The potential of a learning management system to enhance self-directed learning

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Abstract

The use of Learning Management Systems (LMSs) in higher education institutions is not a new tendency. Although this is an innovative way of implementing e-learning in the educational process, there are a few problems concerning these systems. Educators tend to apply traditional classroom ideas and pedagogy in computer-supported e-learning environments, assuming that because these environments allow the interaction that we see in the classroom, traditional pedagogy can be used. Although most of the pedagogical principles that apply to the traditional classroom-delivery method also apply to e-learning, the e-environment supports such interactions in a different manner. Traditional pedagogical principles should be adapted to accommodate the e-learning environment and should form the very basis for inclusion of features in LMSs. These principles should be integrated into the LMS where every feature included is accompanied by explicit guidelines on how to use the feature in such a way that it will effect pedagogically sound instruction.

The aim of this study is to determine how an LMS could be used in order to enhance self-directed learning. In order to reach this aim a brief history of SDL was given and a number of SDL models were discussed. These models were analyzed in order to compile a list of guidelines to foster SDL. The first set of guidelines didn't focus on any specific learning environment and it was necessary to refine these guidelines for an online environment. To be able to refine the guidelines for an online environment, LMSs in general were discussed and a few models for SDL in an online environment were reviewed. The SDL guidelines were further refined for implementation in eFundi™. eFundi™ is the LMS used at the North-West University, Potchefstroom campus, South Africa. The nature of the AGLE 121 module (a literacy module for all first year students) and the specific functionalities of eFundi™ were discussed and taken in consideration when the final set of guidelines was compiled.

The researcher did an empirical study to gather valid and reliable data. A mixed methods inquiry approach was used to obtain reliable evidence. The population consisted of all the students that were enrolled for the AGLE modules over 2 years. These students were divided into 2 groups, the AGLE 121 in 2010 (237 students) and the AGLE 121 (287 students) in 2011. The questionnaire that was used for the quantitative research in this study was based on the Fisher, King and Taque (2001) SDL readiness scale for nursing education. Semi-structured interviews were conducted with seven participants from each group in order get a better understanding of the data collected from the quantitative research, and to elaborate further on the students' development of SDL. Findings

indicated that the students from the second year of the study did not necessarily improve their SDL-skills. Most of the results from the quantitative data showed small practical significant differences. However, the qualitative data indicated that the SDL skills of the students improved in two of the three factors after they used the newly developed eFundi™ site, in the second year of the study and therefore the researcher is of opinion that the intervention had a positive impact on the students' SDL skills.

Keywords

Learning Management Systems; Self-directed learning; Higher education; E-learning; Information and communication technology (ICT); Teaching strategies; Mixed-method research approach

Opsomming

Die gebruik van leerbestuurstelsels (LBS's) in hoëronderwysinstellings is nie 'n nuwe tendens nie. Alhoewel hierdie stelsels 'n innoverende wyse is om e-leer in die opvoedkunde proses te implementeer, kan daar in hierdie verband 'n paar probleme geïdentifseer word. Opvoeders is geneig om tradisionele "klaskameridees" en -pedagogie in rekenaarondersteunde e-leeromgewings toe te pas. Opvoeders maak die aanname dat die interaksie wat hul in hierdie laasgenoemde leeromgewing raaksien, ooreenstem met dié van ’n klaskameromgewing, en dat dit daarom toelaatbaar of versoenbaar is met tradisionele pedagogiese strategieë. Hoewel die meeste van die pedagogiese beginsels wat van toepassing is op die tradisionele klaskamer-leweringsmetodes ook op e-leer van toepassing is, ondersteun die e-omgewing sodanige interaksies op 'n ander wyse. Tradisionele pedagogiese beginsels moet die grondslag vorm vir die insluiting van funksies in LBS's, maar behoort terselfdertyd aangepas te word om die e-leeromgewing te akkommodeer. Dit behoort verder geïntegreer te word in die LBS. Elke kenmerk wat ingesluit word, behoort vergesel te word deur duidelike riglyne oor die wyse waarop die funksie gebruik kan word. Op so ’n wyse kan goeie pedagogiese onderrig bewerkstellig word.

Die doel van hierdie studie is om vas te stel hoe 'n LBS gebruik kan word ten einde selfgerigte leer (SGL) te verbeter. Om hierdie doel te bereik is 'n kort oorsig oor die geskiedenis van SGL aangebied, en is 'n aantal SDL-modelle is bespreek. Die modelle is ontleed om ‘n lys van riglyne wat SGL bevorder op te stel. Die stel riglyne het nie uitsluitlik of noodwendig gefokus op 'n spesifieke leeromgewing nie, en dit was derhalwe nodig om hierdie riglyne vir 'n aanlyn-omgewing verder te verfyn. Om hierdie riglyne vir 'n aanlyn-omgewing te verfyn, is LBS's vanuit ’n algemeen-teoretiese perspektief beskou en 'n paar modelle vir SGL in 'n aanlyn-omgewing is bespreek. Die SGL-riglyne is verder verfyn vir toepassing in eFundi™, (die LBS wat deur die Noordwes-Universiteit, Potchefstroom kampus, Suid-Afrika gebruik word), en verder toegepas op die NWU se akademiese geletterheidsmodule, naamlik AGLE121.

Die navorser het 'n empiriese studie geloods om geldige en betroubare data in te samel. 'n 'Gemengde metode'-ondersoeksbenadering is gebruik om 'n betroubare inligting te bekom. Die populasie bestaan uit al die studente wat in 2010 ingeskryf het vir die AGLE 121 module (287) asook die wat in 2011 vir AGLE 121 (237 studente) ingeskryf het. Die vraelys wat vir die kwantitatiewe navorsing in hierdie studie gebruik is, is gebaseer op die Fisher, King en Taque-

(2001) SGL gereedheid skaal vir verpleegonderwys. Semi-gestruktureerde onderhoude is gevoer met 7 deelnemers van elke groep om 'n beter begrip te kry van die kwantitatiewe navorsing versamel is, en om uit te kon brei op die student se ontwikkeling/ervaring van SGL. Die bevindinge het getoon dat. die studentes in die tweede jaar van die studie nie noodwendig hulle SGL-vaardighede verbeter het nie. Die meeste van die kwantitatiewe resultate was van klein praktiese betekenisvolheid. Daarenteen het die kwalitatiewe data aangedui dat die studentes se SGL vaardighede in twee van die drie faktore verbeter het nadat hulle die nuut ontwikkelde eFundi™ leergemeenskap gebruik het. Dus is die navorser van opinie dat die intervensie ‘n positiewe inpak op die SGL vaardighede van die student gehad het.

Trefwoorde

Leerbestuurstelsel; Selfgerigte leer; Hoëronderwys; E-leer; Inligting- en kommunikasietegnologie (IKT); Onderrig strategieë; Gemengde metode navorsing

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Chapter One

Introduction and statement of the problem

1.1 Introduction and statement of the problem

In recent years, with the rapid development of emerging technologies, the integration of information and communication technology (ICT) has increasingly attracted the attention of educators (Wang, 2008: 411). Institutions of higher education have increasingly invested more money, resources and time on a range of e-learning initiatives (Barnatt, 2008:47). Many institutions are experimenting with e-learning as a means of solving authentic learning and performance problems, while others are just joining the revolution simply because they do not want to be left behind. It is important to realise that the essence of e-learning is not the mere access to knowledge, but is timely access to relevant and useful knowledge.

Educators should plan thoughtfully before they integrate ICT into a curriculum. A simple combination of using hardware and software will not ensure effective integration (Earl, 2002: 6). According to Govindasamy (2002: 288) the actual value of e-learning does not lie in its ability to train anyone, anytime, anywhere, but in the ability to deploy this attribute to train the right people to gain the right skills and knowledge at the right time. Govindasamy (2002:289) further states that one of the most crucial prerequisites for successful implementation of e-learning is the careful consideration of the underlying pedagogy. This is often the most neglected aspect when attempting to implement e-learning.

Pedagogy refers to the teaching of strategies, techniques or approaches that educators use to deliver instruction or facilitate learning (Wang, 2008:412). Throughout history the teaching methods and styles in the educational process have been changing continuously, always aiming at higher quality (Virtič & Pšunder, 2009: 10). In terms of pedagogical design, Kirschner *et al*. (2004: 47) maintains that a learning environment should support and satisfy the learning needs of students with different backgrounds. It should also involve using various learning resources and activities that support students' learning, and allow educators to facilitate learning.

E-learning offers more than teaching of subject content. It can also be used to develop students' thinking practices (Anderton, 2006: 156). Anderton (2006: 157) is convinced that one way in which students' performance can be improved, is by teaching them to manage their own learning processes. In an educational context, this 'self-management' is known as self-directed learning (SDL). According to Skiff and Beckendorf (2009: 76) SDL can be defined as a process by which individuals take the initiative in diagnosing their own learning needs, formulating their own learning goals, identifying resources for learning, choosing and implementing an appropriate learning strategy and evaluating their own learning outcomes. Bolhuis (2003: 335-338) states that self-management, self-monitoring, and motivational dimensions are integrated to reflect a meaningful and worthwhile approach to self-directed learning. Although some research is available on the effectiveness of computer-based instruction in the classroom, the effectiveness of provoking self-directed learning, especially in the e-learning environment, requires further investigation (Petrovic & Kennedy, 2005: 535).

The use of learning management systems (LMSs) in higher education institutions is not a new tendency. Watson and Watson (2007: 28) define an LMS as an infrastructure that delivers and manages instructional content, identifies and assesses individual and organizational learning goals, traces the progress towards meeting those goals, and collects and presents data for supervising the learning process as a whole. Although this is an innovative way of implementing e-learning in the educational process, there are a few problems concerning these systems.

According to Kirschner *et al*. (2004: 48) educational institutions tend to apply traditional classroom ideas and pedagogy in computer-supported e-learning environments, assuming that because these environments allow the interaction that we see in the classroom, traditional pedagogy can be used. Although most of the pedagogical principles that apply to the traditional classroom-delivery method also apply to e-learning (Govindasamy, 2002: 288), the e-environment supports such interactions in a different manner (Kirschner *et al*., 2004: 48). Traditional pedagogical principles should be adapted to accommodate the e-learning environment and should form the very basis for inclusion of features in LMSs. These principles should be integrated into the LMS where every feature included is accompanied by explicit guidelines on how to use the feature in such a way that it will effect pedagogically sound instruction (Govindasamy, 2002: 288-289).

Govindasamy (2002: 288-289) states that most LMS developers distance themselves from pedagogical issues and distinguish themselves as mere providers of technology. This finding is coherent with the argument that there is a serious mismatch between the abundance of features in LMSs and the lack or total absence of explanation on the pedagogy underlying the inclusion of these tools (Vrasidas, 2004: 912). Vrasidas (2004: 911) further states that the lack of skill and knowledge to design online instruction is a barrier in the e-learning environment. The current situation can lead to a waste of resources and it is possible that it can do more harm than good (Govindasamy, 2002: 289). Vrasidas (2004: 911) found that, because of the fact that educators do not know how to integrate pedagogy and technology, LMSs are used to "put content online." The mere fact that content is available for students does not improve learning in any way (Kirschner *et al*., 2004: 48). The aim of this study is to determine how an LMS could be used in order to enhance SDL.

1.2 Review of relevant literature

Currently a variety of research studies on technology focuses on the implementation of technology in the classroom. Most seem to deal with issues related to how to convince educators to use technology more effectively. Because the aim of this study is to understand how e-learning by means of an LMS can enhance SDL, the focus will be on the following aspects in the literature study: (a) Self-directed learning and (b) Learning Management Systems.

1.2.1 Self-directed learning

An approach to education where the student takes responsibility for the learning process is called SDL. It allows students to determine their learning requirements and goals, select resources to achieve the goals, decide upon and employ their preferred learning strategies, and assess the outcomes of the learning process (Ellis, 2007: 55). According to Knowles (1975: 23) learning does not take place in isolation but in association with others such as educators, tutors, and peers. Therefore, when learning is placed on a continuum, it can range from educator-oriented at one end to self-directed at the other end (Ellis, 2007:56; Loyens *et al*., 2008: 55). When shifting from one end to the other, the amount of control over learning as well as the amount of freedom to evaluate learning needs change in order to decide on the content of one's learning issues, and to implement learning strategies to unravel one's learning issues (Fisher *et al*., 2001: 517).

In SDL environments, the instructor acts as a facilitator and guide and students experience a feeling of ownership of the learning process (Ellis, 2007: 55). Grow (quoted by Elwood & Janis, 2005: 170) proposes four stages for educators in which they should guide students to reach SDL readiness, namely : (1) Authority coach, (2) Motivator, (3) Facilitator, and (4) Consultant with the corresponding student stages being: (1) Dependent, (2) Interested, (3) Involved, and (4) Self-directed. They further suggest that the educator should determine the student's stage of self direction, adopt the corresponding stage, and prepare students to advance to higher stages.

According to Kicken *et al*. (2009: 455) students need to develop several SDL-related skills such as: the ability to diagnose their learning needs, formulate meaningful goals for their learning, diagnose and monitor performance, identify resources for accomplishing various kinds of learning objectives, develop and use a wide range of learning strategies appropriate to different learning tasks, and carry out a learning plan systematically and sequentially (Ellis, 2007: 3; Knowles, 1975: 25; Zimmerman, 1989: 2). Towle and Cottrell (1996: 356) also mention the above-listed skills, but add the following activities for SDL students: distinguishing between important and unimportant, integrating material from different sources, time management, monitoring achievement of learning outcomes and monitoring effectiveness of study habits. The principles that should be taken into consideration when facilitating SDL, will be discussed in the following paragraph.

Loyens *et al*. (2008: 4) believe that learning should empower students to become a free, mature, and authentic self. As seen above, the role of the educator should change to that of a facilitator or consultant. Teaching should become student-centred and it should focus on the needs and aspirations of the students rather than on those of the educators (Towle & Cottrell, 1996: 358). They further believe that learning through curiosity, the exploration of knowledge, and the critical evaluation of evidence should be promoted and should ensure a capacity for self-education. According to Schmidt (1983: 11) there are three principles which will make teaching more relevant and effective. The first principle is (a) Building on prior knowledge. Students use the knowledge they already possess to understand and structure new information. Then there is (b) Learning in context. This principle refers to the belief that the closer the resemblance between the situation in which something is learned and the situation in which it is applied, the more likely it is that transfer of learning will occur. Finally there is (c) Elaboration of knowledge. This principle rests on the

premise that information is better understood and remembered if there is opportunity for elaboration (this includes discussion, answering questions, teaching peers, critiquing).

A self-directed learning experience provides several benefits to students such as: including the potential for increased learning because of a greater feeling of ownership of the learning process; an increased responsibility for participating in the learning process; an expanded ability to use a variety of techniques to achieve learning goals, and an enhanced ability to present ideas in a wider variety of forms (Ellis, 2007: 55). Ellis (2007: 56) further states that the employment of self-directed learning approaches also provides several benefits to instructors. These are: greater freedom to explore material, increased satisfaction because of students having a more effective learning experience, and decreased teaching effort as the student takes on greater responsibility for learning.

In recent years, discussions of SDL have focused on the skills and abilities that students should employ to direct their own learning. In this study the researcher identified and discussed the skills and abilities that are needed for SDL. The focus was on the contribution that a computer-based learning environment can make towards the acquisition and enhancement of SDL skills of students who actively use the LMS.

1.2.2 Learning management systems

E-learning and computer-based learning have been topics of increasing interest in recent years. E-learning is often perceived as a group effort, where content authors, instructional designers, multimedia technicians, educators, trainers, database administrators, and people from other areas of expertise come together to serve a community of students (Ong & Hawryszkiewycz, 2003: 340). These software systems are generally referred to as Learning Management Systems (LMSs).

The primary objective of the LMS is to manage learning by keeping track of students' progress and performance across all types of training activities (Brusilovsky, 2004: 105). The LMS manages and allocates learning resources such as registration, classroom and instructor availability, instructional material fulfillment, and online learning delivery (Rapuano, 2006: 1757). Most existing Web-based learning environments are based on basic instruction models and their main functionalities are centred on the management and distribution of learning materials, synchronous and a-synchronous

communication, and progress tracking and reporting (Ong & Hawryszkiewycz, 2003: 340; Rapuano, 2006: 1757).

According to Avgeriou *et al*. (2003: 15) LMSs are specialised learning technology systems based on the state-of-the-art Internet and web-technologies in order to provide education and training following the open and distance learning paradigm. LMSs are not only used for open and distance learning but are frequently used as course web sites that accompany lecture-based courses given in higher education institutions (Kirschner *et al*., 2004: 47; Livingstone & Kemp, 2006: 13; Moti & Abigail, 2004: 39).

When using an LMS as a course-support site, traditional lectures are supplemented by a parallel web site for the course, with exercises and practice drills, supplement, enrichment, and in-depth study of the subject (Moti & Abigail, 2004: 37). Faculties who offer web-based instruction and resources have become very familiar with the likes of WebCT™, Blackboard™, Moodle™, SAKAI™ and other LMSs. Rather than wasting time learning the technical craft of extended Web design, they rely on templates and simple forms to create interactive web-based class environments (Kirschner *et al*., 2004: 48; Livingstone & Kemp, 2006: 13).

These environments offer a number of functionalities such as discussion forums, online chat rooms, grade books and the ability to give automatically marked tests such as multiple-choice questionnaires (SAKAI, 2003). LMSs often include a variety of means for communication between staff and students but they are perhaps most often used as document repositories (Livingstone & Kemp, 2006: 13). This enables flexible access to course materials but does not address any pedagogical principles. Currently for the most part, the educational content in LMSs is stored in static documents – copies of PowerPoint™ slides and Word™ documents. Assessment and interactive features are used less often (Livingstone & Kemp, 2006: 13).

Learning materials are considered resources or tools which students use to solve problems. However, from a self-directed learning perspective resources are not learning materials until they are used actively by students (Dalsgaard, 2006: 5). Students will not be able to become self-directed students when they are passively absorbing knowledge imparted or distributed by either an educator or the LMS (Moti & Abigail, 2004: 38). It is clear that the full potential for interactive learning support is not reached. According to Winters *et al*. (2008: 429) computer-based learning

environments present important opportunities for fostering learning. The LMS that the North-West University uses is called eFundi™. eFundi™ is powered by SAKAI™, a learning and academic collaboration platform developed by an open source community. For the purpose of this study, eFundi™ was used as the LMS in the research.

1.3 Purpose of the study

This study aimed to determine how an LMS could be used to enhance SDL. In order to achieve this aim, the following sub-aims were stated:

i) To identify guidelines to improve students' SDL skills.
ii) To investigate how SDL guidelines can be adopted in an LMS.
iii) To develop an eFundi™ site with components of SDL.
iv) To evaluate to what extent a newly-constructed eFundi™ site could enhance SDL.

1.4 Research design and methodology

This study was performed from a constructivist perspective. It was an empirical study that used a mixed-method research approach (QUANT→qual). This study was conducted at the North-West University, Potchefstroom campus, South Africa. The participants for this study were all the students that were enrolled for the academic literacy module, AGLE 121 in 2010 and for AGLE 121 in 2011. The questionnaire that was used in this study was based on the Fisher *et al.* (2001) SDL readiness scale for nursing education. Descriptive statistical techniques were used and will be discussed in Chapter 5.

1.5 Presentation of the study

A review of the literature will be presented in Chapter 2 and Chapter 3 in which the main themes of the study will be explored. The implementation of the SDL principles within the AGLE 121 module will be discussed in Chapter 4. The research design and methodology follows in Chapter 5 and a presentation of the data and an analysis thereof in Chapter 6. Chapter 7 summarises the most important aspects of the study and concludes with recommendations for further research.

Chapter Two
Self-directed learning

2.1 Introduction

It is evident from the previous chapter that there is a difference between learning that takes place because it is required and learning that is self-directed; the former is reactive, while the latter is proactive (§1.1). This self-directed type of learning requires intent and effort to continuously seek learning beyond what is needed for daily living. The engagement and support for self-directed learning is critical when learning becomes an integral part of life, driven by a desire and need to understand something, or to get something done instead of merely solving a problem given in a classroom setting (§1.2.1). Self-directed learning de-emphasises teaching as a process in which an educator tells something to a passive student. Rather, it focuses on mutual dialogues and joint knowledge construction, enhanced by the creation, discussion, and evolution of artifacts (Fischer & Sugimoto, 2006:37). Although there are a number of teaching and learning strategies that can be used, the researcher decided to investigate whether an LMS can promote SDL (§1.1).

As stated in Sub-aim (ii) the researcher wants to investigate how SDL guidelines can be adopted in an LMS (§1.3). Before sub-aim (ii) can be reached, it is necessary to determine exactly what SDL is, where it came from, how it evolved, and how it should be implemented by the educators and the students. The purpose of this chapter therefore is to reach sub-aim (i), to identify guidelines to improve students' SDL skills (§1.3). In order to identify the above mentioned guidelines, it is necessary to distinguish between self-directed learning (SDL) and self-regulated learning (SRL) (§2.2), a brief history of SDL will be given (§2.3) and in paragraph 2.4 a number of existing SDL models will be discussed. The characteristics of a self-directed student will be discussed later (§2.5) and the role of the educator in the self-directed learning process (§2.6). Only after all the above mentioned aspects have been taken into consideration will guidelines to improve students' SDL skills be identified (§2.7).

2.2 Self-directed learning vs. self-regulated learning

The shift from behaviourism to the cognitive theories in educational psychology has placed an increasing responsibility on students for directing their own learning. Self-regulated learning (SRL) and SDL have therefore become a frequent topic of educational research (Chen, 2002: 11; Petrovic & Kennedy, 2005: 535). Zimmerman and Martinez-Pons (1986: 617-619) define SRL as a process of becoming meta-cognitively and behaviorally active in one's own learning. They further state that students can be described as self-regulated to the degree that they are meta-cognitively, motivationally, and behaviorally active participants in their own learning process (Zimmerman,1989: 9). SDL on the other hand is defined as "a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating goals, identifying human and material resources, choosing and implementing appropriate learning strategies, and evaluating learning outcomes." (Knowles,1975: 18). Despite the similarities, researchers currently differentiate between SRL and SDL. These differences and similarities will be discussed in the next paragraph.

Research supports the idea that self-regulation skills can be taught, and once used, will be predictive of academic success (Zimmerman, 1990: 16). Skills which lead to SRL are not innate personality traits and can therefore be learned through experience and self-reflection (Anderton, 2006: 168). Anderton (2006: 168-169) further states that although self-regulation does not occur overnight, there are numerous strategies that instructors can use to promote effective self-regulation in students.

Both SRL and SDL are ubiquitous in education research nowadays. Although in most literature sources SDL and SRL are described as similar concepts, it is argued that there are both similarities and differences between them. For the purpose of this study it is necessary to distinguish between these two concepts in order to focus on the correct concept that needs to be used for the research on LMS. The similarities between SDL and SRL are much easier to identify than the differences between them. Researchers agree that both SDL and SRL involve active engagement and goal-directed behaviour (Anderton, 2006: 157; Ellis, 2007: 56; Loyens *et al*., 2008: 418). From research done by Loyens *et al*. (2008: 412-418) it is evident that both SRL and SDL require the setting of goals and task analysis, implementation of the plan that was constructed and self-evaluation of the learning process. SRL and SDL are further similar in that they both entail meta-cognitive skills (Anderton, 2006: 1; Loyens *et al*., 2008: 418; Zimmerman, 1990: 6). The above-mentioned authors

also concur that meta-cognitive awareness is involved in all the steps that lead to the actual study activities, as well as in the evaluation of those activities afterwards. As seen above, both concepts clearly significantly overlap and have been used synonymously in previous research because of their similarities.

Loyens *et al.* (2008: 418) suggest that in order to understand the differences between SDL and SRL, a distinction needs to be made between these concepts as design features of the learning environment and student characteristics. Loyens *et al.* (2008: 418) further state that SDL pertains to both, whereas SRL is usually described as a favourable student characteristic. It is clear throughout the literature that most of the research done on SDL is related to adult education outside the school environment; SRL, on the other hand, has been studied in the school environment (Bolhuis, 2003: 418; Loyens *et al*., 2008). Because of the andragogical basis and background of SDL, it has a tradition of being conceptualised as a design feature of the learning environment, a method of instruction as well as a process of learning (Ellis, 2007: 56; Fisher *et al*., 2001: 516; Kicken *et al*., 2009: 455). Fisher *et al*. (2001: 516) further believe that SDL environments are designed to foster self-direction that students will carry into subsequent learning situations. According to Anderton (2006: 157) and Chen (2002: 13), SRL optimises the motivational, behavioural, and meta-cognitive processes using a variety of strategies. Self-regulated learning strategies are the actions and processes used to acquire information and skills (Anderton, 2006: 157). These strategies are purposeful and deliberate, and chosen by the students as an appropriate solution to attaining academic goals (Zimmerman, 1990: 7).

It is clear that in both SRL and SDL the focus is on self-motivation, self-regulation and student control over the learning task (Bolhuis, 2003: 335-338; Zimmerman, 1989: 1-15). However, Loyens *et al*. (2008: 418) state that the degree of control the student has, specifically at the beginning of the learning process when the learning task is defined, differs in SDL and SRL. In SRL, the learning task can be generated by the educator, whereas in SDL, the student is much more involved in defining the learning task. A self-directed student should be able to identify what needs to be learned (Boekaerts & Corno, 2005: 201; Loyens *et al*., 2008: 418). In the SDL process, students are required to initiate learning by setting learning goals, choosing strategies to reach those goals and evaluate their learning processes. Self-regulated students, on the other hand, can decide for themselves which learning strategy to use and which steps to follow within a specific learning task given to them by the educator (Chen, 2002: 11). In sum, the concept of SDL is broader than SRL.

SDL as a design feature of the learning environment stresses students' freedom in the pursuit of their learning (Loyens *et al*., 2008: 419). For the purpose of this study, the researcher will refer to SDL because it is a comprehensive concept that includes SRL as a sub- section in the definition. In the following section, a literature review of SDL will be given.

2.3 Brief history of self-directed learning

Adult self-direction in learning has a long history. It dates back as far as the Greek philosophers such as Socrates, Plato, and Aristotle (Brockett & Hiemstra, 1991:8). Many well-known people such as Abraham Lincoln, Thomas Jefferson, Isaac Newton, and Benjamin Franklin would not have achieved the success or brought about changes in modern technology without self-education and direction. Social conditions in Colonial America and a corresponding lack of formal educational institutions, forced many people to learn on their own (Brockett & Hiemstra, 1991:8).

The literature of the 1800's which refers to self-directed learning is mostly in the form of biographies and autobiographies, since many of the prominent figures in society were largely, if not entirely, self-taught (Kett, 1994:84). Prior to the emergence of formal systems of schooling a couple of centuries ago, this was the main way in which most people learned what they wanted or needed to know (Candy, 2009:46). In 1840, the first edition of Craik's *Pursuit of knowledge under difficulties: its pleasures and rewards* was published in the United States of America. The book documented and celebrated the self-education efforts of several people, showing that efforts to understand self-directed learning were taking place (Craik, 1866:35). In 1859, Smiles published a book in Great Britain entitled *Self-help*, which applauded the value of personal development. These books were reprinted many times and multiple editions were distributed. The authors attempted to keep up with a seemingly insatiable demand for information about every imaginable topic and subject (Candy, 2009:46).

Malcolm Shepherd Knowles was a central figure in US adult education in the 1900's who wrote popular works on self-direction. His work was substantial and influential in reorienting adult educators from 'educating people' to 'helping them learn' (Knowles, 1950:6). In 1961, Houle published his book *The inquiring mind: a study of the adult who continues to learn*. This publication legitimised the study of self-directed learning and, since Houle himself was a leading professor in adult education, it eventually prompted an entire research tradition that continues to this day

(Candy, 2009:47). Houle interviewed adult students and classified them into three categories based on reasons for participation in learning: (a) goal-oriented, who participate mainly to achieve some end goal; (b) activity-oriented, who participate for social or fellowship reasons; and (c) learning-oriented, who perceive learning as an end in itself. It is this latter group that resembles the self-directed student identified in subsequent research (Fasokun *et al*., 2005:29).

In 1971, Allan Tough published his book, *The adult learning projects*. Tough focused on the planning and deciding aspects of the learning project (Brockett *et al*., 2000: 40). His work became a vital part of education literature (Brockett *et al*., 2000:9). Knowles also continued his work on SDL in the 1970's and in 1975 he published his book called *Self-directed learning* which provided foundational definitions and assumptions that guided much subsequent research. *Self-directed learning* is divided into three distinct sections, namely (a) the student, (b) the educator, and (c) a set of learning resources (Knowles, 1975:9). In the first section, which focuses on the student, Knowles discusses the importance of SDL and how SDL differs from educator-directed learning. He also identifies the key competencies of SDL. In the second part, the focus falls on the educator and his role in SDL. Knowles guides the reader through a very detailed process of how a learning facilitator can take a group of students through a self-discovery process. The last section consists of exercises that will help one take responsibility for one's own learning. He argues that the latter tends to increase self-esteem and produces an inquiring mind (Knowles, 1975:21).

Spear and Mocker have contributed the notion of "organising circumstance" as a framework for SDL. In 1984, they published, *The organizing circumstance: environmental determinants in self-directed learning*, which showed the importance of understanding a student's environmental circumstances in promoting self-directed learning (Brockett & Hiemstra, 1991:91). According to them, the consciously acknowledged "learning need" and the "inner disposition" of the individual do not fully account for the emergence of SDL (Bouchard, 1994). They believe that the understanding of the "life field" which encompasses the latter is needed in order to better grasp the phenomenon. In their opinion, SDL exists within the larger system of interacting influences in a person's life, and may therefore be said to construct SDL as a systemic variable (Spear & Mocker, 1984:7). Long and his colleagues established an annual International Symposium on Self-Directed Learning in 1987. The symposia have subsequently spawned many publications, research projects, and theory-building efforts by researchers throughout the world (Brockett & Hiemstra, 1991:85).

In 1991, Brockett and Hiemstra developed the "Personal Responsibility Orientation" (PRO) model based on the premise that self-direction in learning refers to both the external characteristics of an instructional process and the internal characteristics of the student, where the individual assumes primary responsibility for a learning experience (Brockett & Hiemstra, 1991:24). In that same year, Pilling created the self-directed learning test named the Self-Directed Learning Perception Scale (SDLPS). The SDLPS was designed to assess the degree to which an environment is conducive to self-direction in learning (Guglielmino *et al*., 2004:8). Candy's (1991) book, *Self-direction for lifelong learning* seems to be a bridge between the extensive SDL research in the 1980's and the need for future direction (Loyens *et al*., 2008:414). This comprehensive and theoretical book based on previous research, sets forth the autodidactic student as the cornerstone of the learning society. In this publication, Candy published his model for SDL, proposing four stages of readiness for self-directed learning and discussing appropriate instructional approaches for each. The model evoked great interest and discussion and is often cited. In 1992, Garrison explored the links between SDL and critical thinking (Garrison, 1992: 136-148). He continued his work throughout the 1990's and in 1997 Garrison developed *The self-directed reaming model*. This model includes three overlapping dimensions: self-management, self-monitoring and motivation.

A number of SDL measurement instruments have been developed through the years. The Self-Directed Learning Readiness Scale (SDLRS) (Guglielmino, 1977), the Oddi Continuing Learning Inventory (OCLI) (Oddi *et al*., 1990), the Self-Directed Learning Readiness Scale for Nursing Education (SDLRS) (Fisher *et al*., 2001) and the Self-Rating Scale of Self-Directed Learning (SRSSDL) (Williamson, 2007) are some of the most noticeable examples of these measurement instruments.

Guglielmino developed the Self-Directed Learning Readiness Scale (SDLRS) in 1977, an instrument subsequently used by many researchers to measure self-directed readiness or to compare various self-directed learning aspects which display numerous characteristics (Brockett & Hiemstra, 1991:57). Due to the high validity of the instrument, Guglielmino's SDLRS was later reported to be the most frequently used tool for research in SDL (Beitler & Mitlancher, 2007:527). In 1991 the Oddi Continuing Learning Inventory (OCLI), a 24-item scale, developed from Oddi's concern over the lack of a theoretical foundation for understanding personality characteristics of self-directed students (Brockett & Hiemstra, 1991:23).

In 2001, Fisher *et al.* developed a self-directed learning readiness scale for nursing education. The Self-Directed Learning Readiness Scale for Nursing Education was initially developed as an alternative to Guglielmino's (1977) Self-Directed Learning Readiness Scale (Fisher & King, 2010:44). This is an instrument for diagnosing students' attitudes, abilities and personality characteristics which are necessary for self-directed learning (Fisher *et al*., 2001: 516). Hoban *et al.* published The Self-Directed Learning Readiness Scale: a factor analysis study in 2005. In this publication they criticised Guglielmino's SDLRS, which had been commonly used since 1977. Through an extensive factor analysis, Hoban *et al.* (2005:375) reported that the SDLRS falls short of measuring the characteristics that Guglielmino had determined were associated with self-directed learning. Due to considerate demographic changes in the universities' student population, the shortage of suitable instruments for assessing students' levels of self-directedness in learning, and, more importantly, students' need for guidance in becoming self-directed students, Williamson attempted to develop the Self-Rating Scale of Self-Directed Learning (SRSSDL) to measure students' levels of self-directedness in learning. The SRSSDL was assessed and it was found to be a valid and reliable instrument in the nursing environment (Cadorin *et al.,* 2010:10).

Through the years a number of models for SDL have been developed. Each researcher concentrated on only a few of the characteristics of SDL. In his doctoral thesis, Oswalt (2003) developed a new model for SDL that takes all of the overlapping concepts for the previous SDL model into consideration. This model takes nine characteristics of SDL into account and provides a more complete picture of the process of SDL (Oswalt, 2003:23). Since 2000 research on SDL has been incorporated with online and web-based learning. In 2007, Song and Hill introduced a research-based conceptual model for understanding SDL in an online context. They felt a need for new perspectives on how context influences SDL. When initial SDL models were developed, face-to-face instruction was the predominant mode in higher education and not much attention was given to the importance of context in SDL (Song & Hill, 2007:30). In the following section, some of the models that were developed to better understand SDL will be discussed.

2.4 Models for self-directed learning

As seen in the historical overview in §2.3, researchers tried to find a number of ways to create a better understanding of the implementation and facilitation of SDL in educational environments. In

the next section some of the most influential models of SDL over the past three decades will be discussed.

2.4.1 Long (1989)

Long proposed an instructional model for SDL in 1989. This model provides a framework for instruction supporting SDL. Although most of the other models for SDL focus on adult learning, Long's model is based on younger students and focuses on the interaction of two dimensions, namely (a) pedagogical control and (b) psychological control. Long (1989:3) defines pedagogical control as the degree to which students have the freedom to determine learning goals, seek resources and set the mode of evaluation. Psychological control, on the other hand, is defined as the degree and willingness of students to maintain active control of the learning process. He argues that when these two forms of control are equal, or when psychological control exceeds pedagogical control, a situation can be defined as a self-directed learning condition (Long, 1989:4).

As seen in Figure 2.1, Long's model suggests four quadrants. Quadrant I describes a situation of low pedagogical control and high psychological control. This instance refers to a match between a student who demonstrates self-directedness and a facilitator who provides less support. In Quadrant II, a situation of high pedagogical control and high psychological control is described. In this instance the fact that the facilitator controls the learning situation conflicts with the student's self-directedness. Quadrant III describes exactly the opposite of Quadrant II. A situation of low pedagogical control and low psychological control is also an incompatible learning style, since a student who demonstrates low self-directedness will not be able to perform if allowed by the facilitator to control the learning situation. Lastly, Quadrant IV refers to high pedagogical control and low psychological control, which describes a situation where the student has little self-directedness and the facilitator provides a greater amount of support. Thus, Quadrant I and IV provide the best matches for a learning situation while Quadrant II and III illustrate areas of conflict.

According to Long (1989:8), the key factor for SDL is control. He believes that, for SDL to occur, pedagogical control and psychological control should be in balance (Quadrant I). Long (1989:8) further contends that students that demonstrate a self-directed learning style will proceed to direct their own learning without pedagogical assistance. However, if it is not the student's orientation to direct his or her own learning, SDL must be supported by the facilitator (Long, 1989:8).

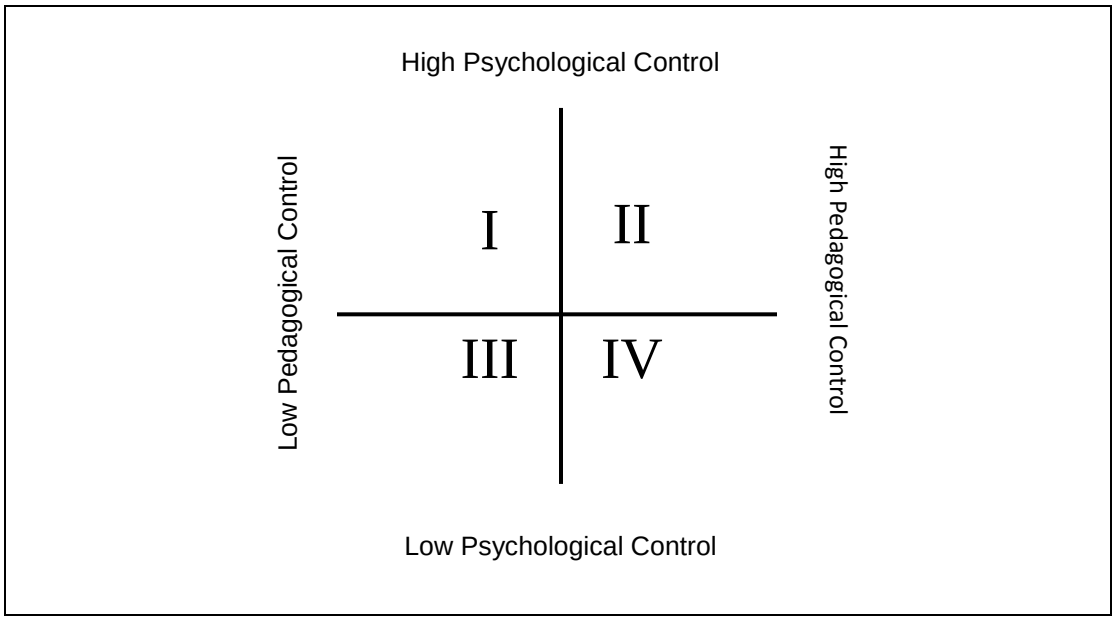

Figure 2.1 Long's model for SDL (Long, 1989:3)

In this model Long focuses on both psychological and pedagogical control. These components play an extremely important role in the higher educational environment, especially when working with first year students. Learning in schools is traditionally dominated and controlled by the educators and students seldom make decisions about their own learning but when they come to university, the lecturers expect them to be in control from the start. Although it is a necessity of effective learning, it cannot simply be assumed that students are in charge of their own learning and that they can direct their own learning processes. The educator should lead the student in their quest to become more self-directed and give them the opportunity to exercise some control over their own learning (Grow, 1991:130, Merriam *et al.,* 2007:107). Although control is an essential component of SDL, it is definitely not the only attribute and cannot stand in isolation from the other characteristics.

2.4.2 Candy (1991)

In 1991, Candy proposed a model of two interacting dimensions of self-directed learning). According to Candy (1991:21), one dimension is the amount of control within an institutional setting.

In this dimension, at one end of the continuum, the educator has total control over how the content is to be presented, what is to be studied, and what outcomes are expected from the students. The opposite end of this continuum represents a state in which the student has total control over the learning experience. The second dimension of self-directed learning is student control in situations outside of the formal institutional setting. Candy refers to this as “autodidaxy”. In this dimension, the student makes the decisions about learning, including what was to be learned, how learning activities would occur, when learning would take place, where learning activities would be conducted, and how learning outcomes would be evaluated. The continuum of the autodidactic domain represents the amount of assistance the student has in making decisions about the learning experience, if any (Candy, 1991:22).

As seen in Figure 2.2, Candy (1991:22) further states that self-direction actually embraces dimensions of process and product (outcome), and that it refers to four distinct, but related, phenomena, namely (a) personal autonomy; (b) self-management; (c) student-control and (d) autodidaxy. Personal autonomy represents one of the principal goals of education in all settings and all ages and refers to a personal characteristic or attribute of students and implies independence, freedom of choice, and rational reflection (Loyens *et al*., 2008:414). Self-management refers to the willingness and capacity to conduct one’s own education (Song & Hill, 2007:29). Although personal autonomy can be considered to be an overall disposition, self-management refers to the exercise of autonomy in learning. Candy (1991:24) further distinguishes between student control and the independent pursuit of learning. Student control deals with control over aspects of the instructional situation, while the latter implies autodidaxy and concerns learning outside formal educational settings.

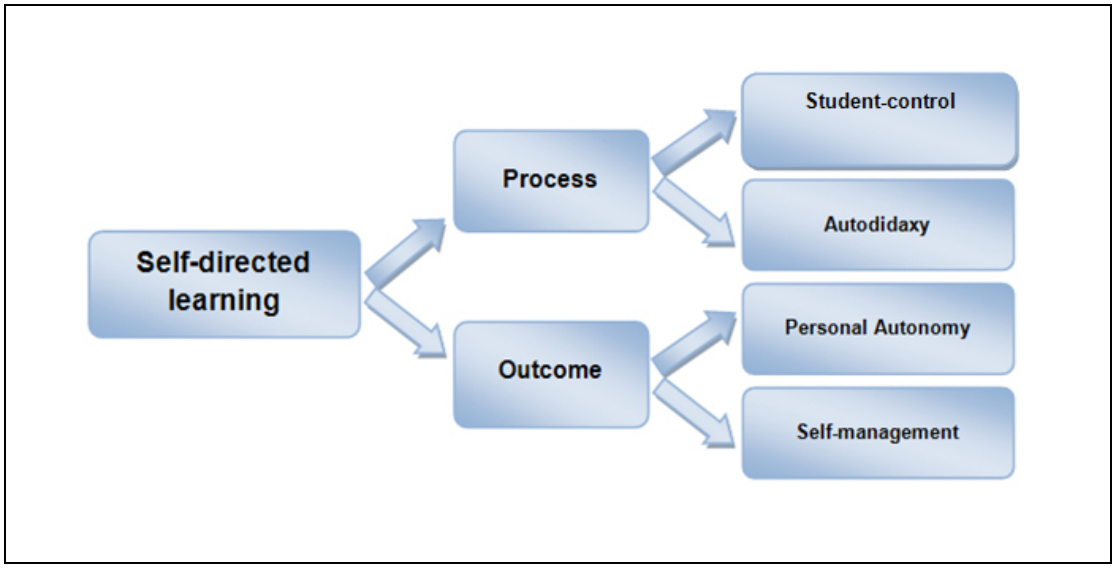

Figure 2.2 Candy's model for SDL (Candy, 1991:22)

Candy's model implies that a student's self-direction might be different in different content areas (Song & Hill, 2007:29). According to Candy (1991), students may have a high level of self-direction in an area with which they are familiar, or in areas that are similar to a prior experience. He also discusses how self-directed learning can be seen as an outcome or a process, but asserts that the development of self-directedness in students is the goal, with a focus on helping people to develop the qualities of moral, emotional and intellectual autonomy (Candy, 1991:19). Candy (1991:309) states that since a student's autonomy is likely to vary from situation to situation, educators should not assume that because a person has been self-directed in one situation, he or she will be able to succeed in a new area, since orientation, support and guidance may all be required in the first stages of a learning project.

