and maintain positive attitudes towards the integration of technology (Mathipa & Muthari, 2014:1217). Resistance to change and a negative attitude are among the barriers to using technology integration in teaching and learning (ibid.). “Change is commonly not an easy thing that will take place smoothly because it is something unusual and frightening” (ibid.). Older teachers are more comfortable with their traditional way of teaching and often believe that using technology holds no benefits for themselves or their learners (ibid.). However, Van Wyk (cited by Alfreds, 2015) argues that teachers with deeply ingrained traditional pedagogical habits could master the necessary skills to use technology skills, but will need continuous training and support. It is most important for all stakeholders to ‘buy into’ the enterprise and have a strong desire for technology in education to succeed (ibid.).

According to Neer (2014), technology will not be implemented successfully unless teachers feel comfortable using it. He suggests that professional development has to go hand-in-hand with technological implementation (ibid.). Van Wyk (cited by Alfreds, 2015) told Fin24 that technology is alien to the traditional classroom, in which most teachers feel at home. He said that “[teachers] are completely out of their depth when given technology tools” (Van Wyk cited by Alfreds, 2015). While teachers may be expected to understand how devices such as tablets, laptops or smartphones work in their personal lives, it is vital that they receive specific training in using them as part of the curriculum (Alfreds, 2015). The teachers who understand technology and recognise its value in their personal lives are more likely to understand and value it in their professional lives. Mathipa and Mukhari (2014:1218If) claim that teachers who have received effective training in using and integrating of technology would be very confident about engaging with it.

Grüneş *et al*. (2010:1266) contend that for teachers to be able to use technology such as computers, they must be willing to believe that they can do so. Lee and Lee (2014:121) refer to various studies done on teachers and conclude teachers’ self-efficacy beliefs about the integration of technology is one of the strongest factors in their actual use of technology. In order to use technology such as a computerised lesson planning program, teachers must have the necessary technical skills to work on a computer. Kobus van Wyk, the head of eLearning at Mustek reported in a live video with Fin24 that a lack of training and therefore the lack of understanding of the ways in which technology can be employed is the major reasons for under-utilisation of technology in schools (cited in Alfreds, 2015).

Grüneş *et al*. (2014:1266) explain that teachers are important stakeholders in any endeavour of technology integration in schools. Their beliefs, views and attitudes must be thoroughly understood before any initiatives take place (ibid.). It is also necessary to take any hindrances

into account in order to understand why digital technologies are not used in the manner they should be (ibid.).

Successful implementation of technology in education needs the whole-hearted backing of teachers. Mathipa and Mukhari (2014:1219) argue that they need to be conscientised on ways in which their colleagues, learners and the society at large could benefit from using the new technologies. In their study they found that using technology had a positive effect on learners and learning (ibid.). It helped teachers to gain and retain the interest of learners and to motivate them to take an active part in learning (ibid.).

In the next section the implications for computerised lesson planning during curriculum development are discussed.

2.4.2 Implications for computerised lesson planning during curriculum development

In this section I explore the implications for computerised lesson planning during the process of curriculum development. Before exploring these implications, the link between technology and computerised lesson planning, the link between technology and curriculum development and the link between technology and education are made explicit.

2.4.2.1 The link between technology and computerised lesson planning

This study argues that the concepts of technology and computerised lesson planning are intertwined and linked. Miller (2011:248) defines technology in this instance as follows:

> ICT means that it deals with any product that can be used to store, retrieve, manipulate, edit, transmit or communicate information in a digital format. This includes software that operates the equipment; software that manages storing and retrieving information; software that manipulates, edits, transmits and communicates information; and the equipment or hardware itself used for storing, retrieving, manipulating, editing, transmitting or communicating information in a digital format.

Miller (2011:249) provides an equation for successful computer usage in education.

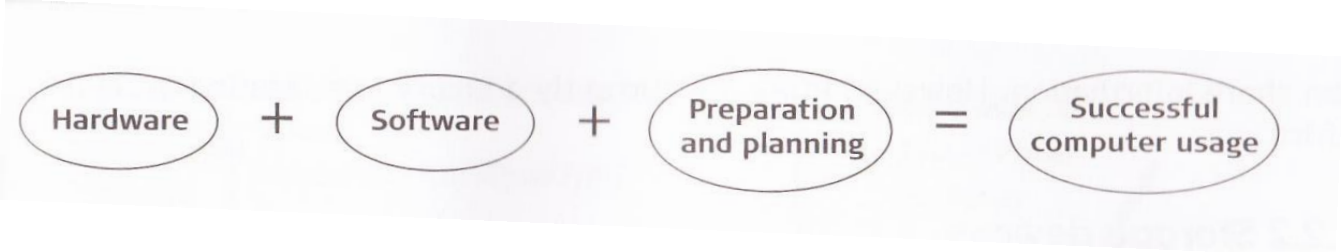


Figure 2.3 Equation for successful computer usage (Miller, 2011:249)

Now that the link between technology and computerised lesson planning has been made, the link between technology and curriculum development is discussed in 2.4.2.2.

2.4.2.2 The link between technology and curriculum development

Lever-Duffy and McDonald (2008:27) explain that technology used in education is far more than just a certain type of computer or a specific camera brand. It is a varied range of theories and practices related to designing, developing, using, managing, and evaluating both teaching and learning processes and the technological resources used in these processes (ibid.). Therefore technology used in education is relevant to curriculum development. This becomes apparent in the definition of curriculum development used in this study: “the process of selecting, organizing, executing and evaluating the learning experiences on the basis of the needs, abilities, and interest of learners, and on the basis of the nature of the society or community” (Alonsabe, 2012:1).

2.4.2.3 The link between technology and education: software

Lever-Duffy and McDonald (2008:167) distinguish between educational computer software, administrative software and academic software. Administrative software assists teachers to accomplish administrative, professional, and management tasks associated with the educational profession (ibid.). Academic software assists teachers and learners in the teaching and learning process itself and it significantly enhances lessons and helps teachers to address the needs of the learners (Lever-Duffy & McDonald, 2008:207). Computerised lesson planning is a technology in the form of an instructional management system. This is a combination of the administrative software and academic software as defined above. According to Mandinach and Sharnell (2012:89), instructional management systems are defined as “[a] technology-based tool that assists educators to design and structure their instruction”.

In order to make the explanation of the computerised lesson planning program more concrete, various examples of software similar to the computerised lesson planning program used for the purpose of this study are discussed next.

2.4.2.3a Curriculum Mapper

Lever-Duffy and McDonald (2008:204) refer to software used for the purpose of curriculum management. One example of this type of software is the Curriculum Mapper. Curriculum Mapper is software that enables teachers to identify standards and analyse when the standards are being addressed (ibid.). This enables the teacher to be informed about exactly what is being covered and when, and to identify resource needs (ibid.). Curriculum Mapping 101 (2007) includes curriculum organisation into content, skills, assessment, activities and strategies.

2.4.2.3b Authoring systems

Another example of how teachers can use technology in education, more specifically for curricular planning, is authoring systems. Authoring systems include programmes that create computer-based customised multimedia lessons (Lever-Duffy & McDonald, 2008:211). These systems can assist the teacher to organise and present lessons, projects or reports (ibid.). Powerpoint is another example of an authoring system. This type of software can be used by the teacher to create transparencies or customised handouts or flyers (Lever-Duffy & McDonald, 2008:215). All of these can be used by the teachers to enhance the objectives of their lesson plans (ibid.).

2.4.2.3c Planboard

Planboard is a third example of how teachers can incorporate technology in their planning. Planboard allows teachers to view their academic year and create synopses of weekly schedules (Chalk.com, 2014). It ensures that learners have the knowledge they need to integrate standards (ibid.). It also allows teacher to create and share lesson plans (ibid.).

2.4.2.3d Other educational software

Bhaskar (2013) lists some other examples of educational software that is available. One is Google sites where technology can be integrated into the classroom to create websites to provide learners with meaningful and rich curricula in the form of images, videos and tutorials. This also allows for collaboration among learners and teachers and these sites can be used for exhibiting examples of work. Another is Camtasia software, which can be used to create video lessons by recording screens to capture PowerPoint slides, demos, web pages and more. This software promotes creative learning. Yet another is Capzles, which enables teachers to create rich multimedia experiences such as videos, images, photos, music and documents. The last of these examples is Prezi, a presentation application that helps teachers to organise and share ideas.[2]

I have discussed the link between technology and computerised lesson planning, the link between technology and curriculum development and the link between technology and education in the sections above. The implications for computerised lesson planning during curriculum development are discussed next.

[2] Although the above mentioned examples refer to how learners learn, this research study focuses on how technology is or can be used by the teacher to do planning and teaching aimed at facilitating learners' learning.

2.4.2.4 The implications for computerised lesson planning during curriculum development

Curriculum development is an on-going process that ranges from design to evaluation (Carl, 2012:41). Short descriptions of each of the phases of curriculum development are used to highlight possible implications for computerised lesson planning.

Curriculum design takes place when a new curriculum is planned or is in the replanning or reviewing stage of an existing curriculum (ibid.). The components of curriculum design include purposefulness, content, methods, learning experiences and evaluation (ibid.). Carl (2012:42) explains that during *curriculum dissemination* the curriculum consumers are prepared for the intended implementation by means of information dissemination. The components of *curriculum implementation* include distribution or publication of information, ideas and notions and in-service training aimed at preparing and informing curriculum stakeholders of the proposed curriculum. Curriculum implementation is the phase in which the relevant design is applied in practice. Lastly, *curriculum evaluation* is the process in which the effectiveness and success of the curriculum are evaluated, including the effect on the learners (ibid).

Teachers are required to design subject or lesson curricula by means of thorough curriculum knowledge and skills (Carl, 2012:109). In essence, dynamic curriculum development depends on the quality of the design (ibid.).

Carl (2012:46) notes that curriculum development, like various other aspects of education, has also been influenced by recent large-scale technological development. According to Mathipa and Mukhari (2014:1215), there can be no doubt that technology forms an integral part of the global society; its value in schools is to help in knowledge creation, knowledge sharing, problem solving, group and cooperative learning, and the development of economic and social change. The integration of technology is vital because it can provide access to information and provide learning beyond the classroom (Mathipa & Mukhari, 2014:1216).

Khan (2015) suggests that technology is best used when it empowers teachers and learners to create learning experiences that are personalised, accessible and creative: “We just have to be careful to view it as a means to this end, rather than an end unto itself” (ibid.). Carl (2012:1) argues that each teacher must be systematically empowered in curriculum development in order to optimise teaching-learning events and contribute to developing their own and their learners’ potential. The type of environment needed “within which teaching may occur optimally can only be created through effective empowerment” (Carl, 2012:2). Effective empowerment means teachers become active agents of curriculum development (Carl, 2012:3). In this context, the term ‘empowerment’ is a process which entails growth and development to optimise the teaching-learning situation as well as teachers’ own potential (ibid.).

Teachers as empowered curriculum developers present various implications for computerised lesson planning. Three key dimensions of this are:

- First, the teacher should be *actively involved* in the process of curriculum development. The teacher should be an agent who is able to develop and apply the relevant curriculum in a dynamic and creative way, rather than a mere implementer of it (Carl, 2012:15). In other words, the teacher should make a contribution to the development of the teaching-learning environment (ibid.).
- Second, the teacher needs to be an *agent of change*. This requires the teacher to have an understanding and broad knowledge of "educational views, a knowledge of children, a positive teaching aptitude and educational relationships, and knowledge and expertise in respect of both general curriculum studies and particular subject curriculum studies" (ibid).
- Third, in addition to being an active role player and agent of change, teachers have to be involved in *creative thinking processes*. The teacher would then develop and apply the curriculum dynamically and creatively (ibid.).

Empowered teachers function as researchers who have a say in decision making (ibid.). In what follows, I relate the notions explored above to curriculum as product, process and praxis.

In *curriculum as product*, knowledge is universal and objective (see 2.3.1). This means that the teacher is not empowered to be actively involved as an agent of change or to be involved with creative thinking processes. In *curriculum as process* (see 2.3.2), teachers are empowered to implement the curriculum according to what works best in their specific contexts (Frame, 2003:26). This allows teachers to be actively involved and creative in teaching-learning processes. Since the curriculum is enacted to suit the needs of particular teachers and learners (ibid.) the teacher needs a broad knowledge of the context and must be an agent of change (Carl, 2012:15). *Curriculum as praxis* (see 2.3.3) requires teachers and learners to look beyond surface appearances and see ways in which social and political issues shape groups. This requires the teacher to be involved in creative thinking processes. Teachers and learners possess the potential to contribute to knowledge (Posner, 2012:249) which means they have the broad knowledge that is required to be agents of change (Carl, 2012:15). The knowledge also permits teachers and learners to engage in solving real-world problems (Kutu, 2013:32). Reflection empowers teachers to transform their practices so that change can take place (Colyn as cited by Carl, 2012:9).

This could mean that technology in the form of computerised lesson planning could be a catalyst for teachers to be actively and creatively involved as well as agents of change when it

comes to curriculum development. For teachers to recognise this, knowledge cannot be seen as universal and objective. Teachers need to be informed and knowledgeable about the curriculum in order for context and social and political issues to be considered as part of the teaching-learning process. This could encourage teachers to be creative and to embrace change and engage in authentic teaching and learning. Furthermore, this could also encourage innovation in the form of new, original and creative ways of developing curricula.

In the next section I will discuss possibilities of curricular innovations.

2.5 Possibilities of innovative curriculum development through using technology

Amory (2014:501) explains some of the ways in which technology can be used in teaching-learning processes. The first is as an information stream which provides teaching and learning resources and other relevant information needed in teaching and learning, research and administration. The second is as an enabler of communication, using both synchronous and asynchronous communication modes. The third is as an enabler of collaboration such as collaborative authoring and other forms of co-authorship and co-construction. The fourth is as an information transformation tool, making it possible for one, or many, information streams to be alternative streams. Lastly, technology can be used as a professionalisation tool. The intervention in the form of the computerised lesson planning program used in this study is an example of software that could be used by lower-primary teachers, final year education students and university lecturers in this way.

Dlamini (2014) emphasises that technology has the ability to bring excluded communities into the mainstream economy as well as to improve education significantly. When communities are connected to the Internet and have access to technological tools, as well as the necessary skills, they will be able to enjoy the full benefits of technology, which could lead to growth and innovation (ibid.). Technology boosts skills, which boost technological innovation and development, which in turn improve society (ibid.). Technology needs to be recognised as a catalyst for change in working conditions, handling and exchanging information, teaching methods, learning approaches, scientific research, and accessing information (Kaul, 2014:45). Greater use of technology could make it possible for schools and universities to harness the benefits of using technologies to complement and support teaching and learning processes (Kaul, 2014:47).

The integration of technology in education could reflect and represent a shifting pedagogical paradigm (ibid.). This paradigm has its roots in the educational theory of Dewey and Freire. They both believed that education and teachers should imbue learners with the skills they need to become rounded individuals and better human beings (ibid.). Researchers and teachers have

a responsibility to embrace and shape the processes of change brought about by technology and to implement them in their teaching (ibid.).

As referred to in Chapter 1 (see 1.2), Hlebowitsh (2010:203) argues that curriculum development should be organic and comprehensive. Any determination about *how to teach* has to be done in relation to *what gets taught* and also that any determination about *what gets taught* has to be understood in relation to wider learning purposes and supplementary learning effects (ibid.). For the purpose of this study the term 'innovative curriculum development' is used to refer to the process of creating new or original learning, content arrangements and experiences based on the abilities, needs and wider learning purposes of the learners.

This study embraces the innovative teaching and learning processes that result from the integration of technologies in education in general, but particularly in curriculum development. It should be emphasised that the integration of technologies in curriculum development is not meant to create a mechanical way of developing teaching and learning, but rather to combine the benefits of technology with emerging models of teaching and learning in order to transform curriculum development, and in turn education (Kaul, 2014:54).

Carl (2012:109) argues that empowered teachers require thorough curriculum knowledge and skills since these will determine the level and quality of their curriculum development. Their level of empowerment will be evident in whether they engage in rigid or dynamic curriculum development (ibid.). Ongoing evaluation is essential: it provides a way of determining whether curriculum development is effective and innovative. As Carl (2012:78) points out, effective curriculum development is "... stimulated as ongoing evaluation takes place". I believe that the use of a computerised lesson planning program that integrates technology and the curriculum could result in dynamic curriculum development.

Celuch *et al*. (2014:27) explain that rigid rules have inhibited the creativity and innovativeness of teachers. Foulger *et al*. (2013:105) suggest that teachers need to have the necessary freedom to think innovatively as they explore the possibilities of applicable technologies. Bladergroen *et al*. (2014:6) explain that innovative teaching and learning bring about change and novelty. Computerised lesson planning could lead, assist and motivate teachers to create or find new ways of accommodating learner's needs, achieving objectives, presenting content, introducing innovative teaching and learning methods and assessing teaching and learning processes. The integration of technology and curriculum development can make innovative lesson planning possible. "By being ahead of technological evolution, the teacher is also an implementer of change, a pioneer" (ibid.).

2.6 Conclusion

In this chapter the elements of lesson planning and how they are related to curriculum development were discussed. Lesson planning was portrayed as a core activity in curriculum development. Drawing on the literature, the nature, elements and practice of the three dominant theories of curriculum development, namely product, process and praxis, were explored. The link was then made between the curriculum and technology, which underpins computerised lesson planning. With the focus on determining the effect of computerised lesson planning on innovative curriculum development, this chapter also explored the factors that could facilitate and/or hinder the use of technology in education. The implications of these were discussed. As mentioned above, Bladergroen *et al*. (2014:6) explain that innovative teaching and learning implies change and novelty. The chapter concluded with a discussion of the possibility of innovative curriculum development using a computerised lesson planning program as an alternative to traditional written lesson plans.

In the next chapter I will discuss the research design employed by this research study.

CHAPTER 3
RESEARCH DESIGN, METHOD AND PROCESSES

3.1 Introduction

Chapter 3 provides a detailed discussion of the research design and methodology used in this study. According to Fouché *et al*. (2011:142), a research design focuses on all the steps in the research process to achieve the end product and expected outcomes. This study used a qualitative research design situated in a pragmatic paradigm. The different aspects of the research design such as the research environment and sample, the data generation methods, analysis methods, the intervention and researcher's positionality are all described. Finally, considerations related to validity, trustworthiness and ethics are discussed.

3.2 Research design

Qualitative and quantitative research approaches differ in how the data are generated, analysed and interpreted (Davis, 2014a:14). Qualitative research approaches are employed when the objective of the study is to understand, explore or describe people's behaviours; themes in their behaviours, attitudes or trends; or relations between their actions (ibid.). According to Creswell (2014:4), the process of qualitative research involves:

- Emerging questions and procedures
- Data typically generated in the participant's setting
- Inductive data analysis building from particulars to general themes, and
- Interpretations of the meaning of the data made by the researcher.

In order to answer the research questions, a qualitative research approach was adopted. Punch (2009:113-144) explains that a research design is the basic plan for a piece of research which includes these five main elements: methodology (3.3), paradigmatic position (3.4) the sample and research environment (3.5), the data generation methods (3.6), and the method of data analysis (3.7). These five elements are discussed below.

3.3 Design-based research methodology

Wang and Hannafin (2005:6) define design-based research as

> ... a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories.

According to Plomp (2013:21) and Van den Akker *et al*. (2006:5), six key aspects underpin this methodology. (1) The aim of design-based research is to design and intervene in real world settings; (2) the focus is on comprehending and improving interventions and therefore design-based research is process orientated; (3) design-based research is also utility orientated, i.e. the value and quality of the design is determined by its relevance to real world contexts; (4) it is also theory orientated in that it has a conceptual framework as well as theoretical propositions and the findings contribute to theory building; (5) design-based research is practitioner orientated and this increases the likelihood that the research will be relevant and applicable to the educational context; and (6) design-based research is iterative in the sense that it incorporates cycles of analysis, design, development, evaluation and revision.

Figure 3.1 was designed in order to illustrate the iterative cycles and phases of design-based research.

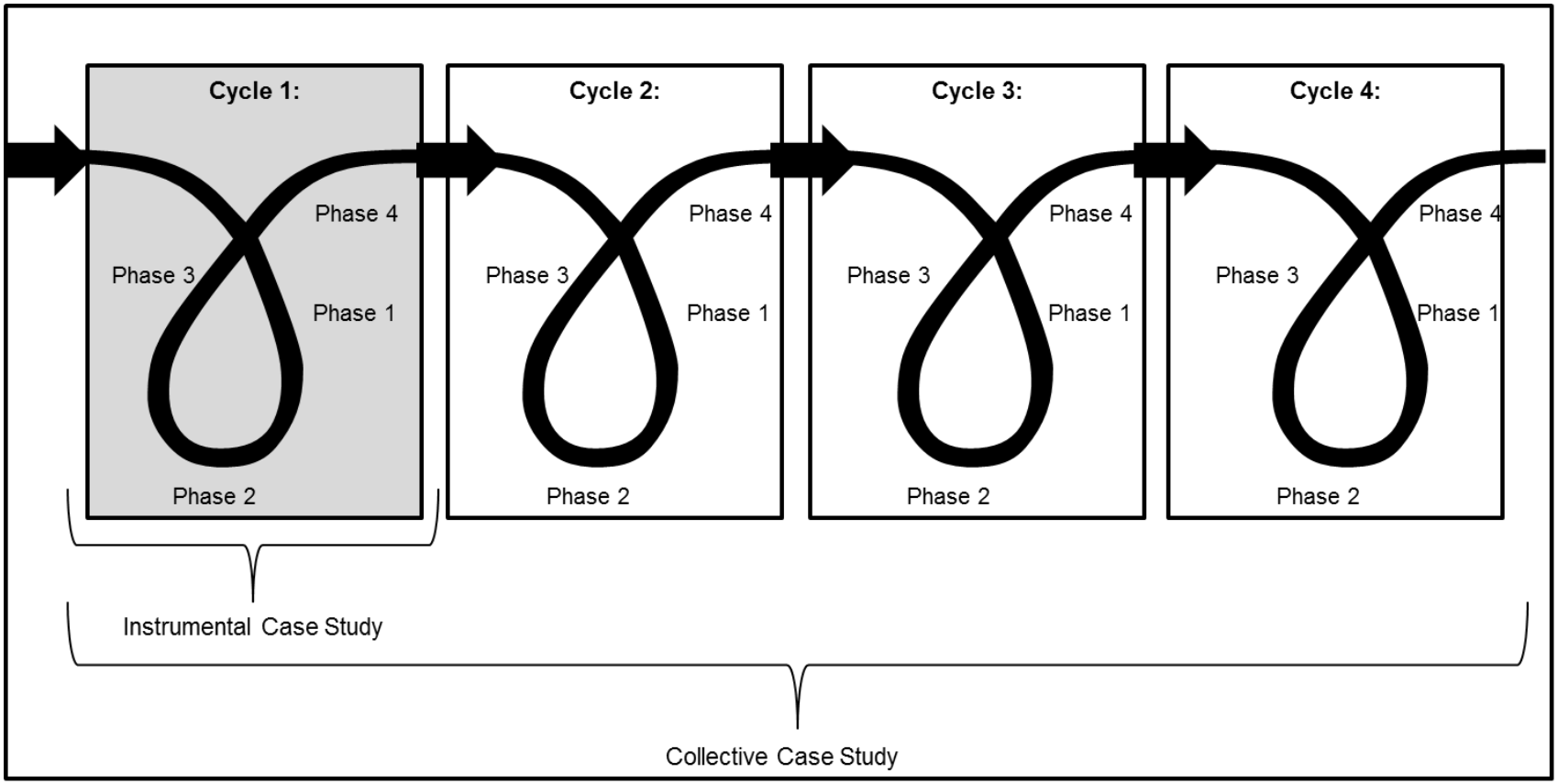


Figure 3.1 The iterative cycles and phases of design-based research

The process consists of a number of phases within each of the cycles. There can also be more than one cycle in a collective case study. Goddard (2010) explains since a collective case study involves more than one case, the research involves cycles within each of the cases.

In this research study, the design-based research started with an existing computerised lesson planning program. Only Cycle 1 of the cycles illustrated in Figure 3.1 was completed (see Figure 3.2 for a more detailed representation of Cycle 1). This means that the case study was an instrumental case study, not a collective case study. According to Grandy (2013), an instrumental case study provides insight into a particular issue. In the case of this research, the focus was on the lower-primary curriculum as one case to gain insight into the phenomenon of computerised lesson planning for innovative curriculum development.

The four phases within the instrumental case study are explained below and illustrated in Figure 3.2. Phase 1 involved doing a qualitative open-ended questionnaire to analyse lower-primary teachers, final year education students and lower-primary lecturers' (university lecturers') perceptions of the benefits and drawbacks of using technology such as computers and the value of the lesson planning program. In Phase 2 the body of scholarship was reviewed so the existing computerised lesson planning program could be revised. In Phase 3 lower-primary teachers, final year education students and university lecturers implemented the revised computerised lesson planning program and recorded their perceptions in a reflective journal. In this phase the participants were trained to use the computerised lesson planning program as well as the reflective journal, which they were expected to complete while learning to use the program. In the last phase, Phase 4, I reflected on the entries in the lower-primary teachers', final year education students' and lower-primary lecturers' reflective journals. This allowed me to make suggestions for further improvement and/or revisions to the program.

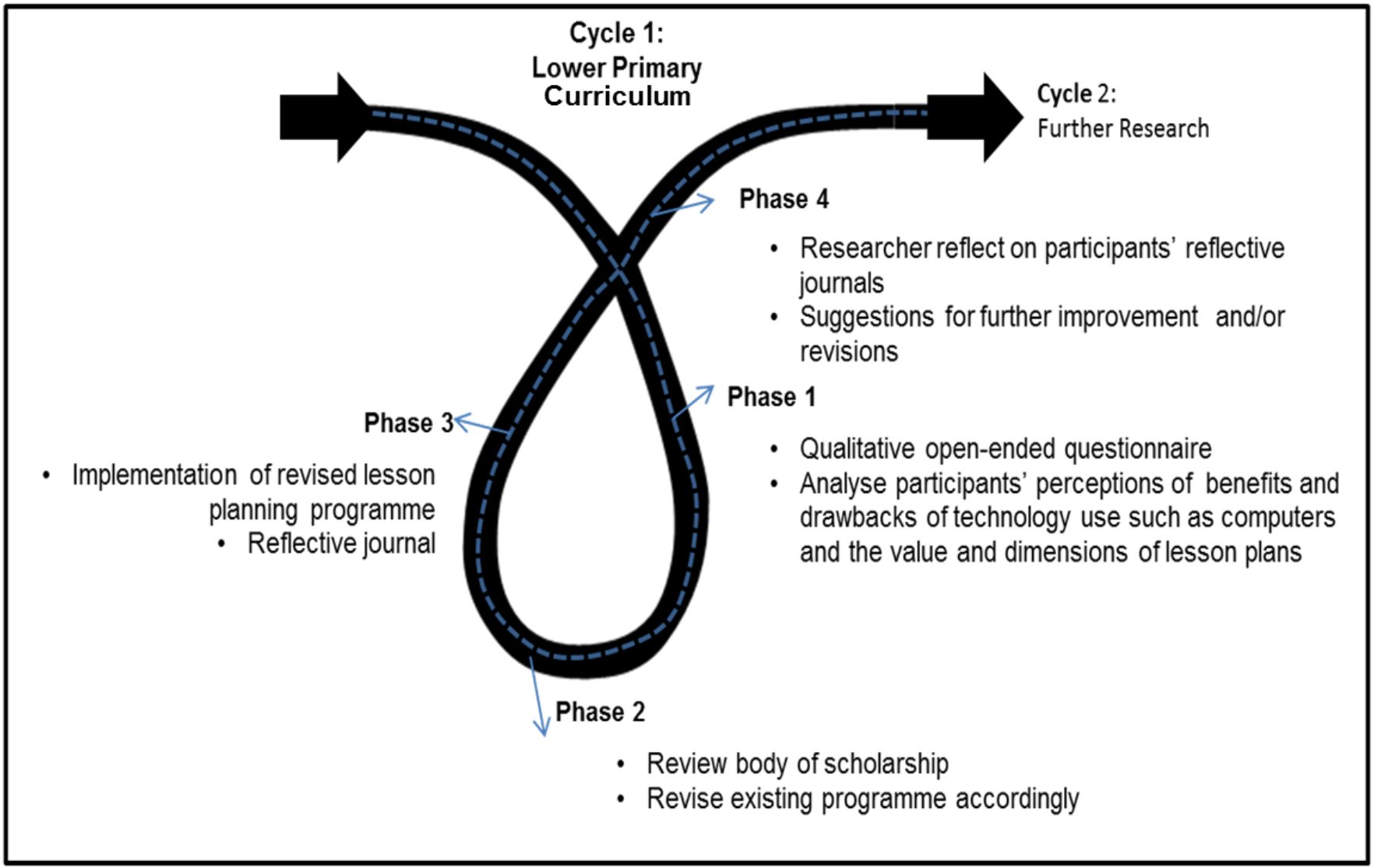


Figure 3.2 The phases of cycle one of design-based research in this research study

As mentioned above, my study ended after Cycle 1 because the primary aim of my study was to ascertain whether there were substantial grounds for arguing the value of the computerised lesson planning program. The second aim was to refine the computerised lesson planning program using the suggestions made by lower-primary teachers, final year education students and their lecturers' perceptions as indicated in Figure 3.2.

Next, I will discuss critique on design-based research.

3.3.1 Critique on design-based research

Design-based research aims to address problems that have scientific and practical significance (McKenny & Reeves, 2014:98). This creates the opportunity to do worthwhile research on practical, real-world problems and to arrive at practical solutions (ibid.). Design-based research presents a number of challenges. Three of these, which are related to this research study, are discussed.

Firstly, Plomp (2013:42) argues that the researcher is the designer and often also evaluator and implementer during the research process. This could lead to potential conflicts of interest. One way of compensating for this is by paying attention to the reliability and validity of the data generation methods (ibid.). Stemberger and Cencic (2014:72) contend that reliability, validity and objectivity can be ensured by triangulating data sources and data generation methods, by iterating analysis cyclically and by using standardised data collection instruments.

Secondly, design-based research takes place in real-world settings. Therefore its ultimate goal is to build a stronger connection between educational research and real-world problems (Amiel & Reeves, 2008:34). The emphasis is on using iterative research in order to evaluate innovative products or interventions, but there are also systematic attempts to refine the innovation at the same as producing design principles (ibid.). However, real-world settings bring real-world complications (Plomp, 2013:42). One challenge is that participants might not be open and honest with a complete outsider. It is therefore important for the researcher to gain their trust by being transparent about the aim(s) of the research and emphasising the potential mutual benefits of the research.

Thirdly, the fact that the research design was adapted could represent another challenge. As mentioned above, design-based research is cyclical and it takes place in real-world settings and this means that each cycle has to consider the findings of the previous ones (Plomp, 2013:43). Researchers need to demonstrate their adaptability by being prepared to take on the additional role of designer without losing sight of their primary role as researcher (ibid.).

McKenny *et al*. (as cited in Plomp, 2013:43-44) present certain guidelines to address the challenges of design-based research mentioned above: (1) The researcher must have an

explicit conceptual framework which is based on a review of literature; (2) a congruent study design must be developed; (3) the researcher should make use of triangulation in order to enhance the reliability and validity of the findings; (4) both inductive and deductive analysis should be done; (5) the researcher should use full, context-rich descriptions of the design decisions, contexts and results; and (6) member checking could be employed in order to increase the validity of the findings. I took careful account of these guidelines in this research study.

3.4 Pragmatism: paradigmatic positioning

Pragmatism is the paradigm chosen for this study. It allowed me to determine how well computerised lesson planning works and the extent to which a computerised lesson planning program can encourage innovative curriculum development.

In the words of William James (1842-1910), one of the best-known founders of pragmatism:

> ... we construct truth in the process of successful living in the world: truth is in no sense absolute. Beliefs are considered to be true if and only if they are useful and can be practically applied. (James, 1907:1-2)

Reigeluth and Frick (cited in Wang and Hannafin, 2005:396) apply this:

> [I]n addition to asking *whether* a theory works, researchers further question *how well* the theory works; that is, whether a given theory is better ... than known alternatives to attaining a desired outcome, and how research might refine the theory.

A pragmatic paradigm seeks practical and useful findings (Patton 2008:303). That is what my study aimed at. The pragmatic research paradigm made it possible to explore moving beyond written lesson plans and adopting computerised lesson plans. This paradigm also accommodated my desire to incorporate reflection. As McCaslin (2008:674) argues, pragmatism can be perceived as the function of reflective thought and relationships to guide action: “truth is relative to the practical consequences of any belief”.

In conclusion, I found Hassanli and Metcalfe’s (2013) description of pragmatism persuasive:

> Pragmatism seeks useful alternative actions to solutions to social problems, to improve the world yet adopt the basic tenets of science. It wants knowledge or ideas to be reasonable, rational and open to empirical study, in the provision of explanations and justifications to a sceptical audience. Knowing is an act of interpretation justified with evidence and reasoning.

3.5 Sample and research environment

Strydom and Delport (2011:391) explain that qualitative researchers strive to find individuals, groups and settings where the particular processes being studied are most likely to occur. Purposive sampling means that participants are selected based on some defining characteristics that make them have the data needed for the study (Nieuwenhuis, 2007a:79). Unfortunately it limits the generalisability of the data. Three research environments were purposefully selected, namely: one private primary school, one government primary school and one public university. All the research environments are in Windhoek in the Khomas region of Namibia.

At these research environments the participants were purposefully selected. Nieuwenhuis (2007a: 79) states that qualitative research usually involves smaller samples than quantitative research. A total of five lower-primary teachers from a private school, five lower-primary teachers from a government school, five final year education students and four university lecturers who present the lower-primary academic programme comprised the sample used by the research study. I wanted five lecturers to take part in the research. However, there were only four at the institution that was willing to participate. There were 19 participants in this research study. The lower-primary teachers were selected because lesson planning forms part of their everyday practice. The final year education students were selected because lesson planning forms part of their formal training as pre-service teachers. The lecturers were appropriate participants because they need to be knowledgeable about lesson planning and the theory on which it is based so that they can teach it to students doing the lower-primary programme. All of these participants work with the National Curriculum for Basic Education in Namibia in their capacities as teachers, students and lecturers.

The ages and the level of technology literacy or skills of these participants varied. This diversity meant that different perceptions of the computerised lesson planning program emerged. To accommodate the participants' diverse technology literacy or skills the data generation methods took account of the different levels of competence and the ease with which they used technology. This was done by loading the computerised lesson planning program onto the participants' laptops and providing training in using the program. Together, we did a variety of examples of term, weekly and lesson plans. The technician and I were available to help them whenever they needed assistance or support.

3.6 Data generation methods

Garnham (2008:193) explains that there is no set of rules for combining multiple data generation methods in qualitative research and therefore qualitative researchers have a number of options to choose from. However, the methods selected have to be congruent with the

principles underpinning the research design, and the data generated must be aligned with the aims of the study (Nieuwenhuis, 2007a:70). Garnham (2008:193) makes the following point:

> [I]t is important that researchers document how data were generated and justify the decisions that were made. This information can then be included in the research report, thereby allowing readers to make judgments about the quality and rigor of the research undertaken.

Strydom and Bezuidenhout (2014:174) mention that qualitative researchers need to be aware that the aim of data generation methods is to explore, understand and describe rather than measure, quantify, predict and generalise such as in quantitative data generation methods. The data generation methods employed in this study included a qualitative open-ended questionnaire (see Addendum F) and a reflective journal (see Addendum G), which will be discussed below. The qualitative open-ended questionnaire was administered before the participants began using a reflective journal. English was the language used in the questionnaires and the journals.

No fieldworkers, apart from me, were involved. I interacted with the participants and transcribed the data myself. I scheduled separate meetings with each group of participants at their school (lower-primary teachers) or university (final year education students and lower-primary lecturers). I believe that this made the data generation methods more convenient to participants. Before employing the qualitative open-ended questionnaire and the reflective journal, I obtained informed consent from the participants. After receiving all the participants' qualitative open-ended questionnaires and reflective journals in which participants had recorded their thoughts, I transcribed all of the data.

3.6.1 Qualitative open-ended questionnaires

Maree and Pietersen (2007:161) distinguish between open and closed questions in questionnaires and state that open-ended questions refers to those which are asked and a space is provided for words, phrases or comments. One reason for employing open-ended questions in the questionnaire was to make it possible to elicit data that would make it possible to explore the research questions. There were four other reasons for asking open-ended questions: (1) to enable respondents to answer the questions honestly and in detail; (2) to allow participants to reveal their thinking process; (3) to obtain adequate answers to complex questions; and (4) to elicit answers that would enable me to do a thematic analysis of their responses (Maree & Pietersen, 2007:160). According to Creswell (2014:242), the advantage of using open-ended questions in questionnaires is to elicit comments that participants might want to make in addition to the responses on closed-ended questions. This allows rich, thick descriptions to be generated from the data. The drawback is that there may be a large number

of responses to analyse, and that some would be long and others short (ibid.). By gathering the data from the qualitative open-ended questionnaire before the reflective journals, I was able to develop a profile of each participant and to gain their perceptions of lesson planning and technology. The participants were given two to four weeks to complete the qualitative open-ended questionnaire (see Addendum F).

3.6.2 Reflective journals

The words journals and diaries are used interchangeably by Vannini (2008:764). I chose to use the term 'journal'. This study invited participants to complete three reflective journal entries. This strengthened the research design and made it possible to have a record of the perceptions of participants while implementing the program. Qualitative researchers employ journals for two reasons, as tools of data collections and as data (ibid.). A wide variety of analytic perspectives can be used to interpret the diary and journal derived data (ibid.). The purpose of journals as data generation method include: firstly to provide researchers with written evidence in the form of biographical material because it is personal, situated, and intimate (ibid.). Secondly, journals offer vivid depictions of the everyday life experiences of the participants (ibid.). Thirdly, journals can be used to record mundane activities and experiences that would otherwise be inaccessible to researchers (ibid.). Lazar *et al*. (2010:129) explain that journals can investigate the use of technology that exists in multiple stages. These stages include: technology that does not exist yet; technology that exists but needs to be improved; and prototypes of new technology that need to be evaluated. In this research study, reflective journals were employed to capture participants' perceptions of the computerised lesson planning program and improve the program based on the participants' reflections.

The drawbacks of employing reflective journals as a data generation method could include having participants writing very full journal entries or that the researcher has difficulty in reading handwritten journals (Creswell, 2014:251). Complete journal entries could be lengthy with only few significant and usable responses. Writing journals could also be very time-consuming (ibid.). Furthermore, participants may sometimes not follow through and record a sufficient number of entries (Lazar *et al.*, 2010:129).

Before the computerised lesson planning program was implemented at the various research environments, the technician and I trained each group of participants in implementing the computerised lesson planning program. The technician installed the computerised lesson planning program on each participant's laptop. The participants preferred laptops as this allowed them to implement the program and complete the reflective journal in their own time and also in a convenient place. The participants were asked to keep a reflective journal that ran parallel to their implementation of the computerised lesson planning program. I provided each of the participants with a reflective journal and explained how it should be completed. The

reflective journals were bound into booklets and consisted of reflective prompts to guide the participants. These prompts can be found in Addendum G. The participants had approximately two months to complete the reflective journals and were expected to complete three entries in response to each reflective prompt. After receiving the completed reflective journals, I transcribed, analysed and interpreted them.

3.7 Data analysis method

According to Denscombe (2007:252) and Crewswell (2014:197-200), data analysis consists of five main steps or stages. These stages are applicable to Cycle 1 of design-based research, which I employed in my study (see Figure 3.2 above). The five stages of data analysis included:

- Stage 1: Data preparation
  (transcribing text, cataloguing text or visual data, preparation of data);
- Stage 2: Initial exploration of data
  (looking for themes or issues, add notes to the data, write memos);
- Stage 3: Analysis of the data
  (coding the data, group codes into categories and themes, comparison, encapsulating);
- Stage 4: Representation and display of data
  (writing interpretations of findings, illustrations, using visual models); and
- Stage 5: Validation of the data
  (crystallisation, validation, comparison with alternative explanations).

These five stages informed the data analysis of this research study. During stage three, content analysis was employed. Denscombe (2007:236) defines content analysis as a method to analyse the content of documents. When content analysis is employed it encompasses to look for similarities and differences in text that would verify or disconfirm theory (Nieuwenhuis, 2007b:101).

Saldaña (2009:13) explains that data is analysed in order to identify and label its content and meaning into categories that are congruent with the nature of the inquiry. According to Denscombe (2007:237), content analysis generally adopts the following logical procedure: choose an appropriate sample of text; develop relevant categories for analysing the data; code the units in line with the categories, and finally analyse the text in terms of their relationship with other units in the text. From these categories, themes emerge (Saldaña, 2009:13). The drawback of employing content analysis for the purpose of this study is that different researchers could arrive at different interpretations because participants' responses were context dependent and subjective (Julien, 2008:121).

Reliability and judgement are important factors and therefore researchers should be mindful of the perspectives that they bring to the data analysis as well as for the context of the content being analysed (ibid.). On the other hand, the advantage of using content analysis is its flexibility. Content analysis, for example, provides a systematic way of synthesizing a wide range of data. It is also a useful way of analysing longitudinal data in order to demonstrate change over time (ibid.). For this research study, it was an effective means of determining whether the participants had changed their perceptions from the time they had recorded their initial impressions to their final reflections in the journal at the end of the sessions in which they used the computerised lesson planning program.

Deductive (*a priori*) codes were first employed to analyse and present the verbatim data in this research study. Deductive codes were based on the questions asked in the qualitative open-ended questionnaire and the prompts in the reflective journal. Thereafter, inductive open-coding was used. Inductive open-coding involved "breaking down, examining, comparing, conceptualising and categorising of data" (Schurink *et al*., 2011:412) so the main themes and findings could be identified. Deductive (*a priori*) codes in the form of the questions asked in the qualitative open-ended questionnaire and the prompts in the reflective journal were first used to represent the verbatim data. Inductive open-coding was then used to identify the main themes and arrive at main data findings. Schurink *et al*. (2011:412) explain that this form of coding makes it possible to naming and categorise phenomena through close examination of the data. Codes emerge when the researcher analyses the verbatim transcriptions (Nieuwenhuis, 2007b:107). As Saldaña (2009:12) explains, the data are analysed into codes and then categories. From these categories themes are derived (ibid.). This is the data process adopted by this research study.

In this chapter I have thus far explained the research design, methodology and paradigm used for this research study. The sample and research environment, data generation methods and methods of data analysis were also described. Now I will explain how the intervention used in this study unfolded. Lastly I will discuss aspects relevant to my positionality as a researcher, the strategies used to strengthen the validity and trustworthiness of the study, as well as the ethical procedures I followed.

3.8 Intervention

In Section 3.8 I provide discussions on and illustrations of the intervention of the computerised lesson planning program employed in this research study. The background to and language of the computerised lesson planning program are provided in 3.8.1. The structure of the program is presented in 3.8.2 with specific reference to curriculum (3.8.2.1), term planning (3.8.2.2), weekly planning (3.8.2.3) and lesson planning (3.8.2.4).

3.8.1 Background to and language of the computerised lesson planning program

The computerised lesson planning program is a program that enables the user to create lesson plans based on the themes of the curriculum. To give an indication of a similar technology to the computerised lesson planning program, I have viewed the *Common Core Implementation Kit* which is a program that enables the user to create standard aligned lesson plans. This program operates from within Microsoft Word 2013 and includes daily learning targets, instructional notes, student friendly "I Can" statements, vocabulary lists, differentiation ideas, assessment ideas, common misconceptions of students and links to open educational resources (Microsoft, 2014).

Hermann Kuschke, a software engineer at Dynamic Web Services in Namibia is the programmer who designed the computerised lesson planning program used in this research study. He used C# to write the program.

Nakov and Kolev (2013:18) explain that C# is a "modern object-oriented, general-purpose programming language, created and developed by Microsoft together with the .NET platform". Software developed in C# include, office applications, web applications, websites, desktop applications, mobile applications, games and many others (ibid.). The advantage of using this programming language in the computerised lesson planning program is that programs written in C# are "portable and, once written they can function with little or no changes on various hardware platforms and operating systems" (ibid.). C# programs most generally run on MS Windows, but the .NET Framework supports mobile phones and other portable devices based on various Windows applications (Nakov & Kolev, 2013:19). This compatibility can be regarded as another advantage of C#, especially if other devices are considered for the computerised lesson planning program at a later stage.

In the sections that follow, the way the computerised lesson planning program works is discussed and illustrated.

3.8.2 Structure of the computerised lesson planning program

The structure of the program is illustrated in Figure 3.3:

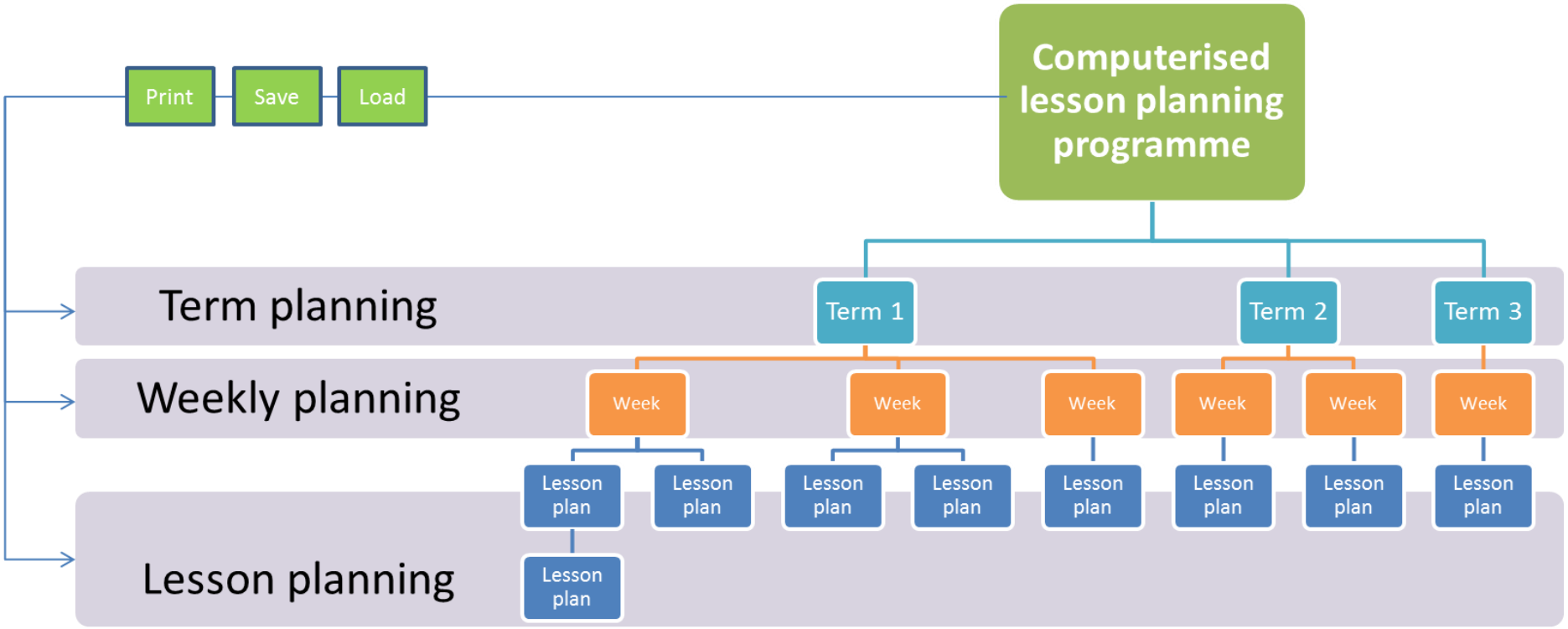


Figure 3.3 Structure of the computerised lesson planning program

As can be seen in Figure 3.3, the lesson planning program allows the user to do term planning. The term plans are then divided into weekly plans which are then divided into lesson plans. The computerised lesson planning program incorporates the five elements of lesson planning: objectives,

context, content, method and assessment. In order to illustrate the basic working of the computerised lesson planning program, various screenshots are provided below. Before each screenshot a short description will be provided.

3.8.2.1 Curriculum

The computerised lesson planning program is based on the National Curriculum for Basic Education as provided by the Ministry of Education of Namibia. The structure of the program is based on the **objectives** of the subject areas and their subareas as set out in the curriculum documents (see Screenshot 3.1). Colours are used to easily distinguish between the organisation of the curriculum's aspects (Screenshot 3.1 and 3.2):

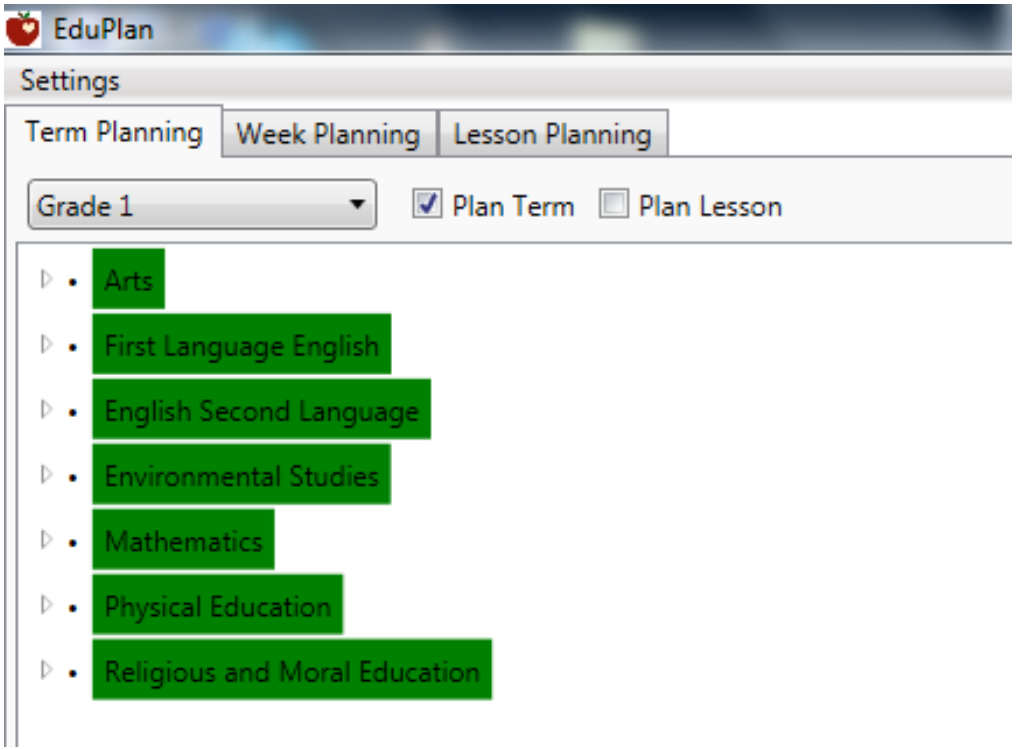
Green: Subject area

Orange: Topic of integration

Blue: Learning objective

Pink: Basic competency

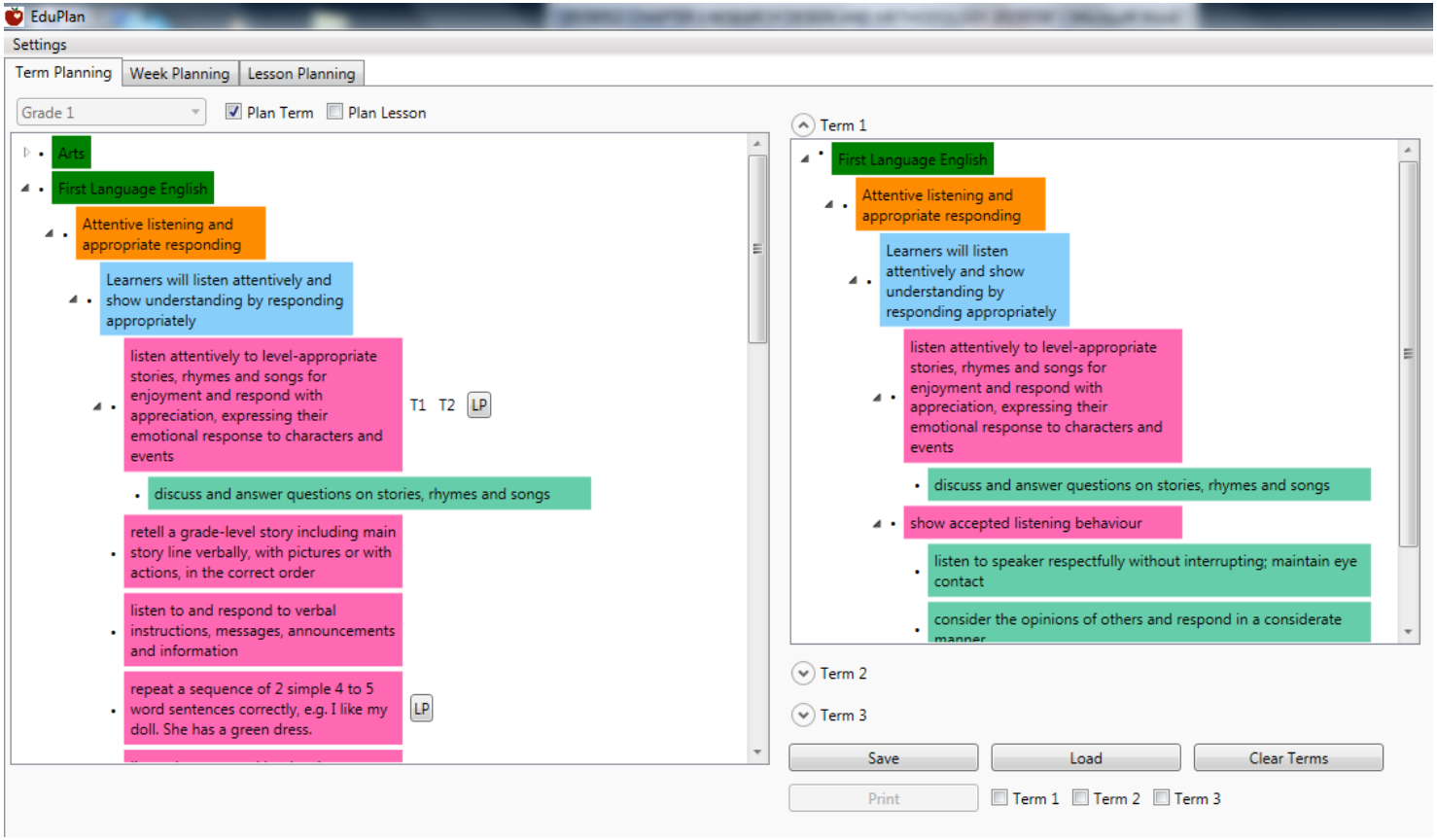
Turquoise: Sub-competency



Screenshot 3.1 Structure of the computerised lesson planning program

3.8.2.2 Term planning

The second screenshot (Screenshot 3.2) of the computerised lesson planning program is the term plan. The term plan is based on the objectives provided in the National Curriculum for Basic Education of Namibia for the lower-primary phase into the first, second and third term of a school year. This term plan is designed for a particular grade and it includes all the subjects per phase (content). The term plan provides the planner with a holistic view of the year plan divided into three terms (T1/T2/T3) and ensures that all of the content is included in the planning for the whole academic year. There is a clear indication that a competence planned to be in a certain term is revised in another. When a lesson plan has been created for a specific competence, the acronym LP is placed next to that competence.



Screenshot 3.2 Term planning in the computerised lesson planning program

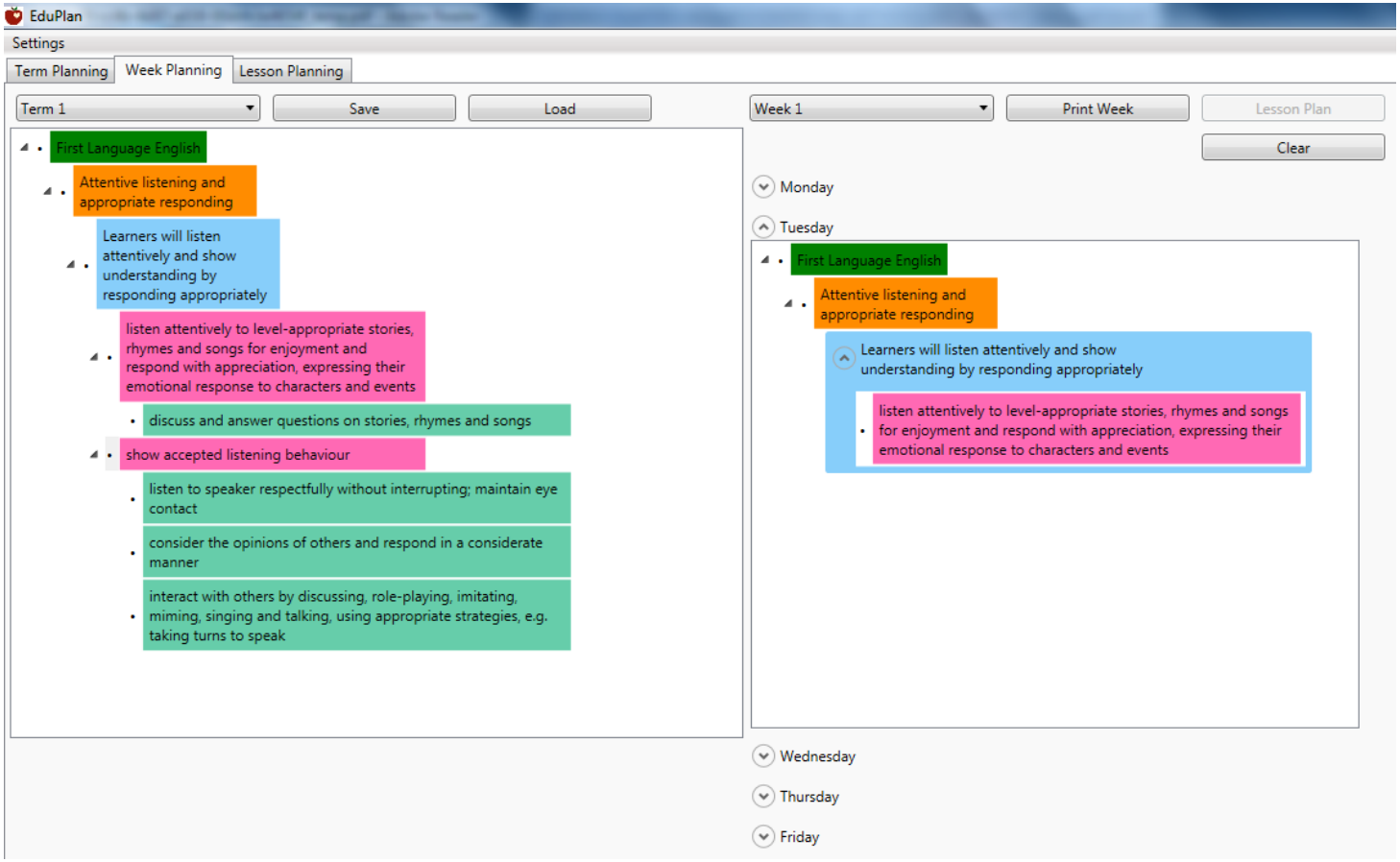
Term plans can be saved, loaded or printed. The term plan would look like Screenshot 3.3 if the user chose to print it.

Term 1	
Subject Area	First Language English
Skill	Attentive listening and appropriate responding
Learning Outcome	Learners will listen attentively and show understanding by responding appropriately
Competencies	Subcompetencies
listen attentively to level-appropriate stories, rhymes and songs for enjoyment and respond with appreciation, expressing their emotional response to characters and events	discuss and answer questions on stories, rhymes and songs
show accepted listening behaviour	listen to speaker respectfully without interrupting; maintain eye contact

Screenshot 3.3 Print preview of a term plan in the computerised lesson planning program

3.8.2.3 Weekly planning

The term plan can be organised into what will be done in each of its weeks. The content of the three terms can be dragged into each week of a particular term. The weekly plan is organised into the five school days and the content is categorised into subjects. This organisation allows the planner to view a holistic plan of a week's teaching and learning (see Screenshot 3.4).



Screenshot 3.4 Weekly planning in the computerised lesson planning program

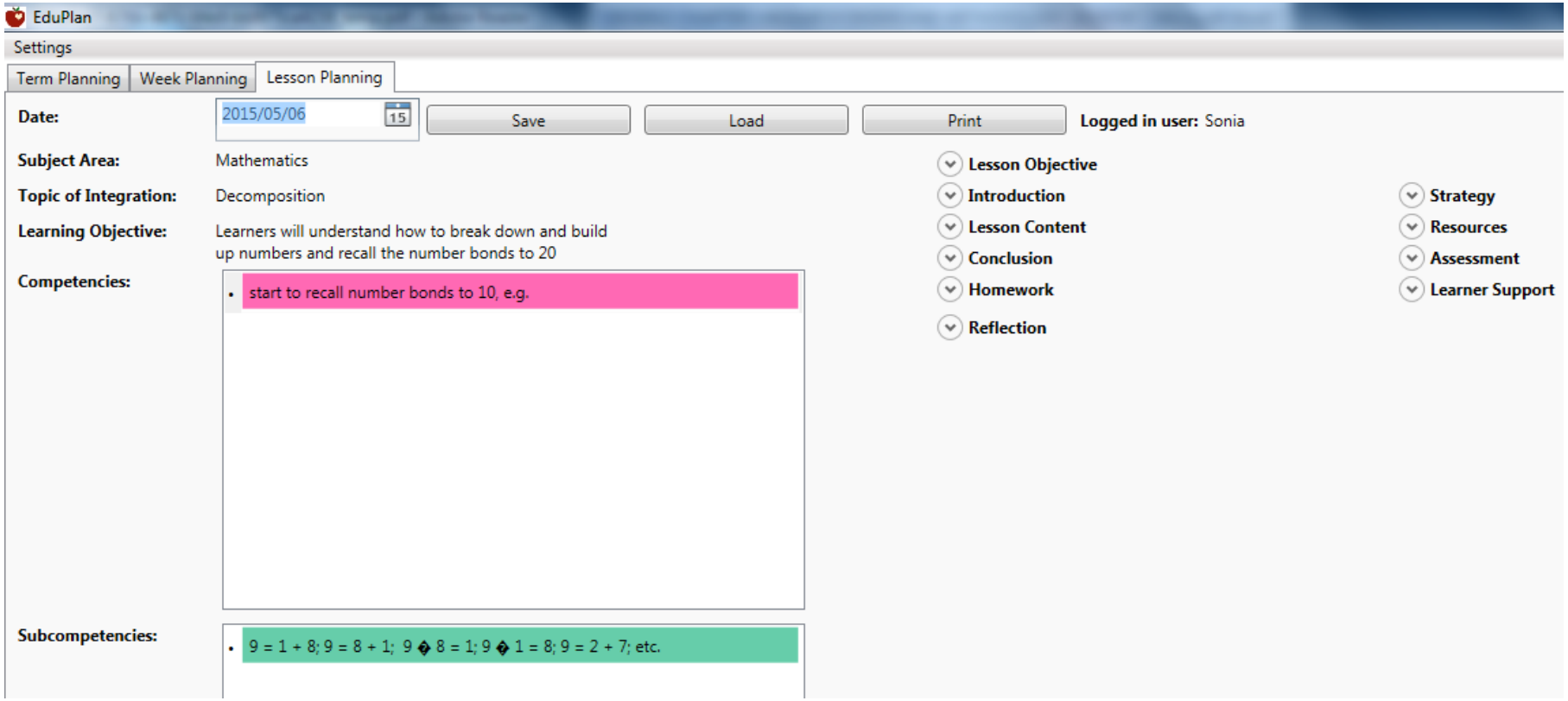
The weekly plan can also be saved, loaded and/or printed. It is also here that the user can ensure that integration takes place with all the subjects. If the user chooses to print the weekly plan it will look like this Screenshot 3.5 below. As explained above different colours are used in order to distinguish easily between the curriculum's aspects. Colours are also used in the print layouts in order to categories the information.

Monday	Tuesday	Wednesday	Thursday	Friday
Arts	Arts	Arts	Arts	Arts
Co-operation, respect, safe practices and conventions	Co-operation, respect, safe practices and conventions	Co-operation, respect, safe practices and conventions	Co-operation, respect, safe practices and conventions	Co-operation, respect, safe practices and conventions
Learners will co-operate in a group, respect the needs of others , and use safe practices and conventions	Learners will co-operate in a group, respect the needs of others , and use safe practices and conventions	Learners will co-operate in a group, respect the needs of others , and use safe practices and conventions	Learners will co-operate in a group, respect the needs of others , and use safe practices and conventions	Learners will co-operate in a group, respect the needs of others , and use safe practices and conventions
demonstrate social skills, e.g. take turns, listen to others, be considerate and co-operate with others	demonstrate social skills, e.g. take turns, listen to others, be considerate and co-operate with others	demonstrate social skills, e.g. take turns, listen to others, be considerate and co-operate with others	demonstrate social skills, e.g. take turns, listen to others, be considerate and co-operate with others	demonstrate social skills, e.g. take turns, listen to others, be considerate and co-operate with others
First Language English	First Language English	First Language English	First Language English	First Language English
Attentive listening and appropriate responding	Attentive listening and appropriate responding	Attentive listening and appropriate responding	Attentive listening and appropriate responding	Attentive listening and appropriate responding
Learners will listen attentively and show understanding by responding appropriately	Learners will listen attentively and show understanding by responding appropriately	Learners will listen attentively and show understanding by responding appropriately	Learners will listen attentively and show understanding by responding appropriately	Learners will listen attentively and show understanding by responding appropriately
listen attentively to level-appropriate stories, rhymes and songs for enjoyment and respond with appreciation, expressing their emotional response to characters and events	listen attentively to level-appropriate stories, rhymes and songs for enjoyment and respond with appreciation, expressing their emotional response to characters and events	show accepted listening behaviour	show accepted listening behaviour	show accepted listening behaviour
listen attentively to level-appropriate stories, rhymes and songs for enjoyment and respond with appreciation, expressing their emotional response to characters and events	listen attentively to level-appropriate stories, rhymes and songs for enjoyment and respond with appreciation, expressing their emotional response to characters and events	show accepted listening behaviour	show accepted listening behaviour	show accepted listening behaviour
Mathematics	Mathematics	show accepted listening behaviour	show accepted listening behaviour	show accepted listening behaviour
Counting	Counting	show accepted listening behaviour	show accepted listening behaviour	show accepted listening behaviour
Learners will count with and without using concrete objects and understand the need and convenience of counting in everyday life	Learners will count with and without using concrete objects and understand the need and convenience of counting in everyday life	Mathematics	Environmental Studies	Environmental Studies
count mechanically up to 100, in 2s up to 30, in 5s and 10s up to 100	count mechanically up to 100, in 2s up to 30, in 5s and 10s up to 100	Counting	Families and communities	Families and communities

Screenshot 3.5 Print preview of a weekly plan in the computerised lesson planning program

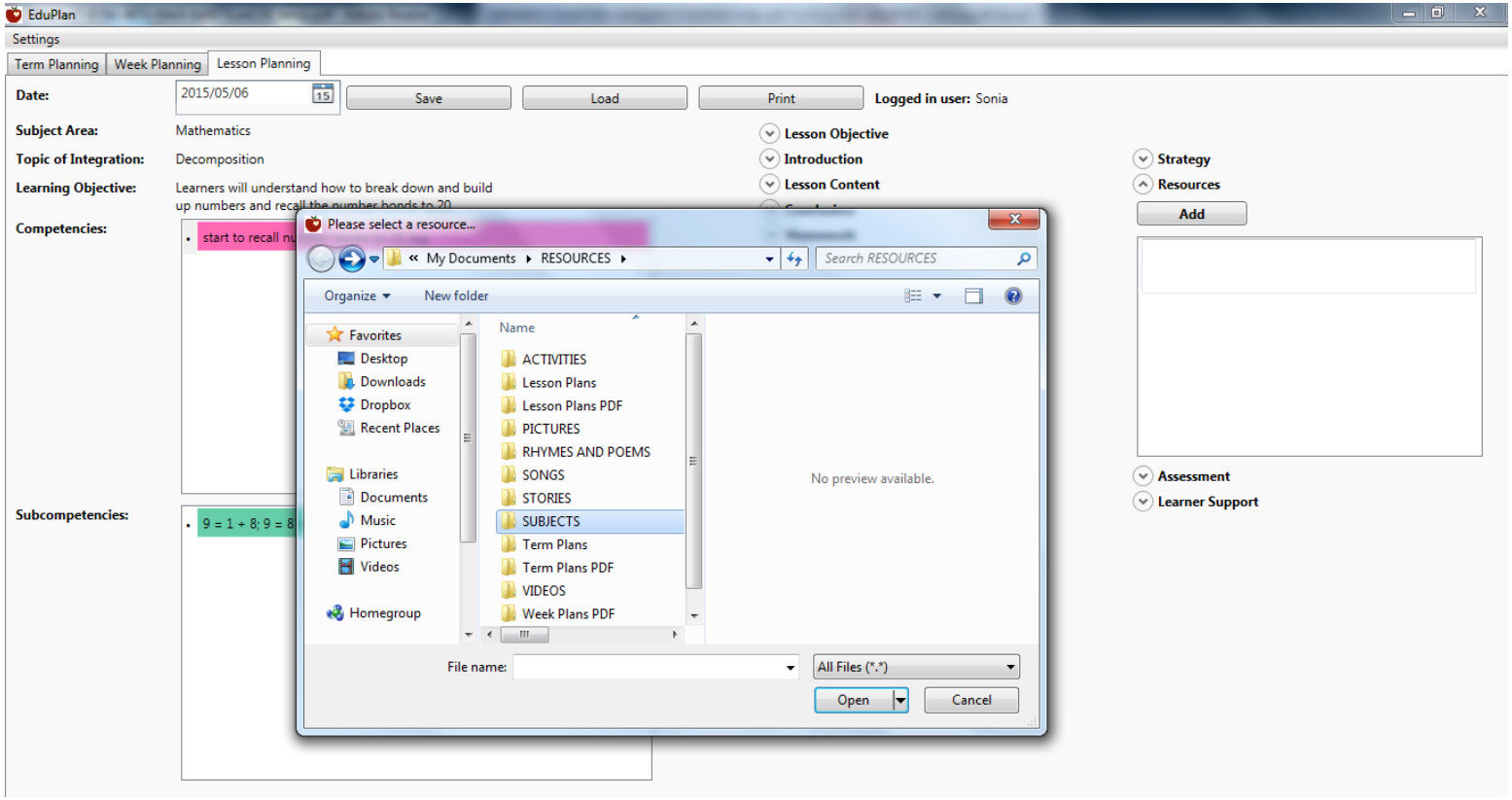
3.8.2.4 Lesson planning

For each competency the user can plan a lesson. The lesson consists of various elements, namely the competencies and sub-competencies listed in the curriculum statements, the lesson objective, introduction, lesson content, conclusion, homework, strategy (method), resources, assessment, learner support and reflection. This is illustrated in Screenshot 3.6.