Although Candy follows in Long's footsteps regarding the control component of his model, they approached this from slightly different perspectives. Long focused on psychological and pedagogical control while Candy distinguished between student control over aspects of the instructional situation and learning outside formal educational settings. Candy further recognized the importance of the learning context for SDL and his model was the first to state that students may exhibit different levels of self-direction in different learning situations and content areas. When implementing SDL in a compulsory model such as academic literacy, learning context cannot be disregarded. It is important to take into consideration that the students are enrolled for several

different fields of study and that their level of SDL can be influenced by their different interests and skills. Although Candy recognizes this component of SDL there are elements missing from the model. For example, the model does not describe how SDL is relevant in different learning contexts such as classroom learning or online learning (Song & Hill, 2007:29).

The researcher relates to the fact that Candy consistently argues for a constructivist interpretation for SDL. He states that "learning in its fullest context is social activity, and the attainment of full personal autonomy – both in learning and outside it – must recognize this interdependence" (Candy, 1991:22). In his model, Candy discusses the social implications of this free learning with its potential to eliminate social inequalities. Candy's (1991) model on SDL seems to form a bridge between the extensive SDL research in the 1980's and the need for future direction (Roberson, 2003:5).

2.4.3 Brockett and Hiemstra (1991)

As indicated in Figure 2.3, Brockett and Hiemstra (1991:25) created a model of Personal Responsibility Orientation (PRO) in self-directed learning. Brockett and Hiemstra (1991:33) contend that, in order to understand the complexity of SDL, it is essential to recognise the differences between SDL as an instructional method and student self-direction as a personality characteristic. This model depicts two dimensions of SDL, namely (a) personal responsibility in the teaching-learning process and (b) personal responsibility in one's own thoughts and actions. In the first dimension, SDL is viewed as a process in which a student assumes primary responsibility for planning, implementing, and evaluating the learning process. In the second dimension, SDL is referred to as a goal, which focuses on "a student's desire or preference for assuming responsibility for learning" (Brockett & Hiemstra, 1991:24). According to Brockett and Hiemstra (1991:27), people have control over their response to a situation even if they do not have control over the actual circumstances in which they need to react.

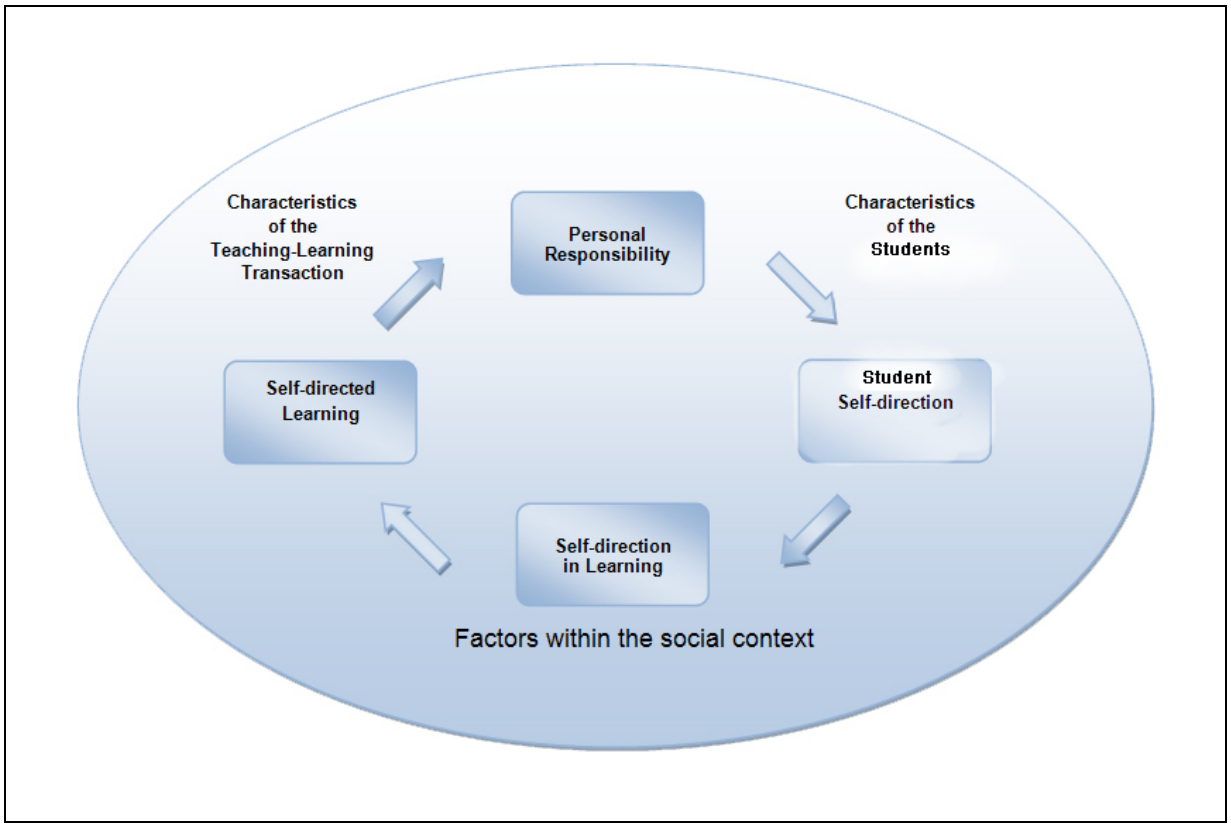

Figure 2.3 Brockett and Hiemstra's PRO model for SDL (Brockett & Hiemstra, 1991:33)

Students' self-directedness includes both their willingness to direct their own learning and their desire to do so (Brockett & Hiemstra, 1991:27). Although students have choices about the directions they pursue as students, they still have the responsibility to accept the consequences of their thoughts and actions (Brockett & Hiemstra, 1991:27). Brockett and Hiemstra (1991:27) regard personal responsibility as the foundation of self-direction in learning. This, however, cannot stand alone, it requires the educator to provide opportunities and support for SDL. Brockett and Hiemstra (1991:32) believe that optimal learning occurs when there is a balance between the student's level of self-directedness and the extent to which opportunity for SDL is possible in a given situation.

Brockett and Hiemstra (1991:32) emphasise that individuals do not learn in isolation and that the social aspects of learning are important as well. They define the social context as different physical institutions where learning takes place, such as community colleges, libraries and museums. The PRO model does not make provision for online learning as a learning context. However, in today's

educational situation, where virtual learning continues to experience exponential growth, a focus on face-to-face settings is quite limited.

The PRO- and Candy's model were both developed in 1991 and therefore did not necessarily influence one another, but they have some similarities. Brockett and Hiemstra also included the component of control although they refer to it as personal responsibility. They argue that personal responsibility does not necessarily mean total control over personal life circumstances or the learning environment. However, it does mean that a person has control over how to respond to a situation. This is an important factor to consider when working with students in a formal educational setting such as a university. It will never be possible to give students full control over the learning environment but they can take control of their own learning and their attitude towards the learning content. It is the role of the facilitator to guide students to understand that along with the latter goes a responsibility for accepting the consequences of one's thoughts and actions as a student.

When referring to the component named Student Self-Direction, Brockett and Hiemstra suggest that optimal conditions for learning result when there is a balance or congruence between the student's level of self-direction and the extent to which opportunity for self-directed learning is possible in a given situation (Brockett & Hiemstra, 1991:24-27). This aspect of the model must be taken into consideration when starting to implement SDL in a classroom with a diversity of students. It is possible that if one student is predisposed toward a high level of self-directedness and is engaged in a learning experience where self-direction is actively facilitated, the chances for success are high. But there will also be students who are not as strong in self-directedness. They will rather find comfort in a situation where the facilitator assumes a more directive role. In both instances, the chances for success are relatively high, since the student's expectations are congruent with the conditions of the learning situation. The implementation of SDL in an educational environment is a process and it is important to balance the different types of activities while guiding the students to become more self-directed.

2.4.4 Garrison (1997)

Grounded in a collaborative constructivist perspective, Garrison's theoretical model, as indicated in Figure 2.4, integrates (a) self-management; (b) self-monitoring and (c) motivational dimensions (Garrison, 1997:3). Garrison believes that although each of these dimensions is discussed

separately, in practice, they are intimately connected (Garrison, 1997:3). Garrison's model of SDL also includes the perspectives of SDL as a personal attribute as well as a learning process. To better understand Garrison's model, the researcher will discuss each of the integrated dimensions accordingly.

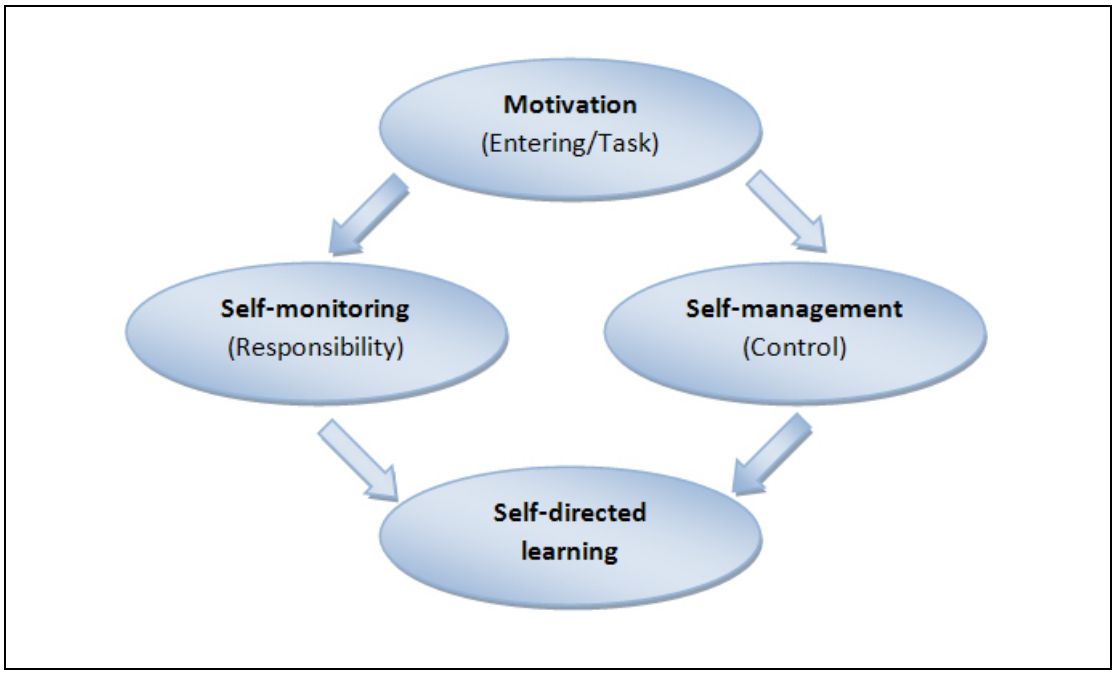

Figure 2.4 Garrison's model for SDL (Garrison, 1997:3)

Garrison explains that self-management involves students taking control of the learning context to reach their learning objectives (Garrison, 1997:3). He further states that student control does not mean independence, but rather collaboration with other people within the context. Garrison (1997:23) contends that the student "does not construct meaning in isolation from the shared world". The control over management of learning tasks is realised in a collaborative relationship between educator and student. Garrison (1997:3) believes that students should be provided with choices of how they wish to proactively carry out the learning process. It is clear from the latter that Garrison's model seemed to focus on the learning process perspective of SDL. Garrison recognises the context factor in his model by specifying self-management of resources in a given context. Yet, the role of context is somewhat superficial in Garrison's model and the dynamic interaction between learning context and SDL is not explicit (Song & Hill, 2007:29). To conclude,

self-management focuses on goal setting, use of resources, collaboration with other people and external support for learning.

According to Garrison (1997:4), self-monitoring refers to the ability of students to monitor both their cognitive and meta-cognitive processes. Garrison (1997:4-5) believes that self-monitoring students should have the ability to (a) exploit their own learning strategies, (b) think about what they are thinking, (c) take responsibility for the construction of personal meaning, (d) be reflective and think critically, (e) use feedback to construct meaning and (f) take responsibility for their own learning. He explains that it is important to ensure that new and existing knowledge structures are integrated in a meaningful manner and that learning goals are being met. In order to do so, the self-monitoring student should show commitment and obligation in constructing meaning through critical reflection and collaborative confirmation (Garrison, 1997:4). He asserts that the degree of self-direction will depend very much upon the student's proficiency in conjunction with contextual and epistemological demands (Garrison 1997;4). During the learning process self-directed students monitor their progress by observing, judging, and reacting to their tasks and activities (Garrison, 1997:5). To promote self-monitoring, students integrate external feedback with their own self-reflection as a form of collaborative confirmation of learning (Garrison, 1997:5). The students should plan and modify thinking according to the learning task or goal, after which they should engage in critical reflection, assimilating new knowledge with existing knowledge.

Garrison (1997:5) stresses the importance of distinguishing between responsibility and control. Responsibility refers to self-monitoring, while control refers to self-management. Although these two concepts are different, they go hand in hand. Educators need to understand that it is very difficult for students to assume responsibility for their own learning without feeling that they have some control over the educational transaction. When the educator controls goals and activities, students are placed in the position of being responsible for decisions made by the educator (Garrison, 1997:5). Without choice and collaboration, it may well be unrealistic to expect students to assume responsibility for their learning. Garrison (1997:5) suggests that sharing control of learning activities and tasks provides opportunities for instructional support while encouraging students to assume cognitive responsibility.

Garrison (1997:6) believes motivation plays a significant role in the initiation and maintenance of effort toward learning and the achievement of cognitive goals. He states that motivation reflects

perceived value and anticipated success of learning goals at the time learning is initiated. This mediates between context (control) and cognition (responsibility) during the learning process. In this model, motivation has two dimensions: (a) entering motivation and (b) task motivation. Entering motivation is what compels the student to participate in the learning process, whereas task motivation is what keeps the student on track and persisting/persevering in the learning process (Garrison, 1997:6). The student's entering motivational state is established by the process of selecting goals and by the decision to participate. If students believe that the learning goals will meet their learning needs and those goals are achievable, their entering motivational state will be much higher.

According to Garrison (1997:6), the second motivational phase, task motivation, refers to the degree to which students maintain their entering motivational state. He states that task motivation is integrally connected to task control and self-management. This means that students are motivated to assume responsibility for constructing meaning and understanding when they have some control over the learning experience. Garrison (1997:6) asserts that intrinsic motivation leads to responsible and continuous learning. He argues that it is crucial that we create conditions where students become increasingly motivated by authentic interest and desire to construct personal meaning and shared understanding. Understanding these conditions is, in essence, what the exploration of self-directed learning is about.

Garrison's model was an attempt to expand the scope of self-directed learning. He felt that most of the other models' emphasis is placed on the external control and management of learning tasks and little attention has been directed to the learning process itself (Garrison, 1997:1). Thus Garrison decided to focus on the integration of cognitive and motivational dimensions of learning. The distinction in Long's model between external control and internal cognitive responsibility is the basis for the self-directed learning framework and model presented by Garrison. Garrison agrees with Long's perception that, without the psychological or cognitive dimension, the focus is on teaching not learning.

Long, as quoted by Garrison (1997:2), argued that: "Pedagogical procedures whether imposed by a teacher or freely chosen by the student remain pedagogical or 'teaching' activities. Hence we have other-teaching or perhaps self-teaching but not self-learning". Garrison also explored the links between self-directed learning and critical thinking. He believes that critical thinking reflects the

complex cognitive processes associated with constructing personal meaning and gaining worthwhile knowledge which has been developed through consensual understanding (Garrison, 1997:3).

When students recognize their learning needs, formulate learning objectives, select contents, draw up learning strategies, procure teaching materials and media, identify additional human and physical resources and make use of them, and they themselves organise, control, inspect, and evaluate their own learning, they are more likely to perform highly at learning tasks (Abd-El-Fattah, 2010:594).

Self-direction is seen as essential if students are to achieve the ultimate educational goal of becoming continuous learners (Garrison, 1997:11). Learning interests and opportunities for student control can promote self-direction and continued learning. Opportunities for self-directed learning, in turn, can enhance meta-cognitive awareness and facilitate the conditions where students can learn how to learn (Abd-El-Fattah, 2010:595).

2.4.5 Oswalt (2003)

After analysing a number of SDL models, Oswalt (2003:22) found nine key concepts concerning SDL, namely : (a) opportunity, (b) support, (c) collaboration, (d) motivation, (e) context, (f) cognitive skills, (g) skill with content, (h) skill with SDL and (i) willingness to control one's own learning. According to Oswalt (2003:22), various authors present a combination of some of these concepts. Although some of the existing models overlap, not one of the authors has integrated all of the identified components. Oswalt (2003:23) recognises the importance and benefits of the existing modules but argues that each of these models only provides a narrow view of SDL. When all nine components are seen together, it embraces the entire process of SDL and it provides a more complete picture of SDL. In Oswalt's "3-Factor Model" he divides the identified nine SDL concepts into three major groups, namely (a) learning situation, (b) components of learning (c) and students' attributes.

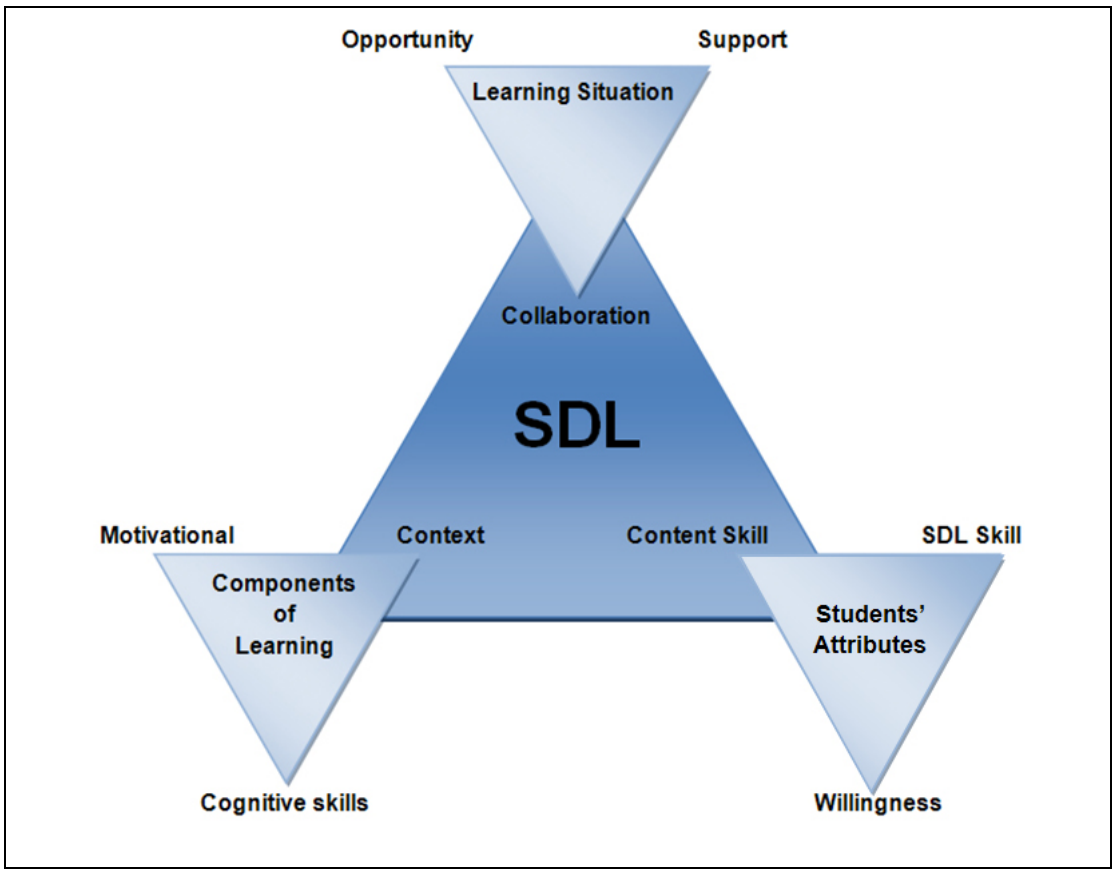

Figure 2.5 Oswalt's model for SDL (**Oswalt, 2003:22)**

In the first group, Learning Situation, Oswalt (2003:24) includes opportunity, support and collaboration. He refers to opportunity as the extent to which the facilitator is committed to foster SDL in the learning situation. In order for SDL to be promoted, the facilitator must be willing to give the students the opportunity, and support them to direct their own learning. According to Oswalt (2003:24), support includes the expertise, guidance and materials that the facilitator provides to the learning situation.

It remains the facilitator's responsibility to provide the students with resources and scaffolding to support students' interaction with new and unfamiliar knowledge and skill (Oswalt, 2003:25). The last concept that has an influence on learning situation is collaboration. Oswalt (2003:25) believes that collaboration is an essential aspect in SDL and that peer-to-peer support groups or networks can encourage SDL, whether it is in a formal or a non-formal learning situation.

Learning attributes, the second group, integrates content skill, SDL skill and willingness to direct one's own learning. Oswalt (2003:25) argues that the students' skill level in a content area will directly impact on their ability to direct their own learning within that specific content area. He further states that students will be more willing to take charge of their own learning if they have developed a prior understanding of basic concepts or mastered basic skills in a certain area. Oswalt (2003:25) stresses that willingness to direct one's own learning is a personal decision and SDL can only occur successfully if the student is willing to invest time and effort to promote their SDL skills.

The components of learning that Oswalt (2003:26) refers to in his model are the cognitive, motivational and contextual factors of learning. Cognitive factors of learning include critical self-reflection on both the individual's learning process and the knowledge and skill the student is attempting to master (Oswalt, 2003:26). The motivational factors include both self-efficacy and volition. Self-efficacy refers to the students' confidence (or lack thereof) in his/her ability to succeed or fail while volition refers to the student's ability to commit to tasks despite things in the environment that also compete for his or her attention (Oswalt, 2003:25). Contextual factors include resources, peers and other external factors in the learning environment over which the student has control. Students have to take responsibility for all factors mentioned above in order to be an effective self-directed student.

SDL is not an activity in isolation, but a process discovering personal meaning in learning processes and products with the help of others (Oswalt, 2003:72). In the academic literacy learning environment students will probably not have much experience in terms of collaboration or efficient group work. It is important for the facilitator to create a positive learning environment with an atmosphere of openness and trust that support group activities. This will only be possible when the facilitator encourages the students to ask significant questions, engage in discussions with peers, giving suggestions and sharing resources. There are a number of learning strategies that a facilitator can use to encourage collaboration. In the next chapter the researcher will focus on activities that can be implemented in an e-learning environment.

2.4.6 Synthesis of self-directed learning models

In the following section, the key constructs associated with each model, descriptions and explanations are summarised. In table 2.1 a short summary of the models, categorised according to the concepts identified by Oswalt (2003) is given.

Long's (1989) model is based on pedagogical SDL and focuses on the interaction of two dimensions namely psychological and pedagogical control. The essence of his model is control. He believes the amount of control given to students will influence their SDL skills. All the other aspects of his model are discussed relative to the control component. Although student control is a given in a successful SDL environment, it is not the only aspect to be taken into consideration. It is also important to remember that it is very difficult in a formal educational setting such as a university to give students ultimate control over their learning environment, but educators can give students control over certain aspects of their learning such as the choice of topics for assignments, the use of alternative learning resources and different learning strategies.

The variety of the concepts in Candy's (1991) model added an element of depth to our understanding of SDL. Furthermore, Candy's (1991) model was the first to state that a students' self-direction might differ in different content areas. This is an important facet of SDL to remember when implementing SDL in the academic literacy classroom. The facilitator will have to consider the fact that there are a variety of students in the classroom that will approach this module from a different frame of reference. There are elements in other models that are not represented in this model. For example, the model does not describe how SDL is relevant in different learning contexts such as classroom learning or online learning and there is not much attention given to the control component or learning situations such as opportunity, support and collaboration.

Brockett and Hiemstra (1991) combined both the process and personal attribute perspectives in the model. They also integrated social context as a component in the model in that they discussed the role of institutions and policies in SDL. At the time the model was developed, this was a significant addition to the SDL models. Yet, in today's educational climate, the context factor in the model is rather limited.

Table 2.1 Synthesis of SDL models

	SDL components	Models				
		Long	**Candy**	**Brockett & Hiemstra**	**Garrison**	**Oswalt**
Learning Situation	**Opportunity**	Educators have a responsibility to give students the opportunity for SDL	Nothing explicit	Educators have a responsibility to give students the opportunity for SDL	Educators have a responsibility to promote student control	Extent to which educators foster SDL
	Support	There should be a balance between Pedagogical and Psychological control	Nothing explicit	Educators need to support students regardless of their personal responsibility	Nothing explicit	Expertise, guidance and materials provided by educator
	Collaboration	Possible but not necessary	Nothing explicit	Students do not learn in isolation	Collaboration with others promote control over learning context	Student-student, group and student-educator interaction
Components of learning	Motivation	Nothing explicit	Nothing explicit	Nothing explicit	Entering motivation, task motivation and volition	Enthusiasm or eagerness of doing something; Self-efficacy and volition
	Context	Nothing explicit	Distinguish between Student control in a Institutional setting and autodaxity	Defines social context as institutions of learning	Students taking control of resources in the learning context	Resources, peers and external factors in the learning environment
	Cognitive	Nothing explicit	Nothing explicit	Nothing explicit	Construct own meaning, critical thinking and reflection	Critical self-refection
Students' Attributes	**Content Skill**	Nothing explicit	Student's SDL skills may differ in different learning areas	Nothing explicit	Nothing explicit	Mastering basic skills within content area promote SDL skill
	SDL Skill Level of self-directedness	High psychological control will proceed to SDL without pedagogical assistance.	Level of SDL skill will be higher in familiar learning areas	Students assume responsibility for planning, implementing and evaluating the learning process	Nothing explicit	Level of self-directedness in specific learning area is influenced by skill level in that area
	Willingness Willingness to direct own learning	Willingness to direct own learning leads to better SDL skills	Willingness and capacity to direct own learning (Self-management)	Willingness and desire	Self Management and Goal setting	Personal decision to invest time and effort

Brockett and Hiemstra (1991) defined the social context as different physical institutions where learning takes place, such as community colleges, libraries, and museums. In today's educational situation, where virtual learning continues to experience exponential growth, a focus only on face-to-face settings is rather limited.

Like Candy (1991), as well as Brockett and Hiemstra (1991), Garrison (1997) also recognized the context factor in his model in that he specified self-management of resources in a given context. Yet, the role of context was somewhat superficial in Garrison's (1997) model and the dynamic interaction between learning context and SDL was not explicit. Garrison followed in Long's (1989) footsteps by also stressing the control component but he further distinguishes between control and responsibilities. These two concepts go hand in hand. The facilitator in the academic literacy classroom has to give students control over certain aspects of their learning. If students, for example, can decide on their own topic for an academic essay, they will find it easier to take responsibility for the learning process and they will be more motivated to do the assignment.

All of the models discussed in the previous sections have been valuable in the understanding and implementation of SDL, but the model presented by Oswalt (2003) integrates the highest number of SDL components and it provides a more complete picture of SDL. In most of the SDL models reviewed, context was discussed to a certain extent. Yet the fact that some of the models above raised awareness of the importance of context in SDL, has not attracted much attention to date. Although Oswalt's (2003) model gives thorough insight into the implementation of SDL in a classroom, face-to-face instruction was still the predominant mode of delivery in all his discussions. A more comprehensive SDL model is needed to incorporate the e-learning context as a contributor to the overall process. In the next chapter the researcher will focus on a model specifically designed for an e-learning environment.

2.5 The self-directed student

In traditional classrooms where knowledge transmission from an educator to students occurs through instructionalist approuches, students are not required to be active and can be passive recipients (Fischer & Sugimoto, 2006:37). All the information or knowledge related to learning is automatically given through an educator irrespective of the students' needs or problems. Fischer and Sugimoto (2006:37) believe that in such instances, students are not motivated to learn. In contrast, if students solve their own problems for their own sake, they try to actively acquire

required knowledge and skills (Heikkila & Lonka, 2006:114) and therefore, active learning happens when students are self-directed to learn for themselves through their demands to solve authentic or personally meaningful problems (Fischer & Sugimoto, 2006:37).

In her doctoral dissertation Guglielmino defined a self-directed student in a way that is still as accurate today as it was a few decades ago. According to Guglielmino (1977:73) “a highly self-directed student is one who exhibits initiative, independence, and persistence in learning; one who accepts responsibility for his or her own learning and views problems as challenges, not obstacles; one who is capable of self-discipline and has a high degree of curiosity; one who has a strong desire to learn or change and is self-confident; one who is able to use basic study skills, organize his or her time and set an appropriate pace of learning, and to develop a plan for completing work; one who enjoys learning and has a tendency to be goal oriented.” Based on a survey of experts and her delphi study Guglielmino (1977) proposed the following characteristics for self-directed students:

- initiative;
- independence;
- persistence;
- sense of responsibility for one’s own learning;
- tendency to view problems as challenges;
- self-discipline;
- high degree of curiosity;
- strong desire to learn or change;
- ability to use basic study skills;
- ability to organize one’s time and set an appropriate pace for learning;
- self- confidence;
- ability to develop a plan for completing work;
- joy in learning;
- tolerance of ambiguity;
- preference for active participation in shaping educational program;
- ability to evaluate one’s own progress;
- exploratory view of education;
- above average risk-taking behaviour;
- knowledge of a variety of potential learning resources and ability to use them;

- ability to accept and use criticism;
- ability to discover new approaches for dealing with problems;
- ability to formulate learning objectives;
- ability to select and use many learning strategies;
- positive orientation to the future;
- emotional security;
- average or above average intelligence;
- creativity;
- preference for independent study or relatively unstructured sources.

As seen in Oswalt's SDL model, students' attributes, which include a number of personality characteristics, is a key component in becoming a self-directed student. Dweck (2008:391) found that personality characteristics have a significant impact on one's attitude and approach to learning. Individuals can improve their learning abilities by changing their self-beliefs (Dweck, 2008:392). Understanding the impact of self-beliefs on one's ability to learn and accurately relate to learning situations is an essential component of the learning process (Hutto, 2009:40). Dweck's (2008:391) research indicates that personality is not necessarily fixed from birth, or even into adulthood. There are some aspects of personality that are inherent, but for the most part personality is "a flexible and dynamic thing that changes over the life span and is shaped by experience." It can be surmised that self-directed learning personality characteristics are not fixed, they can and must be developed (Dweck, 2008:391-394).

According to Guglielmino (2008:2) being a self-directed student is the natural way to learn. As an example of this inherent disposition found in everyone, Guglielmino (2008:2) points to the activities of a young child discovering a new object. The child instinctively examines the item and explores its properties through taste, touch, sight, and sound to learn as much as possible about the object. Although people are born with a natural drive to learn, for some people that drive evaporates and learning beyond what is required for daily living is no longer actively sought (Hutto, 2009:40). Although self-directedness is a quality that can be diminished, it can also be restored and further developed. The use of self-directed learning techniques in an educational setting may be viewed as an attempt to replicate the natural way that people learn (Hutto, 2009:41).

Students should note that their knowledge, attitudes, and SDL skills are essential in terms of functioning within the learning process. They have to realize that the role of the educator changes to that of a facilitator or a guide and the student can no longer depend on the educator as the only source of information (Ellis, 2007; Loyens *et al*., 2008: 55). All students have the potential to succeed in SDL projects and programs. The need remains, however, for increased student awareness of the purposes and processes associated with or necessary for SDL success (Kicken *et al*., 2009: 455). To function effectively, students must recognize the multiple components present in a learning situation (Richard, 2007:64).

2.6 The self-directed educator

In §2.4 a few of the SDL models were discussed briefly. In all those models the educators' role in SDL is recognised. All the authors of those models agree that the educator should guide the students to reach a higher level of self-direction in their learning. In the following sections the role of the educator will be discussed by focussing on the following: (a) to enhance the ability of students to be self-directed in their learning and (b) to foster transformational learning as central to SDL. The role of the educator will also be discussed by means of Grow's model and Borich's model.

2.6.1 Enhance student abilities

Part of the role of the educator is to help students to be able to plan, carry out, and evaluate their own learning (Merriam *et al.,* 2007:107). Merriam *et al.* (2007:107) recommends that educators should give students more control over learning situations by only providing assistance to individuals or groups of students in locating resources or mastering alternative learning strategies. Allowing students a degree of control of the learning situation may be essential to giving students practice at being more self-directed in their learning (Francom, 2009:2). Student control is a way of organizing instruction or instructional materials in a formal educational setting. However, fostering student self-direction involves more than simply reducing the amount of support and guidance given to the students and increasing student control (Merriam *et al.,* 2007:107).

According to Francom (2009:7) the ability to self-direct one's own learning can be increased through certain teaching methods. Several different teaching methods, models and practices have been proposed and implemented to foster student self-direction among students such as: (a) cooperative learning (Oswalt, 2003:25; Merriam *et al.,* 2007:107; Regan, 2003:597); (b) problem

based learning (Loyens *et al*., 2008: 418; Chin *et al., 2007:99;* Savery, 2006:9); and (c) process oriented learning (Bolhuis, 2003:327; Ebner *et al.,* 2010:93; Felder & Prince, 2006:131). These methods of teaching may allow students to independently set their own goals and make plans to reach them, execute learning activities, evaluate the results and monitor their own learning processes (Francom 2009:7). In the following section each of the above mentioned teaching methods will be discussed briefly.

2.6.1.1 Cooperative learning

Cooperative learning is defined by Wessner and Pfister, (2000:1) as an approach that involves a small group of students working together as a team to solve a problem, complete a task, or accomplish a common goal. When integrating cooperative or collaborative learning strategies into a course, careful planning and preparation is essential. Understanding how to form groups, ensure positive interdependence, maintain individual accountability, resolve group conflict, develop appropriate assignments and grading criteria, and manage active learning environments are critical to the achievement of a successful cooperative learning experience (Felder & Prince, 2006:18-21; Wessner & Pfister,2000:1; Berger & Hänze, 2007:29-31).

When using the cooperative learning strategy, the teacher's role changes from an information-giving authority to a facilitator (Felder & Prince, 2006:9). According to Johnson and Johnson (2009:366), cooperative learning is based on the following principles: (a) positive interdependence; (b) individual accountability; (c) promotive interaction; (d) the appropriate use of social skills; and (e) group processing. Cooperative learning is a structured way of learning and it is extremely important to keep the above-mentioned principles in consideration while planning a lesson. Educators must bear in mind that cooperation is about empowerment. Students are empowered to develop to their fullest potential through the support and confidence they gain.

2.6.1.2 Problem based learning

According to Hmelo-Silver (2003: 236) in problem-based learning (PBL) students learn by solving problems, develop strategies, construct knowledge and reflecting on their experiences. PBL is well suited to help students become active students because it situates learning in real-world problems and makes students responsible for their learning (Hmelo-Silver, 2003:236). Chakravarthi and Vijayan (2010:39) state that PBL has been one of the most powerful teaching methods to encourage students to take responsibility for their own learning and cannot occur in the absence of

SDL. They further believe that increasing SDL skills during professional education is a stated objective of PBL, as it helps students effectively obtain and use knowledge and prepare for their professional careers. Loyens *et al.* (2008: 414) assert that in the PBL literature, SDL refers to "the preparedness of a student to engage in learning activities defined by him- or herself, rather than by a teacher" and this refers to a motivational component of having the willingness to engage in those learning activities, as well as the ability to do so. According to Rideout and Carpio (2001:31), essential components of SDL are apparent in the PBL process, namely (a) review the scenario and generate hypotheses; (b) identify their learning issues; (c) confirm the resources they will access; (d) perform their own information seeking and (e) apply their new learning and reflect on the content and process of learning. PBL with its emphasis on SDL is viewed as an appropriate method for developing the attitudes and skills to cope with ever-changing environments (Chakravarthi & Vijayan, 2010:39).

2.6.1.3 Process oriented learning

According to Janssen *et al*. (2010:121) process-oriented learning (POL) focusses on interaction processes such as giving detailed and elaborated explanations, negotiating meaning, co-constructing solutions and lines of reasoning and developing and formulating arguments during collaboration. The process of knowledge construction and the students own learning process, leads to the application of POL (Ebner *et al.*, 2010:93). Ebner *et al.* (2010:93) further states that process orientation does not refer to a tight structuring of the learning process, but rather to the possibility of trying out a range of learning strategies where the role of the teacher changes from that of a knowledge distributor to a facilitator of self-directed learning. The aim of process-oriented instruction is to foster and facilitate self-directed learning while preparing for lifelong learning (Bolhuis, 2003:338). Bolhuis (2003:338) grouped POL into four main principles namely: (a) move gradually to student regulation of the complete learning process, (b) focus on knowledge-building in the domain (subject-area), (c) pay attention to emotional aspects of learning and (d) treat learning process and results as social phenomena. The important role of experiences in the social and cultural context, prior knowledge, and the emotional aspects of learning are highlighted in these principles, and are related to self-directed learning in life. Bolhuis (2003:343) believes that teaching is not just an individual activity but a social practice with a complex power structure. He believes that preparing students for self-directed lifelong learning should be accepted and should be an important educational goal in any educational environment.

2.6.2 Transformational learning as central to self-directed learning

Mezirow, as quoted by Merriam *et al., (*2007:108) suggests that the key to self-directedness is becoming critically aware of what has been taken for granted about one's own learning. The essence of this goal is that students need to reflect critically and have an understanding of the historical, cultural, and biographical reasons for their needs, wants and interests (Merriam *et al.,* 2007:108). This however, is not possible in teacher-centered education settings where the educator is the only source of information. The role of the educator has to change from that of an educator to that of a facilitator or even a consultant to make room for critical thinking, problem solving and reflection. SDL requires a change in approach by both students and educators (Zion & Slezak, 2005:876). SDL helps students to construct their own understanding and meaning and helps them to reason, problem-solve, and think critically about the content (Costa & Kallick, 2003:53). Instead of explaining, demonstrating and correcting, the teacher must place more emphasis on guiding the students' active learning process (Zion & Slezak, 2005:876). In the following sections the researcher will discuss two models with guidelines on how to practically implement the changing role of the educator in the classroom.

2.6.3 Grow's model

In 1991, Grow proposed a SDL model for educators to help them implement SDL in their classroom. His model introduces the four stages which were inspired by four leadership styles (Grow, 1991:125). In this model the educator's purpose is to match the student's stage of self-direction and prepare the student to advance to higher stages (Grow, 1991:129). In the following paragraphs the stages of the model as illustrated is Figure 2.6 will be discussed as well as the role of the educator in each stage.

According to Grow (1991:130) the way to approach the teaching of dependent, stage one students, is through coaching. To use the coaching method, Grow (1991:130) suggests that the educator should first establish their credibility and authority. Educators must prescribe clear-cut objectives and straightforward techniques for achieving them because dependent students respond best to a clearly-organized, rigorous approach to the subject (Grow, 1991:130). The course should be designed clearly, with rigorous assignments and definite deadlines.

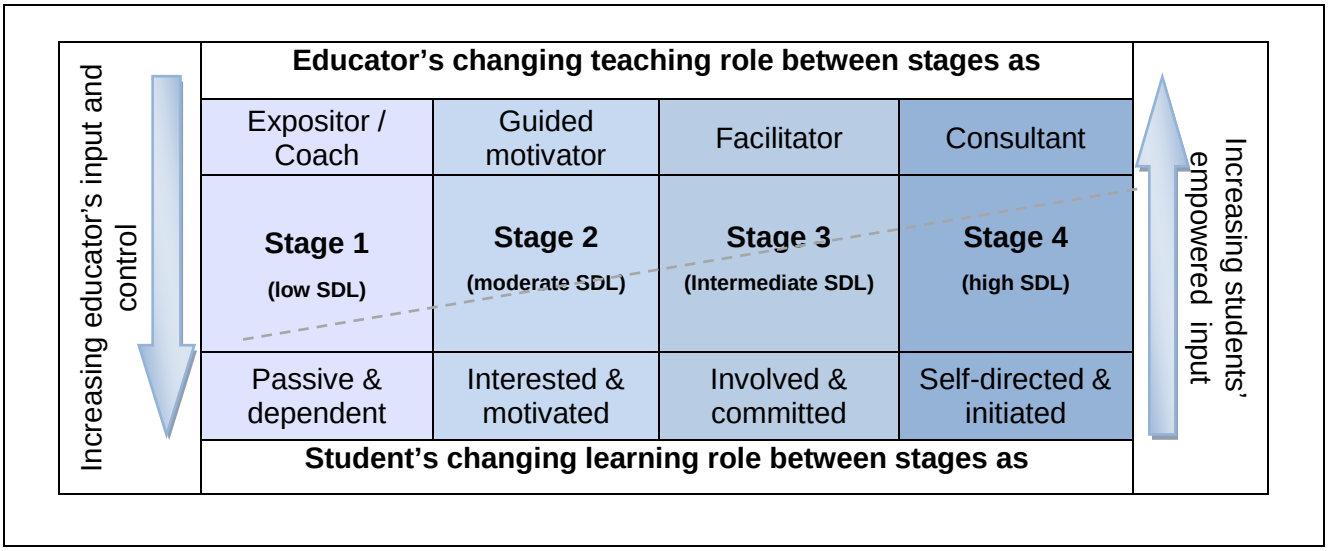

Figure 2.6 Grow's changing roles of Educators and Students (graphically presented by Kwan (2003:318))

Grow (1991:130) believes that educators should keep these students busy learning specific, identifiable skills. It is important to set standards beyond what students think they can do, and then do whatever is necessary to get them to succeed, motivate them by creating and rewarding success (Grow, 1991:130). Grow (1991:130) further states that the educator should avoid giving choices to the students because at this stage of development they depend on educators to make decisions they themselves will later learn to make. Grow (1991:131) recognises the fact that stage one teaching seems to be rejected by many writers on education, but it also has tremendous popular appeal. He believes that people who want to go "back to the basics" can succeed by making use of coaching. An example of such an educator, according to Grow (1991:131) is someone who drives, goads, pushes, and cajoles a group of disenchanted underachievers until they learn almost to spite him. Then, he lifts their self-esteem with the realization that they did it, and they can do it again. By doing that, the educator prepares the passive, dependent students for higher levels of achievement and self-direction by progressing to greater autonomy and responsibility.

In stage two of the model, Grow (1991:130) refers to students that are interested and motivated. These students respond to motivational techniques and are willing to do assignments they can see the purpose of.

In this stage the educator brings enthusiasm and motivation to the class, sweeping students along with the excitement of learning. The role of the educator in stage two, changes from a coach to a guide or motivator. Grow (1991:131) states that such an educator will persuade and explain using a directive but highly supportive approach that reinforces student willingness and enthusiasm. Grow (1991:131) further believes that students at this stage go along if they understand why they are doing something and the instructor provides the necessary direction and help. Unlike the students from stage one, they respond positively to personal interaction from the educator and communication is two-way. The educator has to explain and justify each assignment and persuade the students of its value and students communicate their responses and interests (Grow, 1991:132).

To teach in stage two, the educator should give clear explanations of why the skills are important and how the assignments assist in attaining these skills (Grow, 1991:131). When students are motivated and encouraged, they will continue to learn on their own. Basic SDL skills such as goal setting should be taught to the students in order to prepare them to be self-directed students (Grow, 1991:131). The stage two educator should also require them to become involved and to take risks. Students should be guided to recognize their different personality types, life-goals and styles of learning. According to Grow (1991:132) it is important to set high standards and motivate students to achieve them. Grow (1991:132) also states that a good stage two educator ties a subject to the students' interests. He further believes that the educator's enthusiasm carries students until they have learned enough to become self-motivated. If students remain dependent upon the educator for motivation to learn, however, the educator has failed.

Students in stage three of the model (Grow, 1991:133) see themselves as participants in their own education. Grow (1991:133) believes that they are ready to explore a subject with a good guide and even explore some of it on their own. He further states that they have skill and knowledge but they may need to develop a deeper self-concept, more confidence, and more sense of direction. A greater ability to work with, and learn from others needs to be developed during this stage and students will benefit from learning more about how they learn, such as making conscious use of learning strategies (Grow, 1991:133). As part of the transformation process from other-direction, students in stage three may examine themselves, their culture, and their milieu (Grow, 1991:133). Grow (1991:133) states that students will begin to understand how to separate what they feel from what they should feel, what they value from what they should value, what they want from what they should want. They may learn to identify and value their own experiences in life and to value the

personal experiences of others (Grow, 1991:133). Stage three students can be assigned to work in groups on open-ended but carefully-designed projects (Grow, 1991:134). Written criteria, learning contracts, and evaluation checklists help students monitor their own progress and as they become more competent at setting goal and pace, students can take on greater freedom and more difficult assignments (Grow, 1991:134). Grow (1991:134) admits that students can learn collaboratively at any stage, but students who are ready for stage three learning can accomplish far more as a group or collectively than students in earlier stages.

In stage three of the process the role of the educator has changed to that of a facilitator. The facilitator needs to help students to develop critical thinking skills, individual initiative, and a sense of themselves as co-creators of the culture that shapes them (Grow, 1991:133). It is the facilitator's goal to ensure that students both learn the necessary subject matter and learn how to learn. The facilitator comes closest at this stage to being a participant in the learning experience when teacher and students share in decision-making, with students taking an increasing role with more responsibilities (Grow, 1991:133). Grow (1991:133) proposes that the instructor concentrates on facilitation and communication and supports students in using the skills they have. He further suggests that the facilitator should offer tools, methods, and techniques as a way of interpreting the learning experience. During this stage the facilitator must help them structure the transition toward independence. Grow (1991:133) suggests that the facilitator might begin by negotiating interim goals and interim evaluations, then give students more rope. Grow (1991:133) stresses the fact that a vital part of stage three is for students to become empowered, so that they learn to create lifelong learning situations for themselves.

The students in stage four of Grow's (1991:130) model are called self-directed students. These students set their own goals and standards, with or without help from experts (Grow, 1991:134). Students from this stage are both able and willing to take responsibility for their learning, direction, and productivity and they exercise skills in time management, project management, goal-setting, self-evaluation, peer critique, information gathering, and use of educational resources (Grow, 1991:134). Grow (1991:134) believes that most mature stage four students can learn from any kind of educator, but mostly thrive in an atmosphere of autonomy. He also states that some students become self-directed in a general sense while some students only become self-directed in specific subjects or situations.

The progression is now complete from the subject-matter focus of the earliest stages to the student-focus of stage four (Grow, 1991:134). The role of the educator has changed in such a way

that it is no longer considered appropriate to just teach subject matter: the student's ability to learn needs to be cultivated. According to Grow (1991:134) the ultimate subject of stage four is the student's own personal empowerment as a mature creator and evaluator of knowledge, or as a high-level practitioner of a skill. Due to the psychological maturity of stage four students, the instructor gradually reduces both two-way communication and external reinforcement so that the student's own efforts become the unequivocal focus (Grow, 1991:135). Grow (1991:135) further states that the relationship between teacher and student is collegial but not intense. The relationship between students and world, students and task, and perhaps among students is strong. The educator actively monitors progress to ensure success, but steps in only to assist students in acquiring the skills to be self-directing and self-monitoring. It is the responsibility of the educator to inspire, mentor, challenge or provoke the student, then step back (Grow, 1991:135). A stage four educator might set a challenge, then leave the student largely alone to carry it out, intervening only when asked to help; and then not help meet the challenge, but merely to help empower the student to meet the challenge. They are always ready to step in to offer a change in direction, to suggest a skill, to help evaluate, to serve as a sounding board or to empower (Grow, 1991:135).

2.6.4 Borich's model

According to Borich (2007:336), to promote SDL in a learning environment, the educator is required to perform the following unique teaching functions (figure 2.7):

- Provide information on when and how to use mental strategies for learning.
- Explicitly illustrate how to use these strategies and to link the solutions to real life problems.
- Encourage and motivate students to become actively involved in the subject matter by going beyond the information given and to restructure the new information in their own way of thinking and prior knowledge.
- Gradually shift the responsibility of learning to the student's through practice exercises, dialogues and discussions that engage them in increasingly complex thinking patterns.

According to Kwan (2003:318) the adoption of self-directed learning implies that learning is not just confined within the four walls of the classroom or that students are expected to follow a set programme irrespective of their different learning abilities and needs. In fact, students should go beyond traditional schooling and make learning an on-going process wherever and whenever they have the desire and motivation to do so (Kwan, 2003:318). Students should be able to incorporate

social, geographical and environmental issues that occur day-to-day in our living social context into their learning process (Merriam *et al.,* 2007:108; Kwan, 2003:318).

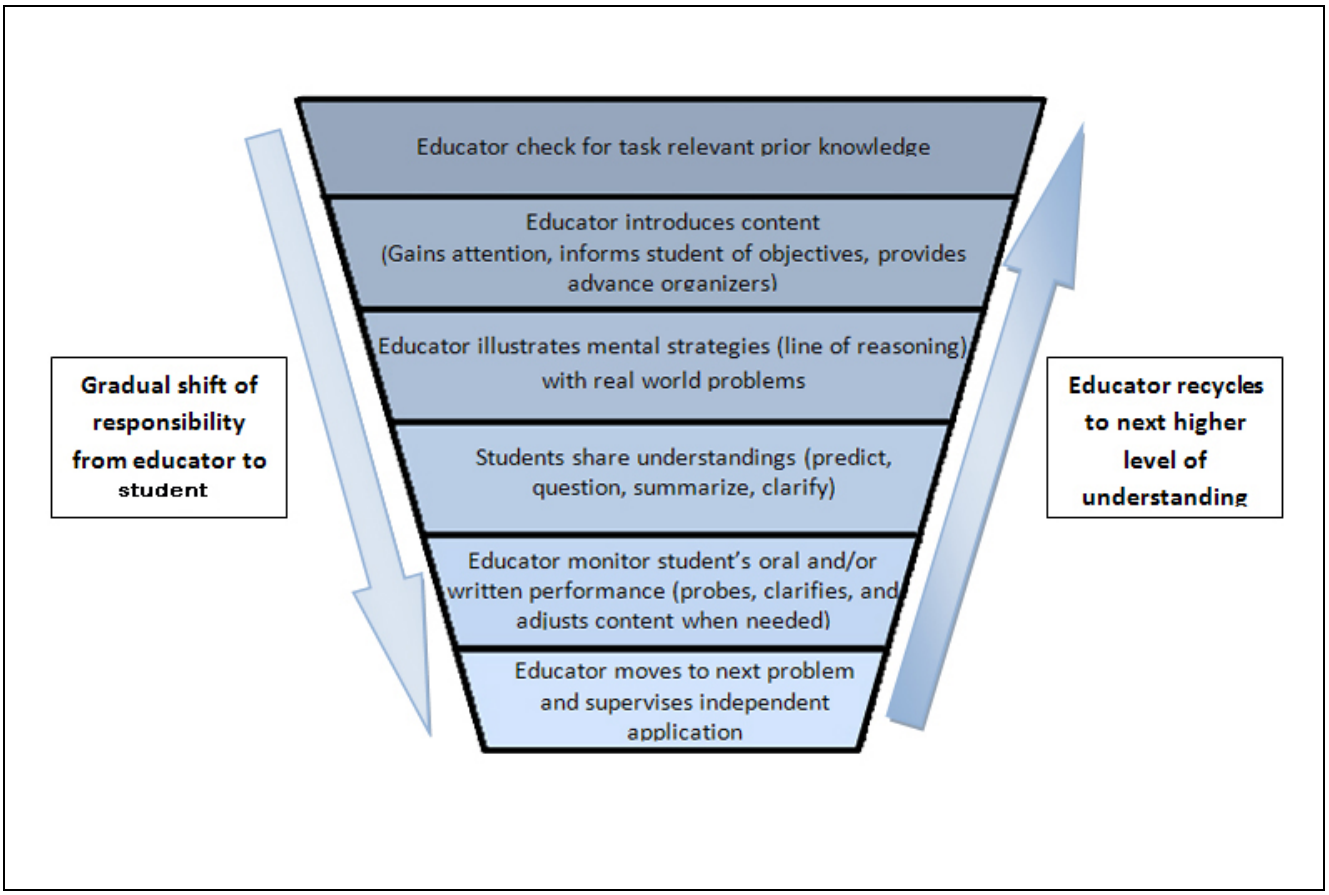

Figure 2.7 Shifting responsibility from teacher to student (Borich, 2007:348)

2.7 Guidelines on how to foster self-directed learning

Because there is a need to provide teaching and learning experiences that help students gain skills for SDL, it is important to find specific principles and guidelines on how to do so. From a review of SDL literature Francom (2009:9) revealed four main guidelines for fostering SDL in a formal educational environment namely (a) match the level of SDL learning required to student readiness; (b) progress from teacher to student direction of learning over time; (c) support the acquisition of subject matter knowledge and student self-direction together; (d) have students practice SDL in the

context of learning tasks. In the next sections each of these principles with guidelines on how to reach them will be discussed.

2.7.1 Match the level of self-directed learning required to student readiness

The first guideline for fostering SDL involves matching the level of SDL required in learning activities to student readiness (Francom, 2009:10). According to Francom (2009:10) students who have more subject matter knowledge and a more advanced SDL experience will be more ready to self direct their own learning than students with a lack of this knowledge or experience. As seen in Grow's (1991:130) model, the educator should determine the SDL readiness level of the student and match his or her teaching role and strategies accordingly. According to Bolhuis (2003:338) competence in SDL needs to be developed. Students need practice to learn how to be better students. Therefore teaching should move gradually towards student self-direction (Bolhuis, 2003:338).

2.7.2 Progress from teacher to student direction of learning over time

The second guideline, according to Francom (2009:11), focusses on progress from educator to student direction of learning over time. After the students' current level of self-direction is determined the educator has to guide them towards a more student centered approach (Grow, 1991:13; Francom, 2009:11). As students progress in gaining subject matter knowledge and experience they should be given more opportunities to self-direct their learning (Francom, 2009:11). This will be possible if students are increasingly allowed to set learning goals, specify what will be learned and choose learning resources. Ellis (2007:56) believes it is not only necessary to allow students to self-monitor their learning process but also to self-assess their progress. By being actively involved in the identification of expected outcomes and determination of assessment methods, the responsibility of the student is being increased and their level of self-directedness will increase over time and the learning process is no longer only teacher-directed (Ellis 2007:55). The educator should motivate students to exercise just a little more regulation than they have already been able to exercise (Bolhuis, 2003:339).

2.7.3 Support the acquisition of subject matter knowledge and student self-direction together

The third guideline for fostering student self-direction involves supporting the acquisition of subject matter knowledge along with student self-direction. Francom (2009:11) suggests that because there is a relationship between subject matter and student self-direction, both should be taught together. Ellis (2007:56) suggests that students should be involved in selecting their own learning material. By doing this students can identify their own needs and select preferable learning experiences, decide on the structure of learning environment and choose learning materials from a variety of sources. According to Bolhuis (2003:330) engagement in a variety of real life learning situations is important and notions like 'situated cognition' and 'contextualizing' stress the importance of real life knowledge. Students want to know if the knowledge and skills they gain are relevant in their everyday lives (Merriam *et al.,* 2007:107).

Researchers agree that the ability to learn in one domain cannot simply be transplanted to another subject area. For this reason it is important to teach subject knowledge and SDL skill together in all the different content areas (Francom, 2009:11). Cognitive strategies, such as those required for SDL, may require the use of intellectual skills which require basic knowledge of subject matter (Francom, 2009:11). Knowledge domains have their own networks of meaning: problem statements, concepts and rules which are expressed in a partly domain-specific language (Candy, 1991:22; Brockett & Hiemstra, 1991:32; Oswalt, 2003:23). According to Bolhuis (2003:330) the access to this knowledge is the main difference between experts and novices in a knowledge domain. He further asserts that an individual's learning potential depends on expertise in the learning domain in three ways: (a) being knowledgeable of the problem statements and procedures of knowledge acquisition (knowing what and how to learn) in the domain; (b) having access to a relevant knowledge base to build on; and (c) being motivated to learn in the domain.

2.7.4 Practice self-directed learning in the context of learning tasks

Learning tasks can provide an excellent context in which students are required to find, evaluate and apply information (Francom, 2009:11). Practicing SDL in the context of learning tasks may foster student self-direction while increasing the relevance and usefulness of learning activities. Gulielmino (2006:4) proposes a few guidelines on how to incorporate SDL into learning tasks and help students to plan, carry out, and evaluate their own learning, namely:

- Involving students in planning: This may include having students develop questions for a lesson or assist you in identifying topics that need to be included in a specific lesson.
- Students may wish to complete a project instead of a paper for an assignment and they should be allowed to make choices regarding the way in which they demonstrate learning.
- Schedule time for students to select activities that they wish to do.
- Use individual and group projects with planning guidelines.
- Present problem situations and have students discuss how they would go about solving the problem and where they would obtain information.
- Have students describe how they learned to do specific skills.
- Encourage exploration and discovery in order for students to make valuable connections
- Discuss the importance of self-directed learning in all facets of life, including at school, in the workplace, and at home.
- Teach goal-setting skills and have students use learning contracts and/or develop task lists.

For students to develop into self-directed students, educators must guide them to proceed along a continuum from dependence to independence (Guglielmino, 2006:3).

2.8 Conclusions

It is evident from this chapter that fostering self-directed learning is a challenging goal for educators and students. It requires a commitment to change, the willingness to take risks, and the development of a comprehensive plan. Improving students' self-directedness requires that some long-standing views about the roles of educators and students must be modified. The proper role of the educator is to make it possible and easy for students to take responsibility for their own learning. This might require that a certain amount of trust be placed in students. Although a first reaction of educators may be that their students lack the maturity and responsibility to learn on their own, it can sometimes be overcome when students are given meaningful responsibilities that lead to successful accomplishments. Effecting change in students' self-directed learning activities requires simultaneous changes in a number of aspects of the instructional environment and its task and goal structures. Altering the demands alone, for example, without providing adequate supports and without altering the way students are assessed and rewarded, may prove to be insufficient.

The implementation of SDL in the classroom takes time and requires planning. It is important that the educator provides students with choices in the use of resources, learning strategies and even learning objectives. The educator should push students out of their comfort zone by providing new challenges, unfamiliar learning conditions and creating problem solving situations. It is the role of the educator to provide feedback and help students to evaluate their learning in order to promote critical thinking. Educators must be able to create an environment of openness and trust so that students will have the confidence to ask questions and take part in group activities and discussions. Finally, the educator has to motivate students so that they will have a positive attitude, a feeling of independence and a willingness to learn and to improve their SDL skills.

Students enter learning situations with different experiences and different levels of SDL skills. Their willingness to participate and direct their own learning depends upon how the student views the SDL experience. The fact that a student demonstrates SDL skill in one situation does not necessarily mean that they can, or want to be self-directed in another learning situation. In different learning situations some students require more guidance than others. Students' SDL readiness can be influenced by the familiarity with the areas in which SDL is encouraged, the nature of the task and the personality of the student. SDL tasks must be set in such a way that they can encourage students of varying readiness and willingness to direct their own learning. Educators can follow Grow's model to help students to move to a next level of self directedness. The educators should encourage students to believe in their own abilities and inspire them to move to a higher level of SDL. The researcher identified a list of guidelines (table 2.2) that emerged from the literature study in this chapter for fostering SDL in a classroom The list of guidelines in the table above does not focus on SDL in a specific learning environment but is set for learning environments in general. The next chapter will focus on the implementation of SDL specifically in an e-learning environment with the use of a LMS. These guidelines will be used and their relevance in an e-learning environment will be determined.

Table 2.2 Guidelines for fostering SDL

Number	Guideline	Sources
1	Help students to assess their own learning needs, goals and interests.	Grow,1991; Oswalt, 2003; Merriam *et al.,* 2007; Francom, 2009
2	Provide a flexible learning environment in which students have the responsibility and freedom to make choices to meet their specific needs concerning goals, resources and participation.	Long, 1989; Brockett & Hiemstra, 1991; Garrison, 1992; Oswalt, 2003
3	Foster a collaborative learning environment that is democratic, challenging and non-threatening.	Long, 1989; Brockett & Hiemstra, 1991; Garrison 1992; Oswalt. 2003
4	Make sure students know what are expected of them in terms of aims and objectives, learning resources and assessment criteria.	Candy, 1991; Brockett & Hiemstra, 1991; Garrison 1992; Oswalt , 2003
5	Situate learning in real life context by choosing learning activities and assignments in familiar situations that can show students the importance of the learning content.	Candy, 1991; Oswalt , 2003; Merriam *et al.,* 2007; Guglielmino, 2008
6	Provide a variety of resources.	Candy, 1991; Brockett & Hiemstra, 1991; Garrison, 1992; Oswalt, 2003
7	Help students to evaluate and validate their learning accomplishments and experience.	Oswalt 2003; Borich, 2007; Francom, 2009; Merriam *et al.,* 2007
8	Vary the amount of SDL guidance and provide students repeatedly with opportunities to increase responsibilities.	Grow 1991; Oswalt 2003; Dweck, 2008; Hutto, 2009

2.9 Chapter summary

SDL is a complex concept with a number of aspects to keep in consideration when implementing it in a classroom. This chapter highlights exactly what SDL is, where it came from, how it evolved, and how it should be implemented by the educators and the students. Firstly, a comparison was drawn between SDL and SRL. A brief history on SDL was given and in a number of existing SDL models were discussed. A synthesis of all the models was made and the key constructs associated with each model, descriptions and explanations were summarised. The characteristics of a self-directed student and the role of the educator were listed. A further two models, focusing on the role of the educator or student in a SDL environment, were also discussed. After all the above mentioned aspects were taken into consideration, the researcher was able to identify a list of guidelines to improve students' SDL skills. In the next chapter the focus will be on SDL in an online environment. The identified guidelines will be refined and adjusted to be implemented in an online environment.

Chapter Three

The use of learning management systems to enhance self-directed learning

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3.1 Introduction

In the previous chapter, sub-aim (i) was investigated. This dealt with aspects such as: the necessity to determine exactly what SDL is, where it came from, how it evolved, and how it should be implemented by the educators and the students. From the previous chapter a list of guidelines dealing with improving students' SDL skills (§2.8) was compiled. These guidelines, however, do not focus on SDL in a specific learning environment but are set for learning environments in general. As stated in Sub-aim (ii) the investigation focuses on how SDL guidelines can be adopted in an LMS (§1.3). The purpose of this chapter therefore is to achieve sub-aim (ii) which is to investigate how SDL guidelines can be adopted in an LMS. In order to adopt the above mentioned guidelines, the following will be discussed: Functionalities (§3.2.1); Roles of users (§3.2.2); Limitations (§3.2.3) and Advantages (§3.2.4) of LMSs in general (§3.2). A model for SDL in an online environment (§3.3.1) as well as the Technological Pedagogical Content Knowledge (§3.3.2) model will be discussed. Thereafter the guidelines to foster SDL from the previous chapter (§2.8) are repeated and implemented in an online environment (§3.4).

3.2 Learning management systems

In the world of education, rapid changes and developments in technology are the order of the day. As more and more technological tools become available for online education, there is an increasing interest among educators and other professionals in the application of these tools in online courses (Moore, 2003:168). Virtual learning environments (VLE) represent an entirely new form of educational technology. According to Cavus and Momani (2009:426) a VLE is a set of teaching and learning tools designed to enhance students' learning experiences by including computers and internet in the learning process. This environment is online, and is dependent on the technology of the internet in order to be able to exist. In large-scale operations, LMSs is a form of this VLE and can save costs and time (Cavus & Momani, 2009:426). It facilitates the delivery and management of learning materials to students in a web-based environment, thus making course information accessible anytime and anywhere (Cavus & Momani, 2009:426).

There are many commercial and open source LMSs that are found on the web. Some of the widely known LMSs are: WebCT™, Blackboard™, Moodle™, SAKAI™. In conventional educational settings, online-learning management systems can help to improve the speed and effectiveness of the educational processes and communication among students and staff (Veerasamy, 2010:66).

Computer-based educational technologies present important opportunities for fostering learning (Winters *et al.,* 2008: 429). These technologies provide students with interactive environments that enable students to actively search for and explore solutions and construct their own knowledge (Nayak & Suesaowaluk, 2007:3). The fact remains that these technologies must be used in a pedagogically correct way and must be managed by the educator to make easily accessible for the students. A LMS allows you to integrate different educational technologies, centralize content, exercise student management, and report all within one convenient interface and technology package.

Barchino *et al.* (2005:140) defines a LMS as an implemented computer system on Internet/Intranet servers that takes care of the following basic activities:

Users' management: A system should allow entrance to users with different profiles, for instance: the educator, the student and the system administrator (Barchino *et al.,* 2005:140; Dalsgaard, 2006: 5).

Administrative management of the virtual courses: It is important to be able to keep track of the students' activities in the virtual course environment. For example, the evaluations carried out by the students to fix the assimilation degree of the contents of the courses is one of the most important administrative tasks (Barchino *et al.,* 2005:140; Watson & Watson, 2007: 28; Brusilovsky: 2004:105).

Management of the communication tools: Users must be able to use a variety of communication tools. These communication tools can be forums, e-mail, video conference, chat, etc (Barchino *et al.,* 2005:140; Winters *et al.,* 2008: 429; Rapuano, 2006: 1757).
Dalsgaard (2006:3) believes that the common idea behind LMSs is that e-learning is organized and managed within an integrated system. Different functionalities are integrated in a single system which offers all necessary tools to run and manage a course in an e-learning environment. All

learning activities and materials in a course are organized and managed by and within the system. Dalsgaard (2006:3) states that when using an LMS, a course is delivered through and takes place within an integrated system. A LMS should also be able to assist to perform the following functions: assess students' current knowledge and skill level, work with educators and students to identify appropriate learning goals as well as identify and sequence instruction appropriate for the individual student. It should also be able to assess student performance, store evidence of attainments, support collaboration and generate reports to provide information to maximize the effectiveness of the entire learning organization (Watson & Watson, 2007: 31).

LMSs have a variety of functionalities used to support learning and cover a wide range of different applications. These tools can be used to support different activities involved in the learning process. The use and organization of tools within e-learning can be approached in different ways depending on the chosen pedagogy (Dalsgaard, 2005:1).

In the following sections the aspects of LMSs will be discussed: (a) functionalities; (b) roles of users; (c) advantages; (d) limitations.

3.2.1 Functionalities in learning management systems

LMSs are software for planning, delivering, and managing learning events within an organization, including online, virtual classroom, and instructor-led courses. According to Ellis (2007:1) a LMS should be able to do the following:

- centralise and automate administration;
- use self-service and self-guided services;
- assemble and deliver learning content rapidly;
- consolidate training initiatives on a scalable web-based platform;
- support portability and standards;
- personalise content and enable knowledge re-use.

An LMS should have certain functionalities to meet these requirements. Although each LMS has its own specific features, most LMSs share several common functionalities to deliver and manage instructor-led synchronous and asynchronous online training (Garcia *et al.*, 2006:13). The following LMSs were investigated: WebCT™, Blackboard™, Moodle™, SAKAI™. In the next section, some

of the most common functionalities used in these LMSs will be listed and each will be described briefly.

3.2.1.1 Announcements

The Announcements tool is used to inform site participants about current items of interest. Announcements can have multiple attachments, such as documents or URLs. An announcement is a useful way to post a notice about an important change in deadlines, meeting times, or meeting locations**.** You can usually sort announcements by subject, sender, access, or date. Educators can choose to have an announcement automatically sent via email to all site participants. When creating an announcement, the educator can select the option to make it visible, hide it, or to set a beginning date and ending date for the announcement's visibility.

3.2.1.2 Assignments

For courses, Assignments tools typically allow educators to create, distribute, collect, and grade online assignments. Assignments are private; student submissions are not visible to other students in the site. The Assignments tool usually has multiple grading options which mean that the educator can choose letter grades, points, pass/fail, checkmarks, or ungraded assignments. The educator can choose to allow students to submit an assignment multiple times. Assignments can also be returned, with or without grades, for resubmission. When the educator releases grades for an assignment, students can access the educator’s comments and their grades. In most of the LMSs the educator can activate an honour pledge option. This option requires students for e.g. to click a checkbox affirming they are submitting their own work. Instructors also have the option to set a model answer to provide immediate feedback to an assignment submission, or to provide feedback on a scheduled date and time. The Assignments tool can automatically post the assignment grade to the Grades tool.

3.2.1.3 Drop Box

The Drop Box feature allows educators and students to share documents within a private folder for each student. The Drop Box works like Resources to allow you to upload many types of files and multiple files at a time. In some of the LMSs the Drop Box also allows nested folders (folders within folders). Educators can use the Drop Box tool to provide private progress reports to each student in the class. Whenever an item is added to the Drop Box, you have the option of sending an automatic e-mail notification.

3.2.1.4 Forums

A forum is a communication and collaboration tool that educators can use to create an unlimited number of discussion forums for their course or project sites. Forums tools are designed to be effective for both academic and collaborative work, and are closely integrated with other tools such as Resources and Grades. Asynchronous discussion provides an opportunity for participants to engage resources and each other, and allows for the free expression of convergent and divergent ideas. Interactions can be assigned a point value and sent to the Grades tool together with comments.

3.2.1.5 Glossary

The Glossary tool can be used when students are learning a new vocabulary. You can also use the glossary to promote active learning by assigning a different group to create definitions for each week or topic. Usually the Glossary tool displays a short definition or explanation. When students click on the name, it hyperlinks to a page with more extensive information. Educators can use these hyperlinks to provide detailed information on objectives, outcomes, or standards represented by each criterion; a complete list of campus activities for each category or an extensive grouping of resources to develop each skill.

3.2.1.6 Grades

The Gradebook is a tool for instructors to calculate and store grade information and distribute it to students online. Students can view their scores for all items; view their course grades once an educator releases them and sort their items by title, due date, grade, and weight, where applicable. Educators can usually choose between point- or percentage-based grading, create categories to organize items and allow for weighting of grades. They will also be able to enter, view, edit, and release scores, grades, and comment. The Grades tool is usually integrated into the Assignments, Tests and Forums tools which enables the transmission of scores to the Grades tool. This tool generally exports scores and grades to Microsoft Excel for further editing.

3.2.1.7 Messages

Messages is a communication tool that allows site participants to communicate using internal course mail. The messaging system gives you a useful tool for communicating in different ways

such as educator-student; student-student, student-educator. Messaging between groups is also supported. Students in large-format courses can easily get lost. If students get into trouble with the course material, or simply lose motivation, they may disengage from the course and risk failure. You can filter your students by last login and send regular messages to those who haven't visited the course site in a while. This will let them know you are interested in their success and encourage them to re-engage.

3.2.1.8 Polls

The Polls tool allows educators to set up an anonymous online vote. The educator can choose when results are available to voters: immediately, after voting, after the closing date, or never. This tool can be used to test the students' opinion about a controversial point in the reading or discussion. It's easy to combine this with the forum tool asking students to explain their responses.

3.2.1.9 Resources tool

When using the Resources tool, you can share many kinds of material securely with members of your site. You can upload files (e.g., word processing documents, spreadsheets, slide presentations, and videos), as well as create and post HTML (web) pages and simple text documents, and share links to useful web sites. The educator can organize resources items into folders and can control which groups or types of users can respectively access and add to different folders. The educator will also be able to show or hide an item at any time and set a start and/or end time for its availability. The Resources tool can usually share items with pre-defined groups which gives the educator more control over who has access to Resources items.

3.2.1.10 Site Stats

The Site Stats tool allows authorized users to view site usage statistics. Statistics can be accessed in the form of tables or graphs. This tool presents a quick overview of how students use the site sorted by time, date or tool.

3.2.1.11 Syllabus

The syllabus is the official outline for your course. As an instructor, if you or your department has prepared an online syllabus already, you can direct the Syllabus tool to link to it. Otherwise, you

can enter material to post directly to your Syllabus tool. Usually you will also be able to link external documents to this tool.

3.2.1.12 Web Content

The Web Content tool allows site owners to choose external web sites to display within their worksites. This can be a very powerful tool to integrate educational technologies on to one central platform. To set up a Web Content link, you can specify the URL for any web site and a brief descriptive title. A link will appear in the menu bar of the site with the title you've chosen; when you click the link, the web site will open within your worksite. You will usually be able to add multiple Web Content links to your menu bar.

3.2.1.13 Wiki

A Wiki is a tool for people with no technical knowledge to change and create web pages. Wiki was designed specifically for researchers and lecturers to collaborate on documents, share information and create teaching materials. When using the Wiki tool students will be able to work collaboratively on an assignment or exercise. The educator will be able to see exactly who did what and when they did it, which makes the grading of such an assignment much easier. Students will be able to delete or edit each other's work, but the educator will see a full report of all the changes made to the Wiki.

3.2.1.14 Test

This tool allows you to create online assessments (i.e., tests, quizzes, and surveys) for delivery via a web interface to your students or other groups. You will use it mainly to administer tests, but you may also create assessments to gather survey information or informal course feedback. The Test tools usually have a number of different types of questions which the system will be able to mark automatically. Those marks will then be sent to the Grades tool if required by the educator. Most of these Test tools will allow you to create a question pool that you can use to create random select assessments.

3.2.1.15 Schedule

Schedule allows instructors or site organizers to post items in a calendar format. The calendar has day, week, month, year, and flat list views. Many instructors use Schedule to post readings for each class on the day they are due to be read.

3.2.2 Different roles and permissions in a learning management system

When creating a standard workspace, the LMS allow users to access certain features of a course or project worksite, depending on their roles and on the decisions made by the site owner and the system administrator.

Roles are simply collections of permissions. Some roles allow the user to simply access or read content, while other roles allow for advanced changes, such as adding participants, editing the site's content and changing permissions for other roles. All roles are not created equal. The naming of the roles varies in the different LMSs but it basically differentiates between three main roles namely: Instructor (Educator, or site owner), teaching assistant and student. When you create a worksite or when one is created for you, you then have the role with the most permissions and the broadest level of access. You can therefore choose which tools or functions (e.g., Forums, Schedule, Resources) you want the site to have. For many of these tools or functions, you can set permissions that allow or prevent users from seeing or performing certain tasks depending on their roles. The permissions of this role allow for interaction in the site, such as creating chat messages, but do not allow for advanced tasks, such as uploading files into Resources or creating assignments.

3.2.3 Limitations of learning management systems

As with any software package LMSs also have a few limitations to take into consideration. Start-up costs, including hardware, software, staffing and training, can be very expensive (Nayak & Suesaowaluk*.,* 2007:7). When the institution decides on using a licensed LMS (e.g. WebCT™ or Blackboard™) they need to pay an immense amount of money for the software and product licenses. When following this route the software companies do guarantee a certain amount of support when needed and it is not necessary for the institution to employ a person that will be responsible for the maintenance of the LMS. However, it is still necessary to train staff and the

faculty on how to use the LMS which will have some additional cost implications. In the open source community (e.g. Moodle™ or SAKAI™) no license fees are payable by the institution. Sometimes there is a small membership fee that the institution can pay to be an active part of the community. If you are part of the community, it is possible to correspond with other members that can help you with the solving of some problems the system may generate (Berg & Korcuska, 2009:10). When choosing the open source path, it is important that the institution employ staff members who are responsible for maintenance and upgrading of the LMS. When belonging to an open source community, the practice is to contribute to the community in the form of new software development or upgrading of existing software. Either way, this is a costly and time consuming process.

A major criticism concerning teaching and learning is that LMSs are often used in very ineffective ways. Educators use LMS to "put content online" without applying any sound pedagogical principles (Kirschner *et al.*, 2004: 48). This should not suggest that it is only because of the lack of pedagogical principles included in the design of LMSs (Govindasamy, 2002: 289), since the lack of educators pedagogical skills is also a factor (Vrasidas, 2004: 912). The major challenge faced by educators is to use the existing tools in pedagogically sound ways so that they take advantage of the online medium's affordances (Vrasidas, 2004: 912). However, in order to do so, educators should undergo a transformation in the way they think about learning (Benson, 2002:1414). Online learning cannot be implemented in the same way as in a traditional classroom environment (Kirschner *et al*., 2004: 48). Traditional pedagogical principles should be adapted to accommodate the e-learning environment and should form the very basis for inclusion of features in LMSs.
According to (Vrasidas, 2004: 912) another limitation of LMSs is that it does not necessarily support constructivist learning as it does not always provide educators and students with the tools needed to engage in constructivist learning. It also lacks tools to support authentic assessment. Usually online assessment is based on written essays, short answers, and multiple choice quizzes. Therefore, faculties often use the tools to create content-based assessment, even though they do not match the instructional objectives of the course (Vrasidas, 2004: 912).

3.2.4 Advantages of learning management systems

The implementation of e-Learning by means of a LMS makes educational content available to students at any time from any location through web access (Brown & Johnson, 2007:1). E-Learning is a teaching perspective that covers a wide range of techniques and methods. It includes the use

of technology as part of a traditional course as well as an online course where tutors and students will never meet face to face (Clarke, 2008:1). The use of a LMS will make a one stop access environment possible where all the different educational technologies can be integrated into one platform (Brown & Johnson, 2007:1).

In a research study done by Nayak and Suesaowaluk *(*2007:3), they compiled a list of advantages of a LMS relating to teaching and learning when used in a pedagogically correct way. According to them LMSs provide students with interactive environments. They also found that the use of a LMS increases the motivations to learn and it offers updated information to help students solve real-life problems. When correctly used LMSs will also:

- Allow students to organize information, contribute content, and engage in learning activities (Vrasidas, 2004:913).
- Support active learning and problem solving (Nayak & Suesaowaluk*.,* 2007:3).
- Support various kinds of student-educator and student-student interactions (Brown & Johnson, 2007:1).
- Enable students and educators to seamlessly integrate real-world authentic activities within class schedule (Nayak & Suesaowaluk*.,* 2007:3).
- Allow students to interact by providing synchronous and asynchronous communication tools (Govindasamy, 2002:296).
- Provide tools that scaffold and support reflection on the learning process e.g. journal keeping (Govindasamy, 2002:296).
- Include intelligent agents to provide feedback to student work and help the educator monitor student progress (Avgeriou *et al.,* 2003: 32).

In the following sections a number of models that focus on how to integrate technology in such a way that it adds pedagogical value to a course or module will be reviewed.

3.3 Learning management systems and online environments for self-directed learning

In the previous chapter, a number of SDL models were discussed. Although those models were used to compile a list of guidelines on how to implement SDL in a classroom, none of them focused specifically on an e-learning environment. They focus primarily on process and personal attributes in face-to-face settings. When initial SDL models were developed, face-to-face instruction was the

predominant mode in higher education. Today higher education is occurring in a variety of contexts, ranging from face-to-face classrooms to virtual classrooms. In the following section, two models that focus on SDL in an online environment (§3.3.1) and the integration of technology (§3.3.2) will be discussed.

3.3.1 Song and Hill (2007)

This section introduces a conceptual model for understanding SDL in an online context (see Figure 1) developed by Song and Hill (2007).

The model by Song and Hill (2007) incorporates SDL as a personal attribute and a learning process, as pointed out by most scholars in the literature of SDL. They added a third dimension, the learning context, to indicate the impact of environmental factors on SDL. With the increasing trend of online learning in higher education, SDL has started to attract more attention due to its speculated and reported impact in the online learning contexts. According to Song and Hill (2007:30) it is believed that online learning allows for more control of the instruction to the students. In fact, not only does an online learning context influence the amount of control that is given to students, it also impacts a student's perception of his or her level of self-direction (Vonderwell & Turner, 2005:67).

3.3.1.1 Clarification of concepts from Song and Hill's self-directed learning model

Prior Knowledge

Students come to a classroom with prior knowledge of the content area, prior experience with the learning context as well as personal attributes (Song & Hill, 2007:32). According to Song and Hill (2007:32) personal attributes refer to students' motivations for and capability of taking responsibility for their learning. The personal attributes are characteristics students bring to a specific learning context. It also includes the use of resources and cognitive strategies and intrinsic motivation (Francom, 2009:11; Garrison, 1997:21).

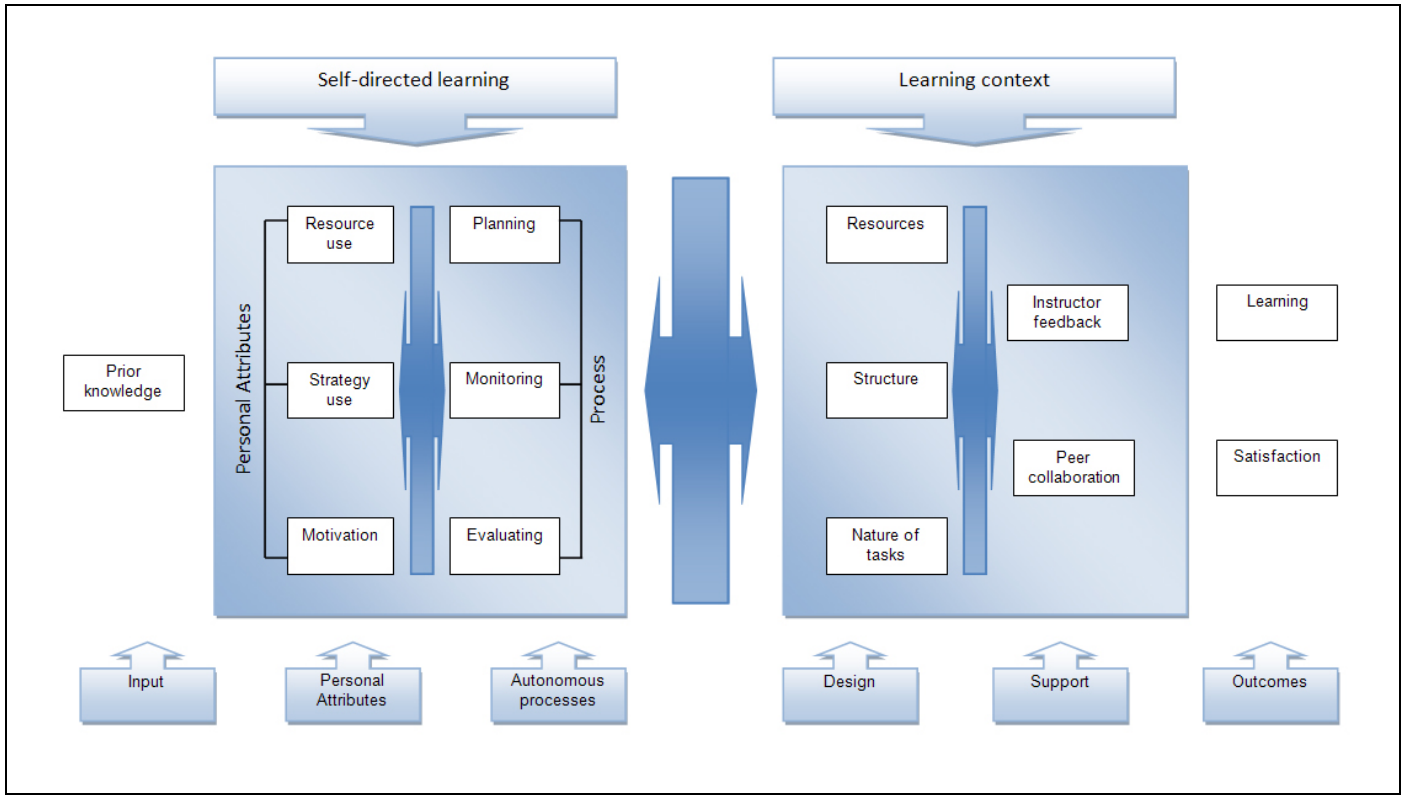


Figure 3.1 Song and Hill's model for SDL in online environment (Song & Hill, 2007:32)

Process

The processes in Song and Hill's model refer to students' autonomous learning processes. Student autonomy is specifically and primarily manifested in three processes namely: (a) planning; (b) monitoring; and (c) evaluating one's own learning. Student autonomy in learning processes is viewed as a continuum (Candy, 1991). Depending on the level of student autonomy, a learning experience can range from a educator centered environment to a situation where the student is taking charge of the learning process during an independent study experience (Grow, 1991:130).

Learning context

Learning context focuses on environmental factors and how those factors impact the level of self-direction expected from the student. There are various factors in a learning context that can influence a student's SDL experience. As the model illustrates, there are design elements and support elements. Design elements include the resources, structure and nature of the tasks in the learning context. These resources could be embedded in the specific learning context and could be

designed by the instructor as instructional support. The specific learning context may decide on the structure of the course and the nature of the tasks also influences the level of self-direction required from and placed on the students (Song & Hill 2007:32).

Another set of elements in the learning context that has an impact on a student's SDL is the support in the learning context (Garrison, 1997:21). This support component includes constructive and informative feedback from the instructor or peer collaboration and communication (Oswalt, 2003:24; Song & Hill 2007:32). In the next sections, how an online context interacts with personal attributes and student autonomy and what SDL processes are like in an online context will be discussed.

3.3.1.2 Self-directed learning personal attributes in an online context

When planning learning activities it is important to add specific contextual information that can enable students to connect the curriculum content to prior knowledge and experience (Bolhuis, 2003:343). The learning context not only impacts the way students plan, monitor, and evaluate their learning (process), but it has the potential to influence how a student becomes motivated to learn, and how he or she uses various resources and strategies to accomplish learning in the specific learning context (Song & Hill 2007:32). In their model, Song and Hill (2007:32) use online learning context as an example to describe and analyse the interaction between learning context and a student's SDL experience. The online learning context impacts on SDL personal attributes of (a) resource use; (b) strategy use; and (c) motivation. In the following sections, these aspects will be discussed.

Resource use

Online learning presents both opportunities and challenges to students in terms of resource use. Resources take different forms, which include but are not limited to, human resources and information resources (Berg & Korcuska, 2009:53). The permanency of the written communication in an online learning context makes peers' ideas and instructors' comments easily and conveniently accessible to students throughout a course and students can access those ideas and perspectives on a certain topic multiple times (Berg & Korcuska, 2009:53). The fact that the students can go back and view the comments again, gives them the opportunity to reflect more deeply on the topic (Song & Hill 2007:33).

However, online learning also presents challenges in resource use for online students. According to Song and Hill (2007:33), delayed response time from the instructor makes it difficult for the students to use the instructor as an expert human resource. Secondly, students may not always feel obligated to respond to every message in an online environment. The uncertainty about the accuracy of peers' knowledge may also stand in the way of using them as human resources. Yet it does not mean that it is impossible for online students to use the instructor and peers as human resources. It rather takes good strategies to explore effective ways to do so (Tedman *et al.,* 2007: 38).