Screenshot 3.6 Lesson planning for each competency in the computerised lesson planning program

All resources and assessment files used in the computerised lesson planning program can be saved and stored in themes, subjects or any other categories. This organisation makes it easy to search and find previously designed lesson plans and resources used as assessments. These resources are all available under resources in the folders chosen by the planner, which are linked to the competencies on which they are based (see Screenshot 3.7)



Screenshot 3.7 Resource and assessment folders in the computerised lesson planning program

Lesson plans can also be saved, loaded or printed by the user. The printed layout would look like Screenshot 3.8 below.

Teacher	Sonia
Date	2015/05/06
Subject Area	Mathematics
Skill	Decomposition
Learning Outcome	Learners will understand how to break down and build up numbers and recall the number bonds to 20
Competencies	SubCompetencies
start to recall number bonds to 10, e.g.	start to recall number bonds to 10, e.g.
Lesson Content	Number bonds 1-10 1= 0+1, 1+0 2= 0+2, 1+1, 2+0 3= 0+3, 1+2, 2+1, 3+0 4= 0+4, 1+3, 2+2, 3+1, 4+0 5= 0+5, 1+4, 2+3, 3+2, 4+1, 5+0 etc.
Conclusion	number house activity
Homework	Bring 10 bottle caps to school
Resources	Number families of 1 to 10.pdf

Screenshot 3.8 Print preview of a lesson plan in the computerised lesson planning program

The computerised lesson planning program was made available in a desktop version for the purpose of this research study. Decisions on whether to make it web-based or not were deferred till after the findings of this study were available. As indicated in 3.8.2.1 to 3.8.2.4 objectives, content, method

and assessment are reflected in the program. Context is not explicitly reflected. However, teachers took context into account during the planning process by ensuring that all the other elements mentioned above were relevant and applicable to their learners' needs and requirements.

In Section 3.9 I discuss my positionality as researcher in this research study.

3.9 Researcher's positionality

As mentioned in Section 1.7, the role of the researcher involves various steps, namely, to obtain ethical clearance, to gain access to research sites and participants, to formulate data generation questions, to conduct the data generation methods, to transcribe the data and to analyse and interpret the data (Creswell, 2009:117, Maree & van der Westhuizen, 2007:41). I worked alone and did not make use of fieldworkers or any other stakeholders to assist me to conduct my research study.

Creswell (2014:187) explains that qualitative research is interpretive and that it introduces a range of strategic, ethical and personal issues into the research process. For that reasons, researchers should "explicitly identify reflexively their biases, values, and personal background, such as gender, history, culture, and socio-economic status (SES) that shape their interpretations formed during the study". In my positionality as a researcher, I needed to be aware that I was a teacher at one of the participating schools of this research study. Being aware of this allowed me to avoid bias. By being transparent about any bias that I might have brought to this study, I hoped the validity of the study was not affected (Creswell, 2014:202).

3.10 Validity and trustworthiness

According to Creswell (2014:201), in qualitative research validity means that the "researcher checks for the accuracy of the findings by employing certain procedures". The use of multiple approaches to check the accuracy of data is recommended by Creswell (ibid.). Given and Saumure (2008:895) define trustworthiness as "the ways in which qualitative researchers ensure that transferability, credibility, dependability, and confirmability are evident in their research". Trustworthiness provides researchers with a toolset to use to illustrate the worth of the data generated in their study (ibid.).

In order to strengthen the validity and trustworthiness of the data generation process and data analysis I used the following strategies:

- Crystallisation: To ensure validity and trustworthiness, the study employed different types of data collection methods. For Nieuwenhuis (2007a:81), this is a process of crystallisation that arises when various data generation methods and data analysis methods are employed. Denscombe (2007:296) supports the use of crystallisation as a method of ensuring validity of research. Validity refers to the accuracy and precision of the data. The data also have to be congruent with the research questions of the research study. This study employed qualitative open-ended questionnaires and reflective journals as multiple data collection methods.

- Audit trail: According to Denscombe (2010:299), an audit trail means that a clear record of the research procedures and decisions is provided making it possible for another researcher to check what was done in order to confirm the existence of the relevant data as well as evaluate decisions made related to data generation and analysis. The promoters of this study checked the data.
- Thick descriptions: Denscombe (2010:296) argues that thick descriptions can be derived by inviting participants to make in-depth responses to open-ended questions. Therefore open-ended questions are employed in the qualitative open-ended questionnaires of this study and open-ended prompts in the reflective journals.
- Peer briefing: Peer briefing occurs through constructive interactions with a supervisor and/or more knowledgeable others regarding the efficiency of research methods in this study (Cohen *et al*., 2011:183). Constructive interactions took place between me and the supervisors of this study in order to ensure that the research methods I had selected were appropriate for this study.
- Member checking: To check the accuracy of the findings the researcher can take the polished or semi-polished product such as the main findings and themes back to the participants in order for them to determine whether they feel they are accurate (Creswell, 2014:201). I took the first draft of the study's main findings to some of the participants so they could do a member check.

Having discussed what I did to ensure that the study is valid and trustworthy, I now discuss the decisions taken to ensure that this study was conducted in an ethical manner.

3.11 Ethical considerations

Creswell (2014:252) explains that data generation requires that participants are willing to disclose information. This is only possible when they have a high level of trust in the researcher. In order for researchers to build and maintain that relationship they have to meet the requirements of ethical research. Ethics is defined by Strydom (2011:114) as

> ... a set of moral principles which is suggested by an individual or group, is subsequently widely accepted, and which offers rules and behavioural expectations about the most correct conduct towards experimental subjects and respondents, employers, sponsors, other researchers, assistants and students.

For researchers, ethics provides the basis on which to evaluate their conduct (ibid.). In this section I will explain the ethical requirements that were met during this research study.

The North-West University, Faculty of Education Sciences' Ethical Committee provided me with ethical clearance before the research commenced (see Addendum A). Thereafter a letter for

permission was sent to the Ministry of Education in Namibia to gain permission to conduct the research in the government school selected (see Addendum B and B1). Once permission was gained from the Ministry of Education in Namibia, consent letters were presented to the principals at the participating lower-primary primary schools (Addendum D, D1, and D2) and the Dean of the Education Faculty at the University (Addendum C and C1). After obtaining permission from the school principals and the Dean I made arrangements to meet with the lower-primary teachers, final year education students and lecturers presenting the lower-primary program to gain their informed consent. A consent form was discussed with them and then it was signed by me and the participants (see Addendum E).

In addition to obtaining permission and gaining informed consent, the following ethical requirements were met in this study (Denscombe, 2007:133-146):

- Participants' interests and privacy were protected to ensure that they did not suffer any harm during their involvement in this research study. The participants were not exposed to any personal, psychological or physical harm during the research process.
- All participants were assured that their responses would remain strictly confidential. Special care was also taken to ensure that all participants remained anonymous. To ensure this, the names of the schools or university, the names of the lower-primary teachers, final year education students and lecturers who took part in this research study are not disclosed in this study.
- I was open and explicit about what the research entailed and the participants' involvement to avoid deception and misinterpretation. To ensure this, truthfulness formed the basis of the researcher-participant connection and communication.
- Voluntary participation and the participants' right to withdraw were also addressed. The participants and I signed an informed consent form that clearly stated that the participants' involvement in the research was voluntary and that they could withdraw from the research at any stage.

The above-mentioned requirements were all taken into account in ensuring that this study was undertaken in an ethical manner.

3.12 Conclusion

According to Punch (2009:112), a research design positions the researcher in the empirical world and it shows how the research questions are linked to the data. This chapter explained the research design, methodology and methods used in the study to explore the effects of introducing a technological innovation (Stemberger & Cencic, 2014:73).

The study was situated in a pragmatic paradigm. This allowed the computerised lesson planning program prototype to be evaluated by users as a means of determining whether it worked or not. This chapter also included the description of the sample and sampling method. Three groups of participants were described. In total there were 19 participants. Qualitative open-ended questionnaires and reflective journals as data generation methods were discussed. Content analysis as data analysis method was discussed.

I also explained that the computerised lesson planning program was the intervention employed in this research study before discussing my positionality as a researcher. Finally, I explained how validity and trustworthiness were ensured as well as the ethical considerations in this research study. In Chapter 4 the analysis of the data generated by my study are presented and the main research findings are discussed.

CHAPTER 4

REPRESENTATION OF DATA FINDINGS AND INTPERPRETATION

4.1 Introduction

This study was guided by the primary question: To what extent, if any, can computerised lesson planning promote innovative curriculum development?

In order to fully explore the primary research question, the following secondary questions were addressed:

- What need is there for a computerised lesson planning program?
- What dimensions might a computerised lesson planning program have?
- When the lesson planning program is implemented by lower-primary teachers, final year education students and university lecturers presenting lower-primary programmes what improvements to the design of the computerised lesson planning program do they suggest?
- What implications could a computerised lesson planning program have for innovative curriculum development?

Content analysis (see 3.7) was used to answer these research questions. This chapter presents the main findings of the study. The chapter discusses the data generated by the qualitative open-ended questionnaire (QOEQ) and then the data generated by the reflective journal (RJ) in this study. In order to ensure a logical order, the representation and discussion of the data generated in this study will use the structure illustrated in Figure 4.1.

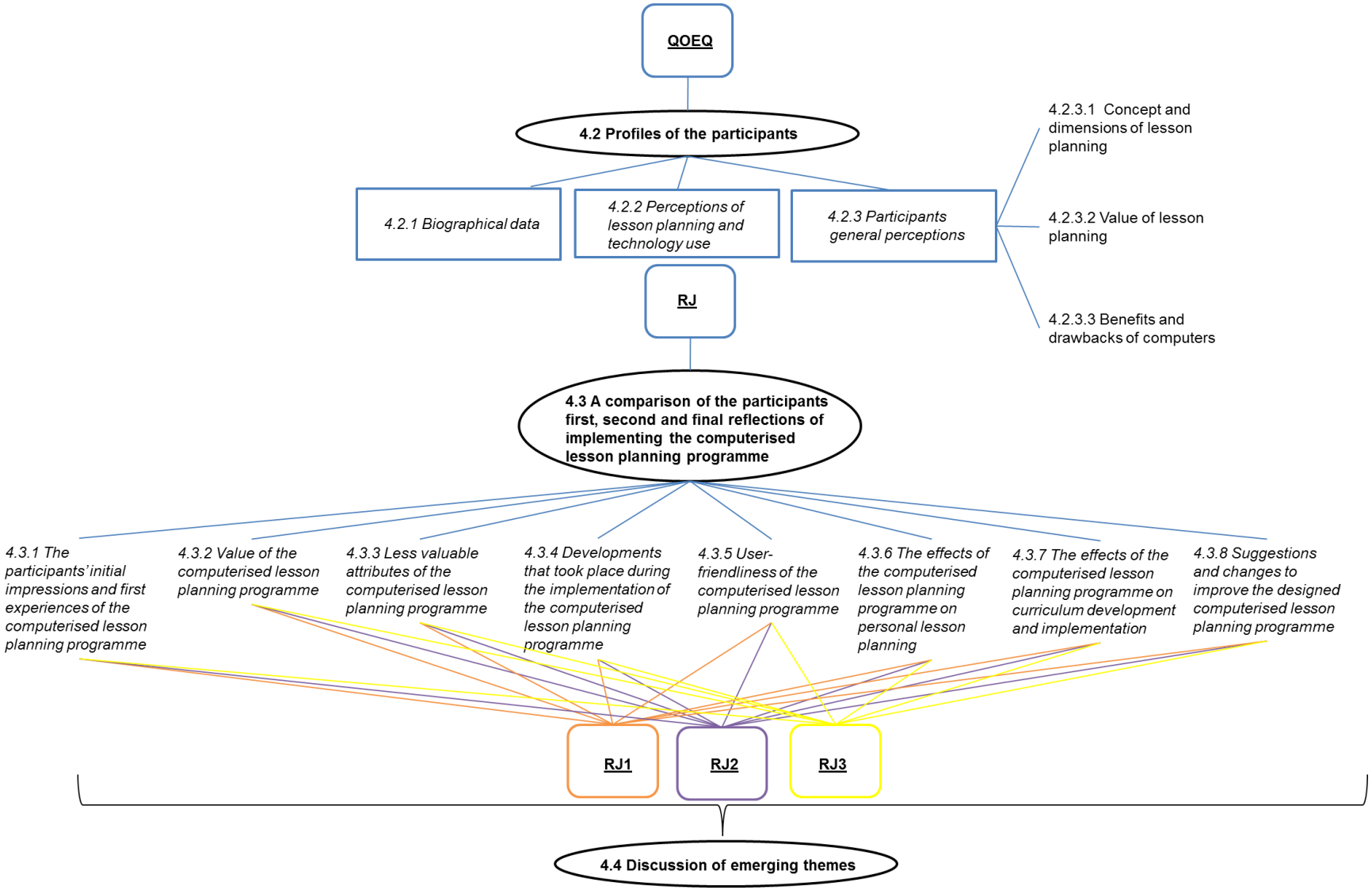


Figure 4.1 Illustration of the structure of Chapter 4

As illustrated in Figure 4.1, the participants' profiles (4.2), consisting of their biographical information (4.2.1), their perceptions regarding lesson planning and technology (4.2.2) and their general perceptions regarding lesson planning and the benefits and drawbacks of technology use (4.2.3) will be presented. These are based on the verbatim data in the QOEQ. Thereafter, the verbatim data from the reflective journals are presented (4.3). This is done in three stages: The first reflection (RJ1), a second reflection (RJ2) and a third and final reflection (RJ3) which were written in approximately two to three week intervals. To highlight the changes in the participants' perceptions, a comparison is made between what they wrote about each element (that they were asked to reflect on) and what they wrote in their last reflection. As explained in Section 3.7, deductive codes in the form of the questions asked in the RJs have been used for this comparison. A comparison between the participants' first, second and final reflections of implementing the computerised lesson planning program is provided in Section 4.3. These reflections draw on: the participants initial impressions (4.3.1); what is valuable (4.3.2) and less valuable (4.3.3) about the program; developments that took place during implementation of the program (4.3.4); user-friendliness of the program (4.3.5); effects of the program on personal lesson planning (4.3.6); implications of the program for curriculum development and implementation (4.3.7); as well as possible suggestions and changes for the improvement of the design of the program (4.3.8).

This chapter concludes with a discussion of the themes that have emerged from the verbatim data and the main findings (4.4). These themes include the following: Competence, comfortability, attitude, experience, training as well as access and availability of computers are interrelated to technology use (4.4.1); computerised lesson planning improves the lesson planning experience (4.4.2); the computerised lesson planning program enhances curriculum development and implementation (4.4.3); training and support are requirements for the successful implementation of the computerised lesson planning program (4.4.4); technical suggestions to improve the current computerised lesson planning program (4.4.5); practice makes perfect (4.4.6); and fostering innovative curriculum development (4.4.7). This chapter will now follow as discussed and illustrated above in Figure 4.1.

4.2 Profiles of the participants

In this section the data generated by the participants are presented verbatim. This verbatim data was drawn from the QOEQ (4.2). All the data were transcribed. This section deals with the participants' biographical information (4.2.1), perceptions of lesson planning and their competence in using technology (4.2.2) and general perceptions of lesson planning and the use of technology (4.2.3) The sub-categories of the participants' general perceptions are: understanding of the concept and dimensions of a lesson plan (4.2.3.1), the value of lesson planning (4.2.3.2) and the benefits and drawbacks of using technology (4.2.3.3). For the

purpose of this section the participants' biographical information is provided in Table 4.1. This includes the schools where the lower-primary teachers were teaching (T1 to T5 of a private school and T6 to T10 from a government school), final year education students' (S1 to S5) and the university lecturers' (L1 to L4) first and second languages, gender, years of experience and qualifications.

4.2.1 Biographical information of the research participants

Table 4.1 Biographical information of the research participants

BIOGRAPHICAL INFORMATION OF THE RESEARCH PARTICIPANTS					
Participants	**First language**	**Second Language**	**Gender**	**Experience**	**Qualifications**
PRIVATE SCHOOL LOWER-PRIMARY TEACHERS					
T1	Afrikaans	English	Female	40 years	• Higher Education Diploma • BEd lower-pre-primary
T2	Afrikaans	English	Female	32 years	• BEd lower-primary • Higher Education Diploma • B.A. Psychology
T3	Afrikaans	English	Female	37 years	• BEd lower-primary • BEd senior-primary
T4	Afrikaans	English	Female	20 years	• BEd lower-primary • Diploma in Special and Remedial Education • Early Childhood Education
T5	Afrikaans	English	Female	4 years	• BEd foundation phase
GOVERNMENT SCHOOL LOWER-PRIMARY TEACHERS					
T6	Afrikaans	English	Female	2 years	• BEd foundation phase
T7	Afrikaans	English	Female	7 years	• Basic Education Teacher's Diploma • Advanced certificate in education
T8	Afrikaans	English	Female	25 years	• BEd lower-primary • Remedial teaching diploma
T9	Afrikaans	English	Female	1.5 years	• BEd foundation phase
T10	Afrikaans	English	Female	26 years	• Higher Education Diploma
FINAL YEAR EDUCATION STUDENTS					
S1	Oshi-kwanyama	English	Female	18 weeks	• BEd pre- and lower-primary (final year)
S2	Oshidonga	English	Female	18 weeks	• BEd pre- and lower-primary (final year)
S3	Oshiwambo	English	Female	18 weeks	• BEd pre- and lower-primary (final year)
S4	Oshiwambo-Oshidonga	English	Female	18 weeks	• BEd pre- and lower-primary (final year)
S5	Oshidonga	English	Female	18 weeks	• BEd pre- and lower-primary (final year)
UNIVERSITY LECTURERS					
L1	Afrikaans	English	Female	25 years	• DEd
L2	Oshi-kwanyama	English	Female	8 years	• BEd • Med
L3	Afrikaans	English	Female	27 years	• Med

					• PhD (in progress)
L4	Afrikaans	English	Female	33 years	• B.A. (hons) • Higher Education Diploma

4.2.1.1 Discussion of the biographical information of the research participants

The first language of the majority of the participants is Afrikaans. English is their second language in all cases. The gender of all the participants is female. This group of participants are only diverse in terms of the schools or institutions where they teach or lecture and the range of years that they have been teaching or lecturing. Their teaching or lecturing experience ranges from 1.5 to 40 years. The final year education students had far less experience in that their course provides only 18 weeks of practical teaching experience. The participants' diversity is also depicted in their various qualifications. Most of the participants have a BEd qualification in lower-primary teaching. Two of the participants have B.A. degrees (one lower-primary teacher and one lower-primary lecturer) and two lower-primary teachers have diplomas in remedial teaching. The highest qualifications were held by one of the university lecturers who had a DEd. The final year education students were less diverse; they had the same second language, gender, amount of experience and qualifications. The only difference lies in their first language. In the next section, the participants' perceptions of lesson planning and their levels of technology use are provided.

4.2.2 Participant's perceptions of lesson planning and levels of technology use

The participants' perceptions of lesson planning and technology use are provided in Table 4.2. This includes frequency of lesson planning, comfortability and competency in using technology such as computers and their perceptions of whether such technology can facilitate their lesson planning.

Table 4.2 Participants' perceptions of lesson planning and levels of technology use

PARTICIPANTS' PERCEPTIONS OF LESSON PLANNING AND LEVEL OF TECHNOLOGY USE				
Participants	**Frequency of lesson planning**	**Comfortability with computer technology**	**Competence in computer technology**	**Can technology facilitate your lesson planning?**
PRIVATE SCHOOL LOWER-PRIMARY TEACHERS				
T1	Once a week	Yes	In certain instances	Yes
T2	Once a week	No	No	No
T3	Once a week	No	No	No
T4	Once a week	Yes	Yes	Yes
T5	Daily	Yes	Yes	Yes
GOVERNMENT SCHOOL LOWER-PRIMARY TEACHERS				
T6	Once a week	Yes	Yes	Yes
T7	Daily	Yes	Yes	Yes
T8	Once a week	No	In certain instances	Yes
T9	Daily	Yes	Yes	Yes
T10	Once a week	In certain instances	No	Yes
FINAL YEAR EDUCATION STUDENTS				
S1	During lectures	Yes	Yes	Yes

S2	During lectures	In certain instances	Yes	Yes
S3	During lectures	Yes	Yes	Yes
S4	During lectures	Yes	Yes	Yes
S5	During lectures	Yes	In certain instances	Yes
UNIVERSITY LECTURERS				
L1	Lecture every second trimester	Yes	Yes	Yes
L2	Lecture every now and then	Yes	Yes	Yes
L3	Lecture in integrated ways	Yes	Yes	Yes
L4	Lecture once a week	Yes	Yes	Yes

4.2.2.1 Discussion of the participants' perceptions of lesson planning and levels of technology use

As can be seen in Table 4.2, seven of the ten lower-primary teachers indicated that they do lesson planning once a week, while three indicated that they do lesson planning on a daily basis. All the final year education students indicated that they had received lectures on lesson planning. This was corroborated by their university lecturers who indicated that lesson planning was presented in integrated ways in their teaching or was dealt with once a week or every now and then.

T10 and S2 saw themselves as comfortable with using technology such as computers in certain instances. Fourteen of the nineteen participants (all of the teachers, four of the final year education students and the four lecturers) regarded themselves as comfortable with using technology such as a computer. The following verbatim responses illustrate why they felt comfortable with computer technology:

> *I understand that it has benefits for my teaching. I am open to learning new things. (T1)*
>
> *I had to do lesson plans previously on a computer. (T3)*
>
> *I am computer literate. (T5)*
>
> *I like working with technology. I have experience with working on computers. (T6)*
>
> *I work on a computer every day. (T9)*
>
> *Computer makes work easier... (S3)*
>
> *Using a computer helps me in my everyday teaching activities such as preparing lessons, searching the internet for information and sending and receiving emails. (L2)*

On the other hand, three lower-primary teachers indicated that they were not comfortable with using computer technology. They gave the following reasons:

Not competent at all. (T2)

I am not experienced. (T3)

After such a long time of not using technology to lesson planning, I personally do not feel up to it now. (T8)

Half of the lower-primary teachers regard themselves as competent in using computer technology as did most of the final year education students. All of the lecturers regarded themselves as competent in using computer technology. Their reasons are evident in the following verbatim responses:

I am computer literate. (T5)

I use it every day. (T6)

I had access to a computer when I was growing up and thus became familiar with computers. (T7)

I completed the ICDL [International Computer Driving License] course. (T9)

Three lower-primary teachers indicated that they were not competent in using technology such as a computer. Two lower-primary teachers and one final year education student felt competent in certain instances. These are some of the reasons they gave:

Lack of skills. (T2)

Technology is a bit challenging sometimes. (S5)

The participants were also asked whether or not 'technology can facilitate their lesson planning'. The lower-primary teacher participants' responses were mainly 'yes', except for two lower-primary teachers who felt that technology would not facilitate their lesson planning. I found it interesting to see that T2 and T3, who had indicated that they are not comfortable with and not competent in computer technology, also believed that technology would not facilitate their lesson planning. All of the final year education students as well as all of the university lecturers indicated that they believed that technology could facilitate their lesson planning.

4.2.3 Participants' general perceptions regarding lesson planning and the benefits and drawbacks of technology use

In this section the participants' perceptions on the concept and dimensions of lesson planning (4.2.3.1), the value of lesson planning (4.2.3.2) and the benefits and drawbacks of using technology such as computers (4.2.3.3) are presented and discussed.

4.2.3.1 The concept and dimensions of lesson planning

First I elaborate on the participants' understandings of the concept of lesson planning. Thereafter, what they regard as necessary dimensions underpinning a lesson plan will be explored.

It is evident from many of the participants' responses that they understood lesson planning as planning and preparing. These are their views on planning:

> *The planning in advance of activities that must be covered according to the curriculum. (T4)*
>
> *Planning before lesson to achieve best results and to accommodate learners. (T6)*
>
> *Procedures on how the lesson will be presented or activities on what will happen before, during and after the lesson. It also states the objectives of the lesson and the materials to be used. (L2)*
>
> *To select, organise and create lesson plans for a term or year. (L4)*

Some of the participants who highlighted the notion that preparation was an important component of lesson planning commented as follows:

> *To be prepared and ready to "entertain" your learners and to know what and why you teach this lesson. (T3)*
>
> *The preparation of the lesson beforehand taking into considerations teaching aids, activities and learning aids. (S2)*
>
> *Is when you prepare yourself of what you are going to teach your learners. It is consisted of the basic competency, learning objective and the lesson objective. (S1)*
>
> *Procedures on how the lesson will be presented or activities on what will happen before, during and after the lesson. It also states the objectives of the lesson and the materials to be used. (L2)*
>
> *Preparing to guide learners to develop conceptual and procedural knowledge as determined by the syllabus. (L3)*

When the participants mentioned what they regarded as the important dimensions underpinning a lesson plan, they referred to the following:

- *Topic/theme (S5, L2)*
- *Time (S5)*
- *Introduction (T1, T3, T5, T7, T9, S2, S3, S4, S5, L1, L3, L4)*
- *Learning/lesson outcome/goals/objectives (T2, T5, T6, T9, S1, S5, L2, L3)*
- *Skills/Competencies (T2, L2, S1)*

- *Presentation (T3, T4, L4)*
- *Activities (T7, S5, L2, L3)*
- *Prerequisite knowledge (T1, T5)*
- *Content/Information/development/consolidation of knowledge/functionalization (T1, T8, T9, S2, S3, S4, S5, L1, L3, L4)*
- *Integration (T8)*
- *Reinforcement/recap (S2, S3, S4, S5, L1, L2)*
- *Conclusion (T1, T3, T5, T7, T9, S2, S3, S4, S5, L1)*
- *Assessment/evaluation (T1, T5, T6, T7, S5, L1, L4)*
- *Material/resources/teaching aids (T6, T9, S1, L2)*
- *Reflection (L2, L4)*

The concept of lesson planning was recognised as requiring planning and preparation. Lesson planning was seen as something done in advance, during and after the lesson that was aligned with the curriculum. It included the processes of selecting, organising and creating. With regards to preparation, most of the participants indicated that lesson planning enabled them to be prepared for the lessons. There were references to dimensions such as introduction, objectives/goals, content/information, conclusion and assessment in the verbatim data of all of the participants. Two participants regarded reflection as part of lesson planning. Only one participant mentioned time as a dimension. Another dimension that was mentioned by only one of the participants was integration of content in lesson planning. This discussion implies teachers regard lesson planning as having some value. This is discussed next.

4.2.3.2 The value of lesson planning

The participants felt that lesson planning enabled and guided them to be “prepared” for what was going to happen in the teaching-learning process, “how” and “when” (T1, T6, T9, S1, S2, S3, S4, S5). By doing lesson planning “all the learners are included” (S2). They indicated that by helping “learners to achieve their full potential”, lesson planning also “improve[d] their skills” (T2). Furthermore, lesson planning was seen as leading to “effective learning” (T3, T6) and “efficient teaching” (T5, T6) assuring that objectives were met (T9, T10, S3). They felt that lesson planning helped them to be “organised” (T5, T8) and handle unexpected situations (T5, T8). Lesson planning also helped them to “keep on track” (T5, S2) and “manage time” (S2, S3). Lesson planning enabled them to “assess” or “evaluate learning” and “make adjustments” for improvement (S4, S5, L3).

In the participants’ responses with regard to the value of lesson planning, the participants mainly referred to the notion of being “prepared”. Another notion that occurred frequently was that lesson planning helped to ensure that objectives were met and that assessment of learning allowed the teacher to make adjustments to improve their planning.

As this study was concerned with the possible value of 'computerised' lesson planning, these perceptions of the benefits and drawbacks of computer technology were deemed significant. In the next sub-section, these perceived benefits and drawbacks are explored in relation to their verbatim responses.

4.2.3.3 The benefits and drawbacks of technology such as computers

Most of the participants in this study indicated that technology such as a computer could facilitate their lesson planning. The following benefits of using technology such as a computer in education are drawn from the verbatim responses of the participants:

- *There is a wealth of "information" and "resources" available (T1, T6, T7, S3, S4, L3, L4).*
- *Accessibility of information (T5, S4).*
- *Computers promote "communication" (T7).*
- *Work done on a computer is "neat" (T4, T6, T7).*
- *Work done on a computer is "organised" (T6).*
- *Work done on a computer can be "stored" (T4, S4, L3).*
- *Computers are "easy" to use (S1, L4).*
- *Computers allows for the "accommodation of all learners" (S1).*
- *Working on a computer is "efficient" (T9).*
- *Working on a computer is "effective" (T8).*
- *Computers are "convenient" to use (L2).*
- *"Changes" can easily be made (T8).*
- *Working on a computer is "quick"/ "saves time" (T4, T6, T8, T9, S4).*
- *Computers "reduce workloads" / "simplify" teaching and learning (S2, L2, L4).*
- *Computers enhance learners' understanding by incorporating multimedia. This makes learners "eager to learn" and learning is "fascinating" (S1, S2, L1, L2).*
- *Computers are "reliable" (S2).*

From the above verbatim responses it is evident that most of the participants regarded the availability of information and resources as a benefit. Another benefit that computers offers, which most of the participants mentioned was that computers save time. Although a number of benefits of using technology such as a computer were listed above, the participants also mentioned some possible drawbacks of [using] computers. These included:

- *Diminishment of social interaction and skills (T2, T7)*
- *Losing work if not saved (T4, S3, L2)*
- *System failures (L2, L3)*
- *High costs (T5, T8, S1)*
- *Training needs (T5, T6, T8, T9, S4, S5)*

- *Limited access to computers (S4)*
- *Electricity is required (T8, S4)*
- *Teachers will "rely too much on technology" (S5, L1) and therefore become "lazy" (S2, S3)*.

Most participants identified the training needed before the computerised lesson planning program could be implemented as a drawback. I find it significant that most participants indicated the need for training as a drawback. Those who indicated that they were comfortable with and competent in using computers (4.2.2.1) had received some sort of training in using computers. T1 felt that technology such as computers does not have drawbacks and T10 and L4 wrote that they could not think of any.

I explored the participants' general perceptions regarding lesson planning in terms of the concept, dimensions and value, as well as the benefits and drawbacks of technology use. In the section that follows comparisons are made between the participants' first, second and final reflections on implementing the computerised lesson planning program.

4.3. A comparison of the participants' first, second and final reflections of implementing the computerised lesson planning program

In this section the way that participants reflected on their implementation of the program is explored. As the research design of this study involved different phases of design-based research (3.3), I could explore how participants perceived the implementation of the computerised lesson planning program, and the way in which their perceptions changed over time. This kind of comparison allowed valuable data to emerge that could be used to improve the program. The data are presented in relation to the specific aspects that the participants were asked to reflect on in their RJs so that comparisons can be made on all of these aspects. The verbatim data from RJ1, RJ2 and RJ3 are combined to present a collective response, not individual responses. Each of the aspects that the participants reflected on is presented in sections 4.3.1 to 4.3.8 (see Figure 4.1 for the list of deductive codes).

4.3.1 The participants' initial impressions and first experiences of the computerised lesson planning program

In their first reflection the participants were asked to complete a reflection on their initial impression and first experience of implementing the computerised lesson planning program. In their second and third reflections they were asked to refer to their initial reflections (RJ1) before reflecting on that particular aspect again. This enabled me to see whether their initial impression of the computerised lesson planning program had changed or not. Table 4.3 provides the aspects that featured most strongly in their verbatim responses.

Table 4.3 Initial impressions and first experience of implementing the computerised lesson planning program

Initial impressions and first experience of implementing the computerised lesson planning program	
First reflection	• I am totally overwhelmed! But I wish I was 20 years younger! I am not very good with technology/ computer so I am a little bit scared, but I am willing to try. (T1) • Wow! It could be a big time saver and also it will help you make sure that you cover the whole curriculum. (T5) • I was very impressed with the concept and excited to learn more about it. Lesson planning is a very important part of teaching and to make it easier and more effective for teachers would be wonderful. I am a young teacher and believe that technology should be implemented into schools. My first impression is very positive towards the computerised lesson planning program. (T6) • This program is seriously of good quality... it's gonna bring improvement of the educational system of our country. (S3) • I was really very impressed with the introductionary information we received during the session with the MEd student. The idea of getting the newest syllabus integrated in a computer program could be very helpful. (L4)
Second reflection	• Yes, a little bit but I am still struggling! The longer I am working with the program the more I learn. (T1) • Scary and not confident. (T2) • I am much more relaxed to use the program and know more what to do. (T4) • No, the more you "play" with the program, the more excited I get about it. (T5) • Wish I had more computer skills to operate the program easily- if I was younger with more computer training. (T8) • I can see that some people cannot be able to use it since it can be understandable to those who got training. (S4)
Third reflection	• Although I could not use the program efficiently in the beginning I felt that it will be a very valuable change in my/any teaching career. The more I used it, it became clear to me the benefits of it is limitless because it frees my imagination and allows me to go much further into the same topic than in the past. (T1) • Yes...I would recommend it. It could be an advantage to all the teachers. (T2) • In my third reflection, I think this program might create laziness among the teachers. It will make the teachers very lazy because they might end using some lessons over the years. (S1) • I think this program is very good and it will help the user attain the goals of education. I think I should also start to look in the current situation of our education system to come up with ideas on how to help the Namibian society or the whole world at large. Very fascinating ideas. I like them very much inspired. (S5)

In the participants' first impression of their experience of implementing the computerised lesson planning program, concepts such as competence, attitude, experience, comfortability, practicability, effectiveness, and helpfulness emerged from the participants' verbatim responses. With regard to competence, the higher the level of competence shown by participants the more positive their perceptions were of the program. Their perceptions regarding their competence in and comfortability with using computers could have affected on

their attitude towards technology. Higher levels of competence and comfortability could foster a more positive attitude toward implementing it. This was evident in T1 and T6's opinions:

> *I am not very good with technology / computer so I am a little bit scared, but I am willing to try. (T1)*
>
> *I am a young teacher and believe that technology should be implemented into schools. My first impression is very positive towards the computerised lesson planning programme. (T6)*

These opinions suggest the importance of having a positive attitude towards the adoption of technology. The participants revealed that experience could likewise affect their perceptions of the program. This was also evident in opinions such as T1's above. When participants felt competent in and comfortable with using computers, they can see benefits such as practicability. In this sense they referred to the program as a "big time saver" (T5). In terms of effectiveness the participants perceived the program as ensuring that all the competencies in the "whole curriculum" get "covered" in a certain period of time (T5) and that it could "bring improvement of the educational system of our country" (S3). Furthermore, they came to find the program "helpful" (L4).

The participants' second reflections indicated that little had changed in the way they viewed the program. Given more time to use the program, they learnt more: "The longer I am working with the program the more I learn" (T1). They remained impressed with the program. They now realised that the implementation of the program required a fair degree of computer literacy. This was evident when one of the participants mentioned: "[w]ish I had more computer skills to operate the program easily – if I was younger with more computer training" (T8). At this stage it became apparent to some of the participants that computer literacy requires training. In addition to T8 who wished she had more training, S4 argued that she "can see that some people cannot be able to use it since it can be understandable to those who got training" (S4). Training could have an effect on one's computer literacy and therefore also on one's attitude towards technology use. Some participants found changes in their attitudes: they now felt "more relaxed" (T4) and they became "more excited" (T5). These emotions could lead to their being more positive towards the implementation of the program. T2 did not feel positive and could not share her perception as she felt "[s]cary and not confident" (T2) in using the computer. This indicates once again that confidence could affect attitude.

In her final reflection T2 was impressed with the program and stated that she "would recommend it. It could be an advantage to all the teachers" (T2). Although many of the participants' perceptions did not change, it was interesting to note that there were only two final year education students and two lower-primary teachers whose final entry showed that they had

become negative. They felt motivated and stimulated when they first started to implement the program. This was evident in T1s opinion:

> *Although I could not use the programme efficiently in the beginning I felt that it will be a very valuable change in my/any teaching career. The more I used it, it became clear to me the benefits of it is limitless because it frees my imagination and allows me to go much further into the same topic than in the past. (T1)*

One of the final year education student participants' initial impressions changed markedly. She felt very positive in her initial impression, but in her final reflection she was concerned that teachers would become "lazy" (S1) if they relied too much on the program. In contrast to this, S5 who had initially been hesitant about the success of the program now felt motivated and inspired as is obvious in her statement:

> *I think this programme is very good and it will help the user attain the goals of education. I think I should also start to look in the current situation of our education system to come up with ideas on how to help the Namibian society or the whole world at large. Very fascinating ideas. I like them very much inspired. (S5)*

In the next sub-section I compare participants' reflections on the value of the computerised lesson planning program made in their RJs.

4.3.2 Value of the computerised lesson planning program

In order to draw a comparison between the participants' first, second and final reflections, Table 4.4 presents the participants' perceptions on the value of the computerised lesson planning program.

Table 4.4 Value of the computerised lesson planning program

Value of the computerised lesson planning program	
First reflection	• I find the fact that the competencies are already loaded on the system, the most valuable aspect of the program. (T1) • I like the easiness of the program regarding the buttons. Only 3 to really understand and use. (T4) • Quick and easy. (T9) • Things are well organised in a way that everything will be able to understand, how to use the program. (S4) • The valuable thing about the program is its efficacy. It makes planning efficient. It also looks like planning a lesson is made less laborious. The resources are quite good as different pictures, etc. are organised in different subject folders and topics. (L2)
Second reflection	• There is so much information available to make this subject repetitive for learners! Teachers can select between a variation of subject matter. (T3) • Promote computer literacy among teachers. (T6) • It's not only lesson planning, you can also plan for the week and the term. That is something valuable. (S2) • It gets better every time! This is so exciting! The pop-up information once you point the cursor to lesson content, conclusion, etc. gives a lot of guidance on what to write there. (L2)
Third reflection	• The more you use the program the more I try to go further into the program.

	(T4) • My preparation will look neatly and up to date. (T10) • It is not time consuming. You can plan your lesson with less pressure. (S1) • I've discovered that if I choose a competency that does not belong (fit in) with the topic of integration, the system (program) will alert me and will not allow me to do that. This makes the planning coherent and it ensures the link between all components. I've also discovered that I can remove something if I realise that it's not what I want to use after I've dragged it in the box or chosen it with the drop down arrow. The fact that there's also an option for 'other' in the strategy used is also good because the teacher might want to use a strategy that is not listed there. A space to write also pops up which allows the teacher to write down their strategy. (L2)

With regard to the value of the computerised lesson planning program, it became evident in the participants' first reflections that they perceived the value of the structural aspects of the program. This is reflected in their opinions that the "competencies are already loaded on the system" (T1); "only 3 [functions] to really understand and use" (T4) and "things are well organised" (S4). They were also aware of its practical value. They felt that it was "quick and easy" (T9) and "efficient" (L2). This indicated that they found the program useful.

In the participants' second reflections their perceptions of the value of the program extended beyond the structural and practical value of the program. S2 expressed the view that the program was all-inclusive: "[i]t's not only lesson planning, you can also plan for the week and the term. That is something valuable" (S2). At this stage of implementing the program they came to realise its value in terms of the learners and their learning. This was apparent in T3's opinion: "[t]here is so much information available to make this subject repetitive for learners! Teachers can select between a variation of subject matter" (T3). Yet others found the program a valuable means of teacher learning. In this regard, T6 argued that the program "[p]romote[s] computer literacy among teachers". Some of the participants realised that support enhanced their learning experience. This featured in the guidance they experienced in implementing the program that was provided to them through the "pop-up information" (L2). An interesting insight that emerged here was that some of the participants indicated in their second as well as final reflections that the more they used the program the more valuable they experienced it. This indicates that more experience with it could affect one's perception of the value of the program. This was evident when two of the participants stated:

> *It gets better every time! This is so exciting! (L2)*

> *The more you use the programme the more I try to go further into the programme. (T4)*

In their final reflection, four valuable dimensions of the program for lesson planning were highlighted by the participants. Firstly, some of the participants came to realise that the program

offered valuable insights into curriculum development with regard to coherence and relatedness. One of the participants mentioned:

> *... if I choose a competency that does not belong (fit in) with the topic of integration, the system (programme) will alert me and will not allow me to do that. This makes the planning coherent and it ensures the link between all components. (L2)*

This indicated that the implementers recognised that the program could help them to integrate competencies from different subjects that would fit the topic of the lesson plan. There were three valuable attributes that the participants mentioned. Some commented on neatness and being up to date: “preparation will look neatly and up-to-date” (T10). Others mentioned that the program allowed them to use their own creativity when doing computerised lesson planning. One way they could do this was by adding their own methods instead of choosing the methods provided by the program (L2). Yet others expressed positive attitudes to the program because it reduced the pressure on them: “you can plan your lesson with less pressure” (S1).

In contrast to this, I now list what the participants’ experienced as the less valuable attributes of the program.

4.3.3 Less valuable attributes of the computerised lesson planning program

Table 4.5 below provides the participants verbatim responses of the less valuable attributes of the computerised lesson planning program. *A discussion follows thereafter.

Table 4.5 Less valuable attributes of the computerised lesson planning program

Less valuable attributes of the computerised lesson planning program	
First reflection	• The lack of ability to use the program with ease. It made me feel rather to stick to the old method of writing with the hand. (T3) • ... to change first language English to first language Afrikaans? Will it be possible to keep the colours the same throughout the program? Just for consistency. The colours of the week plan when you print it, is different from the rest of the planning on program. (T4) • I would say the colors of the program. The dark green at the term planning are a little too dark. I would use pastel colours. (T5) • Nothing at this stage. First want to use the program more. (T7) • In my first reflection, there was nothing I dislike about the program. Everything was good, because it was so easier to use and it does not consume much time. (S1) • I think the icon/button to get the competence and lesson objective suppose to be in different colour or size just to let someone to know where he/she can click to get something. (S4) • I recommend an instruction or tutor guide. If one plans in the beginning of the year one might have forgotten after a year how the software works (as I did!). (L3)
Second reflection	• For me to do the planning, I should have my laptop with me, because the program is on the laptop at home If we will do the planning together we all will have to keep our laptops with us to work on. But nothing is impossible. (T4) • ...how some teachers might find it very difficult to use because they are computer illiterate, especially the old teachers. (S1) • Sorry – I saw that under the lesson plan I can type in exactly what I want to do so previous comment is not valid. (L3)

Third reflection	• The fact that the resources are not linked to other website where you can download the resources makes it less valuable. I think the resources valuable and relevant to the Namibian context need to be linked to the website so that teachers can download relevant resources and it should also allow teachers to be able to upload other resources that they suggest for others. (S5) • - it seems my biggest challenge is the know-how of the software... again it is lack of skill in using the program. If I have the hang of it, it will be actually fun to plan lessons in such a structured and detailed way. I love this! (L3)

The participants' verbatim responses make it evident that the attributes they disliked were predominantly related to the technical layout. What they saw as the negative aspects of technical layout included: "colours" are too dark and that colours should be consistent throughout the elements of the program (T4, T5), and that the "icons" (S4) should made more visible. With regard to program content, they mentioned that "first language Afrikaans" was not included (T4). Besides these technical and program content aspects, the participants also focused on competence (T3), time and experience (T7, S1) and support (L3) as less valuable attributes. This was evident in the following opinions:

> *The lack of ability to use the programme with ease. It made me feel rather to stick to the old way of writing with the hand. (T3)*
>
> *Nothing at this stage. First want to use the programme more. (T7)*
>
> *...nothing I dislike... because it was so easier to use... (S1)*
>
> *I recommend an instruction or tutor guide... one might have forgotten after a year how the software works (as I did!). (L3)*

The above responses make it clear that T3 was unhappy about her limited ability to use computers and this made her reluctant to use technology that involved computers. She did not indicate whether her view had changed in the time between her first reflection and her final reflection. T7's opinion suggests that she needed more time and experience with implementing the program in order to identify less valuable attributes of it, S1 on the other hand had perhaps used the program more often and therefore she found it easier to implement the program. Based on L3's experience, it seems users would like to have ready support available so that they can implement the program with ease and a feeling of competence.

S1s opinion had changed in her second reflection. In her first reflection she seemed unable to find any *less valuable attributes of the program* but now she saw the fact that the program required a certain level of computer literacy as a less valuable attribute. Her opinion was that "... some teachers might find it very difficult to use because they are computer illiterate, especially the old teachers" (S1). This indicates that increased experience in implementing the program could lead to the identification of aspects that participants previously could not identify. This was

also evident when L3 came to the realisation: “Sorry – I saw that under the lesson plan I can type in exactly what I want to do so previous comment is not valid” (L3). Furthermore, some participants realised that the program requires availability of and access to a computer or laptop. This was evident when T4 realised:

> *For me to do the planning, I should have my laptop with me, because the programme is on the laptop at home If we will do the planning together we all will have to keep our laptops with us to work on. But nothing is impossible. (T4)*

The main finding regarding resources within a particular context can be seen in one of the participant’s third reflections. Their importance becomes evident in the argument:

> *The fact that the resources are not linked to other website where you can download the resources makes it less valuable. I think the resources valuable and relevant to the Namibian context need to be linked to the website so that teachers can download relevant resources and it should also allow teachers to be able to upload other resources that they suggest for others. (S5)*

From this verbatim response it is clear that the participants realised the importance of context and that it should be incorporated in lesson planning and curriculum development. I think it is important to mention that attitude in relation to level of competency featured strongly in some of the participants’ final reflections. L3 indicated that her perception of the program would be more positive if she could get the “hang of” and “know-how of the software”. She would be more positive in the sense that it “will actually be fun to plan lessons in such a structured and detailed way” (L3). Although she had forgotten how to use the program in her first reflection, she concluded her final reflection in this regard with: “I love this!” (L3).

In 4.3.2.2 as well as in this section I have indicated the changes in perception in the course of implementing the program.

I now compare the participants’ perceptions to highlight the developments that took place during their implementation of the program.

4.3.4 Developments that took place during the implementation of the computerised lesson planning program

Table 4.6 provides a comparison of the participants’ verbatim responses from their first to their final reflections of the developments that took place during the implementation of the program.

Table 4.6 Developments that took place during the implementation of the computerised lesson planning program

Developments that took place during the implementation of the computerised lesson planning program	
First reflection	• My first time - very little! (T1)

	• All the outcomes that the curriculum has. (T4) • How to plan a lesson, how to plan for the term, have to click on boxes to plan on term on lesson. (T6) • I have learned a lot of new things. I have never knew that you can be able to plan all your lessons once. Especially for the whole term. Another amazing thing is that each part of the lesson has its colour so you won't get confused. (S1) • I have learnt about different learning objectives across the curriculum since it is new. We were used to the old curriculum and it looks different, such as topic of integration and learning objectives. (S2) • What I have learnt in this implementation is that you can be able to see easily what you have taught in term 1 or term 2. You can use this lesson plan as many times for you is just to change date and other simple activities that you need to add. (S4) • I learnt that most of the times people tend to complain about change for example changes in the new curriculum with lots of workload but they can't find ways to adapt to change. I learnt that technology is a better way of keeping work as well as information well filed and updated. I also realised that it is very important to have some sort of computer skills so that they can keep up with the changes in the world we living in. (S5) • Not really. Maybe just how helpful it is to use technology to help with planning of lessons. (L4)
Second reflection	• I like the computerised way of planning more and more. (T1) • Every time I start with a new lesson, some gained experience from the previous lesson plan makes it easier to use the computer. (T3) • I learnt that this program is not all about having the lesson plan done for you, it requires your input and also the ability of the teacher to plan the lesson accordingly. The lesson plan will just be saved the way you put everything for example if you write something in the content and not in the introduction the lesson will be displayed when viewed the way the teacher/ planner planned the lesson without the introduction. (S5) • That I feel secure in the knowledge I am covering all aspects required in the new syllabus ('15). (L3) • This program makes it so much easier to make sure the whole syllabus is covered in a year's time. (L4)
Third reflection	• The computerised way of lesson planning showed me that I as a teacher can become much more knowledgeable about the lesson topic and thus help the learners to much more understanding. (T1) • To be more positive towards lesson preparation and all the paper work. (T9) • It's very effectively and it will save time and materials since you don't need to type and print lots of paper. I also learnt how to relate things that I have plan already and what I did not plan. (S4) • This program is one of the ways that one can use as a teacher to make their work much more easier and keep them updated to the latest knowledge and technology as the new curriculum suggested. (S5) • Just that using ICT to do lesson planning appears to be really cool. (L2)

Valuable insights were to be found in the participants' first reflection on developments that occurred during the implementation of the computerised lesson planning program. These included the curriculum, lesson planning, progression, structural aspects of the program, value of technology, computer skills and adapting to change. One participant stated that she had learnt "very little" in her first reflection (T1). This changed in her RJ2 and RJ3, which are discussed in this section.

Developments that took place in terms of the curriculum were about the curriculum's actual content and how participants became more knowledgeable about its content. This is evident in the following opinions:

> *[I have learnt about a]ll the outcomes that the curriculum has. (T4)*

> *I have learnt about different learning objectives across the curriculum since it is new. We were used to the old curriculum and it looks different, such as topic of integration and learning objectives. (S2)*

Developments that took place in terms of lesson planning included "how to plan a lesson" (T6) and that one would "be able to plan all your lessons once, [e]specially for the whole term" (S1). This moreover indicates that some participants came to realise that curriculum development occurs throughout the year when they organise the competencies into lesson plans for each of the terms. In the lesson planning program, the lesson plans are organised in such a way that they ensure progression in the implementation of the curriculum. This became evident in S4's response: "[I] learnt in this implementation... that you can be able to see easily what you have taught in term 1 or term 2. You can use this lesson plan as many times...". By indicating which competencies have been covered in a certain term, the implementer can ensure that the teaching-learning of competencies done next can build on what was previously covered. In terms of structural attributes of the program, some of the participants came to realise that the colours (S1) are employed in the program to differentiate between the elements of the curriculum and that the program allows implementers to edit lesson plans so they can use them again (S4). This is one of the many benefits this program holds. In terms of the value of technology the participants discovered the value that technology might have for education and for lesson planning. This emerged in comments such as "... how helpful it is to use technology to help with planning of lessons" (L4) and

> *I learnt that technology is a better way of keeping work as well as information well filed and updated. I also realised that it is very important to have some sort of computer skills so that they can keep up with the changes in the world we living in. (S5)*

This opinion also shows that the participants learnt that basic computer skills are required in order to enjoy the benefits of such technology. Of particular interest to this study, participants also learnt that the program could be an innovative tool for them to adapt to change. This is evident in the journal entry written by one of the final year education students:

> *I learnt that most of the times people tend to complain about change for example changes in the new curriculum with lots of workload but they can't find ways to adapt to change. I learnt that technology is a better way of keeping work as well as information well filed and updated.*

I also realised that it is very important to have some sort of computer skills so that they can keep up with the changes in the world we living in. (S5)

In their second reflections it became evident that experience gained in implementing the program affected their perceptions. This also affected their attitudes. They came to "like the computerised way of planning more and more" (T1) and found that "some gained experience from the previous lesson plan makes it easier to use the computer" (T3). This indicates that the participants learnt that the more experience they gained in implementing the program, the more positive and more competent they became. The participants' descriptions of developments started to have more depth in their second reflection. They viewed developments in terms of teachers' input. The following verbatim response supports this: "I learnt that this program is not all about having the lesson plan done for you, it requires your input and also the ability of the teacher to plan the lesson accordingly..." (S5). In addition to their having the ability to plan lessons more quickly, some of the participants learnt that the program assisted them in covering all the competencies of the curriculum in a year's time (L4). L3 felt "secure in the knowledge" that she is "covering all aspects required in the new syllabus".

In their final reflections, participants' developments included a change in attitude and this was evident in the opinion that they learnt "[t]o be more positive towards lesson preparation and all the paper work" (T9). Furthermore the participants learnt that the program could help improve teachers' and learners' learning. This was apparent in the opinion that teachers could "become much more knowledgeable about the lesson topic and thus help the learners to become much more understanding" (T1). This also indicates that the participants came to learn that the benefits of the program could have an effect on the learners and their learning as well. Interestingly, the concept of relatedness of lesson planning to the curriculum emerged. This is evident in the realisation: "I also learnt how to relate things that I have plan already and what I did not plan" (S4). One of the participants also alluded to the practicability of the program and stated that it "make[s] their work much easier and keep them updated to the latest knowledge and technology..." (S5). This indicates that the program could simplify lesson planning and improve teachers' curriculum development approaches. In addition to making lesson planning more practical, it also made it more fun: "... using ICT to do lesson planning appears to be really cool" (L2).

The user-friendliness of the program as perceived by the participants is presented now.

4.3.5 User-friendliness of the computerised lesson planning program

In Table 4.7 the perceived user-friendliness of the computerised lesson planning program is presented.

Table 4.7 User-friendliness of the computerised lesson planning program

User-friendliness of the computerised lesson planning program	
First reflection	• It is totally confusing! I don't know what tab to use or where to! (T1) • Yes, with the necessary experience it will save time and energy. (T3) • Yes, very. With the few functions on the screen, save, load, clear. It simplify the use of the program. (T4) • Yes, I find the program user-friendly, because if you are unsure of something you click with the mouse on it/the word and it explain the function. (T5) • Easy to operate. (T8) • The program is user-friendly because it is not complicated and does not require complex understanding and learning of computer skills. The person who is using it can teach the other person how to use it also. The lower primary colors used will help you to differentiate the subjects from the competencies. You can plan for the whole year at once and you can just work accordingly to your plan instead of spending sleepless nights writing lesson plans for your class. (S5) • Once you understand it then it is quite enjoyable to use, but it takes time to get the hang of it. (L1) • At first I struggled to get the hang of the program. (L4)
Second reflection	• It requires time to understand how this electronic program works. Enough training should be given or a cd should accompany the software program. (S2) • At this stage I found that there is something that need to be done this program should have a hardcopy so that someone from outside will be able to follow and know what to do. Since now it only accommodate people who attend the training. (S4) • The program is user-friendly because it does not require internet, because in most cases teacher do not know how to search things from the internet or in rural areas where people are not access to internet cannot struggle who use this program to plan their lessons. The lesson plans are shortened and teacher will not spend too much time being in front of the computer that may cause eye damage.(S5)
Third reflection	• Initially it was confusing, but the further I worked through it, it became quite easy to use and in the end I can say that it is quite user-friendly! (T1) • It is definitely users friendly. I just needed more time. (T2) • The instructions become more familiar and easier to follow. (T3) • It is also easy to save and print your planning. You do not have to search for the print button. (T7) • ... So the more you use it, the more you will become fluent on using it and the less the time it will take you to use it when planning your lessons. Very much friendly to the user. (S5) • Being able to remove and add information and/or resources is also quite handy. The system alerts you when you have chosen topics and competencies that do not belong together! How friendly is that! (L2)

In the participants' first reflection, the user-friendliness of the computerised lesson planning program was defined in terms of its practicality. This was described by some of the participants as: "save time and energy" (T3), "easy to operate" (T8) with "the few functions on the screen" (T4) and explanatory in the sense that "if you are unsure of something you click with the mouse on it/the word and it explain the function". (T5). The user-friendliness of the program and the level of competency required in using computers could be linked as a participant argued that "... it is not complicated and does not require complex understanding and learning of computer skills. The person who is using it can teach the other person how to use it also" (S5). However, the program's perceived user-friendliness can also be affected by limited experience and

competency in implementing the program. This became evident when some of the participants expressed their awareness of the role of computer literacy:

> *It is totally confusing! I don't know what tab to use or where to! (T1)*
>
> *Yes, with the necessary experience it will save time and energy. (T3)*
>
> *Once you understand it then it is quite enjoyable to use, but it takes time to get the hang of it. (L1)*
>
> *At first I struggled to get the hang of the programme. (L4)*

Furthermore, some of the participants perceived the program's user-friendliness as convenient. This was found in the opinion that one "... can plan for the whole year at once and you can just work accordingly to your plan instead of spending sleepless nights writing lesson plans for your class" (S5). This indicates that the user-friendliness of the program affects attitudes. Not having to spend "sleepless nights writing lesson plans" (S5) made some participants could feel more positive towards lesson planning.

In their second reflections it became evident that sufficient training and support in the form of a manual would improve the program's user-friendliness. This was found in the opinions that "[e]nough training should be given or a cd should accompany the software program" (S2) and "... this program should have a hardcopy so that someone from outside will be able to follow and know what to do. Since now it only accommodates people who attend the training" (S4). At this stage of implementing the program one of participants came to realise wider benefits of the user-friendliness of the program in the sense of socio-economic status, internet access and health benefits. This was found in the following participant's verbatim response:

> *...it does not require internet, because in most cases teacher do not know how to search things from the internet or in rural areas where people are not access to internet cannot struggle who use this programme to plan their lessons. The lesson plans are shortened and teacher will not spend too much time being in front of the computer that may cause eye damage. (S5)*

In the participants' final reflections it was very clear that the user-friendliness improved with more experience in implementing the program. Experience affects how user-friendly the program is perceived to be. This is evident in the following verbatim responses:

> *Initially it was confusing, but the further I worked through it, it became quite easy to use and in the end I can say that it is quite user-friendly! (T1)*
>
> *It is definitely users friendly. I just needed more time. (T2)*
>
> *The instructions become more familiar and easier to follow. (T3)*

... So the more you use it, the more you will become fluent on using it and the less the time it will take you to use it when planning your lessons. Very much friendly to the user. (S5)

In their third reflections some participants referred to structural aspects of the program that made it user-friendly. These were not referred to in previous reflections. These included that it is "easy to save and print your planning" (T7) and "being able to remove and add information and/or resources" (L2).

In 4.3.2.6 I provide the perceived effects of the program on the participants' personal lesson planning as perceived by them in their RJs.

4.3.6 The effects of the computerised lesson planning program on personal lesson planning

Computerised lesson planning could have an effect on the participants' personal lesson planning. Table 4.8 provides their verbatim responses in this regard.

Table 4.8 The effects of computerised lesson planning program on personal lesson planning

The effects of computerised lesson planning program on personal lesson planning	
First reflection	• I can immediately after the lesson evaluate the lesson and change it for the next year. (T1) • You can always go back for reference and it will be done in a more orderly manner. (T3) • "Your lesson planning will be much more in detail and "volledig". (T5) • "... it would be quick -more effective -more organised -can quickly change something on lesson if needed. (T6) • I think it can make my lesson planning much easier. (T7) • Yes, lesson planning is made easier and less paper work to fill in. (T9) • Yes it will be very easy and fast, because everything is on the computer. (T10) • Yes, I think so because if I plan my lessons for the first term, or for all the terms. Then I might have to use them for three years or so, because if my lesson worked for me well in my first year, then I don't see the problem of using them for the second, third or fifth year. (S1) • ... this program it really guide people what they are expected to do and how to do it... It also save time instead of writing with a pen you can just take your computer. The program help teachers to keep their lesson plans for future reference just for them to add if the lesson was not successfully. It shows everything that a teacher need to focus on. (S4) • Yes, the lesson planning program can have an effect on my lesson plan as I will always reflect on what I have teach. I will always see if my objectives are reached. The program also make provision to add teaching materials to the lesson. My lesson plans has clearly already stated objectives and sub competencies to allow a free flow of information. My lesson plan will be well presented because it's well planned. (S5) • Definite time saver. Can use it over and over by adding new ideas every time you use it. (L1) • I believe it makes lesson planning less laborious... Teachers will prefer to use it as it provides most details already (competencies, sub competencies, activities, resources already). Teachers don't like to do lesson planning now as it requires a lot of writing and takes up a lot of time. CLP last for about less than 5 mins. (L2)

	• ...it makes it a pleasure to plan for a longer period. (L4)
Second reflection	• It exposes me to much more resources of information about the lesson. (T1) • Well it will certainly be done more thoroughly and according to the curriculum. I am still struggling with lesson planning on the program. Can't get to fill in the subject area. Just figure it out on my own! Yes!! Just need some more practice. (T4) • All of your lesson planning will be up to date... (T5) • -it combines the curriculum in one simply program -helps to make your classroom more organised. (T6) • ...less writing makes me as teacher more positive about lesson planning. (T9) • The computerised lesson decreases the chance of team work and collaboration as individuals will just be seated with their laptops and plan their own lessons with discussion even if they do not understand their subtopic and other competencies. (S2) • I did not get any negative effect of this program on my lesson planning. Very clear terms used to guide the user, all the component are well displayed you can save what you wrote on your lesson plan. In fact this program has a positive effect on my lesson since it will allow me to save my information and to keep a record of what I teach and to keep track of the learning and teaching process. (S5) • It definitely can make one enjoy lesson planning and not hate it as it currently is! One will be looking forward to doing it! (L2) • Getting exciting to plan structured teaching with the syllabus already there and no need to search for the syllabus and relevant items. The availability of resources to support the lesson planning is an added bonus! (L3) • It ensures that all elements in a year are covered .(L4)
Third reflection	• It would be easy to improve lesson planning and to adjust your outcomes based on your learners' skills and abilities. (T2) • The good thing is that you will be competent in using the computers. The other thing is that you can load other teaching aids. (S2) • ...somehow I think it could have an effect on the lesson planning in the sense that the teacher might become lazy or maybe the computer stolen or collapsed than s/he will left with nothing. (S3) • The program has a positive effect on my lesson because even if I am not available or cannot show up to class for some sort of reasons, I can always refer someone to what I have planned and that person can use the lesson what I have planned beforehand to deliver the lesson, present it by following all the components of a lesson and more especially the resources that are easily obtained. (S5) • This is an excellent tool for under qualified teachers to step up their competence. (L3) • It is possible to look objectively at the whole period of teaching – seeing shortcomings in you planning more easily. (L4)

The effects of the computerised lesson planning program on personal lesson planning were perceived in terms of its benefits for implementers. These benefits included *that the program permits them to evaluate lesson plans in order to bring about changes for improvement (T1, T6, S4) and building up a collection of lesson plans (T3, S4) to revisit. These changes can be done by reflecting on what has been taught in the collection of lesson plans and it furthermore also ensures that the competencies of the curriculum have been reached (S5). Furthermore some of the participants argued that the program makes their personal lesson planning more practical by being more "orderly" (T3), quick / fast/ save time (T6, T10, S4, L1); "more in detail and complete" (T5); "effective, organised, quickly change[able]" (T6); "easier" (T7, T10); and

reusable (S1, L1). Furthermore the program guides the teacher so that they know "... what they are expected to do and how to do it" (S4). S5 commented: "My lesson plan will be well presented because it's well planned" (S5).

The practical benefits of the program could also affect one's attitude. This was reflected in the following participants' opinions:

> *...less paper work to fill in. (T9)*
>
> *Teachers will prefer to use it as it provides most details already (competencies, sub competencies, activities, resources already). Teachers don't like to do lesson planning now as it requires a lot of writing and takes up a lot of time. CLP last for about less than 5 mins. (L2)*
>
> *...it makes it a pleasure to plan for a longer period. (L4)*

In the participants' second reflections, the above finding was explicitly stated in two of the participants' opinions that they would be more positive towards lesson planning:

> *...less writing makes me as teacher more positive about lesson planning. (T9)*
>
> *It definitely can make one enjoy lesson planning and not hate it as it currently is! One will be looking forward to doing it! (L2)*
>
> *Getting exciting to plan structured teaching with the syllabus already there... (L3)*

One of the participants, however, also mentioned possible negative effects that the program might have on teamwork and collaboration (S2).

Although some of the experiences were no different from those in the first reflections, in their second reflection, the participants looked beyond the benefits for their personal lesson planning. They now considered these effects in terms of the functions of the program, the curriculum that is incorporated in the program and what the program exposes them to. These effects are discussed next.

The program included functions such as 'saving' and thus being able to keep electronic records of their plans (S5). In terms of the curriculum the participants believed that their lesson planning would be much more "thorough" (T4) by being aligned with the curriculum. This would also ensure that "all elements in a year are covered" (L4). Curriculum implementation by means of computerised lesson planning would be more "up to date" (T5). Since the program includes the curriculum in the software, it would also help teachers to have "organised classrooms" (T6). Moreover, the program exposed them to "much more resources of information..." (T1). It is also significant that gaining experience in implementing the program brought with it a feeling of

accomplishment to the participants and that this fostered an 'I can' attitude within them. This was evident in epiphanies such as "[c]an't get to fill in the subject area. Just figure it out on my own! Yes!! Just need some more practice" (T4).

In the participants' final reflections it became apparent that they had a deeper appreciation of the effect of the program on their personal lesson planning. This became evident when one of the participants commented: "It would be easy to improve lesson planning and to adjust your outcomes based on your learners' skills and abilities" (T2). This indicates that the participants had started to think about aspects such as improvement and including learner's context in curriculum implementation through their lesson planning. One of the participants also mentioned the effect of the program on their own professionalization in the sense that they "... will be competent in using the computers" (S2). For another participant, the possible erosion of the teachers' professionalism and the possibility of being left with nothing if the system were to fail or the computer were to be stolen were a concern. This featured prominently in the argument "...somehow I think it could have an effect on the lesson planning in the sense that the teacher might become lazy or maybe the computer stolen or collapsed than s/he will left with nothing" (S3). In contrast to this opinion, another participant felt:

> *[t]he programme has a positive effect on my lesson because even if I am not available or cannot show up to class for some sort of reasons, I can always refer someone to what I have planned and that person can use the lesson what I have planned beforehand to deliver the lesson, present it by following all the components of a lesson and more especially the resources that are easily obtained. (S5)*

For two of the other participants, the program was perceived as a developing and changing agent in the sense that it is "... an excellent tool for under qualified teachers to step up their competence" (L3) and "it is possible to look objectively at the whole period of teaching – seeing shortcomings in your planning more easily" (L4).

I have now discussed the possible effects of the program on personal lesson planning. In Section 4.3.2.7 I explore the participants' perceptions of the effect of computerised lesson planning program on curriculum development and implementation.

4.3.7 The effects of the computerised lesson planning program on curriculum development and implementation

Table 4.9 provides the participants' verbatim responses on the effects that the computerised lesson planning program could have on curriculum development and implementation.