According to Song and Hill (2007:33), research suggested that time management strategies could help students improve their online learning experience by having effective online communication with the instructor and peers. Setting established guidelines for response may assist in this regard. Students need to develop strategies to effectively use resources and overcome challenges that are uniquely associated with online learning (Ko & Rossen, 2010:215).

Although there is an unlimited amount of information available on the internet, the gathering of good quality information resources can be a challenge to students (Carmean & Haefner, 2002:33). With the variety of information that is accessible online, students need to evaluate the validity and reliability of the resources accessed. Students need to become aware of and actively explore various learning resources in an online learning context. It is important to educate students to pay attention to the sources and the date of information so that they could exercise better judgment to determine whether the information they have obtained is reliable and still valid (Song & Hill 2007:33).

Strategy use

Successful learning in every learning environment involves the use of effective learning strategies (Weinwright, 2002:1). To overcome challenges in a specific learning environment, proper planning and the use of learning strategies is needed (Song & Hill 2007:33). Online learning may present challenges to students that they have not yet experienced during face-to-face classroom learning. The communication in an online learning context is mostly written as opposed to verbal communication in a classroom context. While online learning provides students with the opportunity to reflect more when putting their thoughts in writing, the lack of facial expressions and body language in written communication may lead to misinterpretation (Song & Hill 2007:33). To avoid being misinterpreted and improve the use of the reflection opportunity in online communication,

students need to develop communication strategies that are more relevant to text-based online learning context (Ong & Hawryszkiewycz, 2003: 341).

Motivation

According to Song and Hill (2007:33) motivation to learn in an online learning context may be a difficult task due to the easy-to-procrastinate nature of online learning. When students do participate, their motivation to contribute in-depth thoughts and ideas may be low. For example, in asynchronous bulletin board discussions, students may be posting messages simply to fulfill the course requirement to post a certain number of postings. This does not mean they are actually engaged in meaningful cognitive thinking (Biesenbach-Lucas, 2003:30). Research indicates that for meaningful interaction to occur in online environments, students need to be motivated to contribute cognitively deep messages (Song & Hill 2007:34).

Another challenge to motivation in online learning relates to procrastination. Song and Hill (2007:33) state that it is easier to postpone in an online learning situation as compared to a traditional face-to-face classroom primarily because online classes often do not provide strict schedules. Therefore online students need enhanced motivational strategies to avoid procrastination in learning. To succeed in online learning context, students need to take control in planning their learning pace, monitoring their learning comprehension, and making judgments on various aspects in their learning process (Song & Hill 2007:34). Students need to become aware of and actively explore various learning resources in an online learning context. Online students need to become motivated to overcome the challenge of procrastination associated with online learning and to take advantage of online communication affordances to create meaningful interaction (Song & Hill 2007:34).

3.3.1.3 Self-directed learning processes in an online context

Song and Hill's model presents the interactive relationship between the learning processes and personal attributes. Three primary processes have been explored: planning, monitoring, and evaluating. These processes provide information regarding how students are different in terms of the level of self-direction as well as how students take control in the learning process (Song & Hill, 2007:32). For students to take control of the planning, monitoring, and evaluating learning processes, they rely on their use of strategies and resources, and their ability to motivate themselves to be involved in the learning processes. Their involvement in the learning processes

can impact their level of self-regulation of their personal attributes. Song & Hill (2007:32) believe that active involvement in controlling learning processes can help students improve their ability to effectively use resources and strategies. Understanding how students embrace the level of control placed upon or expected of them in an online learning context can assist instructors with implementation (Grow 1991:130). In the following sections the three primary processes namely: (a) planning (b) monitoring and (c) evaluating, will be discussed.

Planning

Online learning provides flexibility for students to pace their own study. According to Song and Hill (2007:34) the anytime, anywhere feature of asynchronous online learning provides students with the ability to plan their activities at the time and the place that are most convenient for them. In synchronous learning (e.g., live chats or virtual classrooms), students still have the flexibility to choose the most convenient place from which to participate (Song & Hill, 2007:34). Online learning affords much more control for students to create their own learning space and decide on their own learning time, pace and sequence than in a face-to face classroom (Loveland, 2002:14).

Monitoring

The flexibility provided during online learning offers more freedom to students. According to Song and Hill (2007:34) online students are more likely to monitor their comprehension than traditional students are. Unlike in a traditional classroom setting where the instructor can easily see whether the students are paying attention or actively participating in the class activities, in an online learning environment, the monitoring responsibilities are in large part left to the student (Song & Hill, 2007:34). They must decide for themselves whether they understand the subject correctly or are heading in the right direction with their course work. The level of responsibility for seeking assistance is also much more centered with the students since they are directly involved in monitoring the process, and seeking resources to improve the situation as needed (Huang, 2002:33).

Evaluating

Song and Hill (2007:34) state that instructors spend far more time delivering an online course than they do a face-to-face class. The heavy workload challenge makes it almost impossible for the instructor to respond to every single message posted on the bulletin board. It is somewhat inevitable that students will provide comments, suggestions, and answers for each other in this kind of environment (Song & Hill, 2007:34). How students react to peers' comments may present a

challenge because of the fact that students are usually suspicious of the validity of peers' knowledge (Song & Hill, 2007:34).

3.3.1.4 Conclusion

Although Song and Hill's model focuses specifically on online learning, all concept and principles they discuss can apply to any form of e-learning. The online context provides students with benefits associated with flexibility. However, there are also challenges in planning, monitoring, and evaluating learning, many of which students have not been faced with in traditional classroom environments. It is important to continue to explore how the unique characteristics of online learning influence the processes associated with SDL. The AGLE 121 module is not 100% online, but we can still benefit from this model and adopt it in such a way that it can add value to a learning environment that uses a combination of instruction methods. Song and Hill's model does not provide specific guidelines and examples on how to implement SDL in an online environment but when this model is used in combination with the guidelines determined in Chapter 2 (§2.8) it could be of great value.

Song and Hill listed some of the challenges pertaining to SDL in an online environment. Even though they don't provide solutions to all the problems and challenges, it helps the educator to be on his guard regarding those aspects. Educators need to align their epistemological beliefs with the practice of instructional design. Therefore, an educator who believes in the importance of SDL needs to design a learning environment that integrates the use of technology in such a way that it fosters students' SDL skills. In the next section Mishra and Khoeler's Technological Pedagogical Content Knowledge (TPCK) model which focuses on the appropriate integration and use of technology in the classroom will be discussed.

3.3.2 Mishra and Khoeler (2006)

Mishra and Khoeler (2006:1017-1053) suggest a conceptual framework for educational technology called the Technological Pedagogical Content Knowledge (TPCK) model. This model (see Figure 3.2) attempts to capture some of the essential qualities of educator knowledge required for technology integration in teaching. They argue that attentive pedagogical uses of technology require the development of a complex, situated form of knowledge that they call Technological Pedagogical Content Knowledge (TPCK). The TPCK model attempts to integrate three main

components of learning environments namely: content (C), pedagogy (P), and technology (T). They accentuate the connections, interactions, affordances, and constraints among these concepts. In this model, knowledge about content (C), pedagogy (P), and technology (T) is central for developing good teaching. However, rather than treating these as separate bodies of knowledge, this model additionally emphasises the complex interplay of these three bodies of knowledge. In the following sections these concepts and their relationships will be discussed.

3.3.2.1 Content knowledge

According to Mishra and Khoeler (2006:1026), Content knowledge (CK) is knowledge about the actual subject matter that is to be learnt or taught. Educators must know and understand the subjects that they teach, including knowledge of central facts, concepts, theories, and procedures within a given field; knowledge of explanatory frameworks that organize and connect ideas and knowledge of the rules of evidence and proof (Ball *et al*., 2008:389-91).

3.3.2.2 Pedagogical knowledge

Pedagogical knowledge (PK), according to Mishra and Khoeler (2006:1027) is deep knowledge about the processes and practices or methods of teaching and learning and how it encompasses, among other things, overall educational purposes, values, and aims. They state that PK is a generic form of knowledge that is involved in all issues of student learning, classroom management, lesson plan development and implementation, and student evaluation. PK includes knowledge about techniques or methods to be used in the classroom; the nature of the target audience; and strategies for evaluating student understanding (Chong *et al.*, 2008:2). PK requires an understanding of cognitive, social, and developmental theories of learning and how they apply to students in their classroom because educators with deep pedagogical knowledge are expected to know how students construct knowledge, acquire skills, and develop habits of mind and positive dispositions toward learning (Mishra & Khoeler, 2006:1027).

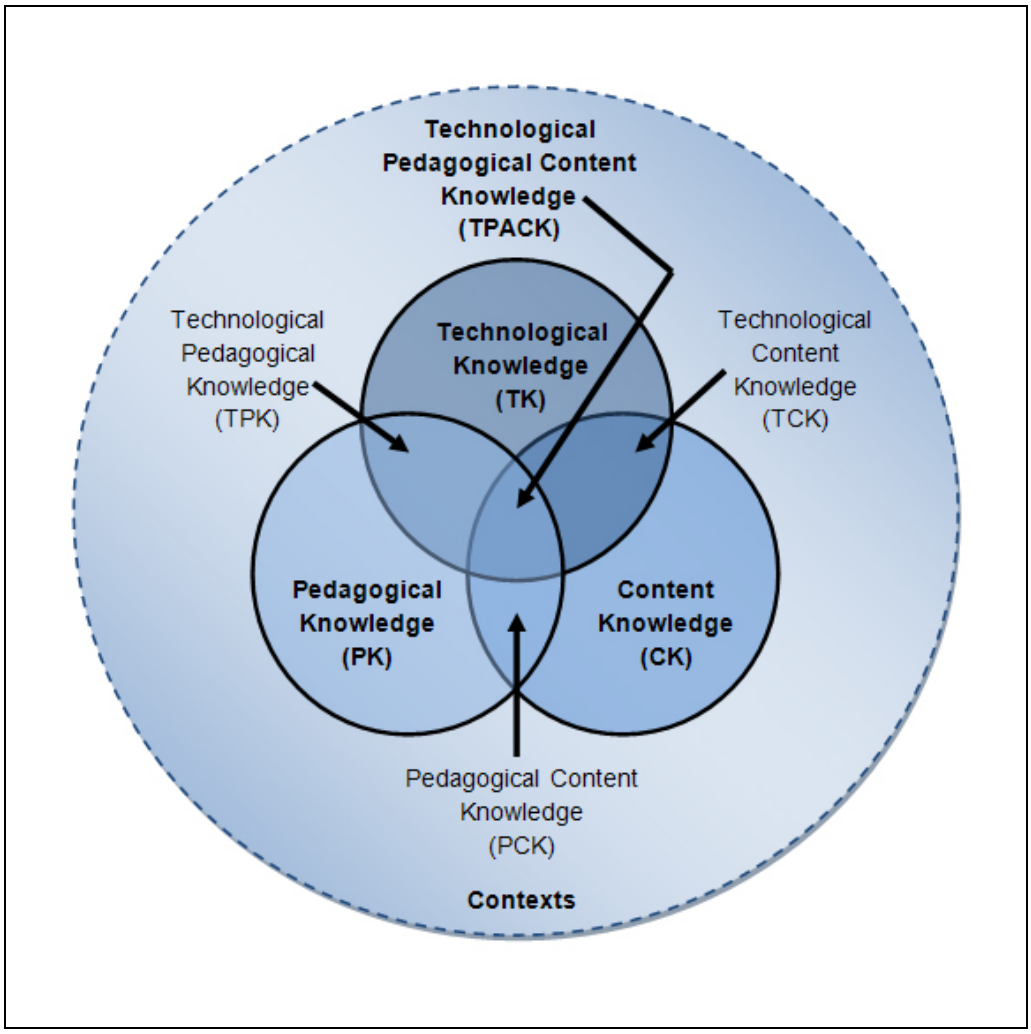


Figure 3.2 Mishra and Khoeler's TPCK model (Mishra & Khoeler, 2006:1027)

3.3.2.3 Pedagogical content knowledge

The idea of pedagogical content knowledge refers to knowledge of pedagogy that is applicable to the teaching of specific content. According to Mishra and Khoeler (2006:1027) this knowledge includes knowing what teaching approaches fit the content and knowing how elements of the content can be arranged for better teaching. This knowledge is different from the knowledge of a subject expert and also from the general pedagogical knowledge shared by educators across disciplines. According to Abell (2008:1406) PCK is concerned with the representation and formulation of concepts, pedagogical techniques, and knowledge of what makes concepts difficult or easy to learn, knowledge of students' prior knowledge, and theories of epistemology. It further involves knowledge of teaching strategies that incorporate appropriate conceptual representations

in order to address student difficulties and misconceptions and foster meaningful understanding (Abell, 2008:1407).

3.3.2.4 Technology knowledge

Mishra and Khoeler (2006:1027) define technology knowledge (TK) as knowledge about standard technologies, such as books, chalk and blackboard, and more advanced technologies, such as the Internet and digital video. In the case of digital technologies, this includes knowledge of operating systems and computer hardware, and the ability to use standard sets of software tools such as word processors, spreadsheets, browsers, and e-mail (Shelly *et al.*, 2008:327). TK includes knowledge of how to install and remove peripheral devices, install and remove software programmes, and create and archive documents (Roblyer, 2006:6-8). Since technology is continually changing, the nature of TK needs to shift with time as well and educators need to stay informed. The ability to learn and adapt to new technologies, irrespective of what the specific technologies are, is of the utmost importance (Mishra & Khoeler, 2006:1028).

3.3.2.5 Technological content knowledge

Technological content knowledge (TCK) is knowledge about the manner in which technology and content are reciprocally related (Mishra & Khoeler, 2006:1028). Although technology constrains the kinds of representations possible, newer technologies often afford newer and more varied representations and greater flexibility in navigating across these representations. Educators need to know not just the subject matter they teach but also the manner in which the subject matter can be changed by the application of technology (Shelly *et al.*, 2008:327). Because of the fact that there is a wide variety of educational software packages available, it is not necessary for the educator to have the knowledge to create these programmes, but it is important to be informed about what is available and how to use these effectively (Roblyer, 2006:6).

3.3.2.6 Technological pedagogical knowledge

According to Mishra and Khoeler (2006:1028), technological pedagogical knowledge (TPK) is not only the knowledge of the existence, components, and capabilities of various technologies, but also the knowledge of how those technologies can be used in teaching and learning settings, and

conversely knowing how teaching might change as the result of using particular technologies. Mishra and Khoeler (2006:1028) further believe that TPK might include an understanding that a variety of tools exists for a particular task as well as the ability to choose a tool based on its appropriateness. It will also encompass strategies for using the tool's affordances, knowledge of pedagogical strategies and the ability to apply those strategies for technology integration.

3.3.2.7 Technological pedagogical content knowledge

Technological pedagogical content knowledge (TPCK) is a much broader form of knowledge that goes beyond all three components mentioned above (content, pedagogy, and technology). According to Mishra and Khoeler (2006:1028), this knowledge is different from the general pedagogical knowledge shared by educators across disciplines and also from knowledge of a disciplinary or technology expert. From Mishra and Khoeler's (2006:1028) point of view, TPCK is the basis of good teaching using technology and requires the following:

- an understanding of the representation of concepts using technologies
- pedagogical techniques that use technologies in constructive ways to teach content
- knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face
- knowledge of students' prior knowledge and theories of epistemology
- knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones

In their model for technology integration in teaching and learning Mishra and Khoeler (2006:1028) argue that developing good content requires a thoughtful interweaving of all three key sources of knowledge: technology, pedagogy, and content. The core of their argument is that there is no single technological solution that is generic for every educator, every course, or every teaching perspective. Developing a deeper understanding of the complex relationships between these sources of knowledge and using this understanding to develop appropriate, context-specific strategies and representations are required for quality teaching.

3.3.2.8 Conclusion

When we incorporate a new technology or new medium for teaching in a module like AGLE 121, we are forced to confront basic educational issues because this new technology or medium

reconstructs the dynamic equilibrium among all three elements. It is important to take into consideration that the relative newness of the online technologies forces the lecturers responsible for this module to deal with all three the discussed factors as well as the relationships between them. This often leads them to ask questions about their pedagogy and teaching strategies, something that they may not have done for a long period of time. It might even require them to rethink the whole structure of the module. When using this framework it allows us to view the entire process of technology integration as being amenable to analysis and development work. Most importantly, the TPCK framework allows educators to identify what is important and what is not. It stresses the fact that you cannot merely choose the latest technology tool or device and find a place where you will be able to use it in your module; but rather to identify a problem area and choose the best possible technology tool or device to address that problem from a pedagogical point of view.

In a complex and multifaceted domain such as integration of technology in education, no single framework or model can provide the necessary guidelines to perfection. The TPCK framework is no exception. However, the researcher believes that none of the models discussed in this study can be used independently. The TPCK is the key to technology integration and in combination with the other models will be of utmost importance when compiling final guidelines for the design of a learning environment that integrates the use of technology in such a way that it fosters students' SDL skills.

3.4 Integration of guidelines for self-directed learning into an learning management system

In the previous chapter, a number of guidelines for fostering SDL (§2.8) were identified. In the next sections, the way in which a LMS can be used to foster SDL will be discussed according to the above mentioned guidelines.

3.4.1 Help students to assess their own learning needs, goals and interests

As seen in §2.4.1 the educator should lead the students in their quest to become more self-directed and give them the opportunity to exercise some control over their own learning (Grow, 1991:130, Merriam *et al.,* 2007:107). Oswalt (2003:64) states that educators must maintain an active role to

assist students to develop their own ideas and understand their own ways of learning (Refer §2.4.5).

According to Jacobs *et al.* (2004:5), students need to be aware of the level of specific competencies that are expected of them; otherwise there will be no way to become aware of any gaps between their current competency levels and those required to complete a course. In an LMS questions can be made available in the form of a quiz, and these answers must/should/can require mastery of the concepts, underpinning, procedures, etc. which will only be attended to during the next class session or learning experience (Borthick, 2004:1). McGonigal (2005:2) states that students should be challenged with events that trigger them to examine their thinking and the limitations of their understanding (Refer §2.6.3).

3.4.2 Provide a flexible learning environment in which students have the responsibility and freedom to make choices to meet their specific needs concerning goals, resources and participation

Long (1989:8) believes that the key factor for SDL is control (Refer §2.4.1). According to Brockett and Hiemstra (1991:24-27) students need to be given the opportunity to take control of their own learning situation (Refer §2.4.3) and should be provided with choices of how they wish to proactively carry out the learning process (Garrison, 1997:21; Refer §2.4.4). Students can use a LMS to organise information and knowledge, take control of their learning and act as autonomous individuals who plan and execute learning tasks (Vrasidas, 2004:913). According to Carmean and Haefner (2002:33) students can become more engaged simply by having access to a greater volume of diverse course materials, and a LMS is specifically adept at handling a large volume of course materials such as lecturer notes, multimedia enhanced case studies, discussion board, live chat rooms, shared drop boxes for group projects, links to outside websites, formative student-learning assessment quizzes, and interactive computer-based training. They further state that student engagement and participation is increased when the educator uses the LMS to promote self-discovery of course material by the incorporation of other resourses on the internet, via for example, Google Scholar and electronic libraries (Carmean & Haefner, 2002:33).

3.4.3 Foster a collaborative learning environment that is democratic, challenging and non-threatening

According to Garrison (1997:23), collaboration with other students promotes control over the learning context. Students integrate external feedback with their own self-reflection as a form of collaborative confirmation of learning (Refer §2.4.4). Brockett and Hiemstra (1991:32) state that students do not learn in isolation (Refer §2.4.3) and student-student, group and student-educator interaction are essential for the implementation of SDL (Oswalt, 2003:23, Refer §2.4.5). With a LMS, the social component of learning is easy to quantify (Carmean & Heafner, 2002:29). The LMS contains a number of communication tools that both the educators and students can use. Messages and announcements keep students aware and up-to-date whenever they log on to the LMS. Students that usually don't participate in class (shy students or reflective thinkers) have the opportunity to post their views in a discussion forum or blog. Non-oral students have a better chance of absorbing information that often slips them by in a face-to-face classroom (Ong & Hawryszkiewycz, 2003: 340).

Discussion boards and live chat tools enable the students to post urgent questions and seek help from fellow students or the educator between contact classes. The educators could easily divide students into discussion or collaborative groups. These groups can meet online and do not have to arrange for face- to- face meeting in order to complete a assignment or learning task (Brusilovsky, 2004:105). Students should be able to get to know each other and accept each others opinions to promote collaboration (Oswalt, 2003:24).

Oswalt (2003:65) also believes that it is important to push students out of their comfort zone by providing new challenges, alternative possibilities and unfamiliar learning situations. LMSs provide you with a number of opportunities to challenge students. The nature of the assignment will determine which functionality to use. Discussion Forums, Assignments and Wiki's can be used to reach this goal. Borthick (2004:1) agrees with Oswalt (2003:25) that it is important to encourage students to reflect on their learning by preparing online learning portfolios, individually or in groups, or writing reflections on a blog (Refer §2.4.5). By doing this students are provided with the opportunity to restructure content in terms of their own thinking and prior understandings (Borich 2007:338).

3.4.4 Make sure students know what are expected of them in terms of aims and objectives, learning resources and assessment criteria

Brockett and Hiemstra, (1991:24-27) believe that students should know what is expected of them in terms of objectives, learning strategies, resources, and evaluation criteria (Refer §2.4.3). Educators need to understand that it is very difficult for students to assume responsibility for their own learning without feeling that they have some control over the educational transaction (Refer §2.4.4). By using an LMS, the learning outcomes and objectives can be made available in the syllabus tool or as a document in the resource tool. The educator can involve the students in the planning and deciding upon learning aims and objectives. A collaborative wiki page can be used for this. Assessment criteria can be made available in the form of an announcement or as part of the assignment so that students can be sure of exactly what are expected from them when completing the assignment or task.

3.4.5 Situate learning in real life context by choosing learning activities and assignments in familiar situations that can show students the importance of the learning content

Engagement in a variety of real life learning situations is important (Refer §2.7.3) because students want to know if the knowledge and skills they gain are relevant in their everyday lives (Merriam *et al.,* 2007:107). The Assignment, Quiz, or even Forum tools can be used to create creative and interesting assignments (Berg & Korcuska, 2009:161). The course content and nature of the assignment will determine which tool should be used and to which extent. According to Clarke (2008:21) technology allows tasks, events and processes to be simulated so that students can be assessed on their competence before they are allowed to work in a real environment. Roblyer (2006:77-116) lists a number of different types of instructional software that can be integrated into a LMS which can contribute to the learning environment, namely:

- Drill and Practice software – this provides exercises in which students work through questions, usually one at a time, and receive feedback on their correctness (Roblyer, 2006:74). Students, especially Grow Stage 1 students (Refer §2.6.3), can benefit from this type of software where they need to remember e.g. math facts, typing skills, vocabulary, states and capitals. The developers of this software can base the tasks and questions on real life scenarios.

- Tutorial software – is an entire instructional sequence similar to a educator's classroom instruction topic. Tutorials are usually expected to be a self-contained instructional unit, rather than just a supplement to other materials (Roblyer, 2006:84). Students should be able to learn the topic without any help or other materials. It is easy to incorporate real life videos and pictures to help link the relevance of the material to the students' everyday lives. This kind of software is better for Grow Stage 3 and 4 (Refer §2.6.3) students that are more self directed in their studies.
- Simulation software – is a computerised model of a real or imagined system that is designed to teach how the system works. Simulations usually emphasise learning about a system itself, rather than learning general problem-solving strategies (Roblyer, 2006:89). Simulation software is popular when trying to teach situations such as the growth or development of living things; show students what outer space looks like; buying and selling on the stock market.
- Instructional games – software designed to increase motivation by adding game rules and/or competition to learning activities. When students know they will be playing a game, they expect a fun and entertaining activity that can focus on real life experiences and scenarios (Roblyer, 2006:93). Roblyer (2006:94) also believes that when learning is fun, students will engage in the learning process and be more motivated. Instructional games is also a great way to encourage cooperative and collaborative learning and peer interaction.

By making use of real life simulations, students can see the relevance of their subject content in their everyday lives (Clarke, 2008:27). Interesting and exciting activities keep students involved and motivated. There are many websites on the internet where educators can find instructional software for free that can be integrated as Web Content links in LMSs. This software still need to be evaluated carefully, but it can contribute to your learning environment in an immense way.

3.4.6 Provide a variety of resources

According to Oswalt (2003:25) the facilitators should provide the students with a variety of resources and scaffolding to support students' interaction with new and unfamiliar knowledge and skills (Refer §2.4.5). However, it is the student's responsibility to take control over his learning situation and find and evaluate alternative learning resources (Refer §2.4.6). According to Clarke (2008:16) learning resources often play a significant role in e-learning. The materials may take a variety of forms and include:

- Interactive materials that you can access and interact with online - e.g. webpages, downloadable files, podcasts – the Web Content tool can be used to integrate these external websites into the course site (Shelly *et al.*, 2008:8).
- Stand-alone interactive materials such as multimedia CD-ROM's – the content of the CD-ROMS can be uploaded onto the Resources tool (Berg & Korcuska, 2009:53).
- Traditional materials (e.g. workbooks, lecturer notes and study guides) – this content can also by uploaded onto the Resources tool (Berg & Korcuska, 2009:53) or it can be made available through the university library website which can be included via a Web Content tool.
- Content created by the educator (e.g. wiki's, presentations or blogs) – If the educator chooses to create the wiki in the site, the Wiki tool can be used. The Forum tool can be used instead of a blog but if the educator chooses to use existing web applications such as blogger or online wikis this can be included in the site via the Web Content tool (Roblyer, 2006:239).

According to Bowman and Hughes (2005:148), the importance of the learning environment and the ease of access to learning resources and well-prepared educators improve student learning and satisfaction. Dalsgaard (2005:2) states that LMSs include a wide range of different applications, namely discussion forums, chat, file sharing, video conferences, shared whiteboards, e-portfolios, weblogs and wikis. These applications can be used to support different activities and incorporate resources involved in the learning process. For learning, resources must be contextualised to determine situational relevance and meaning. When the above mentioned tools are used optimally by the educator, students have the opportunity to engage in the learning process (Tedman *et al.,* 2007: 38).

3.4.7 Help students to evaluate and validate their learning accomplishments and experiences

Francom (2009:7) states that it is important to be able to assess your performance in all forms of learning (Refer §2.6.1). This is especially true for e-learning in that you are often working on your own away from your tutor or peers, which means there is less opportunity for immediate feedback (Clarke, 2008:59). Clarke (2008:59) further states that the educator needs to be proactive in the assessment process. Assignments or test marks are important for students to track their progress but they will also need feedback in the form of discussions with the educator or peers. According to Rapuano (2006: 1757) the primary objective of the LMS is to manage students and keep track of their progress and performance across all types of training activities. He states that LMSs manage

and allocate learning resources, instructional material fulfillment, and online learning delivery. LMSs can retrieve detailed data on student scores, question choices, and navigation habits and can use them to give content managers crucial information on the effectiveness of the content if combined with specific instructional strategies, delivery technologies, and student preferences (Ong & Hawryszkiewycz, 2003: 341).

LMSs usually have a number of Assignment and Test tools that enable the educator to give proper feedback on the specific assignment or test. The Forum tool in a LMS can help the students to engage in interaction through discussion and shared experiences (Berg & Korcuska, 2009:161). The Grades tool allows educators to record and compute the students' grades. Students can then refer to the Grades tool to check their progress at any time (Berg & Korcuska, 2009:159).

3.4.8 Vary the amount of self-directed learning guidance and provide students repeatedly with opportunities to increase responsibilities

According to Grow (1991:130) the educator should determine the SDL readiness level of the student and match his teaching role and strategies accordingly (Refer §2.6.3). In the previous chapter (Refer §2.6.3) Grow's model and the intensity in which the students belonging to each of the stages need to be dealt with were discussed: (a) Students with low SDL skills (Grow, Stage 1) need to be provided with guidance such as immediate feedback and lecturing to help them overcome learning difficulties and resistance to SDL. (b) Students with moderate SDL skills (Grow, Stage 2) should be provided with inspiring, educator-led discussions, guided practice tasks and structured projects. (c) Students with intermediate SDL skills (Grow, Stage 3) should be provided with tools, methods, and techniques as a way of interpreting the learning experience and educators should give these students more responsibilities. (d) Students with high SDL (Grow, Stage 4) skills should be provided with tools and methods which consult on the students' management strategies, inspire, mentor, challenge or provoke the student, and the educator should step back.

The variety of communication tools (e.g. File Transfer, Messaging, Drop Box, Live Chat) used in LMSs enables the educator to communicate with students on a regular basis. The LMS allows the educator to send personal messages to students or upload files and information in their personal drop boxes. This function helps to distribute extra learning material for students that need more guidance and attention (Ong & Hawryszkiewycz, 2003: 340). In addition to the tools used to

distribute resourses the educator can use the Assignment or Test tools to set up a variety of assignments and quizzes that students can use to practice certain concepts.

According to Borich (2007:337), it is important to encourage and motivate students to become actively involved in the subject matter by going beyond the information given and to restructure the new information in their own way of thinking and prior knowledge. Online learning environments free students from inconvenient time schedules and formal classroom environments. This opens up opportunities for students to take responsibility for their own learning (Masiello *et al.,* 2005:183).

The educator should increasingly shift the responsibility of learning to the students through practice exercises, dialogues and discussions that engage them in increasingly complex thinking patterns (Borich, 2007:337). When students reflect on their own work or participate in discussion forums, they get the chance to construct their knowledge by analysing their own thoughts (Clarke, 2008:241). The Forum tool can be used for discussing specific topics that the educator decide on, or the students can post new topics or questions that can help them in their learning process (Berg & Korcuska, 2009:53). Students can also be required to keep a reflective journal in the form of a personal blog or even a normal text document which can be published or uploaded into their personal drop boxes (Berg & Korcuska, 2009:108). Although these features alone do not guarantee to promote SDL skills the way in which they are used can contribute to an effective interactive learning environment (Carmean & Heafner, 2002:29). A short summary of the integration of the SDL guidelines into LMSs will be given in table 3.1.

Table 3.1 Integrating SDL guidelines in LMSs

Guideline	Implementation	LMS Functionalities
1. Help students to assess their own learning needs, goals and interests.	Awareness of competency levels	Quiz tool; Assignment tool
	Reflect on own learning	Online Learning Portfolios Blogs
2. Provide a flexible learning environment in which students have the responsibility and freedom to make choices to meet their specific needs concerning goals, resources and participation.	Availability of a greater volume of diverse course materials	Resources tool; Web Content tool
	Incorporation of other recourses	Resources tool; Web Content tool
	Student participation	Live chat rooms ; Discussion Forums
3. Foster a collaborative learning environment that is democratic, , challenging and non-threatening.	Communication	Announcement tool Messages tool
	Participation in discussion forums	Discussion Forums
	Immediate interaction and feedback	Live chat rooms
	Push students out of their comfort zone	Discussion Forums Assignments tool; Wiki's
4. Make sure students know what are expected of them in term of aims and objectives, learning resources, assessment criteria.	Access to learning outcomes, objectives and assessment criteria	Resources tool; Syllabus tool
	Involve students	Wiki; Discussion forum
	Make assessment criteria available	Announcement tool; Assignment tool
5. Situate learning in real life context by choosing learning activities and assignments in familiar situations that can show students the importance of the learning content.	Create creative and interesting assignments with real life scenarios	Discussion Forums; Wiki; Assignment tool
	Integrate instructional software into the LMS	Resources tool; Web Content tool
6. Provide a variety of resources.	Learning materials	Resources tool
	Discussions	Blogs; Discussion Forums
	External web links	Web Content tool
7. Help students to evaluate and validate their learning accomplishments and experience.	Feedback to students	Gradebook tool; Assignment tool; Test tool
	Discussions and shared experience	Discussion Forums
8. Vary the amount of SDL guidance and provide students repeatedly with opportunities to increase responsibilities.	Communication with students	Announcement tool Messages tool; Live chat rooms
	Availability of resources	Resources tool; Web Content tool; Drop Box tool
	Variety of assignments and quizzes	Test tool ; Assignment tool
	Reflection	Online learning portfolios Blogs

3.5 Chapter summary

In the previous chapter, guidelines on how to integrate SDL in the classroom were given. However, those guidelines focused on SDL in general and not necessarily on an online environment. The purpose of this chapter was to reach sub-aim (ii) - to investigate how SDL guidelines can be adopted into an LMS. In order to reach this aim a study on LMSs was done. It was evident that LMSs have a variety of functionalities which can be used to support learning and it covers a wide range of different applications. This chapter focused on the functionalities, roles of users and advantages and limitations of LMSs in general. Song and Hill's models that focus on SDL in an online environment and Mishra and Khoeler's TPCK model for the integration of technology were also discussed in this chapter. After analysing the above mentioned models and the literature on LMSs, the researcher was able to determine the way in which the guidelines listed in the previous chapter can be integrated into an LMS.

Chapter Four

The implementation of the Self-directed learning guidelines

4.1 Introduction

In the previous chapter, sub-aim (ii), to investigate how SDL guidelines can be adopted for an LMS, was fulfilled. A model for SDL in an online environment (§3.3.1) and the Technological Pedagogical Content Knowledge (§3.3.2) model were discussed in order to reach sub-aim (ii). The purpose of this chapter is to reach sub-aim (iii) which is to develop an eFundi™ site with the necessary components that will enhance SDL. A background of eFundi™ as LMS as well as background to the AGLE 121 module will be given. The implementation of SDL guidelines in the AGLE121 module will be demonstrated by the use of specific activities and functionalities in the AGLE 121 eFundi ™ site.

4.2 Background of eFundi ™

Since 2000 the North-West University (NWU) has implemented the use of an LMS. Prior to 2006 the NWU used Varsity™, a self-developed system, as the primary LMS. In 2006 NWU started to implement eFundi™, an open source system powered by SAKAI™ as the new LMS. These two LMSs were running parallel for two years to ease the transformation process. In 2009 Varsity™ was discontinued and eFundi™ became the only LMS used by the NWU. In the following section, a few concepts and terms used in the eFundi™ environment together with the basic functioning of eFundi™ will be discussed.

4.2.1 Definitions and clarification of concepts

In order to understand the use of eFundi™ as an LMS at the NWU, a few important concepts will be defined in the next section.

4.2.1.1 Open source

Open source is a software development method that harnesses the power of distributed peer review and transparency of process. Under an open source license the source code for software is provided and the end user may customize the code to his or her satisfaction and redistribute his or her changes (OSI, 2009:1).

4.2.1.2 Community Source

Colleges and universities have used the term community source to refer to a type of community coordination mechanism that builds on the practices of open source communities (Berg & Korcuska, 2009:7).

4.2.1.3 Sakai ™ community

Sakai™ is a community of academic institutions, commercial organisations and individuals who work together to develop a common Collaboration and Learning Environment (CLE). The Sakai™ CLE is a free, community source which forms an educational software platform distributed under the Educational Community License (a type of open source license). The Sakai ™ CLE is used for teaching, research and collaboration. At the NWU the Sakai ™ CLE is called (branded) - eFundi™.

4.2.2 Functions of eFundi ™

At the NWU, eFundi ™ is mainly used for teaching and learning purposes. When lecturers decides to use eFundi ™ as a learning platform, they are expected to create an eFundi ™ course site for their specific module. Sites are not created for all modules presented at the NWU by default and it remains the responsibility of the lecturer to create an eFundi ™ site for his/her module. Lecturers are not obligated to use eFundi ™ as a learning platform, thus they can decide for themselves if they want to create a site for their module or not. When such a site is created, the lecturer sends in a request to the IT department to connect all the students registered for that specific module to the eFundi ™ site. Those students will then be added as participants in the eFundi ™ course site. The lecturer can also add teaching assistants and other lecturers as participants in the site. Participants

in an eFundi ™ course site will be allocated a role that will determine the amount of rights they'll have on that specific site. The roles that are available in a eFundi ™ course are:

- Instructor - this is the creator of the site and other lecturers or administration staff chosen by the site creator are usually also added to this role. The instructor role has total access to the site and rights in the site.
- Teaching assistant: The site creator can add teaching assistants that are not currently enrolled for the module to the site. The teaching assistant has limited rights in the site. The instructor can decide exactly what the teaching assistant will be able to do in each of the functionalities added to the site.
- Student: All the students registered for the specific module are added to the site and have limited rights. The instructor can decide exactly what the students will be able to do in each of the functionalities added to the site.

When an eFundi ™ course site is created, the lecturer decides which of the available functionalities should be embedded into the site. As seen in §3.2.1, there are a number a functionalities available in LMSs that can contribute to effective online teaching. The functionalities available in an eFundi ™ course site will be listed in table 4.1.

Table 4.1 Functionality available in eFundi ™

Functionality	Description
Home	For viewing recent announcements, discussion and chat items.
Announcements	For posting current, time-critical information.
Assignments	For posting, submitting and grading assignment(s) online.
Chat room	For real-time conversations in written form.
Drop Box	For private file sharing between instructor and student.
eGuides	For authoring, publishing and organizing learning sequences.

Table 4.1 Functionality available in eFundi ™ (Continue)

Functionality	Description
Forums	Display forums and topics of a particular site.
Glossary	Tool to create a glossary.
Gradebook	For storing and computing assessment grades from Tests & Quizzes or that are manually entered.
Messages	Display messages to/from users of a particular site.
Polls	For anonymous polls or voting.
Resources	For posting documents, URLs to other websites, etc.
Schedule	For posting and viewing deadlines, events, etc.
Site info	For showing worksite information and site participants.
Statistics	For showing site statistics by user, event or resource of the site.
Syllabus	For posting a summary outline and/or requirements for a site.
Tasks, Tests and Surveys	For authoring, publishing, delivering and grading assessments.
Tests & Quizzes	For creating and taking online tests and quizzes.
Web Content	For accessing an external website within the site.
Wiki	For collaborative editing of pages and content.

Lecturers have the opportunity to add or remove any functionality from the site at any given time during the course. Although all the above mentioned functionalities are available to use, lecturers

are advised to make sure that the functionalities they have selected are active in their site and willl be used on a regular basis. Students find it difficult and frustrating if they have to go through a whole list of unnecessary functionalities to look for new information. It is the lecturer's duty to keep the site up to date and keep students interested and engaged.

4.2.3 eFundi ™ users

As seen in §4.2.2 eFundi ™ is used by the lecturers and students of the NWU since 2006. The number of users grew significantly since 2006 when the LMS was implemented. The following statistics were supplied by the NWU's information technology department regarding eFundi ™ users :

Table 4.2 Number of active eFundi ™ sites

Year	Number of sites
2006	4
2007	163
2008	596
2009	1487
2010	2037
2011	2719

Table 4.3 Number of lecturers using eFundi ™ sites

Year	Number of sites
2006	11
2007	122
2008	228
2009	364
2010	592
2011	770

Table 4.4 Number of students using eFundi ™ sites

Year	Number of sites
2010	23511
2011	27891

4.2.4 eFundi ™ support

The ITE (Information Technology in Higher Education) unit of the Academic Support Services department at the NWU is responsible for the eFundi ™ user support. The ITE advisors provide support in the following ways:

- Training material: step by step training material on how to use the functionalities for students and lecturers is made available on the eFundi ™ homepage.
- Workshops: weekly eFundi ™ workshops, both basic as well as advanced levels , in which the use of the functionalities and administrative duties of the lecturers are discussed.
- eFundi ™ helpline: telephonic support for lecturers on technical and procedural issues.
- Technology integration and curriculum design: one on one help and advice on the integration of educational technologies into modules and the classroom.

Each of the three campuses of the NWU has their own ITE Advisors that take the responsibility for the eFundi ™ users of that specific campus. There is a 48 hour response policy but if and where possible users are helped immediately.

In the following section the background of the AGLE 121 module will be discussed.

4.2.5 The background of the AGLE 121 Module

At the NWU the Centre for Academic and Professional Language Practice is responsible for the academic literacy (AGLE) modules of the Potchefstroom campus. In the following section the aim, learning outcomes, profile of the students and the lecturers of the module will be discussed.

4.2.6 Aim of the AGLE 121 module

The aim of the academic literacy modules is to equip students with the necessary academic skills so that they will be able to complete their studies successfully. There are two modules, namely: Introduction to Academic Literacy (AGLE111) and Academic Literacy (AGLE121). During the course of the AGLE 121 module students are exposed to a variety of skills in three main groups: (a) production skills; (b) reasoning and (c) general academic skills (Louw, 2010:4). According to Louw (2010:4) these skills include the following:

- study skills, study methods and time management;
- argumentation skills;
- comprehension of academic texts;
- academic writing (including the structuring of texts);
- basic computer skills;
- information skills and use of resources;
- academic listening and note taking skills;
- basic numeracy skills;
- seminar skills;
- reading skills (in reading laboratory);
- understanding and interpretation of examination questions.

4.2.7 General learning outcomes for AGLE 121

The following learning outcomes for the AGLE 121 module were listed in the AGLE 121 study guide:

After completion of the AGLE 121 module, a student should be able to:

- Demonstrate fundamental knowledge of appropriate computer programmes, as well as apply learning, listening, reading and writing strategies ; use academic language register and read and write academic texts in order to function effectively in the academic environment (Louw, 2010:4).

- As an individual and a member of a group communicate effectively orally and in writing in an ethically responsible and acceptable manner in an academic environment (Louw, 2010:5).
- As an individual and a member of a group find and collect scientific knowledge in a variety of study fields, analyse, interpret, and evaluate texts, and in a coherent manner synthesise and propose solutions in appropriate academic genres by making use of linguistic conventions used in formal language registers (Louw, 2010:5).

4.2.8 Student profile for AGLE 121

At the NWU all first-year students have to enroll for a compulsory academic literacy module entilted AGLE 111. Despite the fact that the AGLE 111 module is compulsory, all new first-year students at NWU must write a placement test in academic literacy when they arrive at the university. The aim of this test is to determine if students possess the necessary broad academic skills in order to complete their studies successfully. These include not only language skills, but other academic skills as well. If the test result indicates that a student runs the risk of not being successful, he or she must follow an additional semester module in Academic Literacy namely AGLE 121. Thus, students enrolled for AGLE 121, generally tend to be the students with lesser academic skills. The AGLE 121 module is presented in the second semester of the first year of study.

Taking into consideration that the participants are first year students, in particular first year students with lower academic skills, one might conclude that most of these students belong to stage 1 or maybe stage 2 of Grow's model (Refer §2.6.3). These students possess low to medium self directed learning skills and still need a lot of engagement from the educator. This must be kept in consideration when planning the intervention for this study. These students will not be able to function on the highest SDL levels yet. The assignments, tasks and the SDL guidelines offered to them must be incorporated accordingly.

4.2.9 Lecturers for AGLE 121

Because of the large number of students enrolled for the AGLE 121 module, there are six lecturers responsible for this module. Students are randomly divided into different groups. Each of the

lecturers is then responsible for approximately 4 groups. The same group of lecturers was responsible for the AGLE modules in 2010 and 2011.

4.2.10 The structure of AGLE 121 in 2010

The method of instruction used in this module is one of assisted independent study. This means that although lectures and facilitation classes are presented with the utmost care, the student shoulders the primary responsibility for his/her studies. Students had to perform certain tasks themselves which include the gathering and reading of study material; participation in lectures and class discussions; as well as the completion and submission of assignments. Two contact session of an hour each per week were allocated to this module.