Table 4.9 The effects of the computerised lesson planning program on curriculum development and implementation

The effects of the computerised lesson planning programming on curriculum development and implementation

First reflection	• At this stage I don't know if it could have any effect on cd and implementation! (T1) • Definitely. For the curriculum to be efficiently implemented in the whole country, this program will assure it. (T4) • Definitely on the implementation of the curriculum as it will handle much quicker and easily on technology. (T5) • ...easier for teachers to implement new curriculum. (T6) • Yes, a very big effect. It will in such a way that now all teachers will have to be trained to use such a program but it will only be effective in urban areas and those areas with electricity. Other areas will be left out as teachers will still use the old way of planning (writing). (S2) • Since printing hardcopy for curriculum is very cost then it will also save money that can be used for other purposes in the development of education. (S4) • This lesson planning program will have an effect on curriculum development and implementation because if all the teachers are given the chance to use this program they will keep a record of what they teach. They will quickly plan their lessons effectively and efficiently and focus on giving the learners the attention they need to accomplish the goals and objectives of the new curriculum. (S5) • Could be, because it could be made available to all teachers and by doing so, everyone can have quality lessons. You can add new stories and update the resources as often as you need to. (L1) • All aspects required in the syllabus will be covered. (L3) • This is difficult to answer if the program is not used over a period of time. (L4)
Second reflection	• It will now be possible to work with teachers all over Namibia for all the schools that have this program, can share plannings. (T4) • I think the program the curriculum very good explain, so each teacher will understand exactly what is expect from learners and implement it. (T5) • Yes, if the government is willing -it could ensure that lessons are planned more or less in the same manner in different schools. (T6). • It will certainly ensure that all the schools do the same work. (T7). • Yes, implementation of the curriculum can be controlled by the fact that it says on the initial curriculum outline in which term the objective are to be attended to (covered). (T9) • The effect is that the curriculum developers will see how the computerised lesson plan will have a effect on the education system and do changes to fit or include all the Namibian context. (S2) • Sharing of material and lessons to all schools. Lessons can even be translated in different mother tongues. (L1) • I do not think teachers will have input in the development of the curriculum. They are the ones expected to implement it. This is a wonderful innovative ground-breaking tool that will enhance implementation of the intended curriculum if teachers use it correctly. (L3) • Because it is easier to see the whole picture on your computer –it should be easier to notice shortcomings in a syllabus – if being used for a period of time. (L4)
Third reflection	• This will make the curriculum less monotonic. (T3) • I think the curriculum will be implemented much more as it should be implemented. (T5) • In my opinion, I think if all schools use the program it will help with ideas on how to teach certain things to the teachers. (T7) • I might have a different reflection on my third reflection. I have come to realise and think that this will not have an effect on curriculum development, as the curriculum developers will keep developing the curriculum. And I think this Eduplan will only be used by the teachers. (S1) • Curriculum developers should experience this program. I'm sure it will enlighten them on how to approach curriculum development and also how to implement it! (L2) • After some thought I realized that this computerised lesson plan is based on the basic competencies of the syllabus –exactly what is needed to be taught –

	but this can be extended to university level teacher training – then the pop-up explanations could include the value and theory behind e.g. subitizing and provide enrichment examples that go beyond the basic competencies. E.g. problem-solving should provide the conceptual understanding before the operational signs are taught. (L3)

In the participants' first reflection on the possible effects of the computerised lesson planning program on curriculum development and implementation some participants felt that it was too early for them to determine whether there was an effect or not (T1, L4). It seemed as if the participants did not have enough knowledge of the concept of curriculum development itself to determine the program's effect. In their responses it was clear that they tended to reflect on the effects on curriculum implementation rather than on curriculum development.

With regard to curriculum implementation, the participants referred to the effect of the program in terms of efficiency, potential for simplifying the implementation of a new curriculum, requirements for maximum productivity, eliminating costs, learners and their learning, and improved quality. The recognition of the program's efficiency was most evident in one participant's response: "Definitely. For the curriculum to be efficiently implemented in the whole country, this program will assure it" (T4). Other comments related to the efficiency of the program included its time-saving element: "...much quicker and easily on technology" (T5). One of the university lecturers also saw the potential this program has to simplify the implementation of a new curriculum. Another lecturer felt that the implementation of a new curriculum would be easier (L3)**.** (The new Namibian curriculum was implemented in January 2015). For the program to achieve maximum productivity in terms of curriculum development and implementation, requirements such as "training" and "electricity" (S2) have to be available and accessible. Moreover, there were participants who realised that the program would eliminate costs incurred in printing curricula which "... can be used for other purposes in the development of education" (S4). The participants also perceived the effects of the computerised lesson planning program in terms of the snowball effect it could have on learners and their learning: "They will quickly plan their lessons effectively and efficiently and focus on giving the learners the attention they need to accomplish the goals and objectives of the new curriculum" (S5). Furthermore, it was perceived that "quality lessons" (L1) could improve the quality curriculum development and implementation.

In their second reflections the participants considered the way the program could affect curriculum development and implementation, highlighting aspects such as sharing, conformability, transformability, controllability, and accommodation. Participants indicated that lesson plans could be shared amongst teachers in Namibia (T4) and this would make curriculum development and implementation a participative, shared experience. They noted that

the program “explains” (T5) the curriculum and its elements. This would thus enhance curriculum development and implementation because teachers would be able to understand the curriculum. With regard to conformability, the participants indicated that the program would ensure that teachers planned in similar ways (T6, T7). The program could have a transforming effect on curriculum development and implementation in terms of the type of content. Some of the participants felt that seeing the “whole picture on [one’s] computer” had enabled them to identify “shortcomings in the syllabus” (L4). This could be done by including the “Namibian context” (S2) when applicable and relevant information was chosen for lessons. Controllability of the competencies (seeing what competencies have been achieved or not) would enable teachers to determine the success and extent of their curriculum implementation (T9). Furthermore, the possibility of including “different mother tongues” (L1) in the program could ensure that all teachers and learners were accommodated.

A significant observation was made in one of the participants verbatim responses in the second reflection:

> *I do not think teachers will have input in the development of the curriculum. They are the ones expected to implement it. This is a wonderful innovative ground-breaking tool that will enhance implementation of the intended curriculum if teachers use it correctly. (L3)*

This indicates that some participants regard themselves as mere implementers of the curriculum and not as curriculum developers. They did not believe they had a say in decision making processes of the curriculum. However, one participant also felt that the program was “a wonderful innovative ground-breaking tool that will enhance implementation of the intended curriculum...” (L3). In the participants’ final reflections they came to realise that the curriculum could be made “less monotonic” (T3). This highlights the need for an even greater emphasis on teacher creativity. Teachers’ input is required in the program and they have to implement the curriculum through creative lesson planning for their specific contexts. Furthermore, in their third reflection participants came to realise that the program could promote learning amongst its implementers. This became evident when one of the participants expressed the view: “... it will help with ideas on how to teach certain things...” (T7) and this could lead to teachers becoming more knowledgeable curriculum implementers. In addition to ideas on how to teach certain things, which T7 mentioned, one participant believed that the program would also lead teachers towards having more competence in implementing the curriculum: T5 “think[s] the curriculum will be implemented much more as it should be implemented”.

Similar to the finding in the second reflection, two participants commented in the third reflection that teachers cannot be seen as curriculum developers. This was the focus of their following responses:

I might have a different reflection on my third reflection. I have come to realise and think that this will not have an effect on curriculum development, as the curriculum developers will keep developing the curriculum. And I think this Eduplan will only be used by the teachers. (S1)

Curriculum developers should experience this programme. I'm sure it will enlighten them on how to approach curriculum development and also how to implement it! (L2)

Although L2's perception indicated that curriculum developers are different from that of curriculum implementers, she indicated that the program would be a good example of how curriculum implementation should occur. One of the lecturer participants suggested that the program be extended to tertiary level where lecturers could enhance the course content on curriculum development and implementation by including value and theory behind the curriculum's competencies in their lectures to education students (L3).

I now draw on the verbatim responses of the participants in terms of suggestions and changes to improve the designed computerised lesson planning program.

4.3.8 Suggestions and changes to improve the designed computerised lesson planning program

In this section I present the participants' suggestions and changes to improve the computerised lesson planning program. This is presented in Table 4.10 below.

Table 4.10 Suggestions and changes to improve the designed computerised lesson planning program

Suggestions and changes to improve the designed computerised lesson planning program	
First reflection	• I know too little to make any suggestions! (T1) • None at this moment, except for the fact to become more acquainted in the use of the computer. (T3) • [dark green] colour, Afrikaans. (T4) • At term planning the competencies are blue and the sub competencies are pink – at the lesson planning it differ. I would make them the same. (T5) • At this stage I do not find something that I would change" (T7) • I would add more resources. (T6) • No changes (T9, L3, L4) • I don't see any changes that need to be done in this program because everything is just perfect. I like the way you put in thinks and how easily you can delete them. (S1) • In the lesson plan area, I will add a reinforcement component. (S2) • Fonts, fonts please. (S3) • The icon/button for competencies, lesson plan, topic of integration need to have different colors or size just to let the person know that he/she can click on that icon. The instructions that shows/indicate the keys that can be found in the program and they represent what so that even someone who is not trained can be able to follow and use the program. (S4) • The program should be online where people can download it freely and use it. I suggest that the documents saved should display on the documents of the computer and you don't need to search for Eduplan documents. The resources should be linked to other websites where you can download other resources. (S5)

	• Too quick to make a judgment. One need to use it for a period to see how it will work and what changes will be necessary. (L1) • It will be good to add the 'reinforcement' component to the lesson stages. (L2)
Second reflection	• There should be a manual also to facilitate the information as some people are not good listeners but good reading and facilitate the process. (S2). • There should be guideline of how to use the program and I suggest that the program should be taken to the teachers workshop so that they can receive training on how to use this program. (S5). • The time (duration) of the lesson as well as grade specification. (L2).
Third reflection	• I have not worked enough on the program, thus there is nothing that needs change now. (T7) • For now there are no changes that I can think of, maybe if the program is used over a longer period of time changes can be suggested. (T9) • Nothing should be changed. Things are easier to use. (S1) • It will also be good to add the Namibian language subject option and let teachers fill in the competencies and the rest of the information. As long as it appears on the list of the lp subjects. (L2) • Because I struggled in the beginning with the practical implementation of the program, I would suggest that the arrows that must be clicked, must be more prominent – with the function they have jumping up easier. I also missed a way to save every lesson with a specific personalised title. I hope it is possible to update the content in the program every time a new syllabus is designed. (L4)

In the participants first reflection they suggested changes to the technical layout, structure and design aimed at improving the existing computerised lesson planning program. Their technical layout suggestions and changes included that the dark green "colour" should be a tone lighter (T4) and that the colours used in the different elements of the program should be consistent (T5). Other technical suggestions and changes were to make the "icon[s] / button[s]" more visible (S4) and to provide more "fonts" (S3). In terms of structural suggestions and changes the participants would like the program to be available in "Afrikaans" (T4), have "more resources" (T6), and the addition of a "reinforcement component" (S2, L2) in the lesson planning element of the program. Another structural suggestion was to save the resources in a document folder instead of in the program's folder. (This can be done by simply moving the folder). Design suggestions include having the program available online and that resources should be linked to websites (S5).

One of the participants indicated that the only change she would make is "to become more acquainted in the use of the computer" (T3). This indicates that the participants realised that they needed to be more computer literate before they could offer worthwhile criticisms of the program. A number of participants could not make any suggestions (T1, T3, T7, L1). This was because they needed more time and experience before they would be able to do so. Other participants liked the program as it was and indicated that "no changes" or "none" should be made to the program at that stage (T7, T9, S1, L3, L4).

In the participants' second reflection there were also structural suggestions and changes to improve the program that were different from those already mentioned. This included having a "time (duration)" specification in the lesson planning element (L2). It was also in their second

reflection that the participants came to realise that support would affect their perceptions of as well as their experience of the actual implementation of the program. Their suggestions and changes in terms of support included having a “manual” (S2) or “guideline” (S5) for the computerised lesson planning program so they could fully implement the program and enjoy its benefits. Another suggestion in addition to support was training. “Training” on the program could be provided at the “teachers’ workshop” (S5) so that teachers could feel comfortable about and competent in implementing the program.

In the participants’ final reflections, most of the perceptions did not seem to have changed, but there were additional suggestions and changes that related to technicality, structure and user-friendliness. A suggestion related to a technicality was that the “arrows ... must be more prominent” (L4). In terms of structural and user-friendliness one of the participants suggested that “Namibian languages” (L2) should be available in the program. In their final reflection it was clear (as in several of the codes presented and discussed in 4.3.2.1 to 4.3.2.7) that the amount of experience one has in implementing the program affects one’s perception of it. In this regard some of the participants stated:

> *I have not worked enough on the programme, thus there is nothing that needs change now. (T7)*
>
> *For now there are no changes that I can think of, maybe if the programme is used over a longer period of time changes can be suggested. (T9)*
>
> *Nothing should be changed. Things are easier to use. (S1)*

This recurring finding is reflected in one of the themes that emerged: practice makes perfect. In the next section I discuss the themes that emerged from the data analysis.

4.4 Discussion of themes that emerged

Some of the main findings are discussed in this section under the following themes that emerged:

- Competence, comfortability, attitude, experience, training as well as access and availability of computers interrelate with the use of technology (4.4.1);
- Computerised lesson planning improves the lesson planning experience (4.4.2;
- The computerised lesson planning program enhances curriculum development and implementation (4.4.3);
- Training and support are requirements for the successful implementation of the computerised lesson planning program (4.4.4);
- Technical suggestions to improve the current computerised lesson planning program (4.4.5);

- Practice makes perfect (4.4.6);
- Fostering innovative curriculum development (4.4.7).

Each of these themes will be discussed in the sections to follow.

4.4.1 Competence, comfortability, attitude, experience, training as well as access and availability of computers interrelate to the use of technology

From the main data findings it became evident that elements such as competence, comfortableness, attitude, experience, training as well as access and availability of computers are interrelated to technology use. In order to illustrate the interrelatedness between these elements Figure 4.2 was designed.

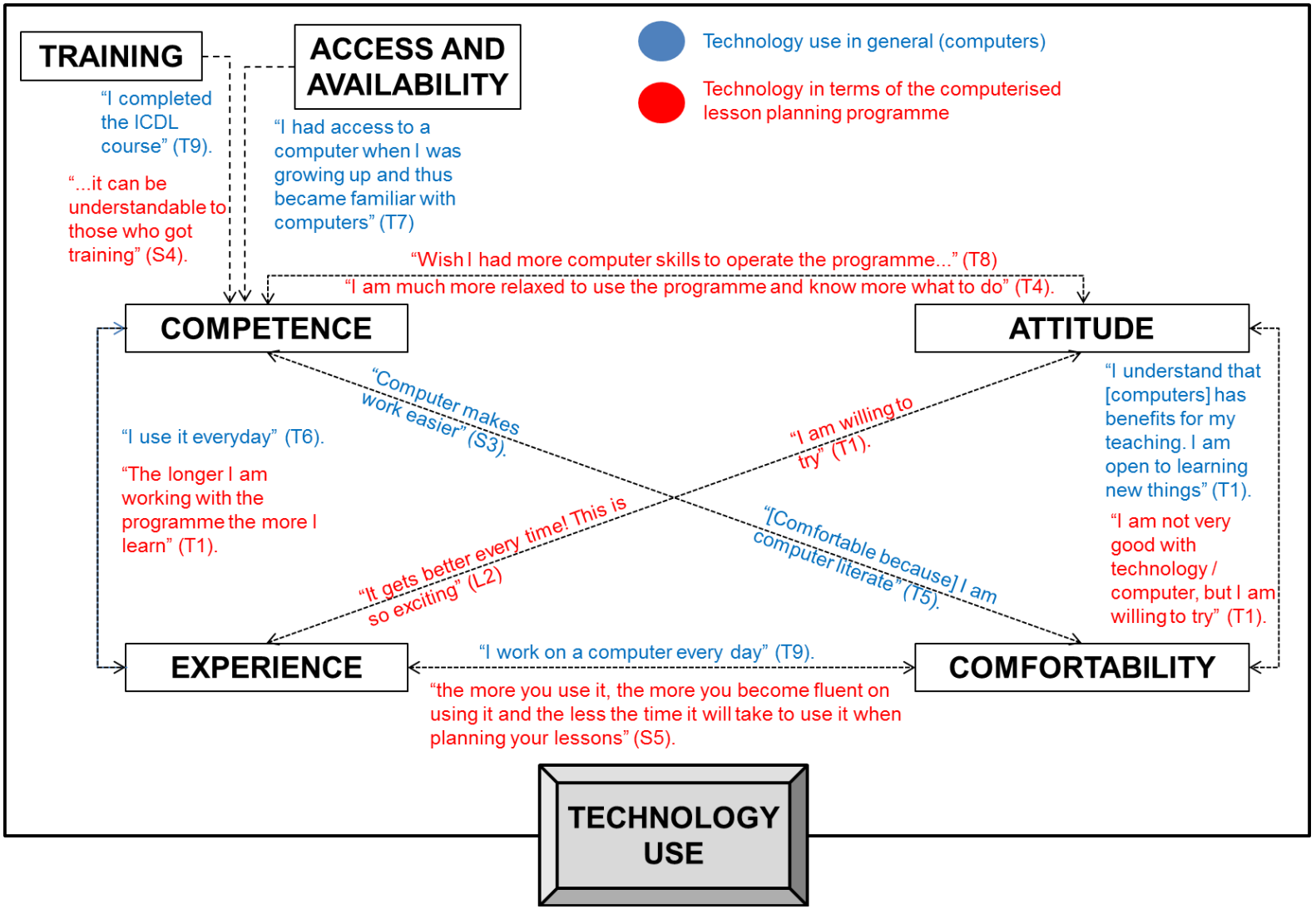


Figure 4.2 Competence, comfortability, attitude, experience, training as well as access and availability of computers' interrelatedness to technology use

Based on Figure 4.2 the main findings show that higher levels of competence result in more positive attitudes towards, increased comfortability levels with using technology and greater experience of using technology (2.4.1.2). In addition, factors such as training and access to and availability of computers could increase one's competency levels (2.4.1.1, 2.5). Similarly, it could be assumed that more positive attitudes towards technology integration could facilitate higher levels of competency, better experiences, and increased levels of competence in using technology (2.4.1.2). Moreover, higher levels of comfortability could lead to increased experience, increased levels of competency and more positive attitudes towards technology use (2.4.1.2). Finally, increased experience in implementing technology could lead to increased levels of competence, more positive attitudes to and higher comfortability levels with implementing technology (2.4). Therefore these elements are so interrelated that it can be argued that their dependence on each other determines the success of technology use (2.4). It is important to note that the opposite could also be true: limited or lower levels of computer literacy, a negative attitude to or lack of comfortability with technology or little experience of, access to or training in using computers could decrease the desire to use technology (2.4).

With the elements interrelated to the use of technology in mind, it is not surprising that the participants found that the computerised lesson planning program could improve their lesson planning experience.

4.4.2 Computerised lesson planning improves the lesson planning experience

In their responses, lower-primary teachers', final year education students' as well as the university lecturers expressed the view that computerised lesson planning improves the lesson planning experience. One of the lower-primary teachers felt that lesson planning would be "easy and fast, because everything is on the computer" (T10). This is evident contributes to how one of the final year education students experienced lesson planning though means of the computerised lesson planning program:

> *I learnt that most of the times people tend to complain about change for example changes in the new curriculum with lots of workload but they can't find ways to adapt to change. I learnt that technology is a better way of keeping work as well as information well filed and updated... (S5)*

Many of the participants' experiences alluded to the computerised lesson planning program as a tool that improves their lesson planning experience. In this regard, one prominent factor was that it can decrease teachers' workloads specifically in terms of planning (2.4.1.1). As indicated in the above opinion of S5 it became evident that technology could facilitate adaptation to change such as implementing a new curriculum as well as improving the quality of administration, including keeping work and information updated and organised (2.4.1.2). The program also reduced the workload and made planning faster and easier by being "... not time

consuming. You can plan your lesson with less pressure" (S1). From another perspective, one of the lecturer participants argued that she:

> *... believe[s] it makes lesson planning less laborious... Teachers will prefer to use it as it provides most details already (competencies, sub competencies, activities, resources already). Teachers don't like to do lesson planning now as it requires a lot of writing and takes up a lot of time. CLP last for about less than 5 min. (L2)*

This perspective makes it evident that the program was perceived as complete because it included all the elements of a curriculum (2.2). The lesson planning experience would therefore be more pleasurable, as the lecturer participant commented: "[i]t definitely can make one enjoy lesson planning and not hate it as it currently is! One will be looking forward to doing it!" (L2).

These responses suggest that computerised lesson planning could be a better experience for teachers than traditional ways of lesson planning. Therefore, saving time, simplifying and speeding up the lesson planning process, facilitating the adaptation to change (such as implementing a new curriculum), keeping planning updated and organised, being more positive about lesson planning by reducing pressure, enjoying and being excited about planning as well as having an inclusive curriculum planning tool: these all contributed to a better lesson planning experience. The program furthermore enhanced curriculum development and implementation.

4.4.3 The computerised lesson planning program enhances curriculum development and implementation

Teachers require thorough curriculum knowledge and skills in order to design subject or lesson curricula (Carl, 2012:109). Curriculum development at a micro level includes consulting curriculum statements, defining objectives of lessons, searching for information about topics, choosing suitable teaching methods, and deciding on ways in which assessment will be done best (Jacobs, 2011:33). As curriculum developers and designers, teachers are the holders, users, and producers of knowledge. They are self-directed individuals who take the curriculum as specified and negotiate it in active engagement with learners in order to meet their needs and the requirements as set out in the curriculum documents (Morris, 2010:867).

In their implementation of the computerised lesson planning program, the participants' verbatim responses included insights into how objectives, context, content method and assessment of the curriculum are facilitated through the program (2.2). This was evident in the lower-primary teachers', final year education students' and lecturers' experiences. In terms of objectives, one participant mentioned that "[t]his program makes it so much easier to make sure the whole syllabus is covered in a year's time" (L4). In addition to covering the whole curriculum, some of the participants indicated that "implementation of the curriculum can be controlled by the fact that it says on the initial curriculum outline in which term the objective are to be attended to

(covered)" (T9), and that "lesson plans has clearly already stated objectives and sub competencies to allow a free flow of information" (S5). The need to consider context was reflected in views such as "[i]t would be easy to improve lesson planning and to adjust your outcomes based on your learners' skills and abilities" (T2). The program also allows teachers the ability to make content applicable and relevant to specific contexts. This was evident in T3's opinion: "[t]here is so much information... Teachers can select between a variation of subject matter" (T3) or by "[b]eing able to remove and add information and/or resources" (L2). Creativity can be incorporated in the method chosen to help learners construct knowledge. "[a] space to write also pops up which allows the teacher to write down their strategy" (L2). Assessment of teaching and learning is facilitated through the program "[b]ecause it is easier to see the whole picture on your computer – it should be easier to notice shortcomings..." (L4). One would be able to "immediately after the lesson evaluate the lesson and change it for the next year" (T1). This contributed to the way S5 experienced the program: "I will always reflect on what I have teach. I will always see if my objectives are reached".

I have described above how the computerised lesson planning program facilitates the elements of a curriculum (2.2). The participants also indicated that curriculum development and implementation could be enhanced by the program in the sense that it "... makes the planning coherent and it ensures the link between all components" (L2); "... make the curriculum less monotonic" (T3); "... will handle much quicker and easily on technology" (T5); "printing hardcopy for curriculum is very cost then it will also save money that can be used for other purposes in the development of education" (S4); "... will quickly plan their lessons effectively and efficiently and focus on giving the learners the attention they need to accomplish the goals and objectives of the new curriculum" (S5); Furthermore, it was perceived that "quality lessons" (L1) could improve the quality of curriculum development and implementation. Curriculum development and implementation would be more successful as a result of the program as it "explains" (T5) the curriculum and its elements so thoroughly.

This main finding that curriculum development and implementation is enhanced by computerised lesson planning features prominently in reflections such as: "My lesson plan will be well presented because it's well planned" (S5) (2.2)

This theme argued that the computerised lesson planning program can enhance curriculum development and implementation, but the requirements for implementing the program need to be considered. These requirements include training and support, which are explored in the next theme.

4.4.4 Training and support are requirements for the successful implementation of the computerised lesson planning program

Training and support were regarded by many of the participants as requirements for the successful implementation of the computerised lesson planning program. In their comments on the drawbacks of technology such as computers, training was identified by most of the participants (T5, T6, T8, T9, S4, S5) (2.4.1.1, 2.4.1.2). I found it interesting that none of the lecturer participants mentioned training as a drawback. The need for training applied directly to the implementation of the computerised lesson planning program. Some of the participants felt discouraged when they began implementing the program. This was evident in their opinions that they "[w]ish[ed] [they] had more computer skills to operate the program easily - if I was younger with more computer training" (T8); and "[t]he lack of ability to use the program with ease. It made me feel rather to stick to the old way of writing with the hand" (T3) (2.4.1.2). It became apparent that training would make the participants feel more competent (2.4.1.2). The participants identified the relation between training and the sufficient competence to implement the program in their opinions such as "I can see that some people cannot be able to use it since it can be understandable to those who got training" (S4). Suggestions were made that the implementation of the program could be improved through training and support: "Enough training should be given or a cd should accompany the software program" (S2); "There should be guideline of how to use the program and I suggest that the program should be taken to the teachers workshop so that they can receive training on how to use this program" (S5); "this program should have a hardcopy so that someone from outside will be able to follow and know what to do" (S4); and "I recommend an instruction or tutor guide ... one might have forgotten after a year how the software works (as I did!)" (L3). These suggestions sufficient training (2.4.1) and support (2.4) should be provided in the form of an accompanying manual to make it easier to implement the program are valuable pointers to the way the computerised lesson planning program could be improved and revised.

In addition to these, technical suggestions were made by the participants in order to improve the current program. This is discussed in the next theme.

4.4.5 Technical suggestions to improve the current computerised lesson planning program

The participants' experiences in the implementation of the computerised lesson planning program enabled them to describe specific aspects they liked and/or disliked about the program. The one aspect that most participants mentioned as needing refinement within the program related to the technical attributes. Four key technical improvement suggestions were mentioned: subjects (program content), colours, icons and fonts used in the program. In terms of subjects (program content), some of the participants suggested that "first language Afrikaans"

(T4) must be available in the program. With reference to colours, some of participants suggested that the dark green colour used in the program is too dark. Another suggestion was that the colours should be consistent throughout the elements of the program. This was contained in one of the lower-primary teacher's suggestions:

> *Will it be possible to keep the colours the same throughout the programme? Just for consistency. The colours of the week plan when you print it, is different from the rest of the planning on programme. (T4)*

In terms of the icons used in the program it was suggested that they be made more visible. S4 made this suggestion: "The icon/button for competencies, lesson plan, topic of integration need to have different colors or size just to let the person know that he/she can click on that icon" and "I would suggest that the arrows that must be clicked, must be more prominent" (L4). Concerning fonts, there was a suggestion that other fonts should be included in the program (S3).

When the program is revised in terms of these technical suggestions, the experience of using the computerised lesson planning program could be improved. More experience using it is also likely to mean it is easier to use. This is explored in the next theme.

4.4.6 Practice makes perfect

Practice makes perfect is a saying used to explain that "[r]egular exercise of an activity or skill is the way to become proficient in it" (Oxford Dictionaries, 2015c). This was a common experience for most of the participants. I present three participant's experiences (one lower-primary teacher, one final year education student and one lower-primary lecturer) which indicate that increased experience in implementing the program had led to improved implementation (2.4.1.2). Figures 4.3 (T1), 4.4 (S1) and 4.5 (L4) illustrate the participants' perceptions with little practice in RJ1 (blue), with some more practice in RJ2 (green) and then with even more practice in RJ3 (orange).

Figure 4.3 presents how practice makes perfect in one of the lower-primary teacher's (T1) experience of implementing the program.

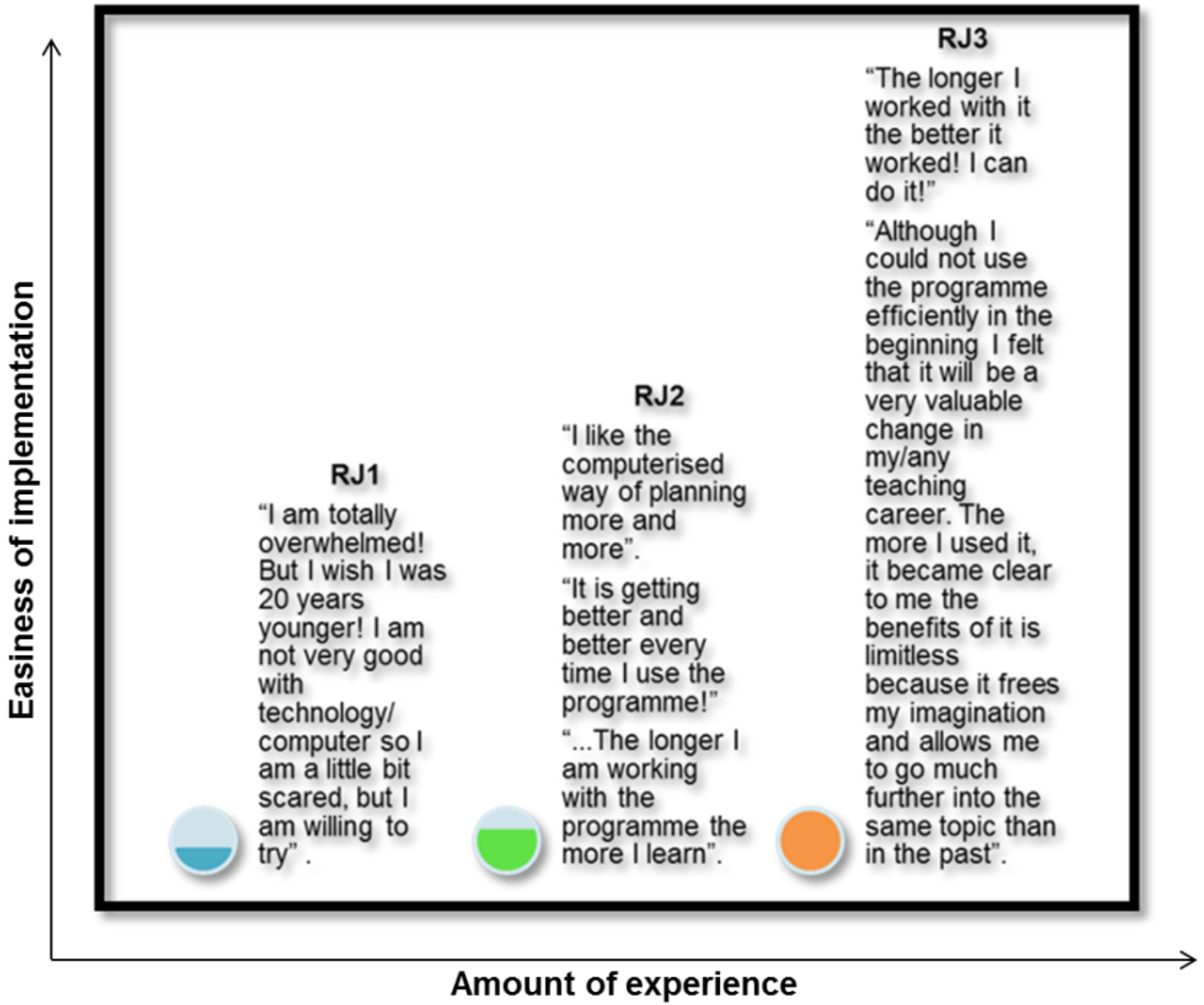


Figure 4.3 Practice makes perfect evident in T1's experience

Figure 4.3 clearly indicates that with greater practice and experience between RJ1 and RJ3, T1 developed a greater competence as well as a more positive attitude toward the implementation of the program. In RJ1 she felt “overwhelmed” and “scared” but with more experience in RJ3 she came to realise that the “benefits” of the program were “limitless” and that it “free[d]” her “imagination” (T1).

In Figure 4.4 below one of the final-year education student’s (S1) experiences are presented. This indicates that increased experience in implementing the program made it easier to implement the program.

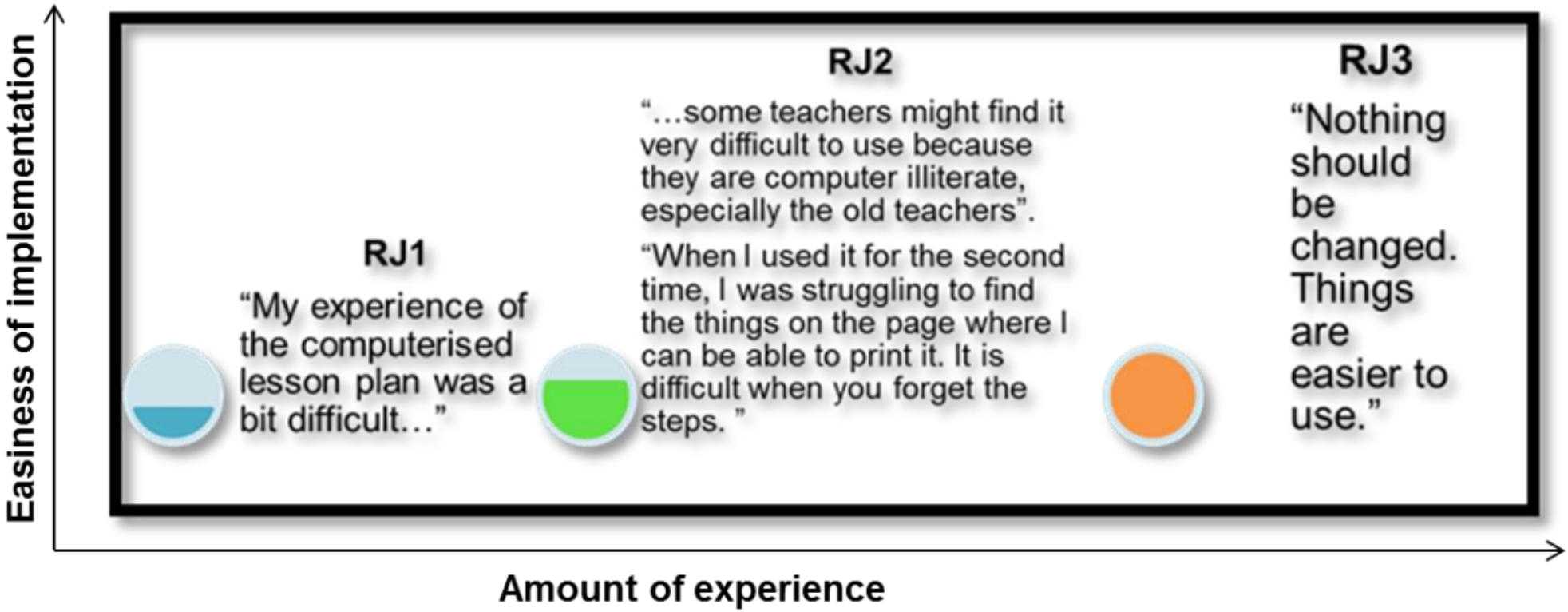


Figure 4.4 Practice makes perfect evident in S1's experience

From Figure 4.4 it is evident that S1 had a similar experience to the one T1 described above. S1's perceptions from RJ1 to RJ3 indicate that increased practice and experience had made her more comfortable about implementing the program. In RJ1 she found the implementation of the program "a bit difficult" but after more practice, she wrote in her RJ3 that she felt that "things [were] easier to use:" (S1).

In Figure 4.5 the statement practice makes perfect is evident in one of the lecturer's (L4) experience of implementing the program.

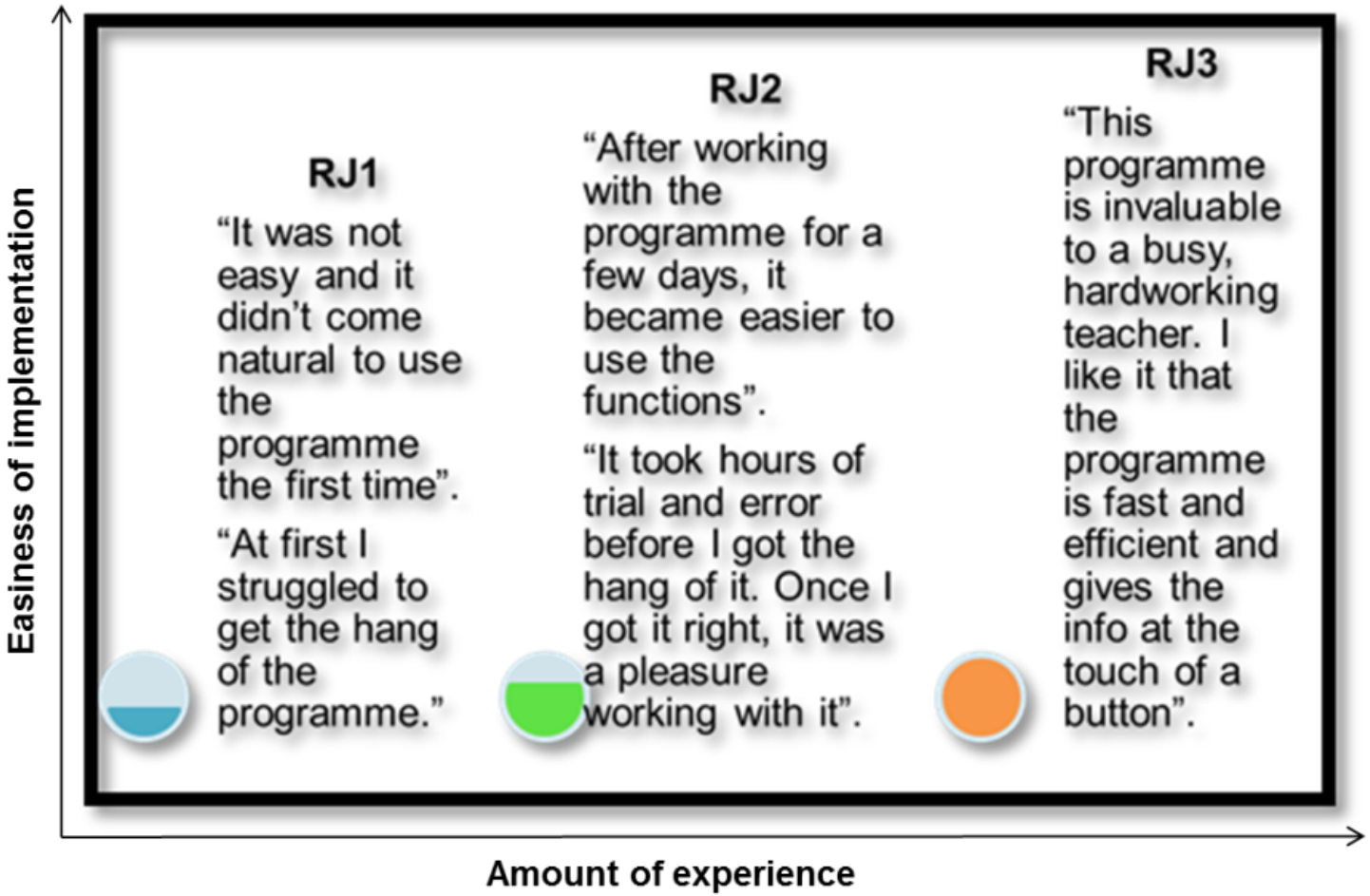


Figure 4.5 Practice makes perfect evident in L4's experience

Figure 4.5 makes it evident that one of the l lecturer participants had a similar experience to one of the lower-primary teachers and one of the final year education students (Figures 4.3 and 4.4). L4's experience also indicated that increased practice and experience improved the implementation of the program. With little experience of implementing the program at the time of RJ1 it was "not easy" for L4 and she "struggled to get the hang of the program". With much more practice and experience at the time of RJ3 she found the program to be "invaluable", "fast" and "efficient" (L4).

The depiction of participants' experiences (see Figure 4.3, 4.4, 4.5) confirms the adage that practice does make perfect. This emphasises that the program must be used regularly and to its full potential for its implementation to be successful.

In Section 4.4.7 the final theme, fostering innovative curriculum development, is discussed.

4.4.7 Fostering innovative curriculum development

Technology can be regarded as a catalyst for change: change in working conditions, handling and exchanging information, teaching methods, learning approaches, scientific research, and in accessing information (Kaul, 2014:45). This study advocates innovative curriculum development in the form of new, original and creative ways of developing the curriculum instead of more traditional forms of curriculum development and implementation. The integration of technologies in curriculum development should encourage teachers to use the benefits of technology to transform curriculum development and in turn education, not to develop teaching and learning mechanically (Kaul, 2014:54). One of the participants felt that the computerised lesson planning program "will make the curriculum less monotonic" (T3). Teachers can develop lessons plans based on the objectives of the curriculum in order to fit their specific contexts (2.2). In planning lessons for a specific context, teachers could use their creativity to meet the learners' needs and requirements (2.4.2.4, 2.5). The objectives of a curriculum are set but the way in which they are interpreted and implemented is not fixed. In the participants' experience of implementing the computerised lesson planning program, one participant referred to possibilities of innovative curriculum development:

> *...the curriculum can... be computerised in such a way that it provides some basis/template on the content to be learnt in schools, but leaves innovation to teachers to use as they have different contexts, children and needs. Curriculum developers can learn from this. (L2)*

This can be done by allowing one to initiate strategies and make teaching and learning applicable to one's context. This was evident in verbatim responses such as "[t]he fact that there's also an option for 'other' in the strategy used is also good because the teacher might

want to use a strategy that is not listed there. A space to write also pops up which allows the teacher to write down their strategy" (L2); "[y]ou can add new stories and update the resources as often as you need to" (L1); "[r]esources are also integrated and saved for you and you can always add your own. Very much helpful" (S5); "[a]nother amazing thing is that, if you want to add either picture or whatever you want to add..." (S1); and one "[c]an use it over and over by adding new ideas every time you use it" (L1) (2.5).

Finally, the notion that the computerised lesson planning program fosters innovative curriculum development is described best by two of the lecturers (2.5):

> *This is a wonderful innovative ground-breaking tool that will enhance implementation of the intended curriculum.... The more I think about what this tool does and what it provides for better instruction if applied properly – the more I value this innovative support for all the admin tasks a teacher has to perform – it provides support and not all additional work. In a short while the teacher can plan ahead for the whole year or term! (L3)*

> *This is such a good initiative that will really be useful for lesson planning! It may change the teachers' mindset/perception regarding lesson planning. Teachers dread lesson planning as they regard it as a laborious task, it takes up a lot of their time. This programme lets them plan in quite a short time, it puts their minds at ease and it simply makes planning a lesson exciting! The programme is user-friendly and reliable as it allows you to save and print for later use. Teachers can keep a record of their plans on the programme. If they are absent, somebody else can retrieve the plan and go ahead with the lesson! The fact that one can remove and add information or resources is also quite handy and practical. The programme links topic of integration (theme) to competencies –sub competencies and eventually lesson objective (formulated by the teacher). It's an excellent innovation and one that will be received with open arms! (L2)*

From these participants' reflections it becomes clear that the computerised lesson planning program can foster innovative curriculum development by getting teachers excited and motivated to develop and implement the curriculum. Furthermore, teachers feel stimulated in the process of curriculum development as they can incorporate their creativity and the learners' context into the curriculum. This, together with a reduced workload will in turn promote positive attitudes towards curriculum implementation and development amongst teachers, which could foster improved and innovative development and implementation of the curriculum. I came to the realisation that the focus should not be on technology or the computerised lesson planning program as such, but rather what these tools can do to embrace teachers' creativity and innovative ideas so that they can develop successful lesson plans that reflect their particular style and fit the context.

This chapter is now concluded in Section 4.5 below.

4.5 Conclusion

In this chapter I have represented, analysed and interpreted the data from the participants' verbatim responses in the QOEQ and the RJ by means of content analysis. The chapter consists out of three parts. In the first part, the profiles of the participants are presented (4.2) including their biographical information as well as their perceptions of lesson planning and technology use. In the second part, the data findings are presented (4.3). These explore the participants' general perceptions regarding lesson planning and the benefits and drawbacks of using technology such as computers. Their first, second and third reflections of implementing the computerised lesson planning program were categorised into eight codes. Finally, seven themes that emerged during the data analysis were discussed (4.4). These themes showed that:

- there is an interrelatedness between elements such as competence, comfortability, attitude, experience, training as well as access and availability of computers and the use of technology for the purpose of lesson planning;
- computerised lesson planning improves the lesson planning experience;
- the program enhances curriculum development and implementation with amongst others; the insights gained on the elements of a curriculum, namely, objectives, context, content, method and assessment;
- sufficient training and support in the form of a manual could improve the program and make the implementation successful;
- technical suggestions were made in order to improve the current program;
- increasing experience in implementing the program increases the easiness of implementing the program; and
- the program fosters innovative curriculum development by encouraging teacher creativity and initiative into curriculum development and implementation by means of planning through the computerised lesson planning program.

These seven themes can serve as guidelines to migrate successfully from traditional written lesson plans to using technology to do lesson planning, as was done with the computerised lesson planning program.

In Chapter 5 I provide a closing chapter for this research study by discussing the significance of my research findings and providing final conclusions.

CHAPTER 5

SIGNIFICANCE OF RESEARCH FINDINGS AND CONCLUSIONS

5.1 Introduction

This chapter presents an overview of this study. It also addresses the research question by reflecting on the resonance between the findings of the study and the literature review. In addition, I explore the possible limitations of the study as well as the contribution it makes. Finally, I make suggestions for further research and provide a general conclusion.

5.2 Overview of the study

In this overview of the study, I summarise each chapter.

Chapter 1 provided an outline of my study. I began by providing the background to the study and the general problem statement. I also explored concepts such as curriculum design and curriculum development and their relationship to lesson planning as a means of establishing the context of the study. I also outlined trends in education and technology in Africa, particularly in South Africa and Namibia, and provided a rationale for this study, which was to explore the contribution computerised lesson planning could make to innovative curriculum development. This informed the problem statement in which the significance of planning and the value of technology such as computers in education were seen as a means of progressing beyond written lesson plans. In this chapter, I also provided the questions and aims of my research study. The chapter concluded with an outline of the research design and the methods and processes used in the research study.

Chapter 2 provided a review of the literature. This focused on lesson planning as curriculum development, including the theories that inform lesson planning, the use of technology, computerised lesson planning and curriculum development. The possible use of technology in education and extrinsic and intrinsic factors that influence the use of technology were also explored. Next the implications for computerised lesson planning as curriculum development were explored, highlighting the links between technology and computerised lesson planning, curriculum development and education. Finally arguments for using technology to do lesson planning were presented.

Chapter 3 focused on the research design, methods and processes employed in this research study. This included a description of design-based research methodology situated within a pragmatic paradigm. I described the sample, research environment, data generation methods and data analysis method. There were nineteen participants: five lower-primary teachers at a government primary school and five lower-primary teachers at a private school in the Khomas region of Namibia as well as four university lecturers who present courses in the lower-primary programme at a university in Namibia (referred to as university lecturers from this point). The

data generation methods employed were qualitative open-ended questionnaires and reflective journals. The data generated by them were analysed using content analysis. I explained the methods and described the purpose of each and how they were employed in my research. This chapter also described the intervention to be used, a computerised lesson planning program. I concluded the chapter by describing the stance of the researcher, as well as how I met the requirements of validity and trustworthiness as well as ethical research in this study.

In **Chapter 4**, I presented and explored my interpretation of the data findings. I provided a profile of the three groups of participants, which included their biographical information as well as their perceptions of lesson planning and their levels of competence in using technology. Their general perceptions regarding lesson planning and the benefits and drawbacks of using technology such as computers were presented and interpreted. I compared the participants' first, second and final reflections on implementing the computerised lesson planning program so I could identify changes in their perceptions. My own reflections explored the participants' initial impressions and first experiences on: what is valuable and less valuable of the program; developments that took place during implementation of the program; user-friendliness of the program; effects of the program for personal lesson planning; implications of the program for curriculum development and implementation as well as suggestions and changes to improve the designed program. The main findings were presented and a discussion of the emerging themes was provided. These themes included:

- Competence, comfortability, attitude, experience, training as well as access and availability of computers are interrelated to technology use
- Computerised lesson planning improves the lesson planning experience
- The computerised lesson planning program enhances curriculum development and implementation
- Training and support are requirements for the successful implementation of the computerised lesson planning program
- Technical suggestions to improve the current computerised lesson planning program
- Practice makes perfect
- Fostering innovative curriculum development

In the section to follow I reflect on the computerised lesson planning program and draw my final conclusions on this research study.

5.3 Reflection of the computerised lesson planning program and final conclusions

In Chapter 3 I explained that design-based research employed in this study completed Cycle 1. Figure 5.1 illustrates Cycle 1 and depicts the way the research questions were addressed. I reflect on each of the four phases, discussing what I learnt from the literature as well as the data that had been generated by the lower-primary teachers, final year education students and university lecturers. In addition, I commented on the research questions applicable to each phase.

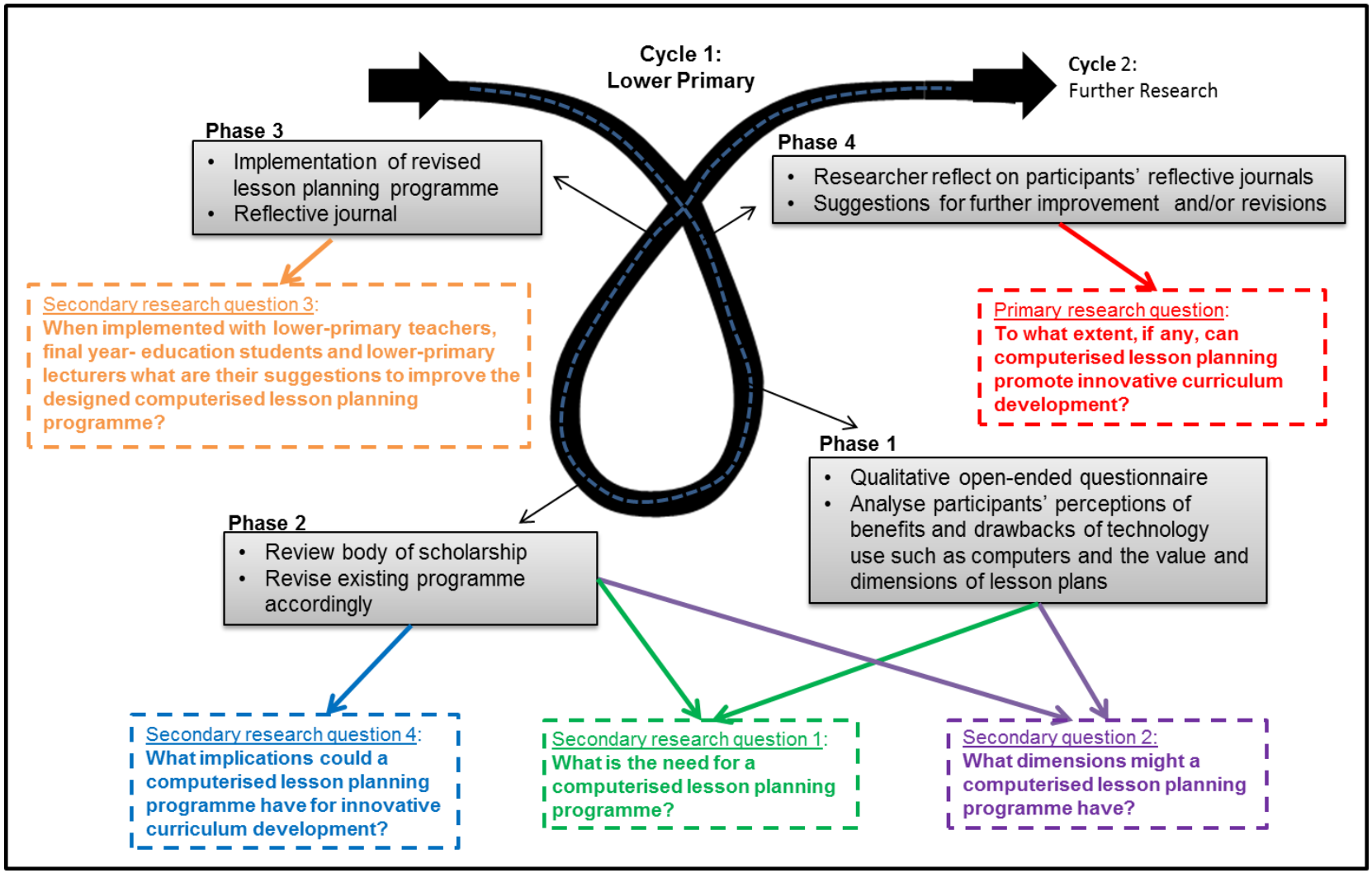


Figure 5.1 Research questions addressed in cycle one of design-based research

5.3.1 Reflection of Phase 1

Phase 1 involved doing a qualitative open-ended questionnaire (QOEQ) to analyse lower-primary teachers', final year education students' and university lecturers' perceptions of the strengths and weaknesses of using technology such as computers to do lesson planning. Analysing these perceptions enabled me to address the first two secondary research questions posed in Chapter 1 which were *what need is there for a computerised lesson planning program* and *what dimensions might a computerised lesson planning program have?*

5.3.1.1 The need for a computerised lesson planning program

The analysis of the participants' perceptions of the strengths and weaknesses of lesson planning using technology such as computers enabled me to answer the first secondary research question; *what need is there for a computerised lesson planning program?* In this section, I did this by drawing on the participants' main reflections and then relating these to key discourses that emerged in my review of the literature.

In the analysis of the QOEQ the participants listed the following benefits of computers (4.2.3.3): There is a wealth of "information" and "resources" available (T1, T6, T7, S3, S4, L3, L4); accessibility of information (T5, S4); computers promote "communication" (T7); work done on a computer is "neat" (T4, T6, T7) and "organised" (T6); work done on a computer can be "stored" (T4, S4, L3); computers are "easy" to use (S1, L4); computers allow for the "accommodation of all learners" (S1); working on a computer is "efficient" (T9), "effective" (T8), "convenient" (L2); and "quick"/ "saves time". (T4, T6, T8, T9, S4); "changes" can easily be made (T8); computers "reduce workloads" / "simplify" teaching and learning (S2, L2, L4); computers enhance learners' understanding through their use of multimedia; and this makes learners "eager to learn" and learning is "fascinating" (S1, S2, L1, L2); and computers are "reliable" (S2). The participants also mentioned the drawbacks of technology such as computers (4.2.3.3). These included: reduced social interaction and skills (T2, T7); losing work if not saved (T4, S3, L2); system failures (L2, L3); high costs (T5, T8, S1); training needs (T5, T6, T8, T9, S4, S5); limited access to computers (S4); electricity is required (T8, S4); and that teachers will "rely too much on technology" (S5, L1) and therefore become "lazy" (S2, S3).

The review of the literature revealed that teachers' views on the value of technology could influence their use of technology (Blackwell *et al.*, 2014:83) (2.4.1.2). Being a teacher myself, I know how much teachers dread lesson planning, one of the many time-consuming administrative tasks that they have to do. Khan (2015) believes that technology could overcome another problem; the time teachers spend on administrative tasks. To overcome resistance to using technology, Mathipa and Mukhari (2014:1219) argue that teachers need to be conscientised on ways in which new technologies could be used as methodological resources to the benefit of their colleagues, learners and the society at large (2.4.1.2). In the study,

participants did recognise the benefits of technology such as computers. The benefit that featured most strongly in the participants' responses was that working on computers saves time. The computerised program made it possible for a teacher to plan lessons that took account of the curriculum in all its complexity. This meant that they could include all of the elements: objectives, context, content, method and assessment as identified by Carl (2012:87), Estes *et al*. (2011:34-35), Jacobs (2011:52), and Nieuwoudt and Nieuwoudt (2011:323) (2.2). When micro level planning is being done, all the elements of a curriculum need to be included. Hlebowitsh (2010:203) emphasises that planning, implementation and evaluation should ensure that what gets taught intersects with teacher decisions over how to teach and how to demonstrate whether learning has taken place. Lessons should be effectively implemented according to the plan and evaluated in order to make the informed choices on future curriculum development. In the participants' opinions, the program helped them understand the concepts of planning, implementing and evaluating (4.2.3.1, 4.2.3.2). This is evident in the following response that reflects the view of many participants: "Procedures on how the lesson will be presented or activities on what will happen before, during and after the lesson. It also states the objectives of the lesson and the materials to be used" (L2).

The benefits of effective lesson planning can be seen in Carl's (2012:78) argument that "[s]uccessful dissemination, implementation and evaluation of the curriculum" will depend to a great degree on planning any curriculum design systematically and thoroughly (2.3). The value of effective lesson planning that was highlighted in the literature was that it leads to greater flexibility, fewer classroom management problems, greater learning (Auala *et al*., 1998:9), successful teaching-learning, clear explanation of facts and content (De Lange, 2009:38), engagement in creative and productive learning, development of thinking skills, and ensuring that teachers are able to find ways of empowering learners (Olivier, 2012) (1.4). Inadequate planning means that learners are unlikely to enjoy the benefits that are listed above. The participants perceived lesson planning as valuable because it provides a feeling of preparedness, helps them to be organised, keep up to date and manage time, helps learners to achieve their full potential, and thus facilitated effective and efficient teaching and learning. (4.2.3.2).

This discussion shows the value of lesson planning, but there is also a need to make it more pleasurable and take less time. The need for a computerised lesson planning program was therefore identified. This is confirmed by the fact that most of the participants (17 of the 19) indicated that they believe technology such as computers could facilitate their lesson planning (4.2.3.3).

In addition to determining the need for a computerised lesson planning program, the participants' perceptions in the QOEQ revealed the possible dimensions of such a program.

5.3.1.2 Dimensions that a computerised lesson planning program might have

The analysis of the participants' perceptions of the dimensions of lesson planning enabled me to address the second secondary research question; *what dimensions might a computerised lesson planning program have?* This was done by drawing on the perceptions of the participants that featured most strongly and relating them to the literature review.

In the QOEQ, the participants mentioned the following possible dimensions of lesson planning: topic/theme (S5, L2); time (S5); introduction (T1, T3, T5, T7, T9, S2, S3, S4, S5, L1, L3, L4); learning/lesson outcome/goals/objectives (T2, T5, T6, T9, S1, S5, L2, L3); skills/Competencies (T2, L2, S1); presentation (T3, T4, L4); activities (T7, S5, L2, L3); prerequisite knowledge (T1, T5); content/Information/development/consolidation of knowledge/functionalization (T1, T8, T9, S2, S3, S4, S5, L1, L3, L4); integration (T8); reinforcement/recap (S2, S3, S4, S5, L1, L2); conclusion (T1, T3, T5, T7, T9, S2, S3, S4, S5, L1); assessment/evaluation (T1, T5, T6, T7, S5, L1, L4); material/resources/teaching aids (T6, T9, S1, L2); and reflection (L2, L4).

According to Jacobs (2011:33), planning on a classroom level includes consulting curriculum statements, defining objectives of lessons, searching for information about topics, choosing suitable teaching methods, and deciding on ways in which assessment should best be done. In the participants' depictions of the dimensions of a lesson plan in the QOEQ, some of the participants also referred to objectives, information (content), methods and assessment (4.2.3.1). However, they did not include context and method. Although these two elements did not feature in their depictions of the elements of a lesson plan, context and method were implied in their understandings of the concept of lesson plan. This is evident in comments such as: "[p]lanning before lesson to achieve best results and to accommodate learners" (T6) and "[p]rocedures on how the lesson will be presented" (L2) (4.2.3.1). These comments imply that context and method were also considered elements of lesson planning. In my view, the term 'accommodate' refers to context and the term 'procedures' refers to method. These two elements also featured in their perceptions of lesson planning when they wrote entries in the reflective journals while the program was being implemented in Phase 3. With this in mind, although this is what the participants' perceptions were, refer to section 3.8 for the intervention of the program which includes these elements.

In the above discussions it is clear that the five distinctive elements of lesson plans indicated in the literature and in the participants' perceptions are possible dimensions that a computerised lesson planning program might have. In Phase 1 the QOEQ was implemented and the analysis and interpretation of the data made it possible for me to address the first two secondary research questions posed in this study. Phase 2 is discussed next.

5.3.2 Reflection on Phase 2

In Phase 2 the need for and the dimensions of a computerised lesson planning program and their implications for innovative curriculum development were explored by consulting the review of the literature in Chapter 2. I revised the program accordingly. The first, second and fourth secondary research questions were addressed in this phase:

[1] *What need is there for a computerised lesson planning program?*

[2] *What dimensions might a computerised lesson planning program have?*

[4] *What implications could a computerised lesson planning program have for innovative curriculum development*?

5.3.2.1 The dimensions needed in the computerised lesson planning program to make innovative curriculum development possible

Together with the findings of the previous phase, this phase enabled me to address the first two secondary research questions: *What need is there for a computerised lesson planning program?* and *What dimensions might a computerised lesson planning program have?* The main aim of this section is to address the fourth secondary research question: *What implications could a computerised lesson planning program have for innovative curriculum development?*

Carl (2012:109) argues that teachers require a thorough knowledge of curriculum content and skills in order to design lessons. Dynamic curriculum development is directly dependent on the quality of the design (ibid.) (2.5). The implication of this is that the computerised lesson planning program must allow teachers to design lively and stimulating lesson plans that facilitate sound curricular content and skills. In discussing technology as a means of improving and enhancing teaching and learning, Mathipa and Mukhari (2014:1215) argue that the value of technology in education is that it facilitates knowledge creation, knowledge sharing, problem solving, group and cooperative learning, and the development of economic and social change (2.4.2.4). The implication is that the program itself has to convey the value of technology.

Teachers need to be empowered to optimise teaching and learning events that help to develop teachers' and learners' potential (Carl, 2012:1) (2.4.2.4). Khan (2015) argues that technology is best applied when it empowers teachers to create teaching and learning experiences that are personalised, accessible and creative (2.4.2.4). This implies that the implementation of the program should create opportunities to enhance and personalise accessible and creative teaching and learning that develops the potential of the teacher and the learner. Moreover, for teachers to be empowered to be curriculum developers that are actively involved in teaching and learning, agents of change and involved in creative thinking processes (Carl, 2012:15). The implication this has for the program is that it should make it easy for teachers to become

actively involved in dynamic and creative ways of developing the curriculum. It should encourage a positive attitude to change (2.3.1.1). Foulger *et al.* (2013:105) suggest that the creativity of the teachers needs to be embraced; they should be given the necessary freedom to think innovatively as they explore the possibilities that technology opens up (2.5). The implication for the program is that it should facilitate this creative freedom. Colyn (cited in Carl, 2012:9) explains that reflection empowers teachers to transform their practices and effect change (2.4.2.4). For this reason, the program should facilitate change through teacher reflection. Adopting technology such as the program that was implemented in this study could thus result in innovative curriculum development.

Amory (2014:501) suggests the following ways of using technology in teaching-learning processes: as an information stream, enabler of communication, enabler of collaboration, as an information transformation tool, and as a professionalisation tool (2.5). The implication for the program used in this study is that it should deliver resources and information pertinent to teaching and learning, it should enable communication and collaboration amongst teachers, it should transfer information from one stream to alternative ones and it should contribute to the professionalisation of teaching. Technology should significantly improve education. Dlamini (2014) argues that access to technological tools and the appropriate skills to operate these technologies could help communities to enjoy the full benefits of technology (2.5). This could lead to a growth of the economy as well as innovation (ibid.). The implication is that the program should be accessible to teachers. Teachers should also be given the training they need to implement it.

Kaul (2014:45) argues that teachers need to recognise technology as a catalyst for change in working conditions, handling and exchanging information, teaching methods, learning approaches, and accessing information (2.5). The implication of this is that in order to enjoy the benefits of technology, teachers need to embrace the change made possible by technology such as the program used in this study.

Based on the participants' perceptions in Phase 1 and the review of scholarship in this phase, I was able to make appropriate revisions to the existing program. In 5.3.4 I discuss the above mentioned implications with regard to the program, but before I do so I discuss the revisions made to the existing program in Phase 2 in the next sub-section.

5.3.2.2 Revisions of the existing program based on the participants' perceptions and the body of scholarship

Design-based research is cyclical and it takes place in real-world settings. Each cycle has to consider findings of the previous ones (Plomp, 2013:43) (3.3.1). Consequently, I was able to identify revisions that I needed to make to the program before Phase 3.

The revisions made included:

- Ensuring that the program was accurately based on the curriculum for basic education in Namibia with its competencies and sub-competencies (4.2.3.1). The implication was that the program not only had to provide the curriculum in a computerised format to the participants, but also to facilitate its innovative implementation and development by means of the program.
- Ensuring that the elements of a curriculum and lesson plan (objectives, context, content, method, assessment) (2.2, 4.2.3.1) were incorporated in the program. The implication of this was that these elements should be incorporated in an innovative and creative way rather than prescriptive and static way. This was done by allowing users to add their own, novel and creative methods and ideas to the lists of options to choose from.
- Ensuring that those who implemented the program could select, organise and create lesson plans (4.2.3.1). This was done by adding a user-friendly dragging functionality to the program. This meant that the use of technology such as computers was integrated into the lesson planning process. This required a certain level of competence in using computers as well as a positive attitude on the part of the participants.
- Providing resources, editable options and pop-up-hints into the program that facilitated learning and the achievement of the objectives and took account of the context of the implementers of the program (4.2.3.1). The implication of this was that the users of the program required training and support. They also required a thorough knowledge of the curriculum as well as their own unique contexts.
- Ensuring that reinforcement was incorporated into the program (4.2.3.1). This was done by adding icons next to competencies in order to indicate when reinforcement took place. This implied that the user of the program had to be aware of the purpose of assessment and the need to reinforce learning in the light of their findings.
- Ensuring that the program took account of the participant's list of benefits and drawbacks of computers (4.2.3.3). This involved ensuring that the program was easy to use and took little time, and that it allowed access to resources and information. I also ensured that training would be done before the program was implemented. In other words, the implication was that the operation and functionality of the program had to be adjusted to remove perceived drawbacks and to ensure that the benefits were readily available.
- Ensuring that the computerised lesson planning program is well organised (4.2.3.2). This was done by programming of folders and automatically saving titles into the program. The implication of this was that I had to adjust the program to meet participants' notion of organisation, which did not necessarily correspond with mine.

The revisions to the program were in keeping with the insights gained from the literature review on what is required for innovative curriculum development as well as my analysis of the needs of the participants. Phase 2 was completed and Phase 3 began.

5.3.3 Reflection of Phase 3

Phase 3 is where lower-primary teachers, final year education students and university lecturers implemented the revised lesson planning program and recorded their perceptions via a reflective journal. In this phase I trained the participants in implementing the computerised

lesson planning program as well as how to write reflective journals. The technician of the program and I were on hand to give them support and advice whenever they needed it. In this phase, I reflected on the improvements to the program suggested by the lower-primary teachers, final year education students and university lecturers (4.3, 4.3.8). This allowed me to make decisions on how the program should be revised. The main goal of this reflection was to address the third secondary research question:

When the lesson planning program is implemented by lower-primary teachers, final year education students and lower-primary lecturers, what improvements to the design do they suggest?

I will now discuss the suggestions made in the reflective journals with reference to the literature review done in Chapter 2. These suggestions include training and support, technical layout, structural, program content, design and professional development.

Alfreds (2015), Blackwell *et al*. (2014:84) and Mathipa and Muthari (2014:1217) regard training and support as a prerequisite for the successful implementation of technology (2.4.1.1, 2.4.1.2). In their journals, the participants referred frequently to the notion of competence and its relation to other factors such as comfortability, experience, attitude, access to and availability of computers (4.3, 4.4.1). This led to the suggestion that sufficient and effective training and support needed to be provided before the program could be optimally implemented (4.3.8, 4.4.4) and a manual should be provided to give additional support.

Technical layout suggestions were made by the participants to improve the program. These suggestions included using pastel colours instead of dark ones, making arrows and icons more visible, and making it possible to choose other fonts (4.3.8). In the review of the literature, there was little emphasis on the need to make the program attractive. However, because the participants' responses showed they felt it was important, I viewed it as an important change to make.

The participants also made structural suggestions for the improvement of the computerised lesson planning program. These suggestions included that the program should be available in an Afrikaans version, and a reinforcement component should be added (4.3.8). I realised that the icons indicating that the planning had taken account of revision and reinforcement of a particular topic or basic competency were not sufficient. Similar to the learner support component, a reinforcement component was included in the program. The participants made frequent reference to structural suggestions that were necessary. I made the changes they suggested even although the literature I reviewed did not raise the issue of changes to structural aspects of computer programs.

In terms of suggestions to program content the participants suggested that subjects such as Afrikaans first language should be included in the program, more resources should be added in the resource folders and the time needed or the duration of the lesson should be specified. L3 suggested that “maybe the assessment schedules can be added and the teacher type in grades during the course of the term as learners accomplish competencies”. In the review of the literature the dimensions of lesson planning were discussed (2.2). These suggestions to program content made by the participants represent an enrichment of these elements.

One design suggestion that was made included that the program should be available online and that resources should be linked to websites (4.3.8). In the review of the literature aspects such as design of computer programs were not specifically mentioned. Nevertheless, I saw these as significant and have therefore included these suggestions here. The literature did, however, make the point that limited access to and the availability of the Internet could impede the use of technology (2.4.1.1). In order to accommodate all the participants and other possible users of the computerised lesson planning program, it seemed wise to create the program in a desktop version.

Lastly, the participants made professional development suggestions that could enhance innovative curriculum development. Amory (2015:501) advocates the use of technology as a professionalisation tool (2.5). Similarly, Neer (2014) argues that the integration of technology and professional development have to go hand-in-hand (2.4.1). One of the university lecturer participants suggested that the program be extended to tertiary level. It could then be used to highlight the value or theory that underpin the curriculum’s competencies and thus enhance their lectures on curriculum development and implementation (L3) (4.3.7). Two of the final year education students suggested “that the program should be taken to the teachers workshop” (S5) (4.3.8). Another final year education student made a similar point in saying that “it’s really useful and I hope you need to further it to NIED [National Institute for Education Development in Namibia]. Our educational system need a great improvement” (S3). This contributed to how S5 argued in her suggestion:

> *I think this programme should not only end with you getting your masters but you should take it to the national institute for education in Namibia so that they will come up with a workshop so that the teachers will receive some sort of training and start using the programme. The more they will be able to establish ways of changing. (S5)*

The above opinions also refer to concepts of change for innovation. The idea that these suggestions were made by final-year education students who are soon to enter the teaching profession and engage in curriculum development and implementation in the form of regular lesson planning indicates that they see the program as having the potential to foster adaptation

to change and innovation. The suggested changes to the program referred to in this phase, including sufficient training and support, technical layout suggestions, suggestions relating to structure, suggestions about program content, design suggestions, and suggestions for professional development will be effected in order to improve its functionality to the user. If these changes prove to be an improvement on the program, once they have been made, the possibility of extending it to tertiary curriculum will be considered.