4.2.10.1 Learning material

The learning material was provided by means of a paper based study guide and workbook. An information document on plagiarism and a power point presentation on actives and passives were placed in the resources folder in eFundi™ (figure 4.1).

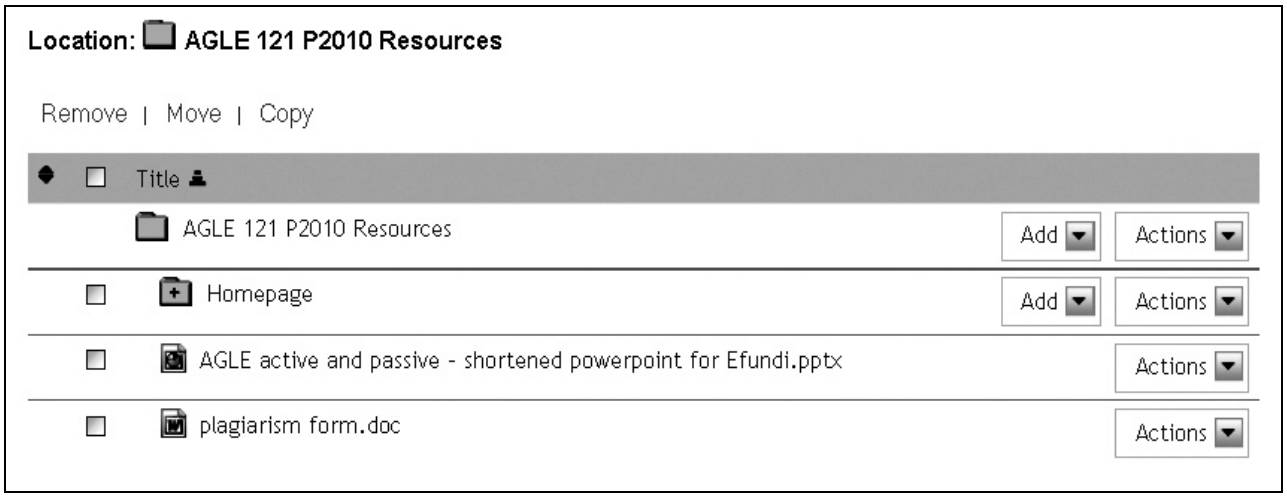


Figure 4.1 AGLE 121 eFundi™ 2010: Resources folder

4.2.10.2 Assessment

Continuous assessment was carried out in this module. The marks allocated, for different sections of the work, were added together to calculate a final mark (table 4.5). Students received a printed version of this assessment plan at the beginning of the semester.

Assignments were given, elucidated and marked, but it was the students' responsibility to master the work him-/herself. Students were expected to hand in two of their assignments on the eFundi™ site (figure 4.2). The rest of the assignments and all the tests for AGLE 121 were paper based.

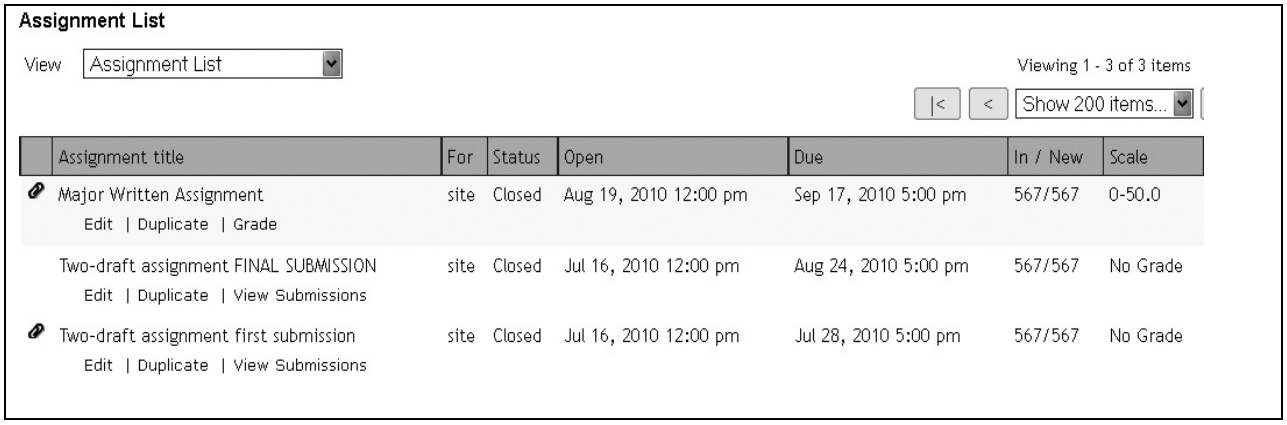


Figure 4.2 AGLE 121 eFundi™ 2010: Assignment

Table 4.5 Assessment plan AGLE 121 2010

Assessment	Mark		Hand in date
MODULE MARK		**60**	
Comprehension test	5		Week 2 (2nd period) (26-30 July)
Semester test	20		Test week (Started 28 Aug)
Two-draft written assignment	15		**First draft:** (2nd period, week 2) **Second draft:** (2nd period, week 5)
Written assignment	20		Week 8, (2nd period.)
Class exercises	10 (5 X 4=20)		Unannounced
Revision test (multiple choice)	5		Week 8, (2nd period)
SDL questionnaire	5		Week 3 & Week 8
RINL Academic Literacy **TOTAL**	20 80 **100**		
EXAMINATION MARK		**40**	
Multiple choice and written exam on	100		Examination 25 October
Academic Literacy Electronic paper on RINL	100		
Reading component (completed or not completed)	100 or 1		
TOTAL	300		
TOTAL for AGLE 121		**100**	

4.2.10.3 Communication with students

The Announcement tool on the AGLE 121 eFundi™ site was used to communicate with students. As seen in figure 4.3, most of the announcements were administrative arrangements and did not contribute to the teaching and learning aspects of the module as such.

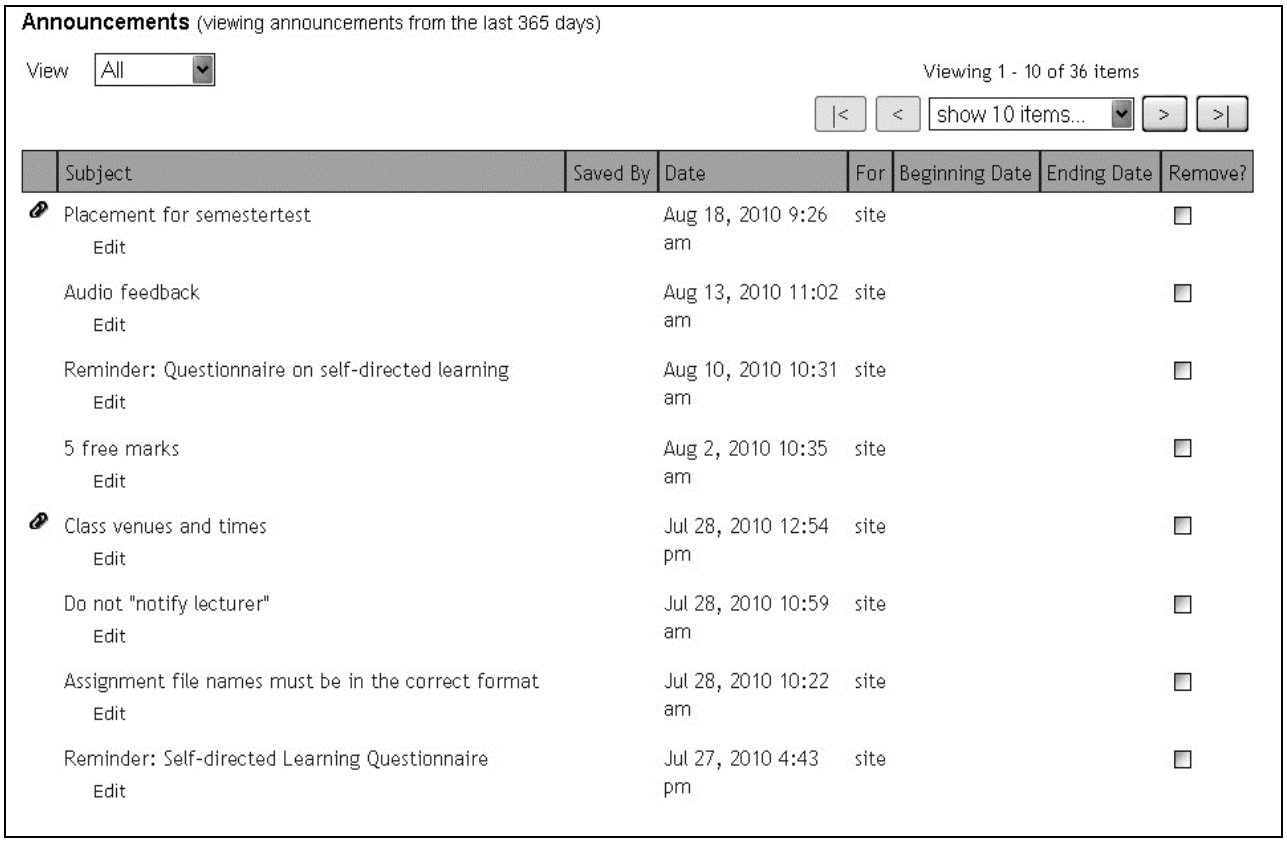
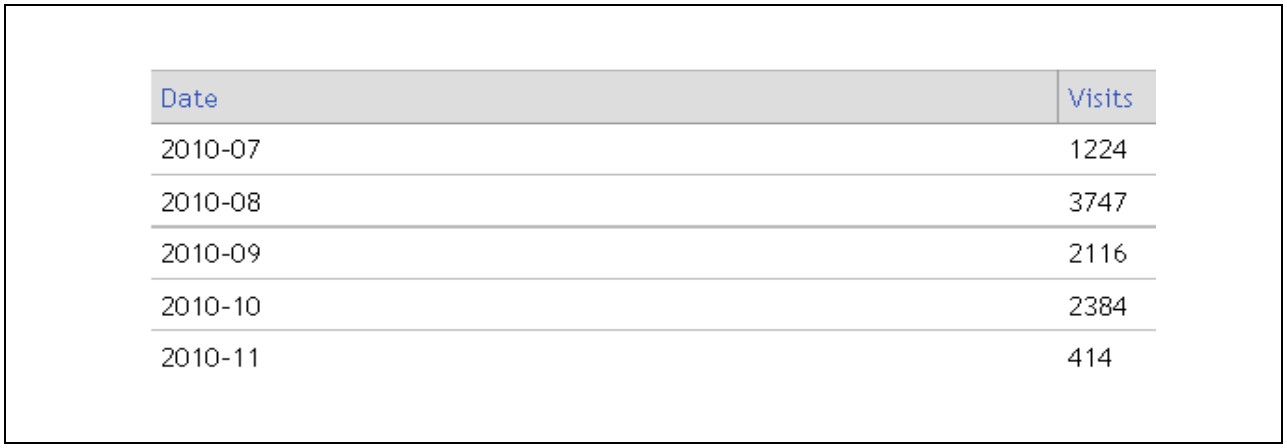


Figure 4.3 AGLE 121 eFundi™ 2010: Announcements

4.2.10.4 AGLE 121 eFundi™ site

The 2010 AGLE 121 eFundi™ functionalities were not used to their full potential. Very few resources were made available on the site (refer §4.2.10.1) and it was mostly used for administrative purposes (refer §4.2.10.3). The only functionalities used in the 2010 eFundi™ site were Resources, Announcements and Assignments. The Tasks, Tests and Surveys functionality

was also active, but was just used for completing the SDL questionnaire posted by the researcher. The 2010 eFundi™ site was administered by an administrative assistant and the lecturers did not put much time and effort into the site. As seen in Figure 4.4 a total of 9885 site visits were logged for the period July 2010 – November 2010. This is an average of 17 visits per student for the duration of the module.



Date	Visits
2010-07	1224
2010-08	3747
2010-09	2116
2010-10	2384
2010-11	414

Figure 4.4 AGLE 121 eFundi™ 2010: Site Visits

4.2.11 The intervention

In the previous chapter, the researcher identified how the guidelines for fostering SDL (§2.8) can be integrated into an LMS (§3.4). Seeing that the 2010 AGLE 121 eFundi™ functionalities were not used to their full potential, the integration of these guidelines into the 2011 AGLE121 eFundi™ site will serve as the intervention for this study. In the following section, how and why the identified guidelines had been integrated into the 2011 AGLE121 eFundi™ site will be explained.

4.2.12 The structure of AGLE 121 in 2011

The primary method of instruction used in this module did not change much from 2010 (Refer §2.4.10) to 2011. Students still had to attend two contact session of an hour each per week but the

above mentioned intervention contributed to the fact that students had to spend far more time on the 2011 AGLE 121 eFundi™ site.

4.2.12.1 Learning material

The learning material was provided by means of a paper based study guide and workbook but it was also uploaded into the resources folder on the 2011 AGLE121 eFundi™ site. A number of additional resources, which will be discussed later in this chapter (§4.2.13), were uploaded into the resources folder (figure 4.5).

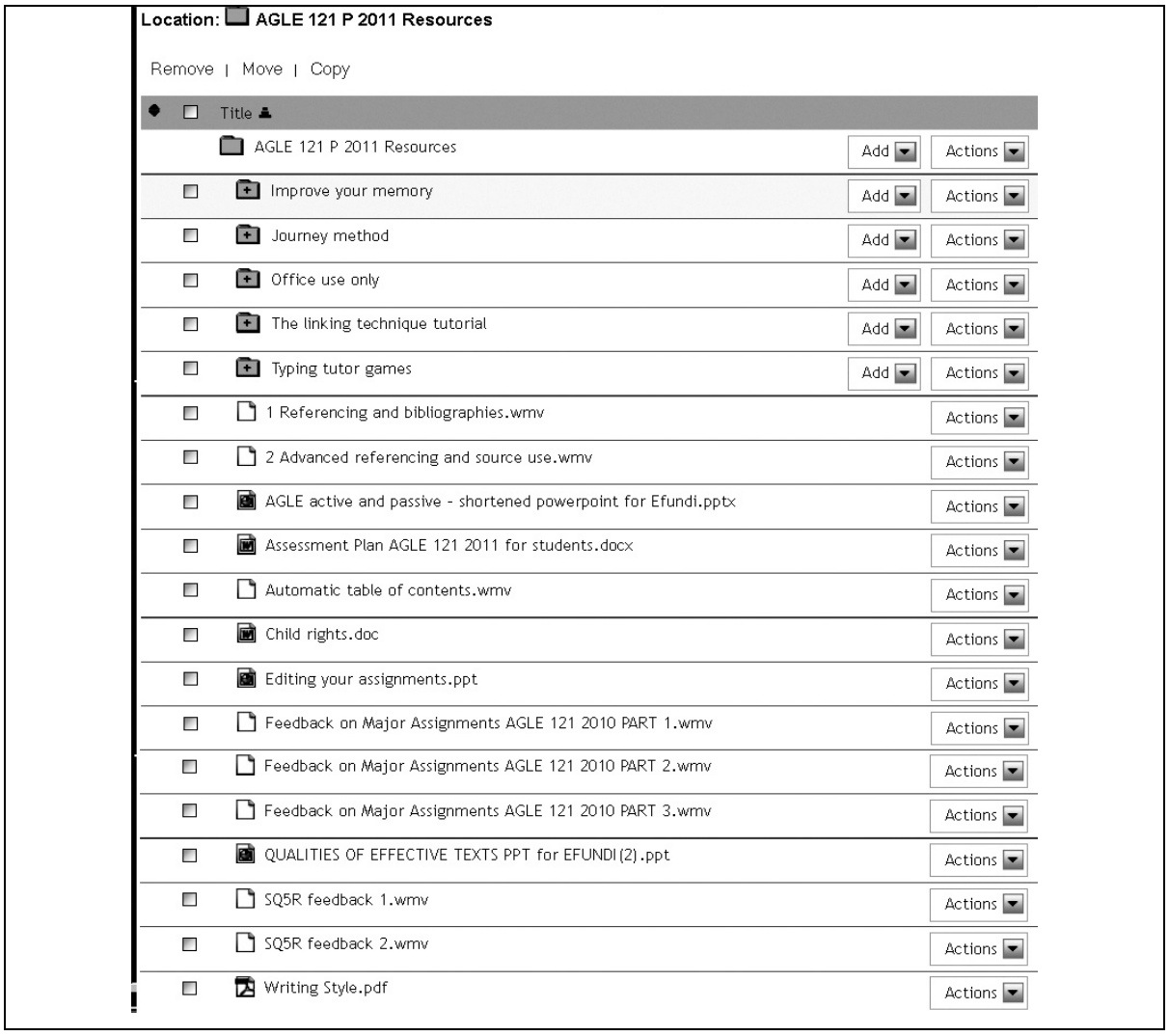


Figure 4.5 AGLE 121 eFundi™ 2011: Resources folder

4.2.12.2 Assessment

Continuous assessment was carried out in this module. The marks allocated, for different sections of the work, were added together to calculate a final mark (table 4.6). This assessment plan was uploaded in the resources folder of the AGLE 121 eFundi™ at the beginning of the semester.

Table 4.6 Assessment plan AGLE 121 2011

Asessment	**Mark**		**Hand in date**
MODULE MARK		**75**	
Comprehension test	5		Week 3 (1-5 August)
Assignment 1	10		Week 5 (15-19 August)
TALL	5		Week 5 (15-19 August)
Written Assignment 2	15		Week 8 (19-23 September)
Unannounced class tests Class exercises	15		Unannounced
Semester test	20		Test week (10-17 September)
efundi exercises	5		Continual
EXAMINATION MARK		**25**	
Multiple choice and written exam	100		Examination 25 October
Academic Literacy Electronic paper on RINL	100		
Reading component • completed • not completed	 100 1		
TOTAL	300		
TOTAL for AGLE 121		**100**	

4.2.12.3 Communication with students

The Announcement tool on the AGLE 121 eFundi™ site was used to communicate with students. Although the Announcement tool was used for administrative arrangements, it was also used to engage students e.g. to remind students to participate in learning activities (figure 4.6) and to introduce additional resources (figure 4.7).

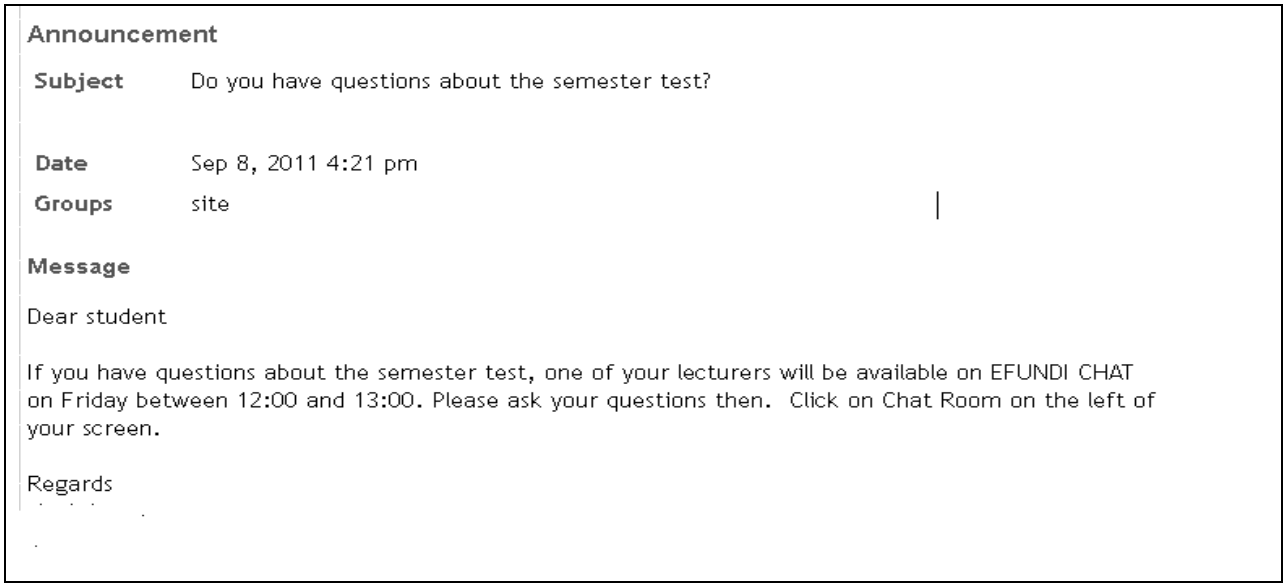
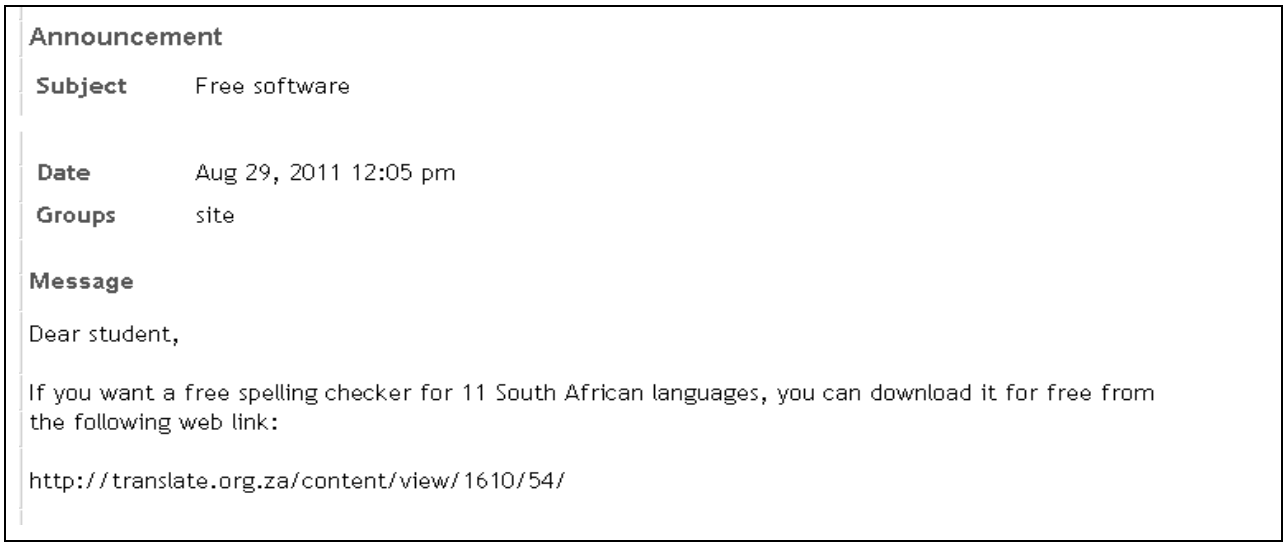


Figure 4.6 Announcement to participate in learning activity


Announcement

Subject Free software

Date Aug 29, 2011 12:05 pm

Groups site

Message

Dear student,

If you want a free spelling checker for 11 South African languages, you can download it for free from the following web link:

http://translate.org.za/content/view/1610/54/

Figure 4.7 Announcement to introduce additional resources

4.2.12.4 AGLE 121 eFundi™ site

The 2011 AGLE 121 eFundi™ site was planned and used far more extensively than in 2010. Most of the administrative announcements were still posted by the administrative assistant but an intervention (§4.2.11) in the form of the integration of the SDL guidelines also featured in the site. For practical reasons, the researcher mainly corresponded with only one of the lecturers responsible for the AGLE 121 module, Lecturer A, to implement the SDL guidelines in the module. The arrangement was that he will then communicate with and involve the rest of the lecturers. Lecturer A, together with the researcher, managed the 2011 AGLE 121 eFundi™ site and made sure that the SDL guidelines were integrated and implemented. The implementation and integration of these guidelines will be discussed in the following section.

4.2.13 Guideline 1: Help students to assess their own learning needs, goals and interests

As seen in §3.4.1 the educator should give students the opportunity to exercise some control over their own learning. This will only be possible if the students are aware of their specific competency level and they know their strengths and weaknesses. Students should be given the opportunity to construct meaning and develop their own ideas and understandings of the learning process and

content (Refer §2.4.5). This guideline was integrated in the eFundi™ site by focusing on the following aspects:

4.2.13.1 Awareness of competency levels

According to Jacobs *et al.* (2004:5), students need to be aware of the level of specific competencies that are expected of them; otherwise there will be no way to become aware of any gaps between their current competency levels and those required to complete a course (Refer §3.4.1). Students were given a skills test at the beginning of the module. Knowledge and skills necessary to pass the module were tested. The aim was for the results of this test to indicate to the students if they needed to put in extra effort as well as to show them on which subject areas they should concentrate. This test was published in the Tasks Tests and Surveys functionality of the AGLE 121 eFundi™ site. Students were expected to do this test in their own time within the first two weeks of the semester. Follow-up tests, focusing on specific content areas, were made available to students to work on those areas they struggled with.

4.2.13.2 Reflect on own learning

According to Borich (2007:338), when reflecting on their own learning, students are provided with the opportunity to restructure content in terms of their own thinking and prior understandings (Refer §3.4.1). Students were expected to upload an electronic diary of 200-300 words every 3rd week of the module. The diary entry had to contain information on (a) how the student was coping with the content knowledge of the module; (b) how the task and exercises given to the student linked with the specific module outcomes of the completed section and (c) how the module outcomes covered in the completed section could be linked to their other modules and field of study. The electronic diaries were uploaded in the Tasks Tests and Surveys functionality of the AGLE 121 eFundi™ site. Figure 4.8 gives an example of such a diary entry.

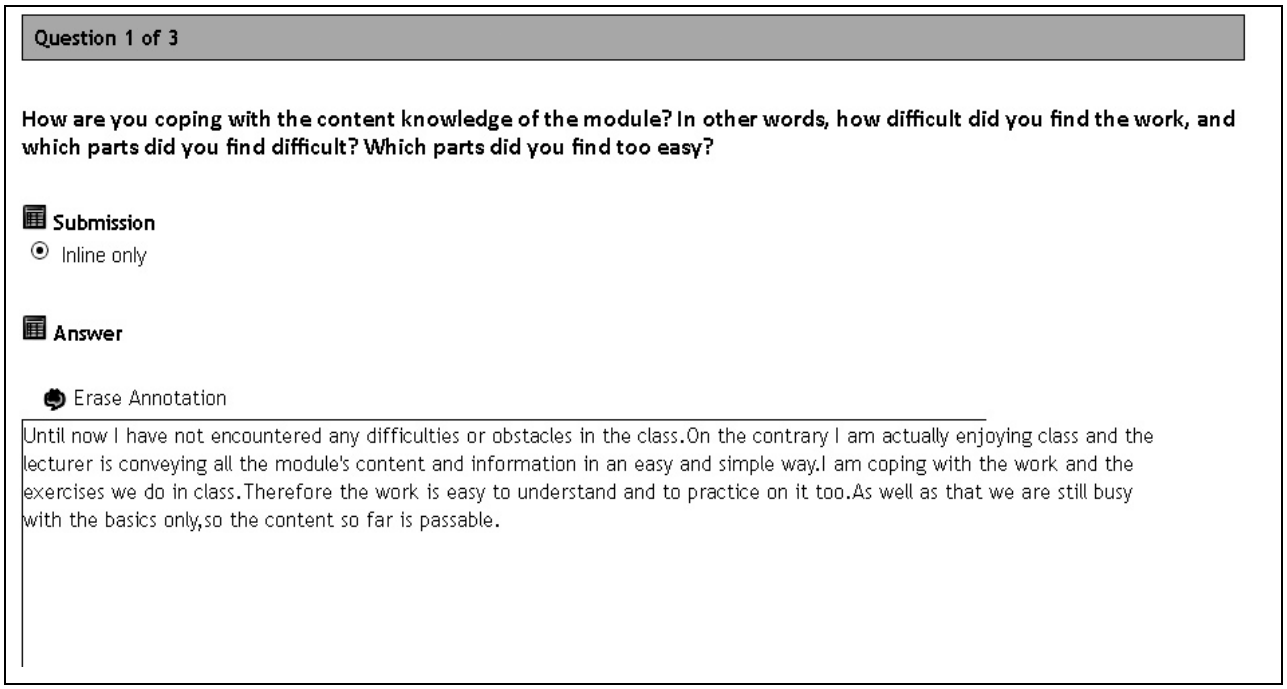


Figure 4.8 Example of a diary entry

4.2.14 Guideline 2: Provide a flexible learning environment in which students have the responsibility and freedom to make choices to meet their specific needs concerning goals, resources and participation

As seen in §3.4.2 students need to be given the opportunity to take control of their own learning situation and should be provided with choices of how they wish to proactively carry out the learning process. According to Carmean and Haefner (2002:33) student engagement and participation is increased when the educator uses the LMS to promote self-discovery of course material by the incorporation of other resourses on the internet, via for example, Google Scholar and electronic libraries (Refer 3.4.2).

4.2.14.1 Availability of a greater volume of diverse course materials

Because this is a structured undergraduate course, there was specific module content that students were expected to master. Most of the content was made available in either the study guide or in the *resources* folder of the AGLE 121 eFundi™ site. Nevertheless, to be able to complete the types of

assignments given to the students, it was sometimes expected of them to find information on certain unfamiliar topics. Guidelines on how to evaluate information found on the internet were also made available. This helped students to find more reliable resources on their own. Other useful resources e.g. guidelines on how to use sentence constructions, prepositions and referencing, were all made available in the Resources functionality of the AGLE 121 eFundi™ site.

4.2.14.2 Incorporation of other resourses

An online typing tutor game was made available for students to practice their reading and typing skills in a fun way (figure 4.9). This activity was published in a *web content* functionality of the AGLE 121 eFundi™ site.

Figure 4.9 Online typing tutor game

4.2.14.3 Student participation

Although the intervention for this study focussed on the integration of the SDL guidelines into the 2011 AGLE121 eFundi™ site, the classroom could not be disregarded as part of the learning environment. Student participation was one of the main focus points during the contact classes. Students were expected to come prepared in order to contribute to the class discussions. On the AGLE 121 eFundi™ site the students also had access to the *chat* functionality. This functionality enabled the students to see whom of their fellow students are online at a specific time so that informal discussions on the module content or assignment topics could be held. An example of such a discussion is shown in figure 4.10.

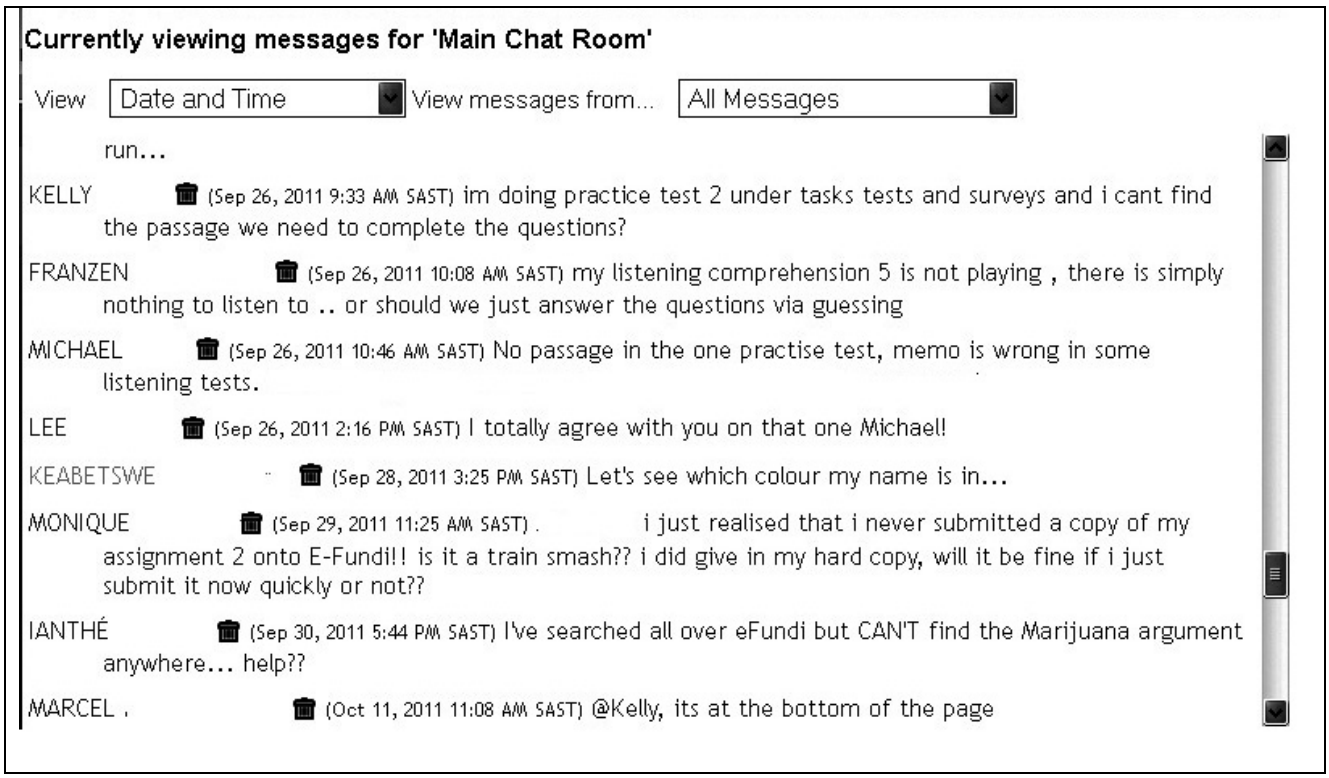


Figure 4.10 Example discussion in the chat room

4.2.15 Guideline 3: Foster a collaborative learning environment that is democratic, challenging and non-threatening

According to Brockett and Hiemstra (1991:32) students do not learn in isolation (Refer §3.4.3) and student-student interaction as well as group and student-educator interaction are essential for the implementation of SDL. The social component of learning can easily be quantified in a LMS by using discussion boards and live chat tools to enable the students to post urgent questions and seek help from fellow students or the educator between contact classes (Refer §3.4.3). This guideline was integrated in the AGLE 121 eFundi™ site in the following ways:

4.2.15.1 Communication

A detailed schedule of class times, due dates for assignments and test dates were published in the AGLE 121 eFundi™ site at the beginning of the course. It was the students' responsibility to stick to those dates. This was made possible with the Schedule functionality of the AGLE 121 eFundi™ site (figure 4.11). The lecturer also used the *A*nnouncement functionality on a regular basis to remind students of due dates coming up and for basic class administration. The Announcement functionality was also used to make students aware of new functionalities or resources that were available to them in the site. Lecturers used the announcement functionality to post topics which students had to find information on, and also posted other necessary resources prior to class sessions.

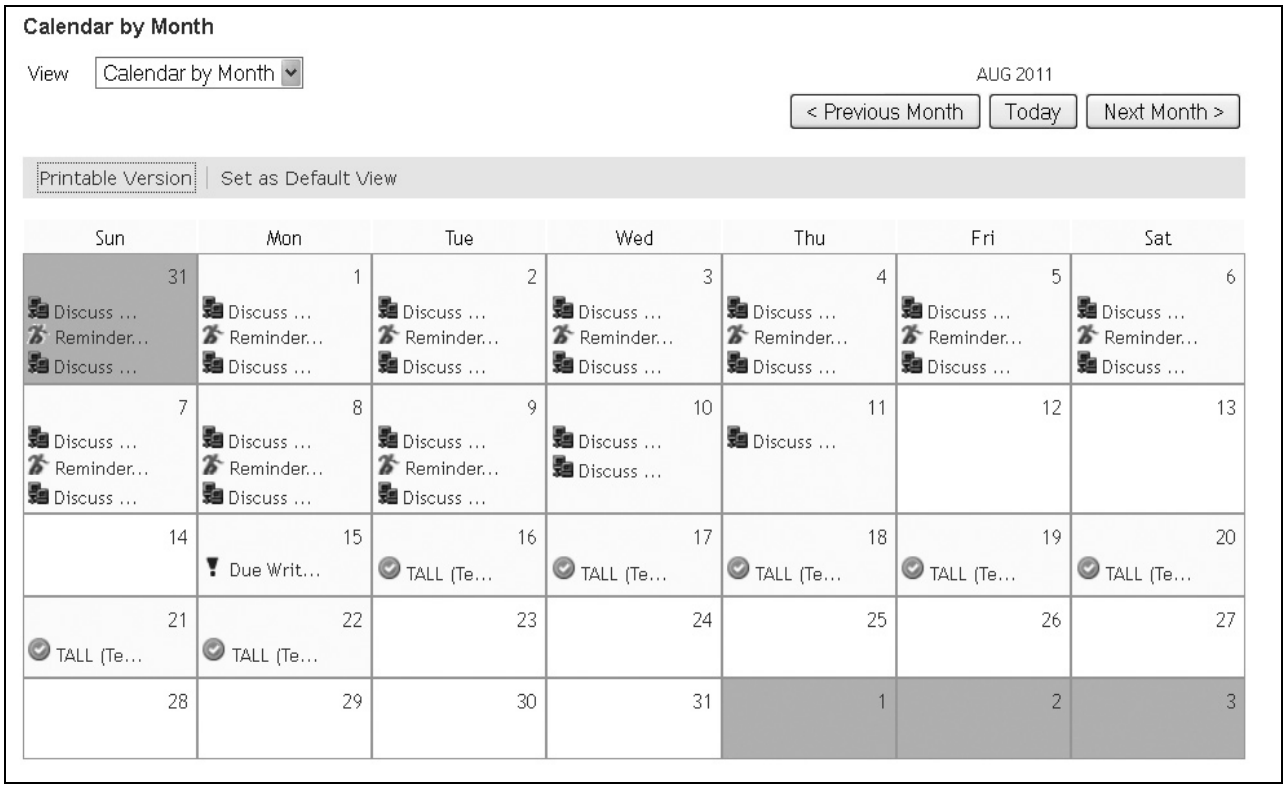


Figure 4.11 Example of schedule

4.2.15.2 Participation in discussion forums

Due to the sizes of the classes and the fact that the module content did not necessarily lend itself to this kind of discussion forum, the discussion forum functionality was not used in this module.

4.2.15.3 Immediate interaction and feedback

The lecturer provided a schedule with online visiting hours. Students could then participate in live chat sessions with the lecturer and other students. This was made possible with the Chat (figure 4.12) and *S*chedule functionalities of the AGLE 121 eFundi^{TM} site. Although immediate feedback was not always possible, the Tasks, Tests and Surveys functionality enabled educators to set up

quizzes and assignments that can by marked by the system and would generate immediate feedback. A number of listening tests, assignments and quizzes were made available to the students during the course (figure 4.13). When doing one of the above mentioned exercises, student would immediately receive feedback to see how they had performed.

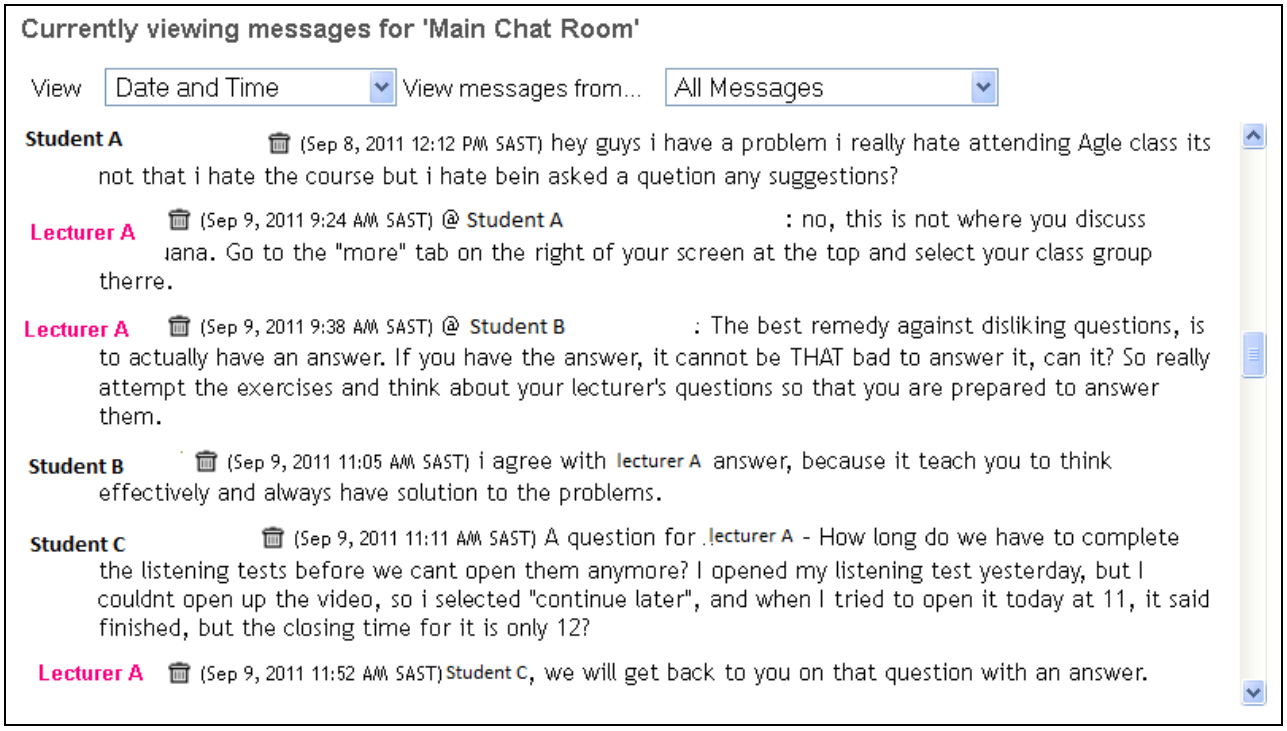


Figure 4.12 Example of live chat sessions with the lecturer

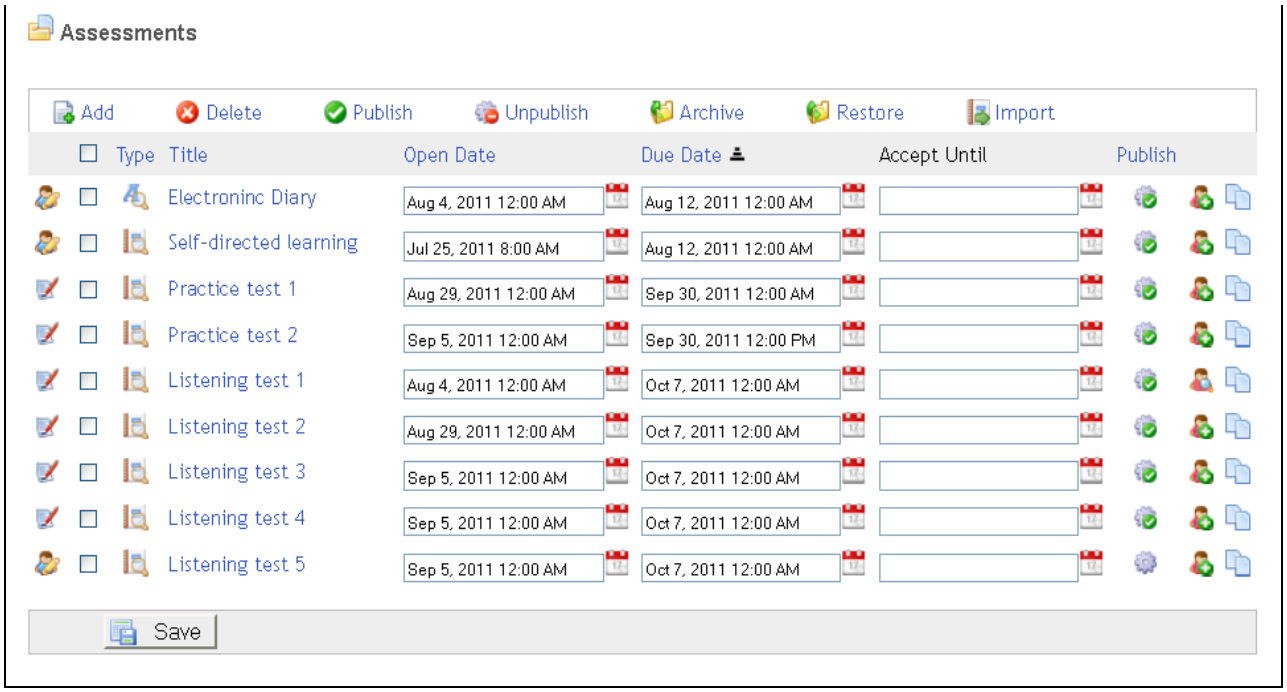


Figure 4.13 Assessments with immediate feedback

4.2.15.4 Push students out of comfort zone

Oswalt (2003:65) believes that it is important to push students out of their comfort zone by providing new challenges, alternative possibilities and unfamiliar learning situations (Refer §3.4.1). Unfamiliar types of assignments, e.g. contributing to a wiki, could challenge students to think outside the box. When students know that everyone could read what you posted they will possibly spend more time on the assignment and try to contribute on a higher level. Controversial topics were given to the students. Students were expected to share their own opinion with the rest of the class. This exercise was done in the *wiki* functionality of the AGLE 121 eFundi™ site. Figure 4.14 shows examples of the wiki contributions. The questions asked in this specific wiki were: (a) When do you stress most at university? (b) Give me your OWN two best tips (not the tips on page 5) for preparing for examinations (c) What are the three biggest problems you've experienced regarding your studies at university?

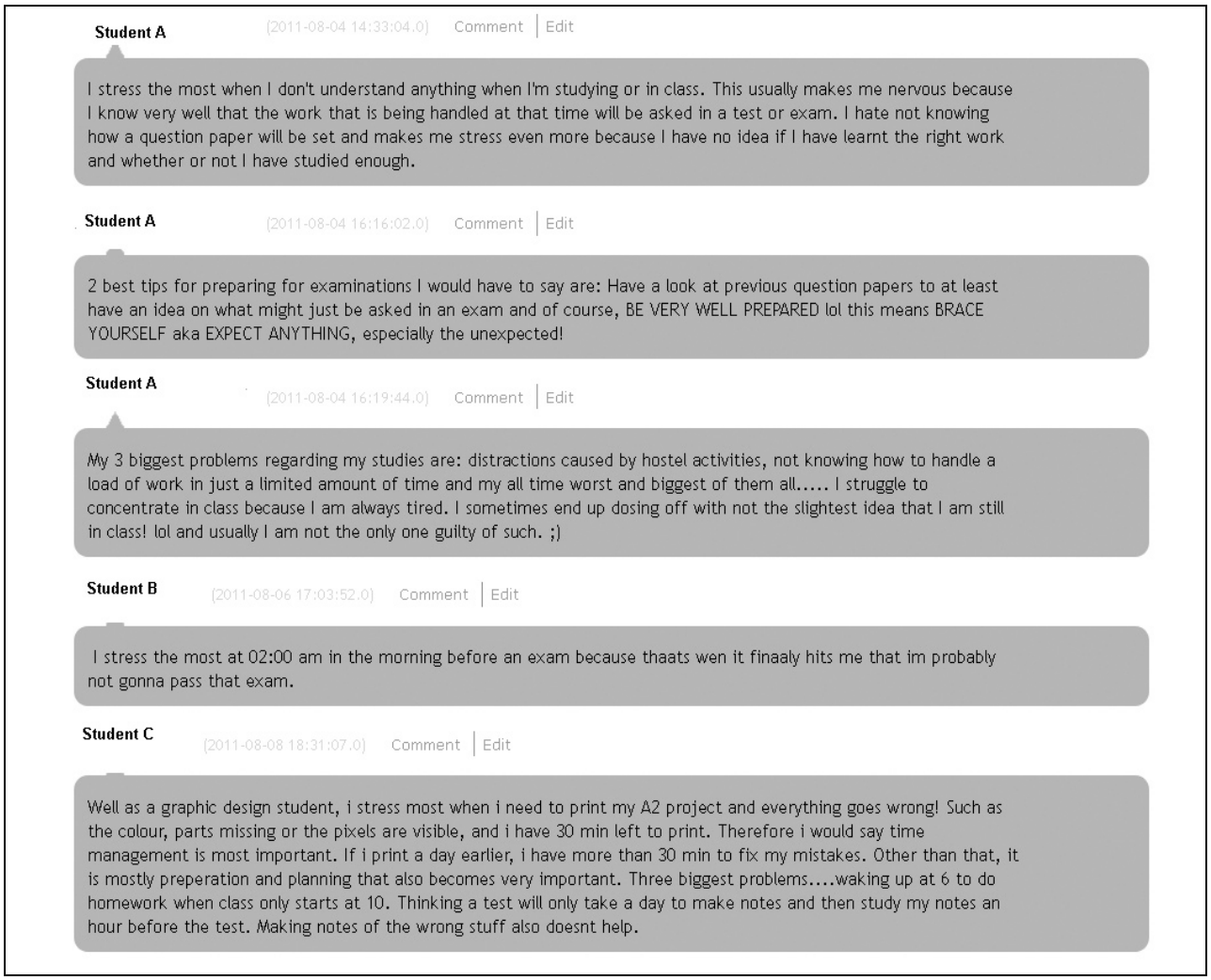


Figure 4.14 Examples of wiki contributions

4.2.16 Guideline 4: Make sure students know what is expected from them in terms of aims and objectives, learning resources and assessment criteria

As seen in §3.4.3 students need to assume responsibility for their own learning. This can be done if the educator involves the students in the planning and decision making upon learning aims and objectives. It is important to take into consideration that this is a responsibility and students need to be on a high level of SDL to be able to contribute to such an activity. As discussed in §4.2.8, the students who had enrolled for the AGLE 121 module, most probably belonged to Grow's stage 1 or stage 2 (Refer §2.6.3), and would not be able to function on such a high level of SDL just yet.

AGLE 121 students will definitely benefit more from Brockett and Hiemstra's, (1991:24-27) point of view, that students should know what is expected of them in terms of objectives, learning strategies, resources, and evaluation criteria (Refer §3.4.3). Therefore, this guideline was integrated in the eFundi^{TM} site by focusing on the following aspects:

4.2.16.1 Access to learning outcomes, objectives and assessment criteria

The learning outcomes and objectives were made available to the students in their study guide (figure 4.15). The students received this study guide as a hard copy and it was uploaded into the resourses functionality of the AGLE 121 eFundi^{TM} site.

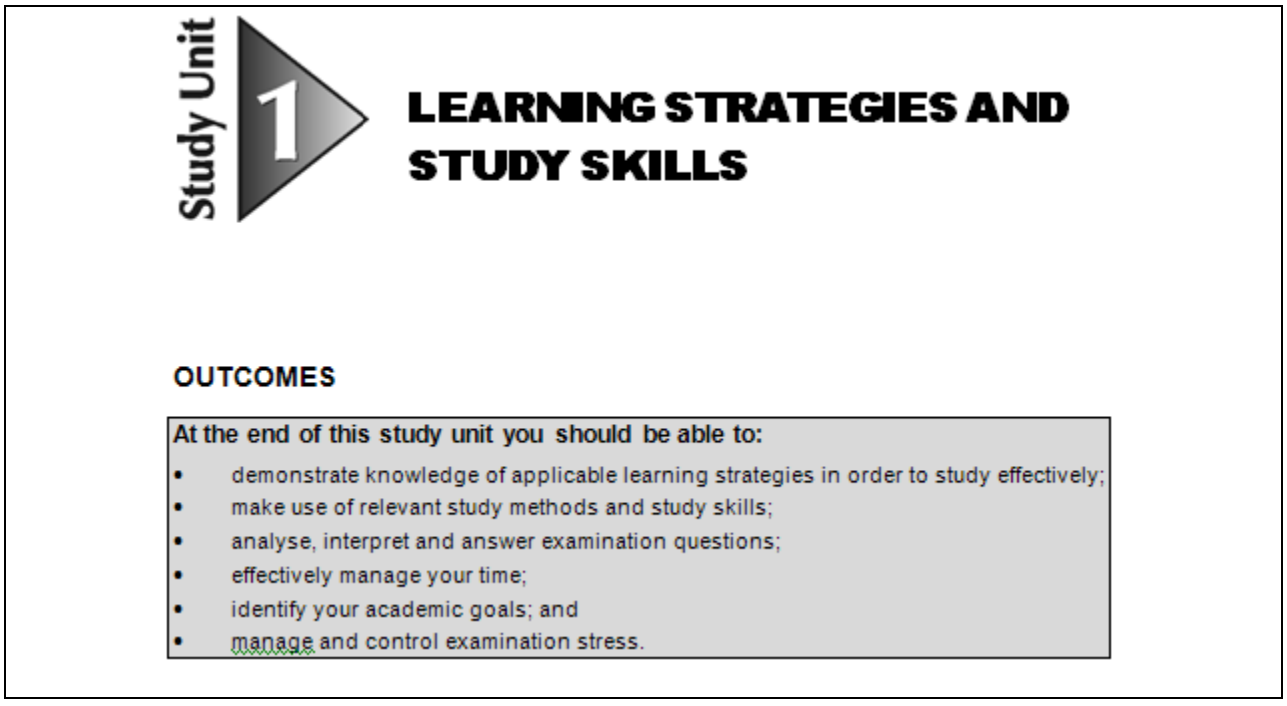


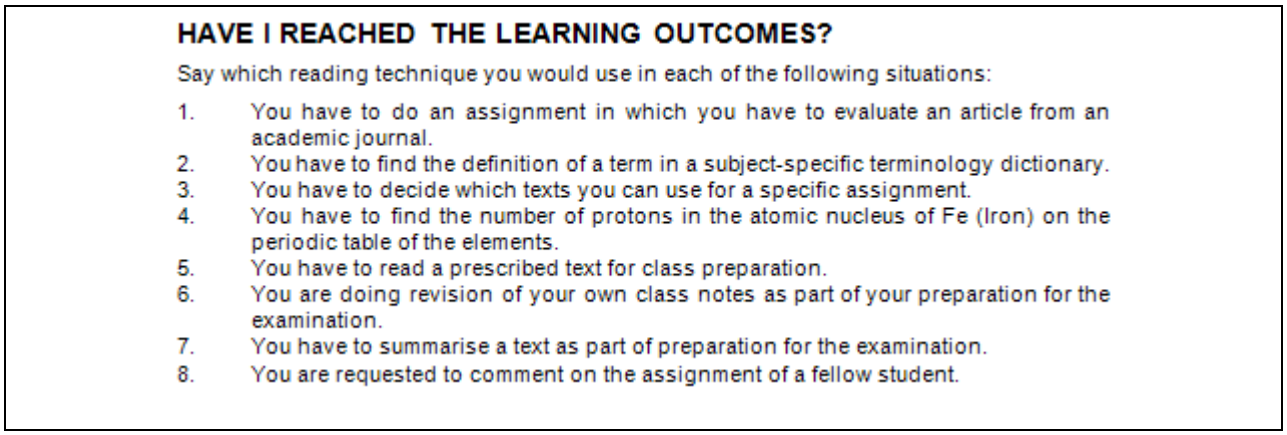
Figure 4.15 Example of learning outcomes in study guide

4.2.16.2 Involve students in the planning and decision making upon learning aims and objectives

As seen in §4.2.16, this guideline could not be integrated into the AGLE 121 module because the SDL level of the students was not high enough yet.

4.2.16.3 Make assessment criteria available

The assessment criteria were made available to the students in their study guide (figure 4.16). The students received this study guide as a hard copy and it was uploaded into the Resourses functionality of the AGLE 121 eFundi™ site (Refer §4.2.16.1).



HAVE I REACHED THE LEARNING OUTCOMES?

Say which reading technique you would use in each of the following situations:

1. You have to do an assignment in which you have to evaluate an article from an academic journal.
2. You have to find the definition of a term in a subject-specific terminology dictionary.
3. You have to decide which texts you can use for a specific assignment.
4. You have to find the number of protons in the atomic nucleus of Fe (Iron) on the periodic table of the elements.
5. You have to read a prescribed text for class preparation.
6. You are doing revision of your own class notes as part of your preparation for the examination.
7. You have to summarise a text as part of preparation for the examination.
8. You are requested to comment on the assignment of a fellow student.

Figure 4.16 Example of assessment criteria in study guide

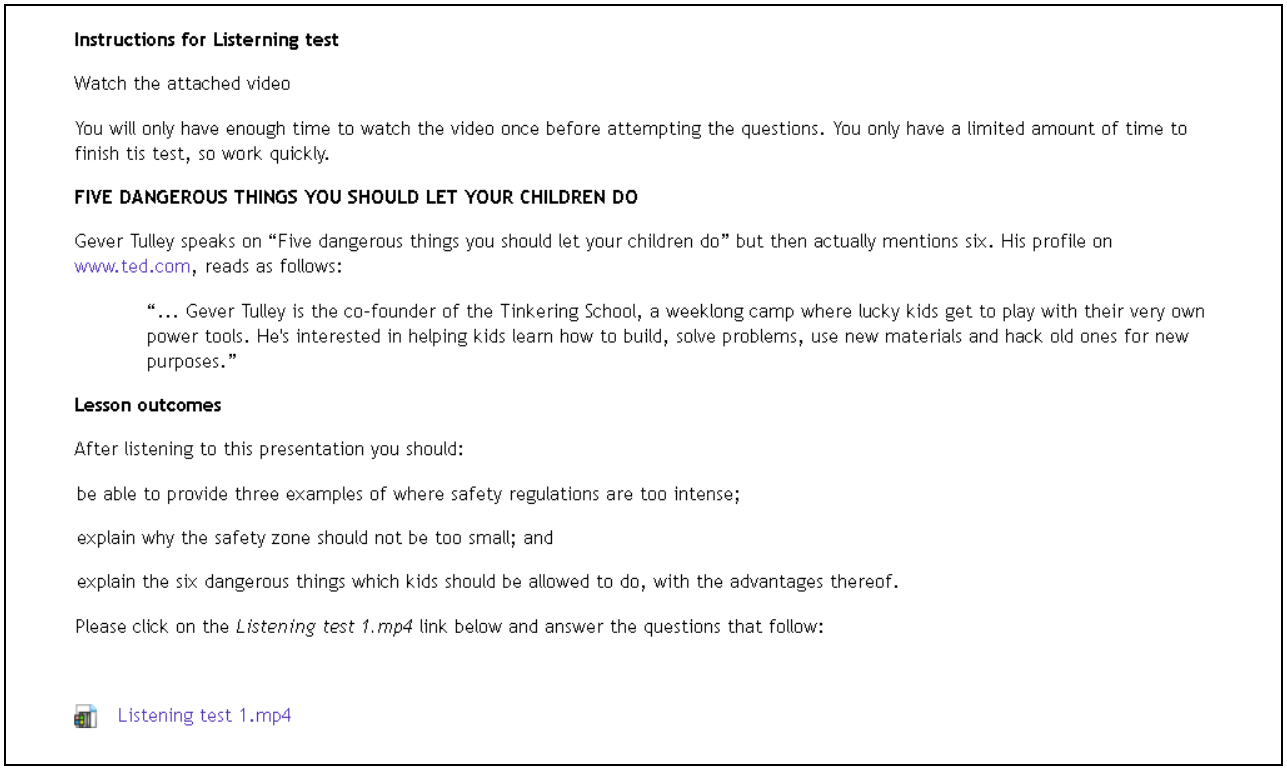
4.2.17 Guideline 5: Situate learning in real life context by choosing learning activities and assignments in familiar situations that can show students the importance of the learning content

According to Merriam *et al.*, 2007:107 engagement in a variety of real life learning situations is important because students want to know if the knowledge and skills they gain are relevant in their everyday lives (Refer §3.4.5). This guideline was integrated in the eFundi™ site by focusing on the following aspects:

4.2.17.1 Create creative and interesting assignments with real life scenarios

A number of listening comprehension tests were made available on eFundi™ (figure 4.17). These tests were based on a variety of interesting controversial topics. Students were expected to do

these in their own time in order to practice their listening skills. This was made possible with the Tasks, Tests and Surveys functionality of the AGLE 121 eFundi™ site. For the written assignments students received topics focusing on issues from their specific study fields. These assignments were uploaded in the Assignment functionality of the AGLE 121 eFundi™ site.



Instructions for Listerning test

Watch the attached video

You will only have enough time to watch the video once before attempting the questions. You only have a limited amount of time to finish tis test, so work quickly.

FIVE DANGEROUS THINGS YOU SHOULD LET YOUR CHILDREN DO

Gever Tulley speaks on "Five dangerous things you should let your children do" but then actually mentions six. His profile on www.ted.com, reads as follows:

> "... Gever Tulley is the co-founder of the Tinkering School, a weeklong camp where lucky kids get to play with their very own power tools. He's interested in helping kids learn how to build, solve problems, use new materials and hack old ones for new purposes."

Lesson outcomes

After listening to this presentation you should:

be able to provide three examples of where safety regulations are too intense;

explain why the safety zone should not be too small; and

explain the six dangerous things which kids should be allowed to do, with the advantages thereof.

Please click on the *Listening test 1.mp4* link below and answer the questions that follow:

Listening test 1.mp4

Figure 4.17 Example of listening test

4.2.17.2 Integrate instructional software into the LMS

As seen in §3.4.5 there are a number of different types of instructional software that can be integrated into a LMS. According to Roblyer (2006:77-116) drill and practice software can be used to give immediate feedback to students on the correctness of their submissions. Students, especially stage 1 students, can benefit from this type of software that helps them to improve memory techniques (Refer §3.4.5). Drill and Practice software on memory techniques and how to improve your memory was also made available to the students. In this programme, students were provided with the information on how to remember certain facts (figure 4.18) when, for example,

answering longer essay questions. They were then given the opportunity to get to practice it and receive immediate feedback (figure 4.19). Other important topics and skills, such as time management, were integrated into the tutorial to give practical examples of how these techniques could be used in their everyday lives. Students were expected to do these in their own time. This was made possible with the *web content* functionality of the AGLE 121 eFundi™ site.

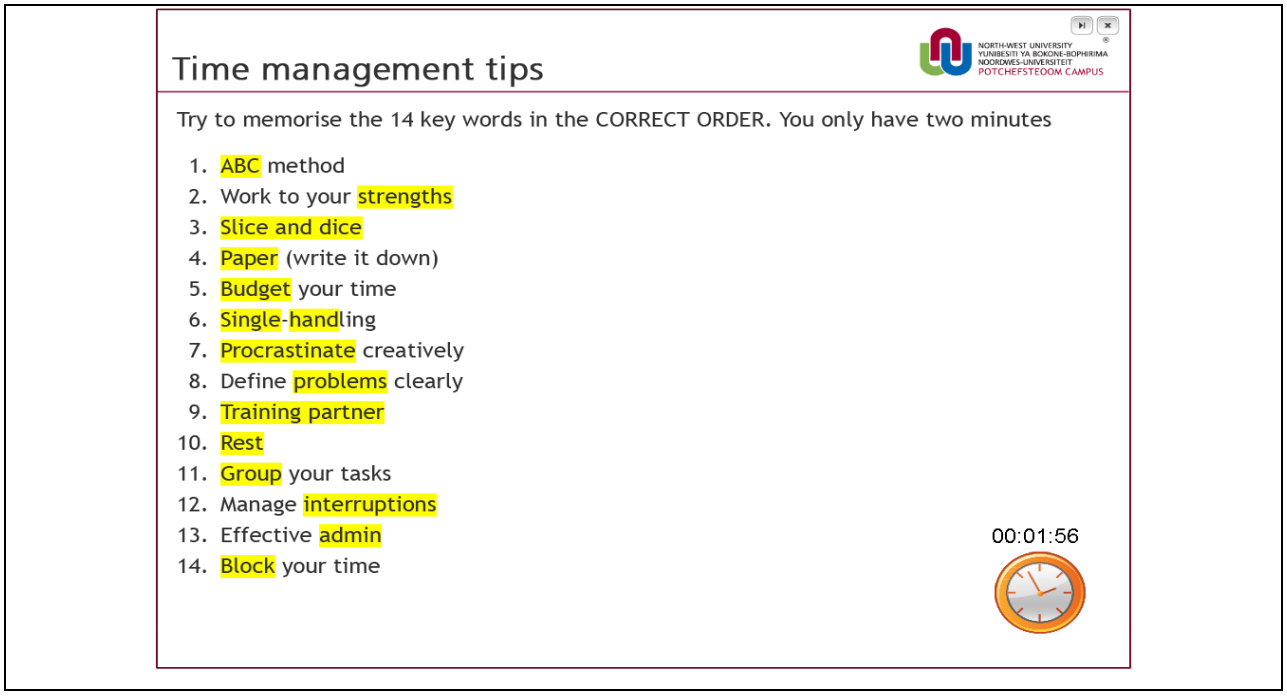


Figure 4.18 Example of things to remember in Drill and Practice software programme

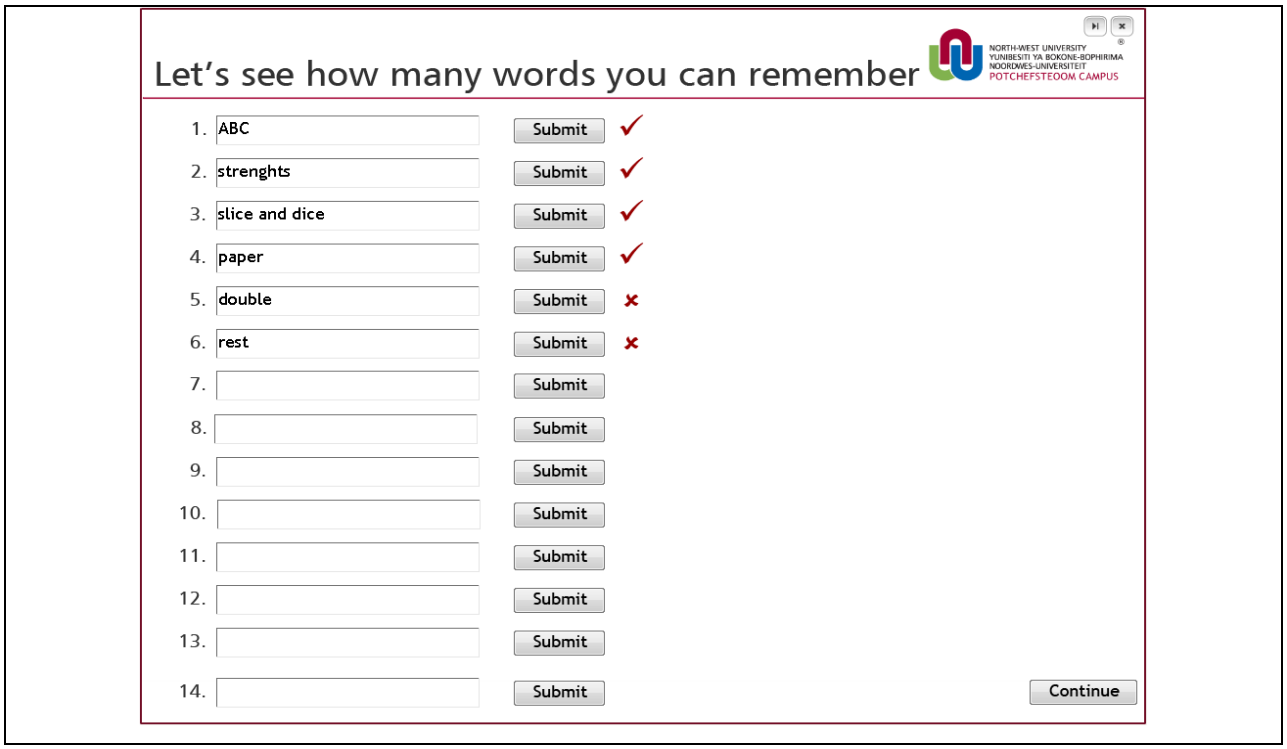


Figure 4.19 Example of immediate feedback in Drill and Practice software programme

4.2.18 Guideline 6: Provide a variety of resources

As seen in §3.4.6 a facilitator should provide the students with a variety of resources and scaffolding to support students' interaction with new and unfamiliar knowledge and skill (Oswalt, 2003:25). However, the student should also take responsibility of their own learning by finding alternative resources (Refer §3.4.6). This guideline was integrated in the AGLE 121 eFundi™ site by focusing on the following aspects:

4.2.18.1 Learning materials

Learning material may take a variety of forms and may include the following that was indeed integrated into the AGLE 121 eFundi™ site (Refer §3.4.6):

- *Interactive materials* - students can access these and interact with them online as seen in §4.2.14.2 with the online typing tutor game which was published in a *web content* functionality of the AGLE 121 eFundi™ site.

- *Stand alone interactive materials - the* drill and practice software programmes which were published in the web *content* functionality of the AGLE 121 eFundi™ site *a*s seen in §4.2.17.2.
- *Traditional materials* - a variety of resources that were made available to the students in the resources functionality of eFundi™ *a*s seen in §4.2.14.1.

4.2.18.2 Discussions

The lecturer and other students can also be seen as an important resource. The lecturer provided a schedule with online visiting hours. Students could then participate in live chat sessions with the lecturer and other students (Refer §4.2.15.3). This was made possible with the *chat* and *schedule* functionalities of the AGLE 121 eFundi™ site. The lecturer also tried to challenge all the different types of students during class discussions. Some students were given more challenging questions and tasks, while other students were exposed to less challenging questions and tasks in order to keep everyone sensibly engaged.

4.2.18.3 External web links

Except for the links to the online typing tutor (Refer §4.2.14.2) students were also encouraged to find alternative relevant resources. A document with guidelines on how to evaluate resources was uploaded in the resource functionality of the AGLE 121 eFundi™ site to help students during the process of finding reliable resources on the internet.

4.2.19 Guideline 7: Help students to evaluate and validate their learning accomplishments and experiences

As seen in §3.4.7 the educator needs to be proactive in the assessment process. Assignments or test marks are important for students to enable them to track their progress but they will also need feedback in the form of discussions with the educator or peers. This guideline was integrated in the AGLE 121 eFundi™ site by focusing on the following aspects:

4.2.19.1 Feedback to students

Proper feedback is of utmost important when guiding students to a higher level of SDL skills. Feedback on the written assignments was given in the form of Audio files where the lecturer provides detailed comments on the students work. The depth of the feedback will vary from student to student depending on their level of skills. These files were uploaded into the personal *dropbox* functionality. Videos with commentary on common mistakes from the current and previous years were uploaded into the *resources* functionality of the AGLE 121 eFundi™ site for the students to view (figure 4.20). Students also received immediate feedback on specific tasks done in eFundi™ (Refer §4.4.3.3).

Assessment Plan AGLE 121 2011 for students.docx	Actions	Entire site	HENK LOUW	Jul 29, 2011 3:44 pm	11.7 KB
Automatic table of contents.wmv	Actions	Entire site	HENK LOUW	Sep 15, 2011 12:35 pm	13 MB
Child rights.doc	Actions	Entire site	HENK LOUW	Sep 5, 2011 9:50 am	625.5 KB
Editing your assignments.ppt	Actions	Entire site	HENK LOUW	Sep 5, 2011 10:26 am	0.7 MB
Feedback on Major Assignments AGLE 121 2010 PART 1.wmv	Actions	Entire site	HENK LOUW	Sep 5, 2011 10:36 am	14.2 MB
Feedback on Major Assignments AGLE 121 2010 PART 2.wmv	Actions	Entire site	HENK LOUW	Sep 5, 2011 10:37 am	25.1 MB
Feedback on Major Assignments AGLE 121 2010 PART 3.wmv	Actions	Entire site	HENK LOUW	Sep 5, 2011 10:38 am	42.5 MB
QUALITIES OF EFFECTIVE TEXTS PPT for EFUNDI(2).ppt	Actions	Entire site	HENK LOUW	Sep 5, 2011 10:27 am	674.5 KB
SQ5R feedback 1.wmv	Actions	Entire site	HENK LOUW	Sep 15, 2011 11:09 am	4.5 MB
SQ5R feedback 2.wmv	Actions	Entire site	HENK LOUW	Sep 15, 2011 11:11 am	10.1 MB
Writing Style.pdf	Actions	Entire site	HENK LOUW	Sep 5, 2011 10:30 am	100.9 KB

Figure 4.20 Videos with commentary on common mistakes in resources folder

4.2.19.2 Discussions and shared experiences

Feedback on assignments and tests were given specifically during the contact sessions. Time was also allocated for discussions during those sessions, but the AGLE 121 eFundi™ site was not used for this purpose.

4.2.20 Guideline 8: Vary the amount of SDL guidance and provide students repeatedly with opportunities to increase responsibilities

According to Grow (1991:130) the educator should determine the SDL readiness level of the student and match his teaching role and strategies accordingly (Refer §3.4.8). As discussed in §4.2.8, the students who had enrolled for the AGLE 121 module most probably belonged to Grow's stage 1 or stage 2. As seen in §3.4.8 students with low SDL skills (Grow, Stage 1) should be provided with guidance such as immediate feedback and lecturing to help them overcome learning difficulties and resistance to SDL. Students with moderate SDL skills (Grow, Stage 2) should be provided with inspiring, teacher-led discussions, guided practice tasks and structured projects. According to Borich (2007:337) it is important to constantly encourage and motivate these students to become more involved in the subject matter by going beyond the information given and to restructure the new information in their own way of thinking and prior knowledge (Refer §3.4.8). Keeping the SDL skills level of the students enrolled for AGLE 121 in mind, this guideline was integrated accordingly.

4.2.20.1 Communication with students

As seen in §4.2.10.2 the students received an assessment plan (figure 4.5) at the beginning of the semester. This plan was made available in the resources functionality in AGLE 121 eFundi™ site. Because of the SDL levels of the AGLE 121 students, this could not serve as the only notification and the lecturer had to remind them of due dates of assignment and tests in the Schedule and Announcement functionalities that were used for communication with students.

4.2.20.2 Availability of resources

A variety of resources were made available to the students (Refer §4.2.18.2) which means that the students with low SDL skills were given enough information to complete the module. However, it was expected of the students to prepare for each class. As part of this process students had to find information and other resources that could be relevant to the study unit they were doing. This encouraged the students with higher SDL skills to become more involved in the module and to make the content their own.

4.2.20.3 Variety of assignments and quizzes

Except for the formal assessment, a variety of assignments and quizzes were made available to students e.g. listening tests (Refer § 4.2.17.2), practice skills tests (Refer § 4.2.13.1) and drill and practice exercises (Refer § 4.2.17.2). Students had to do these exercises on their own time. Not all of these exercises were used to calculate the module mark and students had to do it for their own benefit (Refer §4.2.12.1). Thus most probably the students with higher SDL skills completed the optional exercises as well.

4.2.20.4 Reflection

As seen in §4.2.13.2, students were expected to reflect on their own learning by creating electronic diaries. According to Oswalt (2003:25) it is important to encourage students to reflect on their learning (Refer §3.4.1). When students reflect on their own work they get the chance to construct their knowledge by analyzing their own thoughts (Clarke, 2008:241) and to restructure the new information in their own way of thinking and prior knowledge (Borich 2007:337). The electronic diaries were uploaded in the *tasks tests and surveys* functionality of the AGLE 121 eFundi™ (Refer §§4.2.13.2).

A short summary of the integration of the SDL guidelines in eFundi™ is given in table 4.7.

4.2.21 Chapter summary

In the previous chapter, the SDL guidelines were refined in such a way that it became applicable in an online environment. In this chapter, the guidelines were refined even more in order to focus on the LMS used by the NWU. eFundi™, the LMS being used at the NWU, has a variety of functionalities available to support SDL. However, it is for the lecturer to decide which of the functionalities will be appropriate for the specific module. This chapter gives a background of eFundi™ as LMS as well as the structure of the AGLE 121 module. The layout of the old AGLE 121 eFundi™ site, a layout of the newly developed AGLE 121 eFundi™ with the specific functionalities used and the different tasks and exercises, as well as the integration of the SDL guidelines were discussed.

Table 4.7 Integrating SDL guidelines in eFundi™

Guideline	Implementation	Integration into eFundi™
1. Help students to assess their own learning needs, goals and interests.	Awareness of competency levels	Skills tests in the Tasks Tests and Surveys functionality.
	Reflect on own learning	Electronic diaries in the Tasks Tests and Surveys functionality.
	Push students out of comfort zone	Contribution to the Wiki functionality.
2. Provide a flexible learning environment in which students have the responsibility and freedom to make choices to meet their specific needs concerning goals, resources and participation.	Availability of a greater volume of diverse course materials	Extra resources and guidelines on how to find reliable information were posted in the Resources functionality.
	Incorporation of other resourses	Typing tutor game made available in a Web Content functionality
	Student participation	Informal discussions with fellow students in the Chat functionality and class participation.
3. Foster a collaborative learning environment that is democratic, , challenging and non-threatening.	Communication	Class times, due dates and test dates were posted in the Schedule functionality. Reminders and general class administration was send through the Announcement functionality.
	Participation in discussion forums	The Forum functionality was not used in this module.
	Immediate interaction and feedback	Live chat sessions with the lecturer and other students were made possible with the Chat and Schedule functionalities. A number of listening tests, assignments and quizzes were made available in the Tasks, Tests and Surveys functionality.
4. Make sure students know what is expected of them in terms of aims and objectives, learning resources, assessment criteria.	Access to learning outcomes, objectives and assessment criteria	Learning outcomes, objectives and assessment criteria were made available in the study guides and on the eFundi™ site.
	Involve students	This guideline could not be integrated into this module.
	Make assessment criteria available	Assessment criteria were made available in the study guides and not on the eFundi™ site.
5. Situate learning in real life context by choosing learning activities and assignments in familiar situations that can show students the importance of the learning content.	Create creative and interesting assignments with real life scenarios	Listening comprehension tests in the Tasks, Tests and Surveys functionality. Written assignments were uploaded in the Assignment functionality.
	Integrate instructional software into the LMS	Drill and practice software on memory techniques was made available in the Web Content functionality.

Table 4.7 Integrating SDL guidelines in eFundi™ (Continue)

Guideline	Implementation	Integration into eFundi™
6. Provide a variety of resources.	Learning materials	The Resources functionality was used to provide learning resources.
	Discussions	Students were able to participate in live chat sessions with the lecturer and other students. This was made possible with the Chat and Schedule functionalities.
	External weblinks	Online typing tutor. Finding reliable resources on the internet.
7. Help students to evaluate and validate their learning accomplishments and experience.	Feedback to students	Feedback on the written assignments was given in the form of Audio files and Videos. These files were uploaded into the Resources and personal Drop Box functionality.
	Discussions and shared experiences	Feedback and discussions during contact sessions.
8. Vary the amount of SDL guidance and provide students repeatedly with opportunities to increase responsibilities.	Communication with students	Schedule and Announcement functionalities were used for communication with students.
	Availability of resources	The Resources functionality was used to provide a variety of learning resources.
	Variety of assignments and quizzes	Listening comprehension tests in the Tasks, Tests and Surveys functionality. Written assignments were uploaded in the Assignment functionality.
	Reflection	Electronic diaries in the Tasks, Tests and Surveys functionality.

Chapter Five

Research Design and Methodology

5.1 Introduction

The aims of this research was to determine how an LMS could be used to enhance SDL. In order to achieve this aim, the following sub-aims were stated:

i) To identify guidelines to improve students' SDL skills.
ii) To investigate how SDL guidelines can be adopted in an LMS.
iii) To develop an eFundi™ site with the necessary components to enhance SDL.
viii) To evaluate to what extent a newly-constructed eFundi™ site could enhance SDL.

This chapter addresses the research design and methodology used in this study, viewed from a constructivist perspective. It addresses the researcher's choice of an empirical study using a mixed-method research approach. This chapter furthermore concentrates on research design and methodology, research methods, population and sampling, measuring instruments, data analysis, data collection procedures and ethical aspects. The process shown in figure 5.1 indicates the steps that were followed when executing the empirical study and will be described in the next section.

5.2 Research paradigm, design and methodology

This study was performed from a constructivist perspective. Constructivists believe that knowledge and meaning are constructed in the mind of the individual. When doing research from a constructivist perspective the interest lies in the co-construction of knowledge between researchers and the researched (Clark, 2006:1). Clark (2006:1) further suggests that knowledge and interpretation in a constructivist research paradigm is the result of a collective process and must attend to three things when recording the research:

- The assumptions the researcher brings to their subject of inquiry, and to the research situation.
- The socially constructed meanings that occur in the context of a particular interview.
- The socially constructed meanings that existed prior to, and that shape or limit, the meanings that may emerge in a specific interview context.

Krauss (2005:759) asserts that when researchers interact with the subjects they study in order to obtain data, the inquiry changes both the researchers and the subject, making the knowledge

context and time dependent. According to Kincheloe (2000:342) “the angle from which an entity is seen, the values of the researcher that shape the questions he or she asks about it, and what the researcher considers important, are all factors in the construction of knowledge about the phenomenon in question.” Figure 5.1 is a diagrammatic representation, showing the holistic picture of the processes followed in the research design. After figure 5.1 the process and the flow of the study will be discussed in depth.

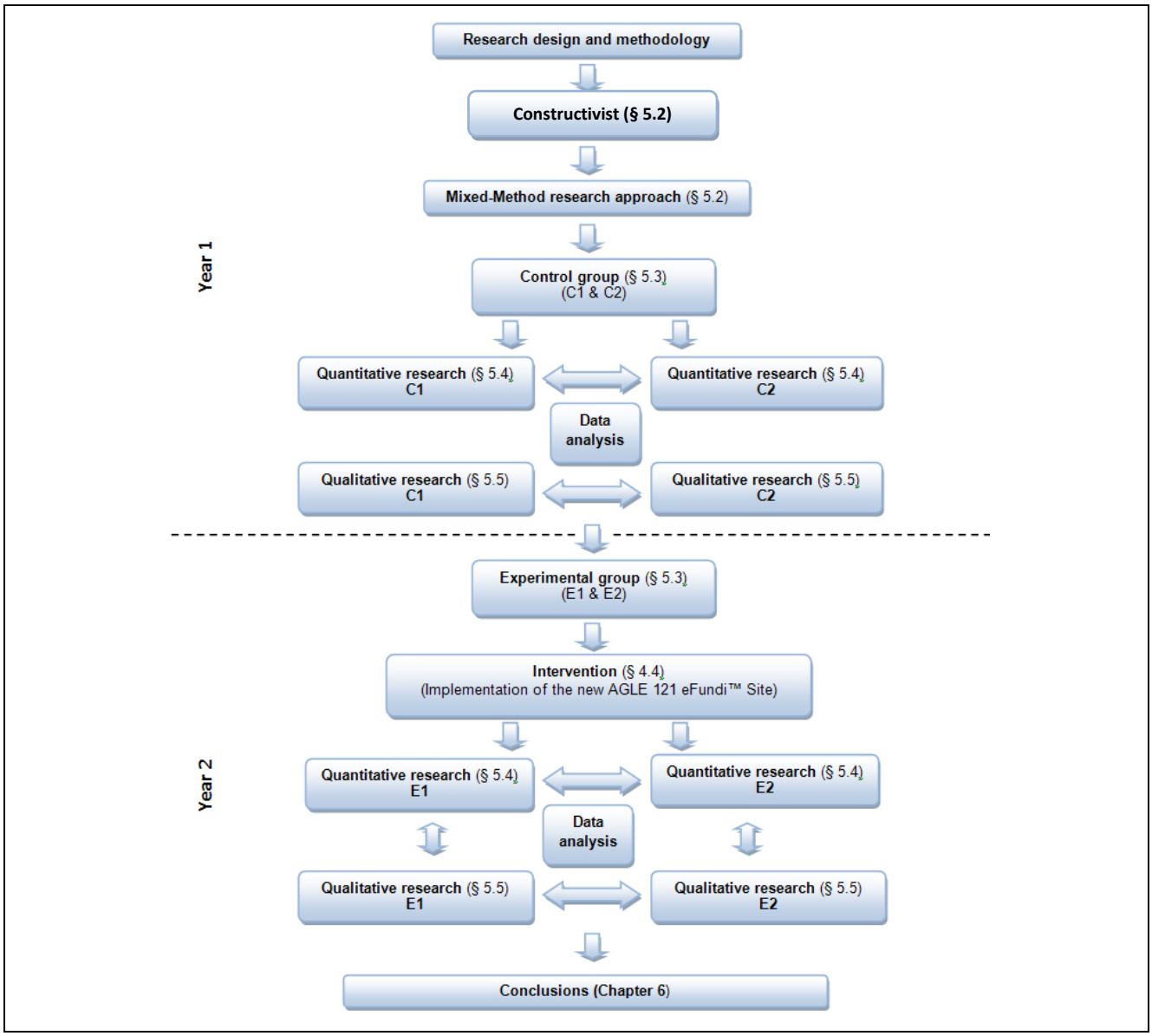


Figure 5.1 Flow of research

The intention of the empirical study was to gather valid and reliable data which addressed the research question, and specifically sub-aim (iv), to evaluate to what extent a newly-constructed eFundi™ site could enhance SDL (refer §1.3). To effectively inquire into these questions, aims and sub-aims, a mixed methods inquiry approach was used. Johnson and Onwuegbuzi (2004: 21)

argue that a mixed-method research design allows words to add meaning to numbers. By using this research design, more reliable evidence could be obtained and it is possible to provide better conclusions through correlation and verification of findings. Quantitative and qualitative inquiry approaches were used to research the questions pertinent to this research. When using a mixed-methods research design a combination of qualitative and quantitative methods are used and researchers are therefore not limited to techniques associated with only one of the traditional designs (McMillan & Schumacher, 2006: 27). This research method is not to replace either the quantitative or qualitative approaches, but rather to use the strengths and minimize the weaknesses of both these methods (Johnson & Onwuegbuzie, 2004:14). Hanson *et al.* (2005: 224) argue that when using data from both quantitative or qualitative approaches, the researcher will gain a deeper understanding of the phenomenon. When a combination of research approaches is used it can add insight and understanding to aspects that might be missed when only a single method is used. Therefore it produces more complete knowledge necessary to connect theory and practice (Johnson & Onwuegbuzie, 2004: 21).

The mixed-method design of choice for this study which allowed for legitimate, valid and reliable data was the ***explanatory mixed method design*** (QUANT→qual). The purpose of the explanatory mixed method design is to use qualitative findings to help clarify the quantitative results (Ivankova *et al.*, 2010: 266). In a explanatory mixed method design, quantitative and qualitative data are gathered sequentially with the primary emphasis on the quantitative methods (McMillan and Schumacher, 2006: 402). First the quantitative data are collected and analysed. After the analysis of the quantitative data is complete, the researcher collects and analyses the qualitative data. The advantage of the explanatory mixed method design is that the data are gathered in two clearly separate stages which makes it straightforward to implement (Ivankova *et al.*, 2010: 266). The sequential flow of the quantitative and qualitative phases are shown in a visual diagram in figure 5.2.