5.3.4 Reflection of Phase 4

This section will address the primary research question: *To what extent, if any, can computerised lesson planning promote innovative curriculum development*? This is my final reflection on the program as a whole and it shows why I believe that the program can promote innovative curriculum development and as a result, become a more grounded tool.

The computerised lesson planning program of this study promotes innovative curriculum development in ten main ways: (1) by facilitating dynamic and vigorous lesson planning; (2) by promoting curriculum knowledge and skills; (3) by facilitating the creation of knowledge, problem solving and collaboration; (4) by optimising teaching and learning and developing teachers' and learners' potential, (5) facilitating personalised, accessible and creative teaching and learning experiences; (6) by encouraging teachers to be actively involved (7) by creating positive attitudes amongst teachers towards curriculum development and implementation; (8) facilitating reflection in order to enable change; (9) proposing a professionalization tool for educators, and (10) fostering competence, growth, change and innovation. These are each elaborated on.

Firstly, the program facilitates dynamic lesson planning (Carl, 2012:109) (2.5) in that the curriculum will be made "less monotonic" (T3). This means teachers will be encouraged to vary their content, methods and assessment. Furthermore, the program makes it "possible to look objectively at the whole period of teaching – seeing shortcomings in you planning more easily" (L4). By seeing shortcomings in lesson plans, teachers will be able to identify them and create livelier or more stimulating lesson plans. Secondly, the program will increase teachers' curriculum knowledge and skills (Carl, 2012:109) (2.5). This is evident in the following participants' experiences: "The computerised way of lesson planning showed me that I as a teacher can become much more knowledgeable about the lesson topic and thus help the learners to much more understanding" (T1); "[I have learnt about a]ll the outcomes that the curriculum has, (T4); and " it will help with ideas on how to teach certain things" (T7). In terms of skills, it is evident that the program promoted teachers' curriculum development and implementation skills as well as their computer skills. This is evident in opinions such as "[I have learnt] [h]ow to plan a lesson, how to plan for the term" (T6) and "[e]very time I start with a new lesson, some gained experience from the previous lesson plan makes it easier to use the computer" (T3).

In reviewing the finding of Mathipa and Mukhari (2014:1215) (2.4.2.4) that technology enables people to create and share knowledge, solve problems and collaborate, the following findings was made: The program allows users to "use it over and over by adding new ideas every time you use it" (L1). Thirdly, then, teachers can create knowledge in the program. The program is currently a desktop application. If the program were a web-based application, it would enable users to share their knowledge with other users. The program enables users to solve problems such as managing time and providing learner support. This is evident in the opinion of one of the final year education students (S5):

> *This program has a positive effect on curriculum development and implementation since all the administration work of the teacher are done half way and all they have to do is just to focus on teaching and learning and make time for learning support program for the learners struggling to keep up or digest information that they are being fed/ given by the teacher.*

In terms of collaboration, the program would enable increase collaboration amongst users if it is web-based. They would then be able to work with other teachers in order to determine the best ways of achieving the objectives and basic competencies of the curriculum. With regard to economic and social change, once it is web-based the program could enable excluded communities to draw on the successful lesson plans of other teachers. Lesson plans, information and resources of the program could also then be shared among communities who share economic and social contexts. This could assist them in implementing the curriculum based on the learner's backgrounds, needs and requirements.

Fourthly, the program enables teachers to optimise teaching and learning and develop their own as well as learner's potential as Carl (2012:1) (2.4.2.4) suggests empowered teachers should do. This is evident in opinions such as

> *[t]he computerised way of lesson planning showed me that I as a teacher can become much more knowledgeable about the lesson topic and thus help the learners to much more understanding. (T1)*

> *It would be easy to improve lesson planning and to adjust your outcomes based on your learners' skills and abilities. (T2)*

> *This lesson planning programme will have an effect on curriculum development and implementation because if all the teachers are given the chance to use this programme they will keep a record of what they teach. They will quickly plan their lessons effectively and efficiently and focus on giving the learners the attention they need to accomplish the goals and objectives of the new curriculum. (S5)*

> *There is so much information available to make this subject repetitive for learners! Teachers can select between a variation of subject matter. (T3)*

These perceptions indicate that the program optimises teaching and learning as well as the developing the teacher and learner's potential.

Fifthly, personalised, accessible and creative use of technology for teaching and learning is promoted by the program in line with Khan (2015) (2.4.2.4), who advocates personalised, accessible and creative use of technology by empowered teachers. With regard to personalised teaching and learning experiences, the context of the teacher and learners are incorporated in the program. The program permits users to add their preferred teaching method, information, resources and so forth. This is evident in the response:

> *Another amazing thing is that, if you want to add either picture or whatever you want to add you will just click on the activities and you will find them either on the computer or on the net. (S1).*

The possibility of personalised learning is evident in "[I value] the fact that there is an option on learner support to emphasize how will you support the learners" (S2). In terms of accessible teaching and learning experiences, the program simplifies access to information, resources and assessment activities in the form of organised folders. This is evident in opinions such as: "The programme made the information accessible to be used by other people" (L2); "All of your lesson planning will be up to date, easy to access and much quicker to plan" (T5); "The programme is easy accessible and useful" (T4); In terms of creative teaching and learning experiences the program invites users to employ creative teaching methods, ways of transferring information, resources and methods of assessment in order to achieve the basic competencies of the curriculum. This creativity is facilitated in each teacher's inclusion of their specific context.

Sixthly, the teacher is required to be actively involved in curriculum implementation and development in the form of lesson planning throughout the program. This is in keeping with Carl (2012:15), who advocates the active involvement of teachers in the process of curriculum development and implementation (2.3.1.1).

Seventhly, the implementation of the program could foster a positive attitude towards curriculum development and implementation among teachers. As Blackwell *et al*. (2014) argue positive attitudes are directly related to the level on which users are able to use the technology (2.4). This is echoed in comments teachers made when they learnt "[t]o be more positive towards lesson preparation and all the paper work" (T9) and that they could "plan [their] lesson[s] with less pressure" (S1). They were "excited and positive about the program" (T6).

Eighthly, the program facilitates teacher reflection in order to enable change. As Colyn (cited in Carl, 2012:9) argues, reflection enables teachers to transform their practices and thus facilitates change. This is confirmed in opinions such as:

> *I can immediately after the lesson evaluate the lesson and change it for the next year. (T1)*
>
> *Help teachers to keep their future reference and they can decide whether to use the saved lesson, edit or change it totally, depending how you want to do it. (S4)*
>
> *You can always go back when you want to repeat the lesson and write down your reflections which help you to reinforce strong points and improve the weak teaching strategies... the lesson planning programme can have an effect on my lesson plan as I will always reflect on what I have teach I will always see if my objectives are reached. (S5)*

Ninthly, the program is a professionalisation tool for educators. This is because it is directly related to the profession of education (Amory, 2014:501) (2.5). Teachers have to implement the curriculum and they have to do lesson planning. They can use this program as a tool to complete these tasks.

Finally, the program fosters competence, which facilitates change, growth and innovation. This was also fostered through training. The link between competence in lesson planning and competence in using a computer is evident in the accounts of most of the participants. The more they implemented the program the more competent they became in developing lessons and in using the computer. This was also indicated in the findings of Blackwell *et al.* (2014) (2.4). Competence and skills in these areas enable teachers to promote growth, change and innovation in the way the implement and develop curricula. Dlamini (2014) contends that access to technological tools can lead to growth and innovation (2.5). In this study, the participants became excited and wanted to do lesson plans. They were eager to learn more. One of the final year education students was inspired to find innovative ways of improving education:

> *I think this programme is very good and it will help the user attain the goals of education. I think I should also start to look in the current situation of our education system to come up with ideas on how to help the Namibian society or the whole world at large. Very fascinating ideas. I like them very much inspired. (S5)*

In terms of change the program also facilitated adaptation to change. This is evident in the following opinion:

> *I was fascinated by the way the programme made the work easier for me. It was easy to use and does not require complex computer skills to use it. Everything is already displayed for you. I consider myself lucky to be a participant in this research because I have this programme installed for me for free. You can plan the whole term the daily plan and I can*

always go back if I feel the need to repeat the lesson. I can really say it's a good experience since the teachers at school with the new curriculum that was just implemented, they complained about too much administration work on their shoulders and as I am just about to go in the field I was worried about how I will cope. This programme help me realise that I don't need to complain or worry about a thing as it will reduce my workload and keep my work updated at the same time. Change is good, you just need to find ways to adopt to it. (S5)

5.3.5 Final conclusions

The employment of the four phases of Cycle 1 of this design-based research study enabled me to address the research questions of this study. In addition the computerised lesson planning program has a more scientific base as a result of my exploration of the relevant literature on computerised lesson planning and innovative curriculum development as well as by generating, analysing and interpreting data on participants' perceptions and experiences of implementing the program. As a result, my research shows that computerised lesson planning can promote innovative curriculum development. Moreover, my findings are a contribution to the research on innovative curriculum development and provide an alternative to traditional written lesson plans.

Possible limitations of the study and further research possibilities are indicated below.

5.4 Possible limitations of the study and their implications

My study has four possible limitations. The first limitation is that I teach at one of the participating schools of this research study. This may have introduced an element of bias. The second limitation is that I had wanted to have five lecturer participants, but there were only four available at the university that was involved in this research study. However, I believe that this did not have an effect on my study as I generated sufficient data from the four lecturers who enthusiastically took part in this research study. The third limitation was that this study focused on implementing the program only in the lower-primary so the program is limited to this curriculum (Grade 1 to Grade 3). The fourth limitation is that the design principles of progression and infusion are not explicitly addressed in the computerised lesson planning program. This has prevented me from exploring the way they manifest themselves in the program.

5.5 Further research possibilities

There are three possible avenues of future research. Firstly, I suggest that a study be *to what extent, if any, computerised lesson planning can promote innovative curriculum development* conducted on the implementation of technology in schools in Namibia. If such a study is done possibilities of innovative teaching and learning could be explored and implemented in schools. Secondly, I suggest that a similar study be done on secondary school and tertiary curriculum. Thirdly, I suggest that further study could involve the National Institute for Educational Development (NIED). Such a study could investigate the perceptions that the NIED have of

implementing technology such as this computerised lesson planning program to foster innovative curriculum development in the national school curriculum.

5.6 Conclusion

This study explored**.** It seems that the integration of technology with curriculum development and implementation processes such as lesson planning can be valuable. For this integration to be successful, a positive attitude to change and innovation is required. If we are not willing to take a different approach to lesson planning, our children are doomed to unreflective, static and uncreative education. In John Dewey's words, "If we teach today as we taught yesterday, we rob our children of tomorrow."

REFERENCE LIST

Alfreds, D. 2015. Effective training 'key' to SA paperless education. *Fin24*, 23 Jan. http://www.fin24.com/Tech/News/Effective-training-key-to-SA-paperless-education-20150123 Date of access: 3 March 2015.

Alonsabe, O.C. 2012. Systems of developing, implementing and assessing curriculum. http://olga-syscurriculum.blogspot.com/2012/04/totos-reflection-1.html Date of access: 14 September 2013.

Amiel, T. & Reeves, T.C. 2008. Design-based research and educational technology: rethinking technology and the research agenda. *Educational technology & society*, 11(4):29-40.

Amory, A. 2014. Tool-mediated authentic learning in an educational technology course: a design-based innovation. *Interactive learning environments*, 22(4):497-513.

Amweelo, M. 2014. Namibia: e-learning is a good tool. (Paper presented at the 9th Electronic Learning (e-learning) Africa International Conference of the Ministry of ICT, Kampala, 28-30 May.) http://allafrica.com/stories/201407060036.html Date of access: 14 October 2014.

Association of Learning Technology (ALT). 2015. What is learning technology? https:// www.alt.ac.uk/about-alt/what-learning-technology Date of access: 11 June 2015.

Auala, R.K., Kasanda, C.D., Magnus, J.C., Katzao, J.J. & Hengari, J.U. 1998. Teaching practice handbook. Windhoek: Gamsberg Macmillan Publishers.

Bates, T. 2014. e-Learning trends from South Africa. http://www.tonybates.ca/2014/01/22/ e-learning-trends-from-south-africa/ Date of access: 11 October 2014.

Beal, F. 2012. Nearly everything I do now is aimed at encouraging teachers to embrace innovation in education: South Africa. http://dailyedventures.com/index.php/2012/07/11/ fiona-beal/ Date of access: 3 March 2015.

Beukes-Amiss, M. 2014. Into the heart of the global economy. (*In* Elletson, H. & MacKinnon, A., *eds*. The eLearning Africa report 2014. Berlin: ICWE. p. 16-17.)

Bhaskar, S.K. 2013. Creation of digital lesson plans and their use in the classroom. http://edtechreview.in/trends-insights/insights/679-creation-of-digital-lesson-plans-and-use-in-classroom Date of access: 26 June 2015.

Blackwell, C.K., Lauricella, A.R. & Wartella, E. 2014. Factors influencing digital technology use in early childhood education. *Computers & education*, 77:82-90.

Bladergroen, M., Bytheway, A., Cantoni, L., Chigona, W., Pucciarelli, M. & Sabiescu, A. 2014. "I can't fall behind!": aspirations, technology and becoming a teacher in South Africa. *South African computer journal*, 54:1-9.

Boateng, P. 2014. The key to everything. (*In* Elletson, H. & MacKinnon, A., *eds*. The eLearning Africa report 2014. Berlin: ICWE. p. 20-22.)

Callahan, C., Saye, J. & Brush, T. 2014. Social studies teachers' interactions with second generation web-based educative curriculum. *Journal of social studies research*, 38:129-141.

Carl, A.E. 2012. Teacher empowerment through curriculum development: theory into practice. 4th ed. Cape Town: Juta.

Carrim, N. & Keet, A. 2005. Infusing human rights into the curriculum: the case of the South African revised national curriculum statement. *Perspectives in education*, 23(2):99-110.

Celuch, K., Bourdeau, B. & Smothers, J. 2014. Thinking innovatively about teaching innovation and ideation: getting students to think differently. *Journal of research in innovative teaching*, 7(1):27-38.

Chalk.com. 2014. Planboard. https://www.planboardapp.com/ Date of access: 27 June 2015.

Cohen, L., Manion, L. & Morrison, K. 2011. Research methods in education. 7th ed. New York: Routledge.

Creswell, J.W. 2009. Research design: qualitative, quantitative and mixed methods approaches. Thousand Oaks, Calif.: Sage.

Creswell, J.W. 2014. Research design. 4th ed. Thousand Oaks, Calif.: Sage.

Curriculum Mapping 101. 2007. Curriculum mapper. http://www.curriculummapping101.com/sites/default/files/01-Proj-Diary-G1-SocStudies.jpg Date of access: 29 June 2015.

Daintith, J. 2004. Computer-assisted learning. http://www.encyclopedia.com/doc/1O11-computerassistedlearning.html Date of access: 2 September 2014.

Davis, C. 2014a. What is research? (*In* Du Plooy-Cilliers, F., Davis, C. & Bezuidenhout, R., *eds*. Research matters. Cape Town: Juta. p. 1-17.)

Davis, C. 2014b. The aims of research. (*In* Du Plooy-Cilliers, F., Davis, C. & Bezuidenhout, R. *eds*. Research matters. Cape Town: Juta. p. 72-81.)

De Lange, C. 2009. Whole school planning. Northlands: Macmillan.

Denscombe, M. 2007. The good research guide for small-scale social research projects. 3rd ed. Maidenhead: Open University Press.

Denscombe, M. 2010. The good research guide for small-scale social research projects. 4th ed. Berkshire: Open University Press.

Department of Education and Training ***see*** Victoria. Department of Education and Training.

Dewey, J. 1938. Logic, the theory of inquiry. New York: Holt.

Dillon, J.T. 2009. The questions of curriculum. *Journal of curriculum studies*, 41(3):343-359.

Dlamini, A. 2014. The benefit cycle: how ICT and skills will sustain each other in developing Africa. http://www.ventures-africa.com/2015/01/the-benefit-cycle-how-ict-and-skills-will-sustain-eachother-in-developing-africa/ Date of access: 8 April 2015.

Du Preez, P. & Simmonds, S. 2014. Curriculum, curriculum development, curriculum studies? Problematising theoretical ambiguities in doctoral these in the education field. *South African journal of education*, 34(2):1-14.

Dube, A. 2010. Research methods: surveys and questionnaires. http:// conducting= research.blogspot.com/2010/11/questionnaires-obtaining.html Date of access: 21 June 2014.

Elletson, H. & MacKinnon, A. 2014. The eLearning Africa report 2014. Berlin: ICWE.

Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utrianen, K. & Kyngäs, H. 2014. Qualitative content analysis: a focus on trustworthiness. *Sage open*, 4(1):1-10.

Eryaman, M.Y. 2010. Frameworks in curriculum development. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 1. Thousand Oaks, Calif.: Sage. p. 380.)

Estes, T.H., Mintz, S.L. & Gunter, M.A. 2011. Instruction: a models approach. 6th ed. Boston, Mass.: Pearson.

Farrell, M. & Pate, G.A. 2014. Planning for learning and teaching in the primary classroom. (*In* Carroll, M. & McCulloch, M., *eds*. Understanding teaching and learning in primary education. London: Sage. p. 56-71.)

Fink, P. 2012. The role of technology in improving education. *BizCommunity.com daily industry news*, 20 Feb. http://www.bizcommunity.com/Article/196/498/71047.html Date of access: 19 June 2013.

Flinders, D.J. & Thornton, S.J. 2009. The curriculum studies reader. 3rd ed. New York: Routledge.

Follett. 2015. Instructional management system. http://www.follettlearning.com/webapp/wcs/stores/servlet/en/fssmarketingstore/curriculum-management-system Date of access: 25 May 2015.

Fouché, C.B., Delport, C.S.L. & De Vos, A.S. 2011. Quantitative research designs. (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L., *eds*. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaik Publishers. p. 142-158.)

Foulger, T.S., Ewbank, A.D., Carter, H.L., Reicks, P. & Darby, S. 2013. License to drive, license to learn: promoting policy for safe and innovative social networking in schools. *Learning landscapes*, 6(2):97-107.

Frame, J. 2003. Theorising curriculum. (*In* Coleman, M., Graham-Jolly, M. & Middlewood, D., *eds*. Managing the curriculum in South African schools. London: Commonwealth Secretariat. p. 17-34.)

Francescone, P. 2014. The responsive teaching/learning revolution: the impact of requests for the portability of services and contents for distance education on instructional models and technologies. http://digitaluniversities.guideassociation.org/wp-content/uploads/2014_1_7_Francescone.pdf Date of access: 2 February 2015.

Garner, R. 2014. Online learning is 'the blackboard of the future'. http://www.independent.co.uk/news/education/education-news/online-learning-is-the-blackboard-of-the-future-9117075.html Date of access: 14 October 2014.

Garnham, B. 2008. Data generation. (*In* Given, L.M., *ed*. The Sage encyclopedia of qualitative research methods. Thousand Oaks, Calif.: Sage. p. 192-193.)

Given, L.M. & Saumure, K. 2008. Trustworthiness. (*In* Given, L.M., *ed*. The Sage encyclopedia of qualitative research methods. Thousand Oaks, Calif.: Sage. p. 895-896.)

Goddard, J.T. 2010. Collective case study. (*In* Mills, A.J., Durepos, G. & Wiebe, E., *eds*. Encyclopedia of case study research. London: Sage. p. 164-166.)

Goodman, M. 2014. e-Learning hard for South Africa to implement, but necessary: iLive. *Time Media*, 5 Mar. http://www.timeslive.co.za/ilive/2014/03/05/e-learning-hard-for-sa-to-implement-but-necessary-ilive Date of access: 10 October 2014.

Goodreads. 2013. Benjamin Franklin quotable quotes. http://www.goodreads.com/quotes/460142-if-you-fail-to-plan-you-are-planning-to-fail Date of access: 14 September 2013.

Graham-Jolly, M. 2012. The nature of curriculum. (*In* Reed, Y., Gultig, J. & Adendorff, M., *eds*. Curriculum: organizing knowledge for the classroom. 3rd ed. Cape Town: Oxford. p. 231-242.)

Grandy, G. 2013. Instrumental case study. (*In* Mills, A.J., Durepos, G. & Wiebe, E., *eds*. Encyclopedia of case study research. London: Sage. p. 474-476.)

Grundy, S. 1987. Curriculum: product or praxis. New York: Falmer Press.

Grüneş, G., Gökçek, T. & Bacanak, A. 2010. How do teachers evaluate themselves in terms of technological competencies? *Procedia: social and behavioural sciences*, 9:1266-1271.

Hadjerrouit, S. 2007. Applying a system development approach to translate educational requirements into e-learning. *Interdisciplinary journal of knowledge and learning objects*, 3:107-134.

Hammond, M. 2011. Technologies and learning. London: Routledge.

Hassanli, N. & Metcalfe, M. 2013. Idea networking: constructing a pragmatic conceptual frame for action research interventions. New York: Springer.

Hlebowitsch, P. 2010. Curriculum development. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 1. London: Sage. p. 203-206.)

Ifenthaler, D. 2012. Computer-based learning. (*In* Seel, N.M., *ed*. Encyclopaedia of the sciences of learning, v. 3. New York: Springer. p. 713-716.)

Isaacs, S., Hollow, D., Akoh, B. & Harper-Merrett, T. 2013. Findings from the eLearning Africa survey 2013. (*In* Isaacs, S., *ed*. The eLearning Africa report. Berlin: ICWE.)

Jacobs, J. 2004. Curriculum design. (*In* Jacobs, M., Vakalisa, N. & Gawe, N., *eds*. Teaching and learning dynamics. 3rd ed. Cape Town: Heinemann. p. 34-87.)

Jacobs, M. 2011. Curriculum. (*In* Jacobs, M., Vakalisa, N.C.G. & Gawe, N., *eds*. Teaching-learning dynamics. 4th ed. Cape Town: Pearson. p. 31-65.)

James, W. 1907. Pragmatism: a new name for some old ways of thinking. New York: Longman Green.

Jensen, L. 2001. Planning lessons. (*In* Celce-Murcia, M., *ed*. Teaching English as second or foreign language. Boston, Mass.: Heinle & Heinle. p. 403-409.)

Julien, H. 2008. Content analysis. (*In* Given, L.M., *ed*. The Sage encyclopedia of qualitative research methods. Thousand Oaks, Calif.: Sage. p. 120-121.)

Kale, U. & Goh, D. 2014. Teaching style, ICT experience and teachers' attitudes toward teaching with Web 2.0. *Educational information technology*, 19:41-60.

Kaul, V. 2014. An exploration of the potentials and potencies of information & communication technologies for educational development. *African journal of computing & ICT*, 7(5):45-66.

Kelting-Gibson, L. 2013. Analysis of 100 years of curriculum designs. *International journal of instruction,* 6:39-58.

Khan, S. 2015. 4 ways technology can help empower teachers and students. http://www.fastcoexist.com/3044585/techsocial/4-ways-technology-can-help-empower-teachers-and-students Date of access: 29 April 2015

Koonin, M. 2014. Validity and reliability. (*In* Du Plooy-Cilliers, F., Davis, C. & Bezuidenhout, R., *eds*. Research matters. Cape Town: Juta. p. 252-261.)

Kutu, M.O. 2013. Feminist perspectives on integration, progression and infusion as principles of curriculum design in life orientation. Potchefstroom: North-West University. (Dissertation - MEd.)

Lazar, J., Feng, J.H. & Hochheiser, H. 2010. Research methods in human-computer interaction. London: Wiley.

Lee, Y. & Lee, J. 2014. Enhancing pre-service teachers' self-efficacy beliefs for technology integration through lesson planning practice. *Computers & education*, 73:121-128.

LeFevre, M. 2014. Barriers to implementing pedagogical change: the role of teachers' perceptions of risk. *Teaching and teacher education*, 38:56-64.

Lever-Duffy, J. & McDonald, J.B. 2008. Teaching and learning with technology. 3rd ed. Boston: Allyn & Bacon.

Lindeque, B., Gawe, N. & Vandeyar, S. 2011. Context analysis. (*In* Jacobs, M., Vakalisa, N. & Gawe, N., *eds*. Teaching-learning dynamics. 4th ed. Sandown: Heinemann. p. 97-126.)

Mandinach, E.B. & Sharnell, S.J. 2012. Transforming teaching and learning through data-driven decision making. London: Sage.

Maree, K. & Pietersen, J. 2007. Sampling. (*In* Maree, K., *ed*. First steps in research. Pretoria: Van Schaik Publishers. p. 171-181.)

Maree, K. & Van der Westhuizen, C. 2007. Planning a research proposal. (*In* Maree, K., *ed*. First steps in research. Pretoria: Van Schaik Publishers. p. 23-45.)

Mathipa, E.R. & Mukhari, S. 2014. Teachers factors influencing the use of ICT in teaching and learning in South African urban schools. *Mediterranean journal of social sciences*, 5(23):1213-1220.

McCaslin, M.L. 2008. Pragmatism. (*In* Given, L.M., *ed*. The Sage encyclopedia of qualitative research methods. Thousand Oaks, Calif.: Sage. p. 671-675.)

McKenna, S. 2003. Paradigms of curriculum design: implications for South African educators. *Tydskrif vir taalonderrig*, 37(2):215-223.

McKenny, S. & Reeves, T.C. 2014. Systematic review of design-based research progress: is a little knowledge a dangerous thing? *Educational researcher*, 42(2):97-100.

McKimm, J. 2007. Curriculum design and development. http://www.faculty.londondeanery.ac.uk/e-learning/setting-learning-objectives/Curriculum_design_and_development.pdf Date of access: 15 March 2015.

McLaren, P.L. & Crawford, J. 2010a. Critical pedagogy. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 1. Thousand Oaks, Calif.: Sage. p. 147-149.)

McLaren, P.L. & Crawford, J. 2010b. Critical praxis. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 1. Thousand Oaks, Calif.: Sage. p. 150.)

Merriam-Webster's Online Dictionary. 2015a. Technology. http://www.merriam-webster.com/dictionary/technology Date of access: 10 March 2015.

Merriam-Webster's Online Dictionary. 2015b. Communication. http://www.merriam-webster.com/dictionary/communication Date of access: 4 April 2015.

Microsoft. 2014. Introduction to the C3 language and the NET framework. http://msdn.microsoft.com/en-us/library/z1zx9t92.aspx Date of access: 11 October 2014.

Miller, P. 2011. Information and communication technology. (*In* Jacobs, M., Vakalisa, N. & Gawe, N., *eds*. Teaching-learning dynamics. 4th ed. Cape Town: Pearson. p. 247-274.)

Morris, R.C. 2010. Teachers as curriculum makers. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 2. Thousand Oaks, Calif.: Sage. p. 867.)

Murphy, M.S. & Pushor, D. 2010. Planned curriculum. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 2. Thousand Oaks, Calif.: Sage. p. 657-658.)

Nakov, S. & Kolev, V. 2013. Fundamentals of computer programming with C#: the Bulgarian C# book. Bulgaria: Svetlin Nakov.

Ndamanomhata, L. 2014. Digital divide in Namibia and its consequences. *The Villager*, 7 April. http://www.thevillager.com.na/articles/6108/Digital-divide-in-Namibia-and-its-conse=quences/ Date of access: 3 March 2015.

Ndemo, B. 2014. Is modernity destroying African education? (*In* Elletson, H. & MacKinnon, A., *eds*. The eLearning Africa report 2014. Berlin: ICWE. p. 8-9.)

Neer, M. 2014. What does technology in the classroom mean? http://dataworks-ed.com/what-does-technology-in-the-classroom-mean/ Date of access: 2 February 2014.

Nieuwenhuis, J. 2007a. Qualitative research designs and data gathering techniques. (*In* Maree, K., *ed*. First steps in research. Pretoria: Van Schaik Publishers. p. 70-92.)

Nieuwenhuis, J. 2007b. Analysing qualitative data. (*In* Maree, K., *ed*. First steps in research. Pretoria: Van Schaik Publishers. p. 98-122.)

Nieuwoudt, H. & Nieuwoudt, S. 2011. Curriculum implementation. (*In* Jacobs, M., Vakalisa, N. & Gawe, N., *eds*. Teaching-learning dynamics. 4th ed. Cape Town: Heinemann. p. 309-335.)

Nieuwoudt, H.D. & Beckley, W. 2004. Implementation of the curriculum. (*In* Jacobs, M., Vakalisa, N. & Gawe, N., *eds*. Teaching-learning dynamics. 3rd ed. Cape Town: Heinemann. p. 313-349.)

O'Neill, G. 2010. Programme design: overview of curriculum models. http://www.ucd.ie/t4cms/UCDTLP00631.pdf Date of access: 15 March 2015.

Olivier, C. 2012. The DNA of great teachers. South Africa: Learning Designs.

Oxford Dictionaries. 2015a. Computerized. http://www.oxforddictionaries.com/definition/english/computerize Date of access: 28 August 2015.

Oxford Dictionaries. 2015b. ICT. http://www.oxforddictionaries.com/definition/english/ICT Date of access: 30 March 2015.

Oxford Dictionaries. 2015c. Practice makes perfect. http://www.oxforddictionaries.com/definition/english/practice-makes-perfect Date of access: 26 August 2015.

Pascoe, G. 2014. Sampling. (*In* Du Plooy-Cilliers, F., Davis, C. & Bezuidenhout, R., *eds*. Research matters. Cape Town: Juta. p. 131-145.)

Patton, M.Q. 1990. Qualitative evaluation and research methods. Beverly Hills, Calif.: Sage.

Patton, M.Q. 2008. Evaluation criteria. (*In* Given, L.M., *ed*. The Sage encyclopedia of qualitative research methods, v. 1. Thousand Oaks, Calif.: Sage. p. 301-303.)

PCMag. 2015. Definition of web-based technology. http://www.pcmag.com/encyclopedia/term/45268/internet-based-technology Date of access: 31 July 2015.

Peneul, W.R. 2010. Technology and learning- supports for managing instruction: classroom uses of technology to manage instruction. Philadelphia, Pa.: Elsevier.

Petrina, S. 2007. Curriculum and instructional design. (*In* Petrina, S., *ed*. Advanced teaching methods for the technology classroom. Hershey: Idea Group. p. 251-278.)

Plomp, T. 2013. Educational design research: an introduction. (*In* Plomp, T. & Neeven, N., *eds*. Educational design research. Enschede: LSO. p. 10-51.)

Pool, J. 2014. An investigation of communities of inquiry within a blended mode of delivery for technology education. Potchefstroom: North-West University. (Thesis - PhD.)

Posner, G. 2012. Models of curriculum planning. (*In* Reed, Y., Gultig, J. & Adendorff, M., *eds*. Curriculum: organizing knowledge for the classroom. 3rd ed. Cape Town: Oxford. p. 243-250.)

Punch, K.F. 2009. Introduction to research methods in education. London: Sage.

Reeves, T.C. 2006. Design research from the technology perspective. (*In* Akker, J.V., Gravemeijer, K., McKenney, S. & Nieveen, N., *eds*. Educational design research. London: Routledge. p. 86-109.)

Reimer, K. 2014. Teaching and learning technologies. https://wiki.elon.edu/display/TECH/Teaching+and+Learning+Technologies Date of access: 11 June 2015.

Saldaña, J. 2009. The coding manual for qualitative researchers. London: Sage.

Sandoval, W.A. & Bell, P. 2004. Design-based research methods for studying learning in context: introduction. *Educational psychologist*, 39(4):199-201.

SAPA. 2014. Schools ready for e-learning, teachers not. *IOL News*, 13 June. http://www.iol.co.za/news/south-africa/schools-ready-for-e-learning-teachers-not-1.1703405#.VEfW9_mSzXo Date of access: 10 October 2014.

Schmid, R.F., Bernard, R.M., Borokhovski, E., Tamin, R.M., Abrami, P.C., Surkes, M.A., Wade, C.A. & Woods, J. 2014. The effects of technology use is postsecondary education: a meta-analysis of classroom applications. *Computers & education*, 72:271-291.

Schubert, W.H. 2010. Mindless curriculum. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 2. Thousand Oaks, Calif.: Sage. p. 575.)

Schurink, W., Fouché, C.B. & De Vos, A.S. 2011. Qualitative data analysis and interpretation. (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L., *eds*. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaik Publishers. p. 397-421.)

Simmonds, S.R. 2010. Primary school learners' understanding of human rights teaching-and-learning in classroom practice. Potchefstroom: North-West University. (Dissertation - MEd.)

Smith, M.K. 2000. Curriculum theory and practice. (*In* The encyclopedia of informal education.) http://infed.org/mobi/curriculum-theory-and-practice/ Date of access: 10 April 2015.

Smyth, J. 2010. Critical theory curriculum ideology. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 1. Thousand Oaks, Calif.: Sage. p. 155-157.)

Steinberg, S.R. 2010. Freire, Paulo. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 1. Thousand Oaks, Calif.: Sage. p. 382-384.)

Stemberger, T. & Cencic, M. 2014. Design-based research in an educational research context. *Journal of contemporary educational studies*, 1:61-75.

Stenhouse, L. 2012. A process model of curriculum. (*In* Hoadley, U., *ed*. Organising knowledge for the classroom. 3rd ed. Cape Town: Oxford University Press. p. 251-257.)

Strydom, A. & Bezuidenhout, R. 2014. Qualitative data collection. (*In* Du Plooy-Cilliers, F., Davis, C. & Bezuidenhout, R. *eds*. Research matters. Cape Town: Juta. p. 173-203.)

Strydom, H. 2011. Ethical aspects of research in the social sciences and human service professions. (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L., *eds*. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaik Publishers. p. 113-132.)

Strydom, H. & Delport, C.S.L. 2011. Sampling and pilot study in qualitative research. (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L., *eds*. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaik Publishers. p. 390-396.)

Su, S-W. 2012. The various concepts of curriculum and the factors involved in curricula-making. *Journal of language teaching and research*, 3(1):153-158.

Techopedia. 2015. Information and communications technology (ICT). http://www.techopedia.com/definition/24152/information-and-communications-technology-ict Date of access: 2 April 2015.

TechTarget. 2015. ICT (information and communications technology - or technologies). http://searchcio.techtarget.com/definition/ICT-information-and-communications-technology-or-technologies Date of access: 2 April 2015.