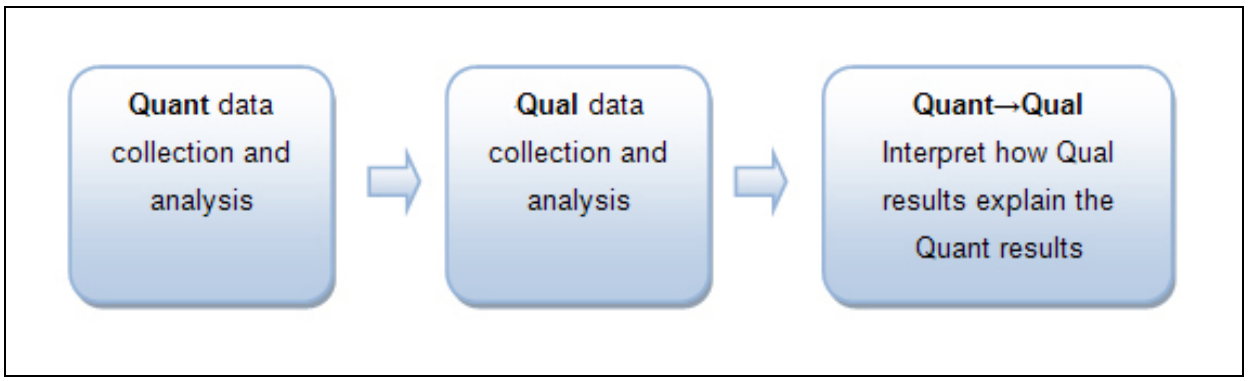


Figure 5.2 Explanatory mixed method design (McMillan and Schumacher, 2006: 402)

In the next sections the research methodology will be discussed by focussing on the research design, study population, data gathering techniques, data analysis techniques as well as the validity and reliability for both the qualitative and quantitative methods.

5.3 Research context and participants

This study was conducted at the NWU, Potchefstroom campus, South Africa. Participants were selected by means of convenience sampling. In convenience sampling a group of subjects is selected on the basis of being available, for example a university class (McMillan & Schumacher, 2006: 125). The participants for this study were all the students enrolled for the module AGLE 121 in 2010 and for AGLE 121 in 2011. Academic Literacy is a compulsory module for all first year students enrolled for studies at the NWU and AGLE 121 is the English version of the module. There are about 700 students who enroll for this module each year.

Because of the large number of students enrolled for the AGLE 121 module, there are six lecturers responsible for this module. Students are randomly divided into different groups. Each of the lecturers is then responsible for approximately 4 groups. All the AGLE 121 students have access to the same AGLE 121 eFundi^{TM} site. For practical and administrative reasons, the researcher mainly corresponded with only one of the lecturers responsible for the AGLE 121 module, Lecturer A. The arrangement was that he in turn would communicate with the rest of the lecturers. The administration of the AGLE 121 eFundi^{TM} site was also done by Lecturer A with the help of the researcher. The researcher wasn't sure if this arrangement with Lecturer A would influence the study in any way and decided that the data gathered from his students will be compared with the data from the other lecturers to see how it correlates.

For this reason the participants for the quantitative research were divided into the following groups:

Control group

Group C1: Students enrolled for AGLE 121 in 2010 that attended Lecturer A's classes

Group C2: The rest of the students enrolled for AGLE 121 in 2010

Experimental group

Group E1: Students enrolled for AGLE 121 in 2011 that attended Lecturer A's classes

Group E2: The rest of the students enrolled for AGLE 121 in 2011

5.4 Quantitative research

The quantitative component of this study was quasi-experimental with a non-equivalent groups pre-test-post-test control group design (McMillan & Schumacher, 2006: 272) where a SDL questionnaire was used to gather the data. The quantitative research design for this study is represented in Figure 5.3. In the next section the research design for the quantitative component of this study will be discussed.

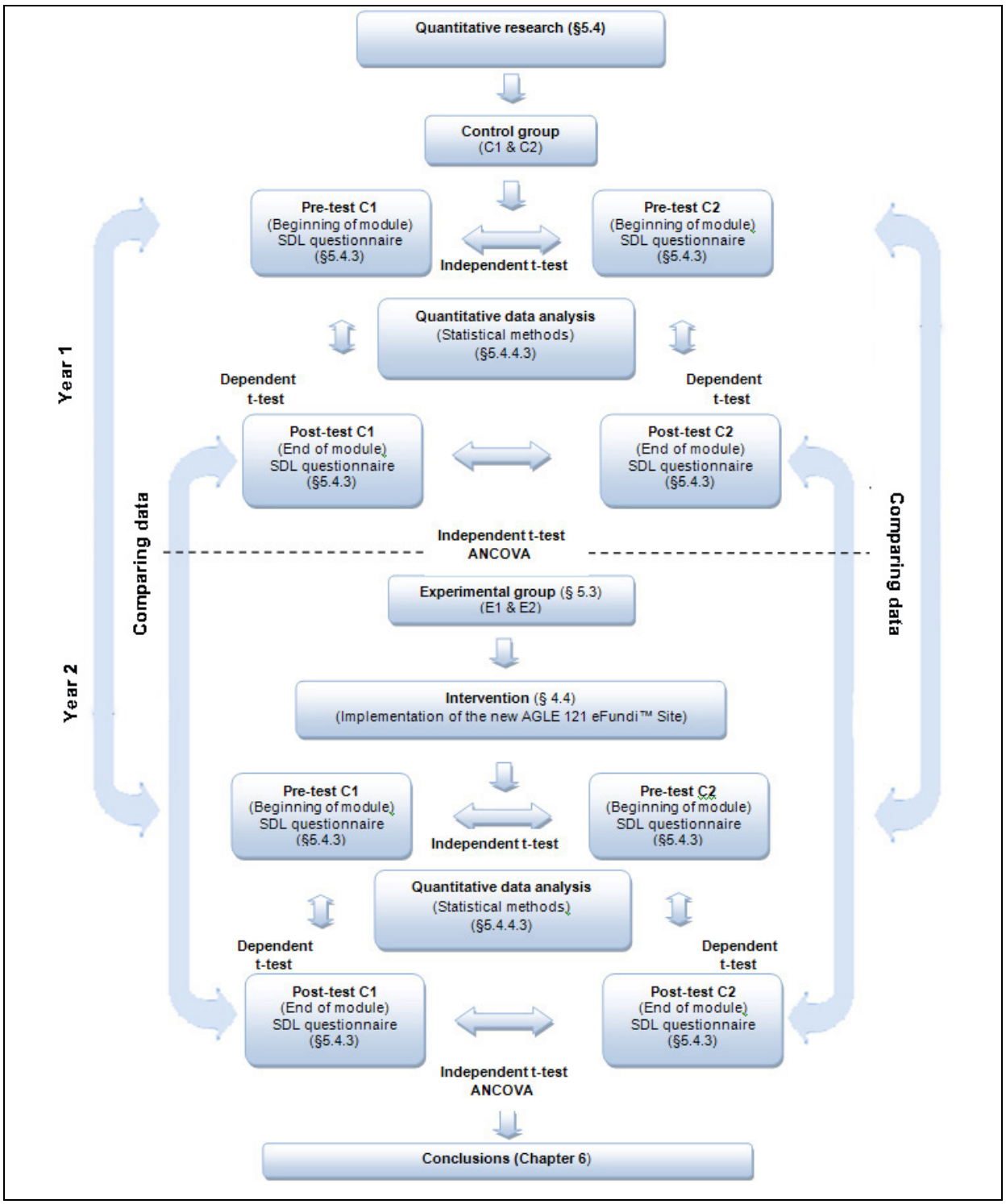


Figure 5.3 Quantitative research design

5.4.1 Research design

According to Maree and Pietersen (2010:27) quantitative research is a process that is systematic and objective in its ways of using numerical data from a selected population to generalise the finding that is being studied. One of the ways in which quantitative research can be conducted is experimental design. In an experimental design the researcher wants to determine the impact of an intervention on participants in a certain study (Cresswell, 2008:591). Thus, the researcher manipulates what the participants will experience (McMillan & Schumacher, 2006: 23). In this specific study, the intervention was the implementation of a newly developed eFundi^{TM} site. SDL guidelines (refer §3.4) were incorporated into the site to see whether the integration of those guidelines could promote the students' SDL skills.

The specific kind of experimental design used for this study is called the quasi-experimental design. The purpose of this method is to determine cause and effect when there is manipulation of conditions (McMillan & Schumacher, 2006: 24). There are many different quasi-experimental designs available to use but because of the nature of this study a non-equivalent groups pre-test-post-test control group design (McMillan & Schumacher, 2006: 272) was chosen. The design is represented below in figure 5.4.

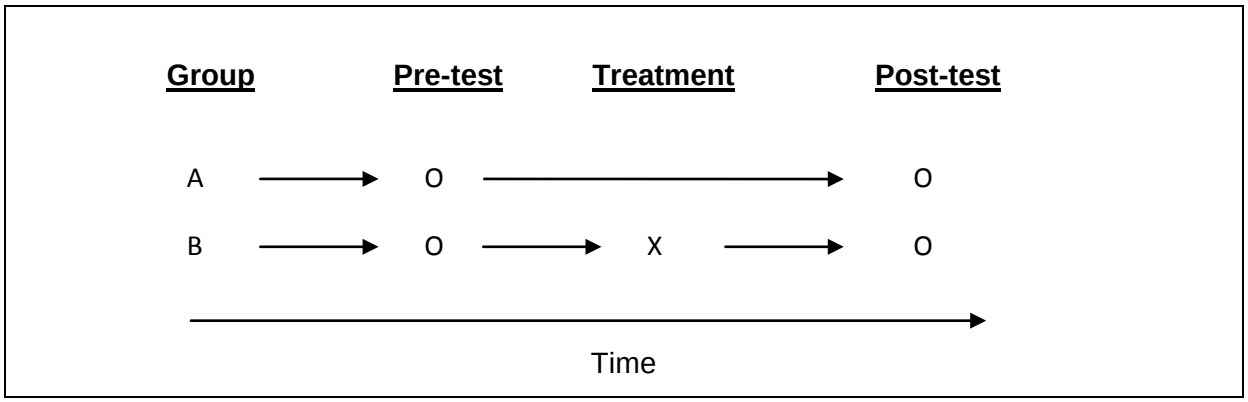


Figure 5.4 Non-equivalent groups pre-test-post-test control group design (McMillan & Schumacher, 2006: 272)

In this design, research on the two groups is usually conducted at the same time, as seen in figure 5.4. The one group progresses without any treatment while conditions in the other group are manipulated in one way or another. For ethical and administrative purposes, which will be referred to later in this chapter (refer §5.6), it was not possible to do the research on the two groups at once.

This study on group A was conducted in 2010 while the research on group B was done in 2011. The modified design is represented in figure 5.5.

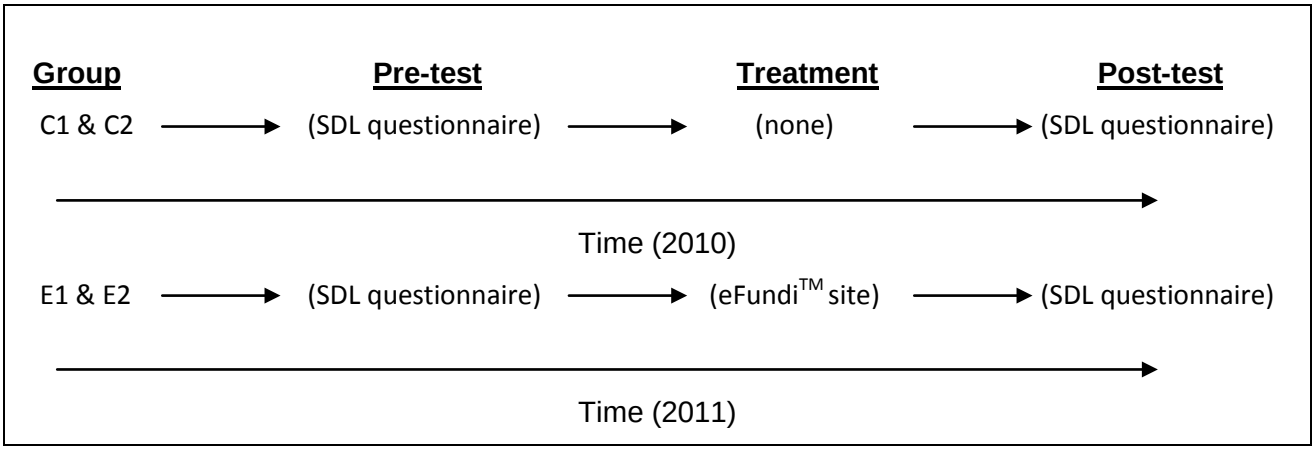


Figure 5.5 Modified non-equivalent groups pre-test-post-test control group design

Although group C (C1 & C2) and group E (E1 & E2) were not researched at the same time, there were no noticeable differences in characteristics between the two groups (refer §5.3) in terms of age, year group, semester taken or lecturer. Because of these similarities this study can still be described as true experimental and the non-equivalent groups pre-test-post-test control group design could be used.

5.4.2 Participants

According to McMillan and Schumacher (2006: 272) the non-equivalent groups pre-test-post-test control and comparison design allows the researcher to conduct the research on previously established groups. The control as well as the experimental group were subjected to a pre-test, after which only the experimental group received an intervention in the form of an eFundi™ site that attempted to promote SDL. The post-test was administered to both groups. The study was conducted over two years. The students who enrolled for AGLE 121 in 2010 were selected as the control group while the students for AGLE 121 in 2011 formed the experimental group. Since the two groups came from different cohorts, which could influence both the validity and the reliability of the research negatively, compensation was built into the design in the form of inferential statistics and control variables:

- Inferential statistics e.g. ANCOVA was performed to partial-out the effect of differences between the two groups from different years.

- To ensure as much similarity as possible between the two groups participating in the research, the questionnaire and interviews for both cohorts were conducted during the same semester of both years, namely the second. This ensured that students had similar average ages and identical study guides, outcomes, and equal hours of contact time and the group had the same lecturers conducting the classes.

5.4.3 Data collection procedure

The quantitative data for this study were collected by a questionnaire. A number of SDL measurement instruments were developed through the years but after analysing some SDL studies, (Guglielmino, 1977; Fisher *et al.,* 2001*;* Beitler & Mitlancher, 2007*;* Cadorin *et al.,* 2010; Williamson, 2007) it was found that a SDL readiness questionnaire is the best way to measure SDL.

Guglielmino developed the Self-Directed Learning Readiness Scale (SDLRS) in 1977, an instrument subsequently used by many researchers to measure self-directed readiness (Refer §2.3). Hoban *et al.* published The Self-Directed Learning Readiness Scale: a factor analysis study in 2005. In this publication they criticised Guglielmino's SDLRS, which had been commonly used since 1977.

As an alternative to Guglielmino's SDLRS, Fisher *et al.* (2001) developed a self-directed learning readiness scale for nursing education (Fisher & King, 2010:44, refer §2.3). This is an instrument for diagnosing students' attitudes, abilities and personality characteristics which are necessary for self-directed learning (Fisher *et al.*, 2001: 516). Fisher and King did another study in 2010 to verify the validity of the instrument. The validity of the scale was definitely supported by the results of the 2010 study.

Taking the above-mentioned into consideration, the questionnaire that was chosen to be used in this study is the Fisher *et al.* (2001) SDL readiness scale for nursing education. The fact that the questionnaire was developed for the nursing environment did not matter, since the questions were asked in such a way that it was not subject matter specific. The researcher was granted permission by Elsevier to use this questionnaire.

The questionnaire consists of forty questions and is scored on a five-point Likert scale (Strongly agree (1) / Agree (2) / Undecided (3) / Disagree (4) / Strongly disagree (5)). Items were grouped into three categories: (a) self-management; (b) desire for learning; (c) self-control.

The SDL-questionnaire was available on eFundi™ which allowed students to complete it online.

Group C1 and Group C2

1. Students completed the online questionnaires when the module started at the beginning of the second semester (pre-test).
2. Students followed the course of the module over approximately 6 months as was usually the case.
3. Students completed the same questionnaire on conclusion of the module (post-test).

Group E1 and Group E2

1. Students completed the online questionnaires when the module started at the beginning of the second semester (pre-test).
2. Students followed the course of the module over approximately 6 months during which they underwent an intervention in the form of a newly constructed eFundi™ site which aimed to foster SDL.
3. Students completed the same questionnaire at the end of the module (post-test).

The researcher exported the data from the eFundi™ site for statistical analysis. The number of completed questionnaires is presented in table 5.1.

Table 5.1 Number of completed questionnaires

Group	Possible participants	Participants who completed both questionnaires
C1	97	48
C2	469	189
E1	207	163
E2	582	124

Of all the completed questionnaires the responses of only 237 participants in 2010 and 287 participants in 2011 could be used for statistical analysis. The rest of the participants only completed either the pre or the post test questionnaire and could not be used for comparison.

5.4.4 Data Analysis

The data gathered from the questionnaires used for this study were processed and analysed with the help of the Statistical Consultation Services of the NWU.

5.4.4.1 Validity

In the context of research design, the term validity refers to the degree which scientific explanations of phenomena match reality, in other words, the truthfulness of the findings and conclusions (McMillan & Schumacher, 2006: 134). As indicated in §5.4.3, a questionnaire for measuring the students' SDL readiness was used. A confirmatory factor analysis, correlation and fit indices was done to assess validity of the instrument used in this study and will be discussed in the following sections.

Confirmatory factor analysis

The fundamental logic of factor analysis is that it is possible to statistically manipulate the empirical relationships among several indicators to reveal a common unobserved factor or hypothetical construct (Neuman, 1997: 170). The results of factor analysis tell a researcher how well the items relate to an underlying factor. A confirmatory factor analysis (CFA) using the AMOS statistical package was done to test whether the measures of the factors in the questionnaire are consistent with the way it was recommended by the designer of the questionnaire. A CFA is a theory-testing model. This model provides a viable method for evaluating construct validity and tests hypothesis concerning the factor structure of a measuring instrument (Taku *et al*., 2008:159).

Correlations

When doing a CFA, the correlations between the factors are tested. Correlations refer to the strengths of relationships between factors . Table 5.2 indicates how to interpret correlations in terms of strengths of relationships (McMillan & Schumacher, 2006: 171).

Table 5.2 Interpretation of correlation coefficients (McMillan & Schumacher, 2006: 171).

Correlation coefficient	Strength of relationship	Direction
-1>-0.5	high	negative
-0.5	moderate	negative
-0.5<0	low	negative
0	none	
0>0.5	low	positive
0.5	moderate	positive
0.5<1	high	positive

Fit indices

Fit statistics tests how well the model fits the data. A number of statistical calculations are made to determine the "goodness-of-fit" The statistics used for this study include the chi square/degrees of freedom ratio, the Bentler comparative fit index (CFI), the parsimony ratio and the goodness-of-fit index (GFI). It is however considered good practice to report multiple fit indices, typically from three broad classes (Hancock & Mueller, 2010). For the purpose of this study the minimum sample discrepancy divided by degrees of freedom (CMIN/DF), CFI and root mean square error of approximation (RMSEA) will be reported. The acceptable values for a good fit is shown in table 5.3.

Table 5.3 Acceptable values for good fit indices (Hancock & Mueller, 2010)

	Acceptable value
CMIN/DF	< 2
CFI	>0.9
RMSEA	<0.08

5.4.4.2 Reliability (Internal Consistency)

Internal reliability refers to the extent to which causal conclusions can be drawn (Maree & Van der Westhuizen, 2010: 39). Once the factor structure has been confirmed, the internal reliability of each factor can be determined. When items are formulated to measure a certain construct, there should be a high level of similarity among them. A measure of this degree of similarity is an indication of the internal consistency of the instrument. Cronbach's alpha coefficient is used to measure this

internal reliability and is based on the inter-item correlations. If the items are strongly correlated with each other, their internal consistency is high and the alpha coefficient will be close to one, but if the items are poorly formulated and do not show a strong correlation, the alpha coefficient will be close to zero.

The formula for calculating the Cronbach alpha coefficient is:

$$r_n = \frac{k}{k-1}\left(1 - \frac{\sum v_1}{v_T}\right)$$

Where

r_n = The Cronbach alpha coefficient

$\sum v_1$ = sum of variances of the items in the factor

k = number of items in the factor

v_T = variance of the factor

Table 5.4 indicates the figures for Cronbach's alpha coefficient generally accepted by researchers. Generally, reliability estimates of 0.80 are regarded as acceptable while values lower than 0.60 are regarded as unacceptable (Pietersen & Maree, 2010b: 216).

Table 5.4 Interpretation of Cronbach's alpha coefficient (Pietersen & Maree, 2010b: 216)

Cronbach's alpha coefficient	Meaning
≈ 0.7	low reliability
≈ 0.8	moderate reliability
≈ 0.9	high reliability

5.4.4.3 Statistical techniques and methods

The quantitative data of this study were analysed by means of dependent and independent T-tests. Descriptive statistical techniques and inferential statistics, e.g. ANCOVA were used. Where appropriate, p-values and effect sizes were calculated to determine statistical and practical significant differences.

Statistical and practical significance

The p- values and effect sizes are used to determine the practical and statistical significance of differences (Pietersen & Maree, 2010a: 210). The p-value is used to determine if there is a statistically significant difference between data from a random sample. A p-value of <0.05 indicates the differences is statistically significant. Effect sizes are used to determine if data is of practical significance. Effect sizes are calculated by making use of Cohen's d-value. The formula for calculating Cohen's d-value is:

$$d = \left| \frac{x_1 - x_2}{s} \right|$$

Where

d = Cohen's d-value

x_1 = average number of the factor for one group

x_2 = average number of the factor for the other group

s = largest standard deviation for the particular factor

Table 5.5 indicates how to interpret Cohen's d-value in terms of effect sizes (Pietersen & Maree, 2010a: 211). If a large effect size is calculated, differences can be believed to be of practical significance.

Table 5.5 Interpretation of Cohan's d-value (Pietersen & Maree, 2010a: 211)

Cohen's d-value	Meaning
≈ 0.2	Small effect
≈ 0.5	Medium effect
≈ 0.8	Large effect

Independent T-test

According to McMillan and Schumacher (2006: 490), an independent T-test is used to determine whether the mean value of a variable in one group of subjects differs from the mean value of the other group of subjects. For the purpose of this study the independent t-test was done on the following:

In year 1 of the study an independent t-test was done between the pre-tests of group C1 and group C2. This was done to determine if there were any differences between the two groups at the beginning of the course.

In year 2 of the study an independent t-test was done between the pre-tests of group E1 and group E2. This was done to determine if there were any differences between the two groups at the beginning of the course.

The formula for calculating the independent t-test statistic is:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{s_{\overline{x}_1 - \overline{x}_2}}$$

Where

t = the t-test statistics

$\overline{x}_1$ = mean of one group

$\overline{x}_2$ = mean of the other group

$s_{\overline{x}_1 - \overline{x}_2}$ = is the standard error of the difference in means

The standard error of the difference in means is estimated from the variances of each distribution. This part of the formula is calculated by pooling the variances of each distribution to result in the standard deviation.

For the independent t-test, the p-value was calculated to determine the statistical significance of the differences. The effect sizes of the differences were calculated to determine the practical significance of the differences.

Dependent T-test

A dependent T-test is used when two groups that have been matched are compared. It also takes into consideration that the groups are related but not independent (McMillan & Schumacher, 2006: 492). For the purpose of this study the dependent t-test was done on the following:

In year 1 of the study a dependent t-test was done between the pre-tests and post-tests of group C1 and again between the pre-tests and post-tests of group C2. This was done to determine if

there were any differences between the SDL skills of the students from the beginning of the course to the end of the course, without an intervention.

In year 2 of the study a dependent t-test was done between the pre-tests and post-tests of group E1 and again between the pre-tests and post-tests of group E2. This was done to determine if there were any differences between the SDL skills of the students from the beginning of the course to the end of the course. The students from these two groups underwent an intervention in the form of a newly constructed eFundi™ site when SDL guidelines where incorporated.

A dependent t-test was done between the pre-tests and post-tests of the entire group C and again between pre-tests and post-tests of the entire group E. This was done to determine if there were any differences between the SDL skills of the students from the beginning of the course to the end of the course for the entire group. The data from these tests was then used to determine whether there were any differences between the control and experimental groups.

The formula for calculating the dependent t-test statistic is:

$$t = \frac{\overline{D}}{\sqrt{\frac{\sum D^2 - \frac{\left(\sum D\right)^2}{N}}{N(N-1)}}}$$

Where

t = the t-test statistics

$\overline{D}$ = the mean difference for all pairs of scores

$\sum D^2$ = the sum of squares of the differences

$\left(\sum D\right)^2$ = squares of the sum of differences

N = number of pairs in the scores

$N-1$ = the degrees of freedom

For the dependent t-test, the p- value was calculated to determine the statistical significance of the differences. The effect sizes of the differences were calculated to determine the practical significance of the differences.

ANCOVA

An ANCOVA was performed on the results of the post-test of the control group and the post-test of the experimental group, partialling-out the effect of differences between the pre-tests of the two groups (McMillan & Schumacher, 2006: 308). This would determine the influence that the intervention had on the experimental group. For the purpose of this study the ANCOVA was done on the following:

In year 1 of the study an ANCOVA was done on the post-tests of Group C1 and Group C2. This was done to determine if there were any differences between the SDL skills of the students from the beginning of the course to the end of the course.

In year 2 of the study an ANCOVA was done on the post-tests of Group E1 and Group E2. This was done to determine if there were any differences between the SDL skills of the students from the beginning of the course to the end of the course, after the students underwent an intervention in the form of a newly constructed eFundi™ site.

In the next section, the qualitative component of this study will be discussed.

5.5 Qualitative research

In the qualitative component of the study a basic study (Merriam, 1998:11) was done where the data were gathered through semi-structured interviews. The qualitative research design for this study is represented in figure 5.4. The qualitative research design as implemented in this study will be discussed in the following sections.

5.5.1 Research design

A basic qualitative research design, as done in this study, can be described as research that attempts to collect rich descriptive data in respect of a particular phenomenon or context with the intention of developing an understanding of what is being observed or studied (Nieuwenhuis, 2010:50). It therefore focuses on understanding the world and constructing meaning through the view of groups or individuals. In this study semi-structured interviews were conducted by the researcher to gather the data for the qualitative research design. The primary purpose of the semi-

structured interviews conducted at the end of the module was to get more insight on the quantitative findings of the study.

5.5.2 Participants

From the student groups mentioned in §5.3, participants were selected by simple random sampling to participate in the qualitative part of the research. Leedy and Ormrod (2010:207) define a simple random sample as a sample of the population where every member of the population has an equal chance of being selected. The researcher conducted semi-structured interviews with participants from each group in order get a better understanding of the data collected from the quantitative research.

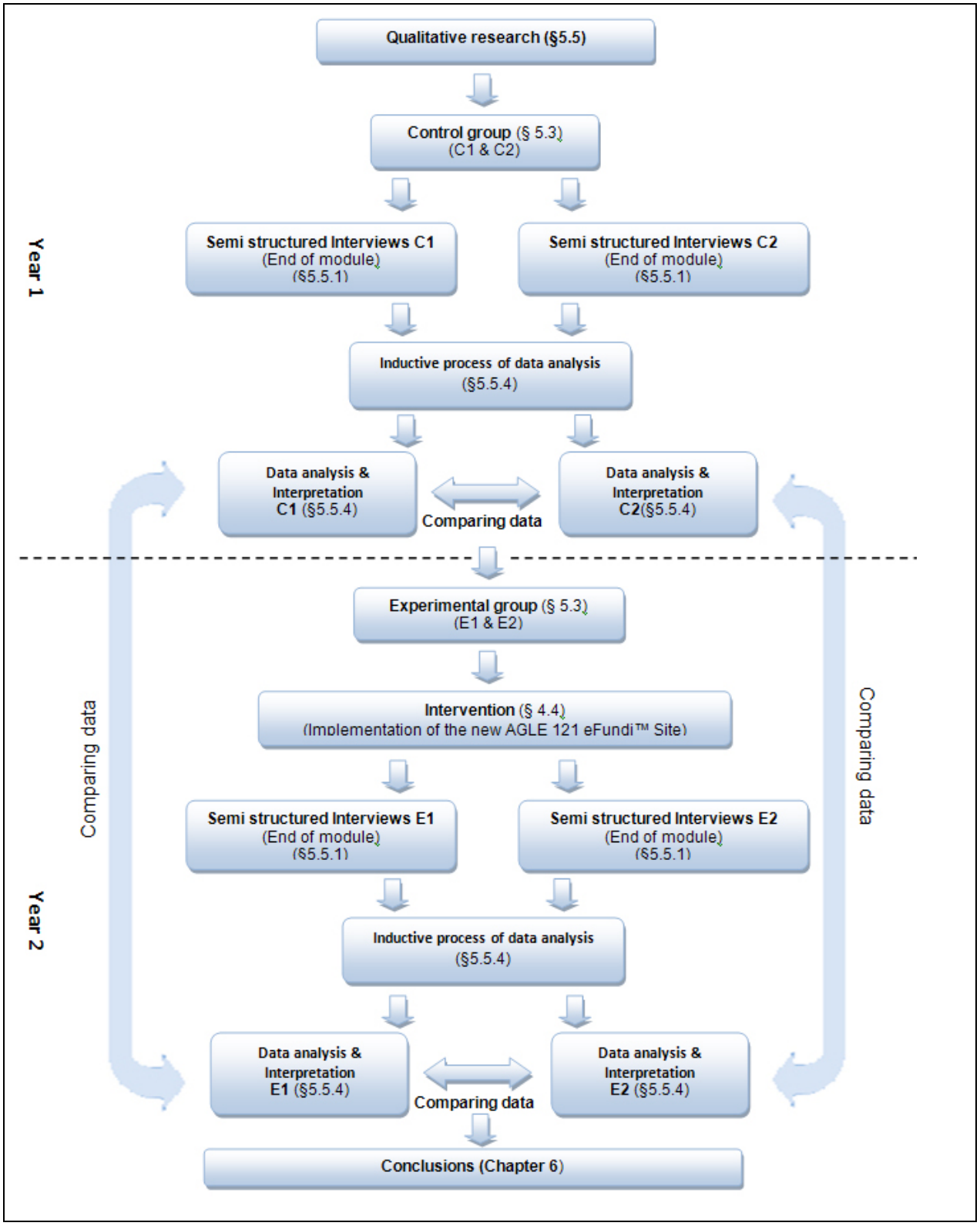


Figure 5.6 Qualitative research design

5.5.3 Data collection procedure

According to Leedy and Ormrod (2010:188) face-to-face interviews allow the researcher to clarify ambiguous answers and seek follow-up information. Semi-structured face-to-face interviews based on the above-mentioned questionnaire were conducted by the researcher with the selected students. Participants were expected to elaborate on some of the questions and issues addressed in the questionnaire. The interviews were conducted at the end of the module. The researcher posted an announcement on eFundi™ to invite all students registered for the module to take part in the interviews. Since none of the participants responded to the invitation, the researcher randomly selected participants to conduct the interviews with. Three participants from group C1 and four participants from group C2 agreed to take part in the interviews, while four participants from group E1 and three participants from group E2 agreed to take part.

Interviews were conducted by the researcher at the end of the module to get a better understanding of and elaborate on the quantitative data. These interviews were done by the researcher herself in order to obtain the students' experiences in the most accurate way possible. The interviews were recorded on a voice recorder and were transcribed by the researcher afterwards.

5.5.4 Data Analysis: Qualitative research

The qualitative data gathered from this was to get a better understanding of and elaborate on the quantitative data. An inductive method for data analysis was used in this study. This process is described by Cresswell (2008:244) as going from detailed data (e.g., transcriptions or typed note from interviews) to general codes and themes. The initial analysis consists of subdividing the data while the final goal is to generate a larger, consolidated picture. Figure 5.7 is a visual representation the inductive process of qualitative data analysis (Cresswell, 2008:244).

A qualitative data analysis computer program, Atlas.ti was used to assist with the analysis of the qualitative data for this study. Atlas.ti is a software package that enables researchers to organize text, graphic, audio and visual data files, along with their coding, memos and findings into a project (Creswell, 2008:249).

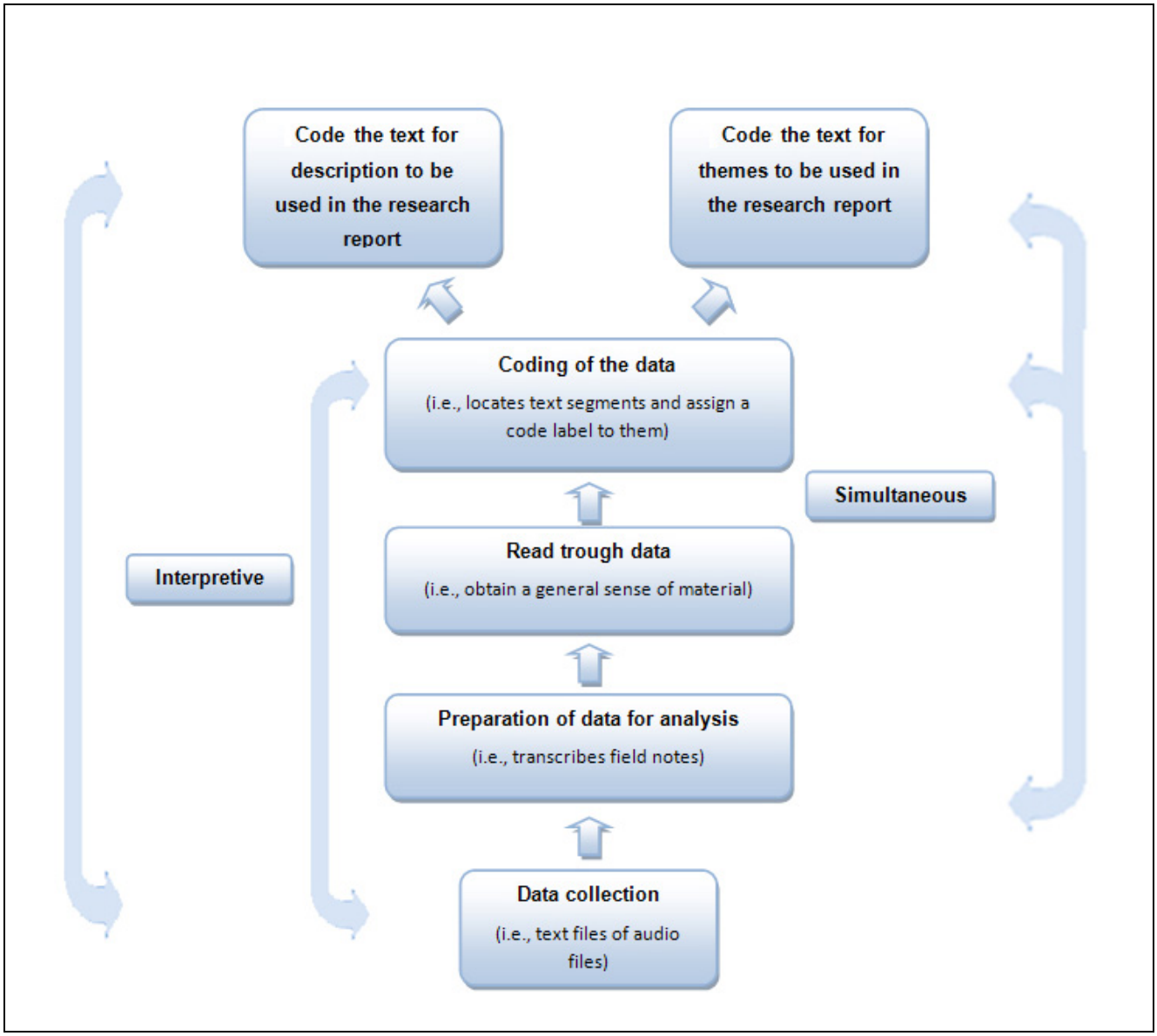


Figure 5.7 Inductive process of qualitative data analysis (Cresswell, 2008:244)

With the help of Atlas.ti, the data analysis of the semi-structured interviews for this study was done according to the process of inductive analysis and will be conducted by following the steps (Dye *et al.*, 2000:2; Cresswell, 2008:244):

- transcription of the data;
- read through data to get a general sense of the material;

- relevant information in each interview was divided into a number of segments consisting of sentences or phrases;
- each of the segments were assigned to specific codes;
- categorising and sorting of the codes and data according to themes and sub-categories;
- comparing data;
- refining categories.

The data collected from the interviews were analysed to get more insight on the quantitative findings of the study.

5.6 Ethical aspects

The research was conducted in accordance with the ethical codes as stipulated by the ethical committee of the North West University. The following factors were considered:

- Participants were informed about the nature of the study.
- The necessary ethics application form was completed and submitted to the NWU's ethics committee and permission was obtained to commence the research.
- Permission for the use of the questionnaire was attained.
- The students' confidentiality and privacy were respected at all times.
- Permission from the relevant deans and staff of the faculties and students were also obtained.
- The identity of students and lecturers remained confidential.
- Participation in the study was optional.
- Participants had the option to withdraw at any stage of the study.
- Data will be safely stored for a period of 5 years.
- Participating in this study will not impair the students in any way.

5.7 Chapter summary

In this chapter the research design and methodology were explored from a constructivist perspective. The essential components of the research methodology were discussed in greater detail. The selection of the measuring instrument was discussed, and the population and the ethical aspects were described. The procedures that were followed in the data collection process were presented and the data analysis techniques were described. In the following chapter, the results of data analysis will be given and discussed to form conclusions.

Chapter Six

Results and analysis

6.1 Introduction

In the previous chapter the research design and methodology used in this study, viewed from a constructivist perspective were addressed. The research design and methodology, research methods, population and sampling, measuring instruments, data analysis, data collection procedures and ethical aspects for both the quantitative and qualitative data were discussed. The purpose of this chapter is to report the findings from both the quantitative and qualitative research process and to recognize the relationship between these two processes. This chapter intends to address sub-aim iv) To evaluate to what extent a newly-constructed eFundi™ site could enhance SDL. The results for the two years of the study will be reported respectively.

6.2 Results from quantitative research

The SDL questionnaire used to gather the quantitative data for this study consisted of forty questions and was scored on a five-point Likert scale where 1=strongly agree and 5= strongly disagree (Refer §5.4.3). Items were grouped into three categories: (a) self-management; (b) desire for learning; and (c) self-control. The SDL-questionnaire was given to the students as a pre-test at the beginning of the semester for both the control group (year 1) and experimental group (year 2). After completion of the module the same SDL-questionnaire was given as a post-test for both the control and experimental group. The statistical analysis of the results of the questionnaires will be discussed in the following section:

6.2.1 Validity of the questionnaire

The motivation and procedure for determining the validity (Refer §5.4.4.1) of the questionnaire was discussed in chapter 5. Confirmatory factor analysis, correlation and fit indices were done to determine construct validity of the instrument used in this study and the results from these tests will be discussed in the following paragraphs.

A confirmatory factor analysis (CFA) using the AMOS statistical package was done to test whether the measures of the factors in the questionnaire were consistent with the way the designer of the

questionnaire recommended (Refer §5.4.4.1). The original SDL-questionnaire consists of three factors namely (a) self-management; (b) desire for learning; and (c) self-control and the CFA was done on these factors. It was found that all the regression weights, means and variances for these factors were statistically significant with a p-value < 0.01.

Correlations refer to the strengths of relationships between factors (Refer §5.4.4.1). The correlation coefficient of the factors for the questionnaire used in this study is presented in table 6.1.

Table 6.1 Correlation coefficients of the factors

			Estimate
Self management	<-->	Desire for learning	0.67
Self control	<-->	Self management	0.60
Self control	<-->	Desire for learning	0.78

From table 6.1 it is evident that the correlation coefficient between all three factors was above 0.5 which indicated that there was a high positive correlation between the factors. The three factors in the questionnaire used for this study had a strong relationship as could be expected of the factors measuring aspects of SDL.

The “goodness-of-fit” statistics were calculated between the specified covariance model and that of the data for the questionnaire used in this study. The three-factor model yielded an adequate Minimum Sample Discrepancy divided by Degrees of Freedom (CMIN/DF) value of 1.94. A relatively low Comparative Fit Index (CFI) of 0.75 was found for the three-factor model while an acceptable Root Mean Square Error of Approximation (RMSEA) value of 0.062 with a 90% confidence interval of [0.057; 0.062] was obtained. Even though the CFI of this three factor model was found to be lower than 0.9, the rest of the “goodness-of-fit” test was in the required range. It can be assumed that the validity of the questionnaire used in this study is satisfactory. The data throughout this chapter will be discussed with regard to the student’s scores in each of these factors respectively. In the next section the reliability of the questionnaire will be discussed.

6.2.2 Reliability of the questionnaire

Cronbach's alpha coefficient is used to measure the reliability or internal consistency and is based on the inter-item correlations. The Cronbach's alpha coefficient and the inter-item correlations of each of the factors is presented in table 6.2.

Table 6.2 Internal consistency of the factors

Factor	Cronbach's alpha coefficient	Mean of Inter- item correlation
Self management	0.85	0.30
Self control	0.81	0.27
Desire for Learning	0.84	0.26

From table 6.2 it is evident that the reliability of the three factors is high. All of the factors had a Cronbach's alpha coefficient of ≥ 0.7 which indicates that there was a correlation between the items of the factors. It is also shown that the mean values of the inter-item correlation were all between 0.15 and 0.55. This is a further indication that the correlations between the items of the factors were strong. Thus the questionnaire used for this study can be assumed to be reliable.

In the next paragraph the differences between the pre-tests and post-tests of year 1 of the study (control group) will be discussed.

6.2.3 Differences between pre-tests and post-tests of year 1 of the study for the entire group

The differences between the pre-tests and post-tests of year 1 of the study were determined with a dependent t-test and the p- values and effect sizes (d-values) were used to determine the statistical and practical significance of the data (Refer §5.4.4.3). The mean values shown in the tables for the quantitative research refer to the average score for each factor. The closer this score is to 1, the higher the SDL skills for that specific factor . Table 6.3 shows the p- values and d-values of the data from year 1 of the study (control group).

Table 6.3 Differences between pre-tests and post-tests of year 1 of the study

Variable	Pre (n=237)		Post (n=237)			
	Mean	Std. Dv.	Mean	Std. Dv.	p	d
Self-management	2.16	0.51	2.23	0.48	0.01	0.13
Desire for learning	1.84	0.43	1.89	0.41	0.04	0.10
Self-control	1.72	0.39	1.74	0.38	0.21	-

With regard to self-management and desire for learning, there was a statistically significant difference between the data of the pre-test and the post-test (p=0.01 and p=0.04). In both these instances the learners' SDL skills measured lower at the end of the module. However, in both these factors the difference was too low to be of practical significance. It is further indicated in table 6.3 that in the pre-tests already, the students from year one had low mean values (<3.0), in all three of the factors which indicated high SDL skills. This did not leave much room for improvement in the post-tests.

In the next paragraph the differences between the pre-tests of the two groups of year 1 of the study will be discussed.