TechTerms.com. 2015a. Application. http://techterms.com/definition/application Date of access: 11 September 2015.

TechTerms.com. 2015b. IT. http://techterms.com/definition/it Date of access: 2 April 2015.

Thornton, S.J. 2010. Curriculum design. (*In* Kridel, C., *ed*. Encyclopedia of curriculum studies, v. 1. Thousand Oaks, Calif.: Sage. p. 199-202.)

Tyler, R.W. 2009. Basic principles of curriculum and instruction. (*In* Flinders, D.J. & Thornton, S.J., *eds*. The curriculum studies reader. 3rd ed. New York: Routledge. p. 69-77.)

Vahedi, M. 2015. Information technology (IT) for teaching and learning. *International journal of psychology and counselling*, 7(1):1-5.

Van den Akker, J., Gravemeijer, K., McKenney, S. & Nieveen, N. 2006. Educational design research. London: Routledge.

Van den Berg, G. 2014. Curriculum development: processes and contexts. (*In* Du Preez, P. & Reddy, C., *eds.* Curriculum studies: visions and imaginings. Cape Town: Pearson. p. 91-109.)

Vannini, P. 2008. Research diaries and journals. (*In* Given, L.M., *ed*. The Sage encyclopedia of qualitative research methods. Los Angeles, Calif.: Sage. p. 764-765.)

Victoria. Department of Education and Training. 2014. Teaching with digital technologies. http://www.education.vic.gov.au/school/teachers/support/pages/elearningcurriculum.aspx Date of access: 24 January 2015.

Wang, F. & Hannafin, M.J. 2005. Design-based research and technology-enhanced learning environments. *Educational technology research and development*, 53(4):5-23.

Webopedia. 2015. Application. http://www.webopedia.com/TERM/A/application.html Date of access: 11 September 2015.

Webster, T.E. & Son, J. 2015. Doing what works: a grounded theory case study of technology use by teachers of English at a Korean university. *Computers & education*, 80:84-94.

Wellington, J. & Szczerbinksi, M. 2007. Research methods for the social sciences. London: Continuum International.

Wu, C. & Lui, C-F. 2015. Acceptance of ICT-mediated teaching/learning systems for elementary school teachers: moderating effect of cognitive styles. *Education information technology*, 20:381-401.

ADDENDUM A:

NWU ETHICS CERTIFICATE

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: (018) 299-4900
Faks: (018) 299-4910
Web: http://www.nwu.ac.za

Ethics Committee
Tel +27 18 299 4849
Email Ethics@nwu.ac.za

ETHICS APPROVAL OF PROJECT

The North-West University Research Ethics Regulatory Committee (NWU-RERC) hereby approves your project as indicated below. This implies that the NWU-RERC grants its permission that provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

Project title: Computerised lesson planning for innovative curriculum development

Project Leader: **Dr S Simmonds**
Student: **Me S Meyer**

Ethics number: N W U - 0 0 3 1 2 - 1 4 - A 2
(Institution – Project Number – Year – Status)

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Approval date: 2014-11-20 **Expiry date**: 2019-11-19

Special conditions of the approval (if any): None

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following:

- *The project leader (principle investigator) must report in the prescribed format to the NWU-RERC:*
  - *annually (or as otherwise requested) on the progress of the project,*
  - *without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.*
- *The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the NWU-RERC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.*
- *The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date, a new application must be made to the NWU-RERC and new approval received before or on the expiry date.*
- *In the interest of ethical responsibility the NWU-RERC retains the right to:*
  - *request access to any information or data at any time during the course or after completion of the project;*
  - *withdraw or postpone approval if:*
    - *any unethical principles or practices of the project are revealed or suspected,*
    - *it becomes apparent that any relevant information was withheld from the NWU-RERC or that information has been false or misrepresented,*
    - *the required annual report and reporting of adverse events was not done timely and accurately,*
    - *new institutional rules, national legislation or international conventions deem it necessary.*

The Ethics Committee would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the Ethics Committee for any further enquiries or requests for assistance.

Yours sincerely

Prof Linda du Plessis
Chair NWU Research Ethics Regulatory Committee (RERC)

ADDENDUM B:

LETTER FOR ETHICAL CLEARANCE FROM THE MINISTRY OF EDUCATION

Letter for ethical clearance from the Ministry of Education

To the Directorate of Education -Khomas Region, Namibia

Dear Mr. G. Vries,

Request for permission to conduct research in primary schools and the University of Namibia in the Khomas Region

I hereby request permission for Ms Sonia Meyer to do empirical research at primary schools and the university in the Khomas Region.

Ms Sonia Meyer (student number 21726469) is an enrolled MEd student at the Faculty of Education Sciences, at North-West University (Potchefstroom Campus). The title of this project is: *Computerised lesson planning for innovative curriculum development.*

Ms Sonia Meyer would like to conduct her empirical research in a school in this environment as it fits the profile required by the research project. Her research is centred on computerised lesson planning and curriculum development and the perceptions that lower-primary teachers, final year education students and lower-primary lecturers hold concerning this.

This research will aim to provide another viewpoint for lower-primary teachers, final year education students and lower-primary lecturers to explore technology in education and to consider computerised lesson planning as a possibility to improve their curriculum implementation and development.

All the information that is gained from the lower-primary teachers at the schools and the final year education students and lower-primary lecturers at the university will be handled confidentially and within the ethical rules of research determined by the North-West University. Aspects such as informed consent, voluntary participation and respect for anonymity will be adhered to. Participants will be insured that they can withdraw at any stage of the research.

I sincerely hope that you will be able to accommodate Ms Sonia Meyer and I thank you for you assistance in this regard. Should you require her details they are, +264 813004383 and sonia_myr@yahoo.com.

Regards
Dr Shan Simmonds

+2718 299-4764
shan.simmonds@nwu.ac.za

ADDENDUM B1:

ETHICAL CONSENT RECEIVED FROM THE MINISTRY OF EDUCATION

REPUBLIC OF NAMIBIA

KHOMAS REGIONAL COUNCIL
DIRECTORATE OF EDUCATION

Tel: [09 264 61] 293 9411
Fax: [09 264 61] 231 367/248 251

Private Bag 13236
WINDHOEK

File No.: 12/2/6/1

11 December 2014

Ms Sonia Meyer
c/o North-West University
Potchefstroom Campus
Private Bag x6001
South Africa 2520

Dear Ms Meyer

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN PRIMARY SCHOOLS IN KHOMAS REGION

Your letter received on 9 December 2014 on the above subject is hereby acknowledged.

Your request to do research in two schools [redacted] and [redacted] in Khomas Region about "Computerised lesson planning for innovative curriculum development" is approved with the following conditions:

- The Principal of the selected schools to be visited must be contacted in advance and agreement should be reached between you and the principal.
- The school programme should not be interrupted.
- Learners/Teachers who will take part in this exercise will do so voluntarily.
- Khomas Education Directorate should be provided with a copy of your thesis.

[redacted] is a private school; therefore you have to approach the Principal and School Governing Body for appropriate approval.

Wish you success in your research.

Yours sincerely

MINISTRY OF EDUCATION
PRIVATE BAG 13236 WINDHOEK
11 DEC 2014
DIRECTOR OF EDUCATION
KHOMAS REGION

Gerard N. Vries
Director of Education

ADDENDUM C:

LETTER FOR ETHICAL CLEARANCE FROM THE UNIVERSITY

Letter for ethical clearance from the university

To the Office of the Vice Chancellor of the [redacted]

Mrs [redacted]

Request for permission to conduct research at the [redacted] in the Khomas Region

I hereby request permission for Ms Sonia Meyer to do empirical research at the university in the Khomas Region.

Ms Sonia Meyer (student number 21726469) is an enrolled MEd student at the Faculty of Education Sciences, at North-West University (Potchefstroom Campus). The title of this project is: *Computerised lesson planning for innovative curriculum development.*

Ms Sonia Meyer would like to conduct her empirical research at a university in this environment as it fits the profile required by the research project. Her research is centred on computerised lesson planning and curriculum development and the perceptions that lower-primary teachers, final year education students and lower-primary lecturers hold concerning this.

This research will aim to provide another viewpoint for lower-primary teachers, final year education students and lower-primary lecturers to explore technology in education and to consider computerised lesson planning as a possibility to improve their curriculum implementation and development.

A qualitative open-ended questionnaire as well as a reflective journal would lead her to grasping the participants' perceptions of computerised lesson planning for innovative curriculum development. The participants will be asked to complete a qualitative open-ended questionnaire and then to keep a reflective journal concurrent with the implementation of the computerised lesson plan programme. The sample should consist of **five pre-service teachers** (final year lower-primary education students) and **five lecturers** (who lecture in the lower-primary phase).

The following will be expected from the participants of this research study:

- Completion of an **Ethical Code signed by researcher and participants**. Participants will give consent to participate in the research. Both researcher and participant would be provided with a copy of this agreement.
- Completion of a **qualitative open-ended questionnaire**. This questionnaire consists of 4 pages and differs for lecturers and students.
- Completion of a **reflective journal** concurrent with the implementation of the computerised lesson planning programme. Participants will receive training in using the programme and on how to complete the reflective journal.

Description of specifically how the researcher will go about on the UNAM campus:

There will adhere to the principles and values that form the foundation of all academic research at the [redacted], as set out in section 3 of the university's *Research Ethics Policy*. These include:

- **Integrity:** The values of 'truth' and 'honesty' are fundamental to all forms of scientific research and creative and scholarly endeavours.
  - **In this research study, the researcher will maintain the highest standards of honesty and integrity at all times and to do research according to internationally acceptable ethical norms and values. Aspects such as informed consent, voluntary participation and**

respect for anonymity will be adhered to. Participants will be insured that they can withdraw at any stage of the research.

- **Respect:** The concept of 'respect' should permeate all aspects of research.
  - **In this research study, the researcher will operate according to civilized norms and ethically acceptable standards and have respect for all participants, the scientific community, the environment and the public at large.**
- **Beneficence and non-maleficence:** Beneficence is the obligation to do good. **Researchers have an obligation to do no harm (non-maleficence) and then to ensure that their research aims to do overall good.**
  - **The researcher will at all times adhere to the principle of beneficence and non-maleficence. Aspects such as informed consent, voluntary participation and respect for anonymity will be adhered to. Participants will be insured that they can withdraw at any stage of the research.**
- **Responsibility:** The ethics of responsibility means that researchers in their search for the truth must be prepared to take responsibility and be held accountable for all aspects and consequences of their research activities. Researchers are accountable to society, their professions, the University and affiliated associations, and by other relevant professional bodies, statutory councils and government institutions. The University expects all researchers to ensure that they are familiar with, and comply with applicable norms, policies and legislation.
  - **The researcher will at all times during this research study accept responsibility for my research and be accountable for all aspects related to my research.**
- **Scientific validity and Peer review:** Sound methodology and scientific validity are the starting points of ethical research. Engaging in research which has fundamental flaws in methodology and design is a waste of human, monetary and other resources and is thus unethical. Appropriate peer review and/or peer input should thus precede the initiation of all research projects. Scientific review may be separate from, or integrated with the ethical approval process where appropriate.
  - **The researcher, her supervisor and co-supervisor will ensure that my research methodology and scientific validity are sound at all times during this research study.**
- **Justice:** The principle of justice ensures the fair distribution of both burdens and benefits of research and is of particular relevance when research involves human participants.
  - **The benefits of this research study are mentioned above an entails that this research will aim to provide another viewpoint for lower-primary teachers, final year education students and lower-primary lecturers to explore technology in education and to consider computerised lesson planning as a possibility to improve their curriculum implementation and development.**
- **Academic freedom and Dissemination of research results:** The University of Namibia supports the principle of academic and intellectual freedom. Researchers have an obligation to report research results accurately and transparently to the public domain (also where appropriate to the target group of the research study) and should not allow funders or other stakeholders to influence research publications.
  - **In this research study the researcher will not withhold any results from participants or the committee. On request, the researcher will provide any stakeholder with the requested information of this research study.**

1. **<u>In addition the researcher will adhere to specifically section 5.3. c and d which entails:</u>**
    - (c) When working with different cultures, the UREC must ensure that the researcher(s) have adequate knowledge and respect for tradition and local authorities,
    - (d) Researchers respect the private interest of private businesses and special groups and institutions that are not interested in a research activity.
2. **<u>In addition, the researcher understands the consequences of misconduct which entails amongst others:</u>**
    - (b) Fabrication: is making up or invention of data and results and recording or reporting on them with the intention of misleading or deceiving the intended audience.
    - (c) Falsification: manipulating research materials, equipment, processes or changing results, such that the research is not accurately presented in the research record. This includes the intentional provision of misleading research information or the deliberate false reporting of research results.
    - (d) Violation: of ethical norms and regulations for research involving human subjects or animals.
    - (e) Violation: of safety norms, practices and regulations for research involving environmental hazards.
        - **By adhering to the principles and values as set out in [redacted] Research Ethics Policy, the researcher will not make herself guilty of any forms of fabrication, falsification or violation.**
3. **<u>The researcher will also consider and adhere to the Research Policy of [redacted] section 7.7. which entails the following:</u>**

- (a)In order to protect and safeguard its staff members and students, [redacted] precludes external researchers (researchers who are neither [redacted] staff nor [redacted] students) and internal researchers ([redacted] staff and students) from using [redacted] Staff and students as research subjects, and [redacted] staff and student records for research purposes, notwithstanding the exceptions stated in 7.7(c). Such preclusion is not unique to [redacted] as it is a common practice in many Universities and similar institutions worldwide.
- (b) The above preclusion is based on the following rationale:
  (i). Staff members and students of the [redacted] are engaged in numerous institutional needs for research, teaching and learning, community engagement, and other demanding activities during the academic year. [redacted] would, therefore not like to allow a situation that overburdens its staff and students by availing them to researchers as subjects of research.
    - **The researcher will, to the best of my abilities, not overburden any participant taking part in this research study. The qualitative open-ended questionnaire would not exceed 30 minutes to one hour of the participant's time. In the case of the reflective journal, each researcher can complete this on their own time within a reasonable timeframe and due date set out by the participants and the researcher. The preceding training of the computerised lesson planning programme would take place on each participant's preferred time and place if it would not be possible to train all 10 participants once.**

  (ii). Staff and student records, by their nature, may contain confidential and private information that should not be made public under normal circumstances.
    - **No student or staff records are needed for this research study. All the information gained through the qualitative open-ended questionnaire and reflective journal would be handled with confidentiality and remain anonymous at all times.**

  (iii). Since external researchers, in particular, have no official connection with the University of Namibia, oversight and control over their activities and conduct would be

difficult to monitor and enforce. There would be a problem of accountability, unless they are collaborating with [redacted] staff.

- **The researcher will collaborate with any [redacted] staff as required. If requested so, the researcher will provide this staff member with a record of all contact with each participant during this research period.**

- (c) Exceptions to the above provision: Access to [redacted] staff members, students, staff records and student records to external and internal researchers for research purposes may be granted under the following conditions:
- (i). If the PVC (AA&R) determines, and is convinced that a research project merits access to [redacted] staff members and/or students as research subjects, non-confidential staff or student records, he/she may grant permission with specific conditions to ensure compliance with the relevant research-related Policies and Procedures of [redacted].
- (ii). External researchers working collaboratively on approved research projects with UNAM staff members are not subject to the above preclusion. Normal procedures will be followed as per relevant [redacted]Polices and Guidelines;
- (iii). The University Management may commission specific research to be done as part of an Institutional Research programme for strategic purposes, to guide institutional decision-making on various matters that may be deemed necessary.

I sincerely hope that you will be able to accommodate Ms Sonia Meyer and I thank you for your assistance in this regard. Should require her details they are, +264 813004383 and sonia_myr@yahoo.com.

Regards
Dr Shan Simmonds

+2718 299-4764
shan.simmonds@nwu.ac.za

ADDENDUM C1:

ETHICAL CONCENT RECEIVED FROM THE UNIVERSITY

Ms Sonia Meyer
North-West University
School of Education Studies
P. Bag X6001, Potchefstroom
South Africa

Dear Ms Meyer

RE: APPLICATION FOR PERMISSION TO CONDUCT RESEARCH AT [redacted]

Your application for permission to conduct research at [redacted] entitled *Computerised lesson planning for innovative curriculum development* was received. It was evaluated by our experts in the field in accordance with the relevant [redacted] Policies and related guidelines. Permission is hereby **granted** with the following conditions:

(a) You will notify and fully consult with the relevant Director(s) and/Dean(s) of the Campus(es) where you intend to conduct your research before commencing your data gathering.
(b) During the course of your research at [redacted] you will observe the required procedures, norms, and ethical conduct in accordance with the relevant policies and guidelines. If not sure, please consult the relevant Offices at [redacted] for guidance.
(c) No inconveniences, disturbances or disruptions to the normal duties of the participants/respondents, the functioning and operations/processes of the concerned Campus(es) will be caused.
(d) The results/findings of your research will be shared with the PVC (AA&R) and/or his nominees before they are disseminated or published in the public domain.
(e) On completion, a copy of the Thesis should be lodged with the [redacted] Library for our reference, notwithstanding the conditions and regulations of North-West University.
(f) Proper/full acknowledgement of the [redacted] and all participants/respondents shall be done in the thesis and any subsequent publications arising from this research.

If you are agreeable to the above conditions, please sign and date a copy of this letter and return to the Research & Publications Office at your earliest convenience. If you have any queries, do not hesitate to contact our Office.

I wish you all the best in your studies.

Yours faithfully

ADDENDUM D:

LETTER OF ETHICAL CONSENT TO THE SCHOOL PRINCIPALS

Letter for ethical clearance from the primary schools

Dear [redacted]

Request for permission to conduct research in primary schools in the Khomas Region

I hereby request permission for Ms Sonia Meyer to do empirical research at primary schools and the university in the Khomas Region.

Ms Sonia Meyer (student number 21726469) is an enrolled MEd student at the Faculty of Education Sciences, at North-West University (Potchefstroom Campus). The title of this project is: *Computerised lesson planning for innovative curriculum development.*

Ms Sonia Meyer would like to conduct her empirical research in a school in this environment as it fits the profile required by the research project. Her research is centred on computerised lesson planning and curriculum development and the perceptions that lower-primary teachers, final year education students and lower-primary lecturers hold concerning this.

This research will aim to provide another viewpoint for lower-primary teachers, final year education students and lower-primary lecturers to explore technology in education and to consider computerised lesson planning as a possibility to improve their curriculum implementation and development.

All the information that is gained from the lower-primary teachers at the schools and the final year education students and lower-primary lecturers at the university will be handled confidentially and within the ethical rules of research determined by the North-West University. Aspects such as informed consent, voluntary participation and respect for anonymity will be adhered to. Participants will be insured that they can withdraw at any stage of the research.

I sincerely hope that you will be able to accommodate Ms Sonia Meyer and I thank you for your assistance in this regard. Should you require her details they are, +264 813004383 and sonia_myr@yahoo.com.

Regards

Dr Shan Simmonds

+2718 299-4764

shan.simmonds@nwu.ac.za

ADDENDUM D1:

ETHICAL CONSENT RECEIVED FROM PRIMARY SCHOOL A PRINCIPAL

23 January 2015

Ms S. Meyer

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN [redacted]

With regards to your letter concerning the abovementioned, the following:

Your request to do research in [redacted] about "Computerized lesson planning for innovative curriculum development" has been approved by me, the principal of the school, as well as the Chairperson of the Parent Committee [redacted]

The following conditions will apply:

- The school program should not be interrupted.
- Learners/teachers who will take part in this exercise will do so voluntarily.
- A copy of your thesis should be provided to the school.

I wish you success in your research.

Yours sincerely

S I

ADDENDUM D2:

ETHICAL CONSENT RECEIVED FROM PRIMARY SCHOOL B PRINCIPAL

For Attention: Dr S Simmonds
North- West University

From: [redacted]
Windhoek

I hereby give permission to Ms Sonia Meyer to conduct her empirical research at [redacted]

The following staff members will assist her:
Grade 1 [redacted]
Grade 2 [redacted]
Grade 3 [redacted]

For any enquiries feel free to contact me.

Yours in Education

[redacted]

ADDENDUM E:

ETHICAL CONSENT LETTER SIGNED BY PARTICIPANTS

ETHICAL CODE SIGNED BY RESEARCHER AND PARTICIPANTS

CONSENT TO PARTICIPATE IN RESEARCH

Computerised lesson planning (CLP) for innovative curriculum development

You are invited to participate in a research study conducted by Sonia Meyer (a MEd student) from the Faculty of Education Sciences at North-West University (Potchefstroom Campus). You were selected as a possible participant in this research study because you are involved in the Lower Primary Phase of education and because you use and implement the National Curriculum for Basic Education of Namibia.

1. PURPOSE OF THE RESEARCH STUDY

The research study will aim to address the following questions: ***To what extent, if any, can computerised lesson planning promote innovative curriculum development? What is the need for a CLP programme? What dimensions might a CLP programme have? When implemented with*** **lower-primary teachers, final year education students and lower-primary lecturers** ***what are their suggestions to improve the designed CLP programme? What implications could a CLP programme have for innovative curriculum development?***

The main objectives of this research study are to:

[1] to analyse the need for a computerised lesson planning programme;
[2] to identify dimensions that a computerised lesson planning programme might have;
[3] when implemented, to determine lower-primary teachers, final year education students and lower-primary lecturers suggestions to improve the designed computerised lesson planning programme; and
[4] to reflect on the implications that a computerised lesson planning programme could have for innovative curriculum development.

2. PROCEDURES

Participation in this research study will entail the completion of a qualitative open-ended questionnaire as well as the completion of a reflective journal concurrently with the implementation of the computerised lesson planning programme.

3. POTENTIAL RISKS AND DISCOMFORT

The research study to be undertaken will not provide any potential risks or discomfort to you, the participant.

4. POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

This research study may lead to the improvement and effectiveness of lesson planning lower-primary teachers, final year education students and lower-primary lecturers.

5. PAYMENT FOR PARTICIPATION

No payment will be made to participants of this research study.

6. CONFIDENTIALITY

Any information that is obtained in connection with this research study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Information will not be released to any other party for any reason whatsoever.

The transcribed data can be reviewed by you at any stage during the research process.

7. PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this research study or not. If you volunteer to be in this research study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the research study. The researcher may withdraw you from this research if circumstances demand it.

8. IDENTIFICATION OF INVESTIGATOR

If you have any questions or concerns about the research, please feel free to contact Dr. Shan Simmonds (promoter of the research study) at +2718 299-4764. Should you need to contact me my details are Ms Sonia Meyer +264 813004383.

9. RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have any questions regarding your rights as a research subject, please feel free to ask the promoter of this research study, Dr. Shan Simmonds (shan.simmonds@nwu.ac.za).

SIGNATURE OF PARTICIPANT

The information above was presented to me by Sonia Meyer in English and I am proficient of this language. I was given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby give consent to participate voluntarily in this research study. I have a copy of this form.

_____ Name of participant

_____ Signature of participant

_____Sonia Meyer_____Name of researcher

_____ Signature of researcher

_____ Date

ADDENDUM F:

QUALITATIVE OPEN-ENDED QUESTIONNAIRE

THE QUALITATIVE OPEN-ENDED QUESTIONNAIRE

This questionnaire is part of a MEd research project at the North West University, Potchefstroom Campus titled '*Computerised lesson planning for innovative curriculum development*'.

The purpose of this questionnaire is to

[1] analyse the need for a computerised lesson planning programme;

[2] to identity dimensions that a computerised lesson planning programme might have;

[3] when implemented, to determine lower-primary teachers, final year education students and lower-primary lecturers suggestions to improve the designed computerised lesson planning programme; and

[4] reflect on the implications that a computerised lesson planning programme could have for innovative curriculum development.

Target group and research process:

The target group of this research will consist of lower-primary teachers, final year education students and lower-primary lecturers. There are **three questionnaires**, one for each group of participants, namely lower-primary teachers, final year education students and lower-primary lecturers.

The research will take place in the Khomas region of Namibia. The research procedure will be conducted over a period of the first school term, at which time lower-primary teachers will be given the questionnaires at the beginning of the research process. Participants will remain confidential and reported anonymously. Participants will be insured that their participation is voluntary and that they can withdraw at any stage of the research.

PLEASE READ THE FOLLOWING:

- This questionnaire will be handled confidentially and you may withdraw at any time during the research.
- Please answer all the questions as honestly as you can.
- Please read all the questions carefully.
- There are no right or wrong answers.

QUALITATIVE OPEN-ENDED QUESTIONNAIRES: QUESTIONS FOR LOWER-PRIMARY **TEACHERS**

CATEGORY	BIOGRAPHICAL INFORMATION • Please provide the following information of yourself • Only tick one block or provide one answer per question	Please do not write anything in this column.
A1	What is your first language? a. Afrikaans ☐ b. English ☐ c. Other (Please specify)	
A2	What is your second language? a. Afrikaans ☐ b. English ☐ c. Other (Please specify)	
A3	At which school are you teaching at present? a. Primary school (State) ☐ b. Primary school (Private) ☐ c. Other (Please specify)	
A4	For how long have you been teaching?	
A5	What qualifications do you have?	
CATEGORY	PERCEPTUAL INFORMATION CONCERNING COMPUTERISED LESSON PLANNING • This category of questions aims to obtain information on your feelings with the regard to computerised lesson planning (lesbepanning) • Only tick one block or provide one answer per question	Please do not write anything in this column.
B1	What do you understand by the concept 'lesson planning'?	
B2	How often do you do lesson planning? a. Daily ☐	

	b. Once a week ☐ c. Not very often ☐ d. Never ☐ e. Other (Please specify)	
B3	What, do you believe, are the dimensions of a lesson plan?	
B4	**Why** do you do lesson planning (or not)?	
B5	Do you feel comfortable with using technology such as a computer? Please explain your answer. a. Yes ☐ b. No ☐ c. In certain instances ☐	
B6	Do you regard yourself as competent in using technology such as a computer? Please explain your answer. a. Yes ☐ b. No ☐ c. In certain instances ☐	

	.....	
B7	What, in your opinion, are the **benefits** of using technology such as a computer in your teaching practice?	
B8	What, in your opinion, are the **drawbacks** of using technology such as a computer in the field of education?	
B9	Do you think that technology can facilitate your lesson planning? a. Yes ☐ b. No ☐	

QUALITATIVE OPEN-ENDED QUESTIONNAIRES: QUESTIONS FOR FINAL YEAR EDUCATION **STUDENTS**

CATEGORY	BIOGRAPHICAL INFORMATION • Please provide the following information of yourself • Only tick one block per question or provide one answer per question	Please do not write anything in this column.
A1	What is your first language? a. Afrikaans ☐ b. English ☐ c. Other (Please specify)	
A2	What is your second language? a. Afrikaans ☐ b. English ☐ c. Other (Please specify)	
A3	At which school/s have you done practice teaching? a. Primary school (State) ☐ b. Primary school (Private) ☐ c. Other (Please specify)	
A4	How much practical teaching experience do you have?	
A5	What qualifications are you currently studying for?	
CATEGORY	PERCEPTUAL INFORMATION CONCERNING COMPUTERISED LESSON PLANNING • This category of questions aims to obtain information on your feelings with the regard to computerised lesson planning (lesbepanning) • Only tick one block or provide one answer per question	Please do not write anything in this column.
B1	What do you understand by the concept 'lesson planning'?	

B2	Are you taught about lesson planning at the university? a. Yes ☐ b. No ☐ c. In certain instances ☐	
B3	What, do you believe, are the dimensions of a lesson plan?	
B4	Do you think that lesson planning is important? Please explain your answer. a. Yes ☐ b. No ☐ c. In certain instances ☐	
B5	Do you feel comfortable using technology such as a computer? Please explain your answer. a. Yes ☐ b. No ☐ c. In certain instances ☐	
B6	Do you regard yourself as competent in using technology such as a computer? Please explain your answer. a. Yes ☐ b. No ☐ c. In certain instances ☐	

	....	
B7	What, in your opinion, are the **benefits** of using technology such as a computer during teaching practice?	
B8	What, in your opinion, are the **drawbacks** of using technology such as a computer in the field of education?	
B9	Do you think that technology can facilitate your lesson planning? a. Yes ☐ b. No ☐	

QUALITATIVE OPEN-ENDED QUESTIONNAIRES: QUESTIONS FOR LOWER-PRIMARY **LECTURERS**

CATEGORY	BIOGRAPHICAL INFORMATION • Please provide the following information of yourself • Only tick one block or provide one answer per question	Please do not write anything in this column.
A1	What is your first language? a. Afrikaans ☐ b. English ☐ c. Other (Please specify)	
A2	What is your second language? a. Afrikaans ☐ b. English ☐ c. Other (Please specify)	
A3	At which institution do you lecture at present? a. University of Namibia ☐ b. Polytechnic of Namibia ☐ c. Other (Please specify)	
A4	For how long have you been lecturing?	
A5	What qualifications do you have?	
CATEGORY	PERCEPTUAL INFORMATION CONCERNING COMPUTERISED LESSON PLANNING • This category of questions aims to obtain information on your feelings about computerised lesson planning (lesbepanning) • Only tick one block or provide one answer per question	Please do not write anything in this column.
B1	What do you understand by the concept 'lesson planning'?	
B2	How often do you present lectures on lesson planning	

	in your courses? a. Daily ☐ b. Once a week ☐ c. Not very often ☐ d. Never ☐ e. Other (Please specify)	
B3	What, do you believe, are the dimensions of a lesson plan?	
B4	**Why** do you give (or not give) lectures on lesson planning?	
B5	Do you feel comfortable using technology such as a computer? Please explain your answer. a. Yes ☐ b. No ☐ c. In certain instances ☐	
B5.1	Do you think that your students feel comfortable using technology such as a computer? Please explain your answer. a. Yes ☐ b. No ☐ c. In certain instances ☐	

	....	
B6	Do you regard yourself as competent in using technology such as a computer? Please explain your answer. a. Yes ☐ b. No ☐ c. In certain instances ☐	
B6.1	Do you regard your students as competent in using technology such as a computer? Please explain your answer. a. Yes ☐ b. No ☐ c. In certain instances ☐	
B7	What, in your opinion, are the **benefits** of using technology such as a computer within the field of education?	
B8	What, in your opinion, are the **drawbacks** of using technology such as a computer within the field of education?	

	....	
B9	Do you think that technology can facilitate your lesson planning? a. Yes ☐ b. No ☐	
B9.1	Do you think that technology can facilitate your students' lesson planning? a. Yes ☐ b. No ☐	

Thank you for voluntarily participating in this research project.

ADDENDUM G:

REFLECTIVE JOURNAL

REFLECTIVE JOURNAL

The purpose of the reflective journal

This reflective journal is part of a MEd research project at the North-West University, Potchefstroom Campus dealing with '*Computerised lesson planning for innovative curriculum development'*.

The aims of this research include:

[1] to analyse the need for a computerised lesson planning program;

[2] to identify dimensions that a computerised lesson planning program might have;

[3] when implemented, to determine lower-primary teachers, final year education students and lower-primary lecturers suggestions to improve the designed computerised lesson planning program; and

[4] to reflect on the implications that a computerised lesson planning program could have for innovative curriculum development.

Target group and research process:

The target group of this research is lower-primary teachers, final year education students and lower-primary lecturers. The research will take place in the Khomas region of Namibia. The research procedure will be conducted over a period of the first school term, at which time lower-primary teachers, final-year education students and lower-primary lecturers will be given the reflective journals after completing the qualitative open-ended questionnaires.

The participants will be asked to keep a reflective journal while implementing the computerised lesson plan programme. Therefore the programme would be loaded onto each participant's computer. This reflective journal allows lower-primary teachers, final year education students and lower-primary lecturers to narrate their experiences of implementing the computerised lesson planning programme. For the purpose of this research study a reflective journal refers to the participants' recollection and reflection of their personal observations and experiences while implementing the programme. Reflective journals will be used because they make it possible for participants to give vivid depictions of their experiences and perceptions regarding computerised lesson plans.

Participants' responses will be treated confidentially and reported anonymously. Participants will be assured that their participation is voluntary and that they can withdraw at any stage of the research.

PLEASE READ THE FOLLOWING:

- The purpose of this reflective journal is for lower-primary teachers, final year education students and lower-primary lecturers to narrate their experiences of implementing the computerised lesson planning program.
- The reflective journal will be used in conjunction with the implementation of the computerised lesson planning program. Each participant will be provided with the computerised lesson planning program as well as this hardcopy of the reflective journal.
- All participants will have received training in implementing the computerised lesson plan program and on how to keep the reflective journals up to date, beforehand.
- This reflective journal is anonymous and all information will be handled confidentially.
- Please answer all the questions as honestly and frankly as you can.
- Please read all the questions carefully.
- There are no right or wrong answers.
- Please complete all three reflections during the implementation period. When you complete the second and third reflections, please review your first reflection and indicate any changes in your findings.

Please tick the appropriate blocks:

1. I am a a. teacher ☐ b. lecturer ☐ c. student ☐

Reflective journal prompts:

QUESTION 1: What was your first impression of the computerised lesson planning program?

QUESTION 2: How did you experience the implementation of the computerised lesson planning program when you used it for the first time?

QUESTION 3: What do you regard as valuable about the program and why? (What do you like about the programme?)

QUESTION 4: What do you regard as less valuable about the program and why? (What do you dislike about the program?)

QUESTION 5: What developments took place during the implementation period of the program? Please elaborate.

QUESTION 6: In your opinion, is the program user-friendly? Explain.

QUESTION 7: Do you believe that the computerised lesson planning programme could have an effect on your lesson planning? Please elaborate.

QUESTION 8: Do you believe that the computerised lesson planning programme could have an effect on curriculum development and implementation? Please elaborate.

QUESTION 9: What changes or adjustments would you suggest to the program and why?

QUESTION 10: Please refer back to Question 1. Has your initial impression changed since your introduction to and implementation of the programme? Please elaborate.

Structure of the reflective journal:

First reflection	**Second reflection**	**Third reflection**
Date: ____/____/____	Date: ____/____/____	Date: ____/____/____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Thank you for voluntarily participating in this research project.

ADDENDUM H:

CERTIFICATE FROM THE LANGUAGE EDITOR

LANGUAGE EDITING CERTIFICATE

TO WHOM IT MAY CONCERN

This is to attest that the master's dissertation named below has been language edited:

"Computerised lesson planning for innovative curriculum development" by Sonia Meyer.

(Dr) Elaine Ridge BA UED (Natal) DEd (Stell)
Freelance Editor and Translator

16 October 2015

ADDENDUM I:

SUMMARY OF TURN-IT-IN REPORT

Turnitin *Originality Report*

- Processed on: 20-Oct-2015 18:37 SAST
- ID: 587520638
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