6.2.4 Differences between the pre-tests of the two groups in year 1

For year 1 (control group) of the study an independent t-test on the pre-tests of group C1 and on the pre-tests of C2 were done. As seen in §5.4.3, group C1 refers to students enrolled for AGLE 121 in 2010 that attended Lecturer A's classes while group C2 refers to the rest of the students enrolled for AGLE 121 in 2010.

This was used to determine whether the mean value of a variable in one group of subjects differs from the mean value of the other group of subjects (Refer §5.4.4.3) . Table 6.4 shows the results from this test.

Table 6.4 Independent t-tests done on the pre-tests of group C1 and C2

	Group C1 (n=48)		Group C2 (n=189)			
	Mean	Std. Dev	Mean	Std. Dev	p	d
Self-management	2.35	0.54	2.11	0.48	0.00	0.44
Desire for learning	1.90	0.44	1.83	0.43	0.28	-
Self-control	1.75	0.32	1.72	0.40	0.58	-

From table 6.4 it is clear that the mean values for group C1 measured slightly higher in self-management, desire for learning and self-control than group C2 . Table 6.4 further shows that regarding self-management, there was a statistically significant difference between the pre-tests of C1 and C2. The d-value for self-management (d=0.44) indicated a small to medium effect and it can be assumed that there was a difference which is of small to medium practical significance between the two groups. This implies that regarding self-management, the students from the group C1 had slightly lower SDL skills at the beginning of the module than the students from group C2.

In the next paragraph the differences between pre-tests and post-tests of year 1 of the study will be discussed.

6.2.5 Differences between the pre-tests and post-tests of the two groups in year 1

For year 1 (control group) of the study a dependent t-test and an ANCOVA were done on the pre-tests and post-tests of group C1 and again on the pre-tests and post-tests of group C2. The data gathered from these tests will be discussed in the following paragraphs.

Dependent t-test

A dependent t-test is used when two groups that have been matched, are compared (Refer §5.4.4.3). The results for the dependent t-tests done on the first year of the study will be given in table 6.5 and 6.6 . Table 6.5 shows the results from the dependent t-tests that were done on the pre-tests and post-tests of group C1.

Table 6.5 Dependent t-tests done on the pre-tests and post-tests of group C1

	Pre-test (n=48)		Post-test (n=48)			
	Mean	Std. Dev	Mean	Std. Dev	p	d
Self-management	2.35	0.54	2.38	0.45	0.58	-
Desire for learning	1.91	0.44	1.93	0.38	0.54	-
Self-control	1.75	0.32	1.78	0.38	0.67	-

From table 6.5 the p-values for all three the factors were very high which is an indication that there was no statistically significant difference between data of the pre-tests and the post-tests of group C1. Thus, from the above data it can be assumed that there were no statistically significant differences between the SDL-skills of the students from Group C1 from the beginning of the module to the end in any of the measured factors.

Table 6.6 shows the results from the dependent t-tests that were done on the pre-tests and post-tests of group C2.

Table 6.6 Dependent t-tests done on the pre-tests and post-tests of group C2

	Pre-test (n=189)		Post-test (n=189)			
	Mean	Std. Dev	Mean	Std. Dev	p	d
Self-management	2.11	0.49	2.19	0.48	0.01	0.16
Desire for learning	1.82	0.43	1.87	0.42	0.05	0.12
Self-control	1.71	0.40	1.74	0.39	0.24	-

Table 6.6 indicates that with regard to self-management and desire for learning, there was a statistically significant difference between the data of the pre-test and the post-test (p=0.01 and p=0.05). However the d-values for these were too low which indicates no practical significant differences between the pre-tests and the post-tests of group C2. This implies that there was a decrease in SDL skills from the beginning to the end of the module for the students of group C2. However, this difference cannot be seen as practically significant.

ANCOVA

An ANCOVA was done to determine if there were any differences between the post-tests of the control group by compensating for differences in the pre-test. This was done to establish if the SDL-skills of the students at the end of the module differed from the SDL-skills of the students at the beginning of the module for the students in the control groups. For year 1 of this study the ANCOVA was done on the post-tests of group C1 and group C2 . Table 6.7 shows the results from the ANCOVA done on the post-tests of group C1 and group C2.

Table 6.7 ANCOVA done on the post-tests of group C1 and C2

	Adjusted means				
	C1 (n=48)	C2 (n=189)	Mean Square Error	p	d
Self-management	2.30	2.26	0.12	0.44	-
Desire for learning	1.91	1.90	0.09	0.90	-
Self-control	1.76	1.75	0.08	0.89	-

Table 6.7 shows that the p-values for all three the factors were very high which is an indication that there were no statistically significant differences between the adjusted post-tests scores for the groups C1 and C2. Thus, from the above data it can be assumed that there were no practical or statistical significant differences between the SDL-skills of the students from the two groups after the completion of the module in all three of the factors.

In the next paragraph the differences between pre-tests and post-tests of year 2 of the study (control group) will be discussed.

6.2.6 Differences between pre-tests and post-tests of year 2 of the study for the entire group

The differences between pre-tests and post-tests of year 2 (experimental group) of the study were determined and the effect sizes and p- values were used to determine if there were statistical and practical significant differences between the pre-test and the post test (Refer §5.4.4.3) . Table 6.8 shows the p- values and d-values of the pre-tests and post-tests from year 2 of the study (experimental group).

Table 6.8 Statistical and practical significance of data from year 2

	Pre (n=287)		Post (n=287)			
Variable	Mean	Std. Dev.	Mean	Std. Dev.	p	d
Self-management	2.15	0.50	2.22	0.62	0.06	-
Desire for learning	1.79	0.42	1.41	0.55	0.00	-
Self-control	1.64	0.36	1.72	0.55	0.02	0.22

Table 6.8 indicates that there was a statistically significant difference between the pre-test and the post-test regarding desire self control (p=0.02) . Table 6.8 further shows that a small effect size of 0.22 was calculated for self control which indicates that the difference between the two tests was of small practical significance . Table 6.8 also indicates that in the pre-tests, the students from year two also had low mean values, <3.0, in all three of the factors. Thus, as in the case of year 1, there was not much room left for improvement in the post-tests (refer §2.6.3). However, the SDL skills of the students, regarding self control did deteriorate from the beginning to the end of the course and the difference was of small practical significance.

In the next paragraph the differences between pre-tests of the two groups of year 2 of the study will be discussed.

6.2.7 Differences between the pre-tests of the two groups in year 2

For year 2 (experimental group) of the study an independent t-test was done on the pre-tests of group E1 and on the pre-tests of E2 (Refer §5.3). This was used to determine whether the mean value of a variable in one group of subjects differed from the mean value of the other group of subjects (Refer §5.4.4.3) . Table 6.9 shows the results from this test.

Table 6.9 Independent t-tests done on the pre-tests of group E1 and E2

	Group E1 (n=287)		Group E2 (n=124)			
	Mean	Std. Dev	Mean	Std. Dev	p	d
Self-management	2.20	0.47	2.10	0.52	0.10	0.19
Desire for learning	1.85	0.43	1.71	0.39	0.01	0.33
Self-control	1.71	0.39	1.60	0.35	0.02	0.28

From table 6.9 it is clear that the mean values for group E1 measured slightly higher in self-management, desire for learning and self-control, than group E2. This implies that the SDL skills of the students from group E1 was slightly lower to begin with . Table 6.9 further shows that the p-values for self-control (p=0.02) and desire for learning (p=0.01) were small, which indicated that there was a statistically significant difference between the pre-tests of group E1 and E2. The d-values for desire for learning (d=0.33) and self-control (d=0.28) were small and indicates small effect sizes for these factors. Thus, although there was some statistical significance, it can be stated that there were practical significant differences of a small effect between the SDL-skills of the students from the two groups at the beginning of the module.

In the next paragraph the differences between pre-tests and post-tests of the two groups for year 2 of the study will be discussed.

6.2.8 Differences between the pre-tests and post-tests of the two groups in year 2

For year 2 (experimental group) of the study a dependent t-test and an ANCOVA were done on the pre-tests and post-tests of group E1 and again on the pre-tests and post-tests of group E2. The data gathered from these tests will be discussed in the following paragraphs.

Dependent t-test

The results for the dependent t-tests done on the second year of the study are presented in tables 6.10 and 6.11.

Table 6.10 Dependent t-tests done on the pre-tests and post-tests of group E1

	Pre-test (n=124)		Post-test (n=124)			
	Mean	Std. Dev	Mean	Std. Dev	p	d
Self-management	2.19	0.47	2.27	0.61	0.08	-
Desire for learning	1.83	0.43	1.93	0.54	0.02	0.21
Self-control	1.69	0.38	1.74	0.52	0.23	-

From table 6.10 it is evident that the p-value for desire for learning (p=0.02) were small enough and can be seen as statistically significant. A small effect size for desire for learning (d=0.21) indicated

a small practical significant difference between the pre-tests and the post-tests of group E1 with reference to desire for learning. This implies that the SDL skill of the students deteriorated slightly from the beginning to the end of the module regarding desire for learning.

Table 6.11 shows the results from the dependent t-tests that were done on the pre-tests and post-tests of group E2.

Table 6.11 Dependent t-tests done on the pre-tests and post-tests of group E2

	Pre-test (n=163)		Post-test (n=163)			
	Mean	Std. Dev	Mean	Std. Dev	p	d
Self-management	2.10	0.55	2.14	0.63	0.47	-
Desire for learning	1.74	0.40	1.95	0.56	0.00	0.53
Self-control	1.59	0.33	1.70	0.58	0.03	0.36

Table 6.11 shows that the difference between the pre-test and post-test can be seen as statistically significant regarding desire for learning (p=0.00) and self-control (p=0.03). The d-values for desire for learning (d=0.53) and self-control (d=0.36) indicated differences of a medium effect. Thus, from the above data it can be stated that the average SDL skills regarding desire for learning and self-control decreased from the beginning to the end of the module and the difference was of a medium practical significance.

ANCOVA

For year 2 of this study the ANCOVA was done to determine if there were any differences between post-tests of the experimental group by compensating for differences in the pre-test. The results for the ANCOVA are presented in table 6.12.

Table 6.12 ANCOVA done on the post-tests of group E1 and E2

	Adjusted means				
	E1 (n=163)	E2 (n=124)	Mean Square Error	p	d
Self-management	2.24	2.17	0.23	0.29	-
Desire for learning	1.90	1.98	0.22	0.20	-

Self-control	1.70	1.74	0.23	0.58	-

From table 6.12 it is clear that the difference between the mean values of the post-tests of both group E1 and group E2 by compensating for differences in the pre-test were small . Table 6.12 further shows that no statistically significant differences were obtained for any of the factors. This implies that there were no significant differences between the SDL-skills of the students from the two groups after the completion of the module in any of the three factors.

6.2.8.1 Data analysis for the entire group C and the entire group E

From the results discussed above it is evident that there were no significant differences between group C1 and C2 or between E1 and E2. Thus, the data from these groups were merged together and the statistical tests were performed again in order to compare the data from year 1(C) with the data from year 2(E).

Independent t-test

Table 6.13 shows the results from the independent t-test between the pre-tests of group C and between the pre-tests of group E.

Table 6.13 Independent t-tests done on the pre-tests of group C and E

	Group C (n=237)		Group E (n=287)			
	Mean	Std. Dev	Mean	Std. Dev	p	d
Self-management	2.16	0.51	2.14	0.50	0.68	-
Desire for learning	1.84	0.43	1.77	0.41	0.04	0.19
Self-control	1.72	0.39	1.65	0.37	0.02	0.23

Table 6.13 shows that the p-values for desire for learning (p=0.04) and self-control (p=0.02) were small and the difference between the two groups can be seen as statistically significant. Nevertheless the d-values for desire for learning (d=0.19) and self-control (d=0.23) were an indication that the difference between the two groups were of small practical significance. This implies that there were small practical significant differences in SDL-skills of the students from the control group and the experimental group at the beginning of the two semesters regarding desire

for learning and self-control. The SDL-skills of the students of the experimental group were higher than the students from the control group.

ANCOVA

The ANCOVA was done to determine if there were any differences between post-tests of the group C and group E by compensating for differences in the pre-test. The results for the ANCOVA are shown in table 6.16.

Table 6.14 ANCOVA done on the post-tests of group C and E

	Adjusted means				
	C (n=237)	E (n=287)	Mean Square	p	d
Self-management	2.23	2.22	0.18	0.88	-
Desire for learning	1.87	1.95	0.15	0.02	0.21
Self-control	1.71	1.75	0.15	0.37	-

From table 6.14 it is evident that only for the factor desire for learning, there appears to be a statistically significant difference (p=0.02) between the post-tests of group C and group E. However, the difference is only a small practical significant difference. This implies that the desire for learning component of the students' SDL-skills in the second year of the study was slightly lower than in the first year of study. In the following section the results gathered from the qualitative data will be discussed.

6.3 Results from the qualitative research

A total of seven students from each year of the study were interviewed by the researcher using semi-structured interviews. Interviews for year 1 were conducted with students 1-7. See addendum 4 for a list of questions asked. The interviews were recorded, transcribed and then analysed. The data were coded according to themes. The coded data were categorised into families. These families were then grouped under the three main factors used in the quantitative research to see whether the qualitative data supported the quantitative findings. See example of analysis process below:

1) *Question asked:* What do you do if you have a problem that you can't solve?

2) *Response:* “Well, in AGLE itself I can’t imagine finding something too complicated that I couldn’t do it. But if that would happen, I probably go research something on the internet about it. If I still couldn’t find anything I go to the lecturer and ask him to explain it to me better. Or I’ll go to a senior in my hostel who already had the subject and ask them.”
3) *Themes identified from responses:* research on internet, ask lecturer, ask friend.
4) After all the interviews were coded according to themes, *families were identified*: problem solving family. These are codes that relate to each other.
5) The families were then grouped according to *factors identified in the quantitative research*: self-management.

In table 6.15 the codes and families and number of responses will be shown. Thereafter the data will be discussed in terms of the factors from the quantitative data.

6.3.1 Central themes in coding for the data gathered in year 1

Table 6.15 shows the central themes for the data gathered in the first year of the study grouped into families. The percentages given in table 6.17 refer to the percentage of total participants which were linked to a certain theme.

Table 6.15 Central themes in coding for the data gathered in year 1

Family	Theme	Nr of responses	Represented % *(n/7*100)*
Class attendance	Attend – have to	3	43%
	Attend – like to	2	29%
	Don't attend	2	29%
	Participate	3	43%
Problem solving	Won't try it myself	1	14%
	Ask lecturer	4	57%
	Don't ask lecturer first	3	43%
	Ask friend	6	85%
	Try it myself	6	85%
	Research on internet	5	71%
Assessment	Adequate	3	43%
	Class work doesn't match the exam	5	71%
	Don't trust the assessment	4	71%
	Need more relevant topics	2	29%
	Need to explain exercises in more detail	4	57%
	Want more feedback	5	71%
Attitude	Positive towards AGLE	3	57%
	Negative towards AGLE	4	43%
	Module is difficult	3	43%
	Module is not difficult	4	57%
	Like to obtain new skills	5	71%
	Sceptic when need to obtain new skills	2	29%
Content	Useful	3	43%
	Not useful	4	57%
Lecturer	Contribute to success	4	57%
	Involves the class	4	57%
	Wasted our time	1	29%
Learning goals	Aim for distinction	6	71%
	Just wanted to pass	1	29%

Table 6.15 Central themes in coding for the data gathered in year 1 (Continue)

Family	Theme	Nr of responses	Represented % *(n/7*100)*
Time management	Leave assignments to last minute	3	43%
	Don't spend time on module	6	85%
	Use daily schedule	1	14%
	Study a day before the exam	4	57%
	Study in advance	1	14%
eFundi™ usage	Never used it	3	43%
	Didn't know about it	2	29%
	Only gave resources	4	57%
	Nothing exceptional	2	29%
	Gave valuable information	2	29%
eFundi™ suggestions	Examples of assignments	3	43%
	Practice exams	3	43%
	Structure resourses	1	14%
	Feedback	2	29%

Responses concerning self-management

When the data from the interviews conducted in the first year of the study were analyzed, the following themes concerning Self-management were identified namely: (a) class attendance; (b) problem solving and (c) time management. In the following paragraphs the responses from the participants will be discussed.

Class attendance

Of the seven students interviewed in the first year of the study, five of the students indicated that they do attend the classes regularly (Refer table 6.15: Attend – like to + Attend – have to). Two of those students said they like going to class while the other three only attend the classes because they have to. Student 1 said: "I go to class because I enjoy it. It's funny, I usually laugh a lot. But that's the only reason I go." Student 6 agreed by saying: "The classes were fun to attend, the lecturer was prepared and it was a nice interactive class" Student 3 on the other hand did not like to attend the classes and commented that: "My friends are not in the class with me, and I don't like to

attend the classes alone. I'm afraid to fail. It's the only reason for me to attend the classes and study" Student 5 stated that: "I didn't like the classes…the classes I attended wasted my time"

Problem solving

When the students were asked how they would go about solving a problem, six of them said that they would first try and see if they could solve it for themselves before they ask for help from a friend. As seen in table 6.15 (Research on internet + Ask friend + Ask lecturer) most of those students agreed that they would first do research on the internet and if they still struggled they would ask someone to help. Although four of the students indicated that they would ask for help from the lecturer, three of the students clearly indicated that they would only go to the lecturer as a last resort (Refer table 6.15: Don't ask lecturer first). Student 6 commented that: "I'll go to the lecturer if no one else can help me. But it wouldn't be my first choice." Student 7 agreed by saying: "If no one can help me, then I'll maybe go to the lecturer" Student 2 disagreed with the rest. He felt that he wasn't ready to struggle with a problem and responded that: "No, when I don't get it the first time, I'll ask around"

Time management

From the data gathered from the interviews it seems that the students may have problems regarding time management. As seen in table 6.15 (Use daily schedule) only student 2 indicated that he makes use of a daily schedule: "I have a daily schedule where I have a specific time for a specific module." Student 2 also said that: "if there's a test or there's an exam coming, I'll study a chapter each day for at least a week or two leading up to the test so that I can familiarise myself with the work" Some of the students said they realise that they have to start with the assignments in advance but almost all of them said they only start studying for the exam a day before the time (Refer table 6.15: Study a day before the exam). Student 1 commented: "For the written assignments, you have to start a few days in advance otherwise you are not going to finish. You actually have to set time aside for that. If it is anything else, tests or exams, the night before the time" Student 3 agreed by saying: "I will never do my final draft and my practice exercises on the same day… I will start a few days before the time. It's too much work to do on the evening before the time. But for the test, I only start the day before." During the interviews the students were asked what their main incentive for spending time on this module is. Student 1 responded: "To be honest, I don't spend any time on it at all. Even for my exam today, I didn't study for it" Student 2 agreed by saying: "I knew from the beginning that I wasn't going to put in that much time and effort for AGLE" Student 5 said: "I actually spent more time on my other subjects than on AGLE" The responses from the rest of the students were consistent with the above-mentioned statements.

6.3.2 Responses concerning desire for learning

The analysis of the data from the interviews produced the following themes concerning desire for learning: (a) assessment; (b) attitude; (c) content and (d) lecturers.

Assessment

As seen in table 6.15 (Don't trust the assessment), of the seven students with whom the interviews were conducted four of them said they don't trust the assessment process. Student 4 said: "We only got three assignments and that makes up our module mark. I don't think that is fair" Student 1 commented that: "The mark system for multiple choice questions should change" Student 6 felt that class attendance should be made part of the assessment criteria, it should be. He replied: "And they give marks for class attendance, but the students sign for their friends, so the process doesn't work for me" Even though more than half of the students felt that the assessment process were not adequate, three of the students were satisfied with the process.

During the interviews the students were asked what criteria they would suggest to evaluate their performance in the AGLE 121 module. Not many suggestions were made concerning this. However, two of the students felt that they need to give more relevant topics. Student 3 said: "We got a lot of assignments on random, useless, senseless topics. I would have preferred more relevant topics for assignments - maybe study field specific" More than half of the students also felt that exercises should be explained in more detail (Refer table 6.15: Need to explain exercises in more detail). Student 5 made the following remark: "Sometimes it felt to me that we didn't get enough help and feedback on assignments" Student 5 also said that: "You just get a bad mark and then you still don't know exactly what you did wrong so that you can fix it for the next assignment" At least four other students agreed that they need more feedback on assignments and the exam. The last concern regarding the assessment was the fact that the class work did not match the exam. Student 1 commented: "It feels like what you do in class and what you get in the exam doesn't match and you can't always see the link" Student 3 agreed by saying: "It didn't seem that the things we did in class and what I studied for the exam didn't appear in the paper"

Attitude

The overall impression after analysing the interviews was that the students' attitude towards AGLE 121 tends to be negative. Only three of the students said they like the module but the rest didn't agree with them (Refer table 6.15: Positive towards AGLE + Negative towards AGLE). Student 1

commented: “From the beginning I really didn’t like the subject and I had a negative attitude towards it, because I felt it was a waste of my time” Student 4 shared the opinion of student 1: “I feel like it’s a waste of time” Student 3 indicated a lack of motivation by saying: “I’m not really motivated to do well in this module… I really don’t like this subject”

When students were asked what was preventing them from doing well in this module, three of the students felt that it was the level of difficulty (Refer table 6.15: Module is difficult + module not difficult). Student 3 admitted: “It is really difficult for me. I was never good with language and I really struggle with the content of the module” Student 7 agreed by saying: “I think I underestimated the module in terms of difficulty and the amount of work” The other students felt the module content was not difficult. Student 4 commented: “Most of the module content is really easy… It doesn’t feel like work you have to do at university, it is at school level.” Student 1 shares the opinion of student 4 with the following remark: “Well, in AGLE itself I can’t imagine finding something too complicate that I couldn’t do it”

In one of the interview questions the students were expected to indicate how they would feel about being exposed to exercises and tasks that require new skills. As seen in table 6.15 most of the students weren’t negative about the idea. Student 2 explained: “I like to experience new things; I like to explore new things. So if something is brought to me and I’m not familiar with it, I’ll take it up” Student 7 had the same idea: “I really see it as a challenge. I’m here to learn new stuff so I enjoy challenges that will help me learn new skills” The one thing that was consistent in all the replies was that they will be willing to do it as long as they can see the relevance of it. Student 1 explains: “I’ll see it as a challenge if I can see that it is something necessary that I will use again in my life”

Content

The students that participated in the interviews did not agree on whether the content presented in the AGLE 121 module was relevant or useful. An indicated in table 6.15 (Not useful + Useful) half of the students couldn’t see the relevance of this module. Student 1 said: “I feel like besides learning how to write a bibliography they haven’t told me anything useful that I’ll ever use again” Student 3 agreed with student 1 by saying: “The content of the module seems useless. I feel like I’m learning stuff that I’m never going to use again in my life. However, the rest of the students think the module is necessary and relevant” Student 6 commented: “I’ve learned a lot of new skills and I can see that the content is relevant. I’ll use it outside the classroom” Student 7 shared the opinion of student 6 by saying: “You can really use the content and the skills they teach you in your other modules”

Lecturers

The overall comments concerning the lecturers were good. The students felt that the lecturers definitely contributed to their success in the module (Refer table 6.15: Contributed to success). According to student 4: “The lecturer was really good and understanding and if you get negative and struggle, he motivates you” Student 6 agreed by saying: “The classes were fun to attend, the lecturer was prepared and it was a nice interactive class” The students were of the opinion that the lecturer motivated them to do well. Student 7 also confirmed it: “My lecturer made the classes interesting and motivated us to perform in this module.”

The students further believed that the lecturers did what was necessary to involve the students in the class and promote collaboration. Student 2 explains: “He really involves the class. He likes to ask questions. He picks on specific students, especially if they come in late” Student 6 agrees: “The lecturer was prepared and it was a nice interactive class” There was only one student that disagreed with the rest by saying: “The classes I did attended was a waste of time. The lecturer talked about other stuff most of the time and not the work. So I didn’t like going to class and I just wanted it to be over with”

6.3.3 Responses concerning self-control

Learning goals was the only theme regarding self-control that was visible from the interviews and will be discussed in the following paragraph.

Learning goals

When the students were asked if they had set themselves any specific goals for the module, most of the students indicated that they want to do well in the module and get a distinction (Refer table 6.15: Aim for distinction). As Student 1 explained: “I knew I was going to get high marks regardless my effort” Student 7 agreed by saying: “I decided that I want to do well in the module and not just pass it” Some of the students changed their goals halfway through the module: “So my goal was to do my work to get a good module mark, but I stopped with that halfway through the module because I was not motivated anymore” Student 6 agreed by saying: “But then I actually saw that you learn relevant, important information in this module, so then my goal change to doing well and enjoying the module” Only one of the students said their only goal was to pass the module. Student 4 said: “I just spend enough time to pass the module. I really didn’t mind whether I got a distinction for this module”

6.3.4 Responses concerning eFundi™

During the interviews students were asked if they thought that the eFundi™ site added any value to the module and whether they had any suggestions regarding the site. After analysing the interviews for year 1, it was clear that the eFundi ™ site was only used to place a few extra resources and send out administrative announcements.

eFundi™ usage

The opinion of Student 4 was shared by all of the participants: “It was nothing exceptional. But there was some information and announcements on the site” Student 6 agreed by saying: “I don’t think there was a lot of information on the eFundi™ site. I only looked at the announcements, and I saw there were a few” Two of the students said they didn’t even know such a site existed. Student 1 explained: “Well, I noticed things were uploaded onto the site that looked like it was supposed to help us, but we were never told about it.” Student 5 felt that even though they knew there was an eFundi™ site, they never really used the site. He said: “I didn’t really use the eFundi™ site. We received all the announcements by email and we were never told that there was any information on the site that we should go and look at” Student 1 and student 3 agreed with him.

eFundi™ suggestions

The following suggestions on how to improve the eFundi™ site were made by the students:

Student 1: “Maybe exercises similar to the ones you’ll get in the exam”

Student 3: “Practice tests to do in your own time. And give feedback on those tests and discuss the parts we struggled with….and better feedback on assignments”

Student 6: “They can maybe give us examples on how the assignments should look. And maybe some practice test”

6.3.5 Central themes in coding for the data gathered in year 2

Interviews for year 2 were conducted with students 8-14 . Table 6.16 shows the central themes for the data gathered in the first year of the study grouped into families. The percentages given in table 6.16 refer to the percentage of total participants which were linked to a certain theme.

Table 6.16 Central themes in coding for the data gathered in year 2

Family	Theme	Nr of responses	Represented % *(n/7*100)*
Class attendance	Attend – have to	6	85%
	Don't attend	1	14%
	Participate	3	43%
Problem solving	Won't try it myself	1	14%
	Ask lecturer	6	85%
	Ask friend	2	29%
	Try it myself	4	57%
	Research on internet	2	29%
Assessment	Adequate	7	100%
	Want more feedback	1	14%
Attitude	Positive towards AGLE	6	85%
	Negative towards AGLE	1	14%
	Module is difficult	3	43%
	Like to obtain new skills	4	57%
	Sceptic when need to obtain new skills	3	43%
Content	Useful	6	85%
	Not useful	1	14%
	Was learning something new	3	43%

Table 6.16 Central themes in coding for the data gathered in year 2 (Continue)

Family	Theme	Nr of responses	Represented % *(n/7*100)*
Lecturer	Contribute to success	6	85%
	Involves the class	1	14%
Learning goals	Aim for distinction	6	85%
	Just wanted to pass	1	14%
Time management	Leave assignments to last minute	2	29%
	Start with assignments in advance	5	71%
	Use daily schedule	3	43%
	Study a day before the exam	1	14%
	Study in advance	3	43%
	Just enough to pass	3	43%
	Spend proper time	4	57%
	Gave valuable information	2	29%
eFundi™ usage	No marks didn't bother them	4	57%
	Extra exercises helped a lot	7	100%
	Learned new skills	4	57%
	Announcements helped a lot	7	100%
	Helped to understand the work better	5	71%
	Wasn't aware of all the exercises	2	29%
eFundi™ suggestions	Increase exercises	1	14%
	A bit too much exercises	1	14%
	Site was good	7	100%

6.3.6 Responses concerning self-management

When the data from the interviews conducted in the second year of the study were analysed, the following themes concerning self-management were identified namely: (a) class attendance; (b) problem solving and (c) time management. In the following paragraphs the responses from the participants will be discussed.

Class attendance

Of the seven students interviewed in the second year of the study, six of the students indicated that they do attend the classes regularly (Refer table 6.16: Attend –have to). Student 11 explained: “I just wanted to pass. So I decided to attend the classes and do everything that was necessary to pass” Student 14 agreed by saying: “I attended all my classes. I took part in the class discussions and I did all the assignments and work that was required of me” Student 8 indicated that there were advantages to go to class: “I realised when I go to class, and you participate in the activities, then it is not necessary to go and study the work at home” The opinion of student 8 was shared by three other students. They believed it was important to participate in the class activities. Student 9 explained: “I realised when I go to class, and you participate in the activities, then it is not necessary to go and study the work at home” Although most of the students indicated that they do attend the classes and acknowledge the advantages only one student, Student 13, did not attend the classes and commented that: “I didn’t have time to attend the classes. I spend time on my own to do all the assignments.”

Problem solving

When the students from the second year of the study were asked how they would go about solving a problem, four of them said that they would first try and see if they could solve it for themselves before they asked for help from a friend (Refer table 6.16: Try it myself + Ask a friend) . Table 6.16 further shows that most of those students agreed that they would first do research on the internet and if they still struggled, they would then ask someone to help. Unlike the students from the first year of the study, most of the second year’s students indicated that they would ask for help from the lecturer. The opinion of student 12 was shared by 6 of the students: “Our lecturers are great so they guide you on what to do. So when I’m not sure what to do I’ll go and ask them” Only one of the students who were interviewed indicated that they will only go to the lecturer as a last resort. The fact that almost all the students were prepared to struggle a bit on their own before they seeked for help, also shows that their SDL- skills concerning self-control were relatively high.

Time management

When the data gathered from the interviews were analysed, it seems that the students from the second year of the study who were interviewed were relatively on track concerning time management. About half of the students indicated that they made use of a daily schedule (Refer table 6.16: Use daily schedule). Student 10 explained how he managed his time in order to pass ALGE by saying: “I always write a timetable. I do my work. I start with my assignments long before the time. And I start to study for the exam long before the time” Planning ahead is also important for

student 12. He explains his working process as follows: “I’ll set up a schedule and allocate time for different modules in a day so that I can start studying well in advance”

As seen in table 6.16 (Start with assignments in advance + spend proper time), more than half the students said they realised that they had to start with the assignments in advance and they spent proper time on the module. Student 9 commented: “I’ll start about a week before the time, just to read through and brainstorm to write down ideas” Student 12 agreed by saying: “When I received an assignment I’ll go home and start doing research. Then later when I have time I’ll start putting the stuff together and maybe the day before I’ll write the final draft” This group of students also indicated that they started to study a few days in advance for the exam.

However, there were three students that admitted they didn’t spend much time on the module and only did what it took in order to pass (Refer table 6.16: Just enough to pass). Student 11 said: “I only spent time when I had to. Like when I know there was an upcoming test or assignment. I just spent time in order to pass” Student 9 felt that ALGE wasn’t on top of his priority list and said: “I usually spend time on my other modules first before I look at AGLE. If I still have time, I would go and do the exercises on eFundi™”

During the interviews the students were asked what their main incentive for spending time on this module was. Student 10 responded: “I felt like I was really learning something in the module and that is why I was spending time on the module” Student 12’s opinion was consistent with that of student 10: “It was really stuff I needed to know and I wanted to learn. So I spent time on the module because I really felt it was necessary and relevant” Student 5 said: “I actually spent more time on my other subjects than on AGLE” The responses from the rest of the students were consistent with the above mentioned statements. One more student, student 14 agreed by saying: “Not only did I want to pass, I also wanted to learn more” The rest of the students indicated that they spent time on the module in order to pass. Student 9 decided the following: “At first I wanted to get distinctions but then I saw the module is not as easy as I thought and decided to put less pressure on myself and only tried to pass the module”

6.3.7 Responses concerning desire for learning

The analysis of the data from the interviews produced the following themes concerning desire for learning: (a) assessment; (b) attitude; (c) content; and lecturers.

Assessment

All seven of the students that participated in the interviews said the assessment for this module was adequate (Refer table 6.16: Adequate). Student 10 said: “I think the way they assessed us was appropriate. All those tests on eFundi^{TM}, it helped a lot and the test and exams, nothing was too difficult. So I think it was fine” Student 11 agreed by saying: “I think it was appropriate. The exams contribute to the aims of the module. I could definitely see the relevance of the module” The students agreed that the assessment process was fair and they knew what was expected of them, as explained by student 14: “I think the assessment was fine. It was adequate and it was fair. I think they tested what we were supposed to learn” The responses from these students regarding assessment were clearly different from the responses of the students from year 1.

Attitude

Unlike the control group, the overall impression is that the students’ attitudes towards AGLE 121 for the second year of the study were much more positive. Only one of the students responded negatively by saying: “I wasn’t motivated enough. I didn’t like the module” The overall impression of the rest of the students was that they weren’t negative at all. Student 14 said that: “The information we got from this module was really relevant in our other modules as well, we could use it outside the AGLE classroom” According to student 12 the module was useful and he replied: “The module content helped me a lot and it was really stuff I needed to know and I wanted to learn”

When students were asked what was preventing them from achieving well in this module, three of the students felt that it was the level of difficulty (Refer table 6.16: Module is difficult). Student 11 admitted: “The content was tougher than I expected. I think I just underestimated it a bit” Student 13 agreed and responded: “The content was tougher than I expected. I think I just underestimated it a bit” According to student 8, interest was the problem: “Some of my other modules are much more interesting and they are the ones I’m getting distinctions in” Another student felt the English language was a barrier since it was his third language. Student 12 felt that AGLE 121 wasn’t his top priority. He said: “So I had to prioritise my modules, and AGLE wasn’t on top of the list”

In one of the interview questions the students were expected to indicate how they would feel about being exposed to exercises and tasks that require new skills. As seen in table 6.16 (Like to obtain new skills + sceptic when need to obtain new skills), most of the students reacted positively to the idea. Student 9 explained: “I put in effort to go and look at the new exercises” Student 11 had the same idea: “I’ll see it as a challenge and do it to the best of my ability” The one thing that was

consistent in all the replies was that they would try to put some effort into the challenge. Student 14 explains: “I’m usually really enthusiastic about learning new skills”

Content

As indicated in table 6.16 (Useful + Not useful), almost all of the students that participated in the interviews agreed that the AGLE 121 module content was useful and relevant. Student 9 said: “I realised that I need to know this stuff and the information that I get in AGLE is relevant in my other modules as well” Student 11 agreed with student 9 by saying: “I could definitely see the relevance for the module” Student 14 also said: “This module was really relevant in our other modules as well, we could use it outside the AGLE classroom” The rest of the students’ comments were consistent with the ones mentioned above.

Lecturers

The overall comments concerning the lecturers were good. The students felt that the lecturers definitely contributed to their success in the module (Refer table 6.16: Contributed to success). According to student 8: “The lecturers attempted to make it more interesting” Student 8 further said: “They always gave some insight on what to do and how to approach the problem” Student 9 admitted that “The lecturer puts a lot of pressure on us but it was good because we learned a lot in class” The students were of the opinion that the lecturer motivated them to do well. The students further believed that the lecturers involved the students in the class discussions and encouraged a collaborative learning environment. Student 10 explains: “He would have class discussions on the assignments so that everyone should come up with ideas so that we can learn from each other”

6.3.8 Responses concerning Self-control

Learning goals was the only theme regarding self-control that was visible from the interviews and will be discussed in the following paragraph.

Learning goals

When the students were asked if they had set themselves any specific goals for the module, most of the students indicated that they wanted to do well in the module (Refer table 6.16: Aim for distinction). Two of the students decided from the start that they wanted to do everything in their power to get a distinction. Student 10 explained: “I promised myself that I would give myself time for ALGE 121, I will go to the classes and do the assignments they gave us, I will go through the work we did in the class at home. I wanted to get distinctions” As seen in table 6.16, three of the students changed their goals in the middle of the course. At first they decided they just wanted to pass the

module, but after a while, decided that it is possible to get a distinction. Student 8 decided the following: “After the first two classes I establish that I should get a very good mark in this module and not just pass” Student 13 also decided to change his goal and aim higher: “In the beginning I just wanted to pass, but later I decided that if I work just a little bit harder I can get a distinction” Student 12 was the only student that said their only goal was to pass the module.

6.3.9 Responses concerning eFundi™

During the interviews students were asked if they thought that the eFundi™ site added any value to the module and whether they had any suggestions regarding the site. After analysing the interviews for year 2 the following interesting opinions concerning eFundi™ were gathered:

eFundi™ usage

As discussed in chapter four there were a number of tasks and exercises available on eFundi™ for the students to do. Not all of those exercises counted towards the module mark, but were put there to guide the students towards SDL readiness. Four of the seven students indicated that the fact that all the exercises didn’t count marks didn’t bother them. Student 10 replied: “Even though we didn’t get marks for all of the exercises on eFundi™, it helped us to do better.” Student 12 also agreed: “Even thought we didn’t get many marks for those exercises, it still helped to understand to work better” Their opinions were shared by student 13.

All seven of the students felt that the extra exercises helped them to understand the work better and helped them to practice some of the skills they gained in the module (Refer table 6.16: Extra exercises helped a lot + Learned new skills + Helped to understand work better). Student 10 replied: “All those extra exercises really helped to understand the work better” In his reply, Student 12 specifically referred to the drill and practice software program: “It actually helped me…this study method thing they put on eFundi™ for us, I put it into practice and it actually helped me!” Student 13 was also positive about the exercises: “Definitely, all the extra exercises they put on helped us to learn and practice some of the skills they taught us” According to Student 14, the resources that were made available also added value to the site, he answered: “There were a lot of extra resources and exercises that helped us to master the work” The replies from the rest of the students were consistent with the ones mentioned above.

Only one of the students, student 9, said that he wasn’t aware of all the activities and exercises on eFundi™. He replied: “We weren’t really aware of all the activities. Sometimes when you go onto

eFundi™ you just see, oh, there were some activities we had to do and then the due date has passed and then he didn't really tell us about it" His opinion wasn't supported by the rest of the students. None of the other students indicated that they didn't know about the exercises. Student 10 said: "We always know what was expected of us"

eFundi™ suggestions

There weren't a lot of suggestions made by the students from this year. Most of the students felt that the site was good (Refer table 6.16: Site was good). The students made a few small suggestions. Student 8 struggled to open the listening test. Student 9 had the following suggestion: "I would just maybe want them to immediately put out an announcement if they uploaded new resourses and notify us more regularly" Student 10 felt that they could increase the exercises, while student 12 thought: "there were a bit too many exercises"

6.4 Conclusion from combined analysis

In the following paragraphs, the relationship between the data from the two years and the data from the quantitative and qualitative research processes will be discussed.

6.4.1 Self-management

As seen in the results from the quantitative research (refer table 6.15), the students' SDL-skills with respect to self-management from the dependant t-test measured quite high in the beginning and again towards the end of the module. The fact that most of the students did attend classes, even though they did not like it, shows that they were motivated to do what was expected of them in this module. The students' comments from the first year corresponded well with that of the second year. As in the previous year, only one student indicated that he didn't attend classes.

The fact that almost all the students were prepared to struggle a bit on their own before they seeked help, also show that their SDL-skills concerning self-control were relatively high. It seems that the students from year 2 had a much better relationship with their lecturers than in year 1. They indicated that the lecturer guided them towards success which is an important aspect in SDL.

The responses from the time management component were quite interesting, Even though the students reported that they didn't use daily planners, most of them answered by saying they knew they should start with the assignments well in advance to be able to finish in time. Thus they

actually did manage their time in order to complete their projects in time. However, it seems that most of the students started to study for the exam just a day before the time.

The rest of the responses from the interviews concerning self-management are in line. The quantitative data from the two groups didn't differ much either. Thus, from the data above it would appear that there is a positive relationship between the scores from the questionnaires and the feedback gathered from the interviews and it is clear that the students from the two years are on the same level regarding self-management.

6.4.2 Desire for learning

As seen in the results from the quantitative research (refer table 6.15), the students' SDL-skills with respect to desire for learning also measured high in the beginning and again towards the end of the module. The students' SDL skills at the beginning of the semester measured slightly higher for the students from year 1 than the students from year 2. The SDL skills of the students from year 1 also measured slightly higher towards the end of the module than the students from year 2.. Thus, the data from the quantitative research indicates that in both year 1 and in year 2, the students had a slight decrease in SDL-skills regarding desire for learning. Although the SDL skills of the students from year 1 measured slightly higher towards the end of the module than the students from year 2, the difference was not practically significant and can be disregarded.

From the interviews it seems that the students from year 2 were much more satisfied with the assessment process than the students from year 1. The students from year one felt the topics were irrelevant and they wanted more feedback. The students from year 2 didn't mention those problems. They felt that the assessment was adequate and that they benefitted from the extra exercises on eFundi™.

It was also clear from the interviews that the students from year 1 were much more negative towards the AGLE 121 module than the students from year 2. The students from year 1 felt that the module was a waste of time while the students from year 2 saw the relevance of this module and they realised that they could use it in their other modules. Although the students from year 2 admitted that the content was more difficult than they expected, they were prepared to work hard. The two groups agreed upon the fact that if they were exposed to exercises and tasks that required new skills, they would see it as a challenge.

The year 2 students again agreed that the module content was relevant and useful while the year 1 students felt they were learning things they would never use again. Both the groups felt that the lecturers contributed toward their success in the module. The students believed that the lecturers motivated and guided them. They also promoted collaborative learning and class discussions. The above mentioned qualities are all qualities of a good facilitator that can promote SDL.

The quantitative research indicated that the SDL-skills of students from year 1 were slightly higher than the SDL-skills of students from year 2. However, the differences had no practical significance and can be disregarded. Despite the differences indicated by the quantitative research, both groups gave good positive feedback during the interviews. There were a few areas in which the students from year 2 tended to show more SDL-readiness than the students from year 1 regarding desire for learning.

6.4.3 Self-control

As seen in the results from the quantitative research (refer table 6.15), the students' SDL-skills with respect to self-control measured a bit lower than the other two factors, but is still relatively high. The data from the quantitative research indicated that in both year 1 and in year 2, the students had a slight decrease in SDL-skills regarding desire for learning. The students' SDL skills at the beginning of the semester measured slightly higher for the students from year 1 than the students from year 2. The SDL skills of the students from year 1 also measured slightly higher towards the end of the module than the students from year 2. However, the differences had no practical significance and can be disregarded.

It was clear from the analysis of the interviews that the students from year 2 of the study set themselves much higher learning goals than the students from year 1. Most of the students from year 2 were prepared to do everything in their power to do well in the module and get a distinction while the majority of students from year 1 just wanted to pass the module to get it over with. Thus regardless of the quantitative results, it is clear from the interviews that the students from year 2 of the study, as found in the qualitative research, showed a higher level of SDL skills than the students from year 1.

6.4.4 Chapter summary

In this chapter the findings from the quantitative research process and the qualitative research process were reported and discussed. Regarding the quantitative research process, construct validity of the instrument was determined by doing confirmatory factor analysis, correlation and fit indices. The results from these tests were analysed and the validity of the instrument was supported. The Cronbach's alpha coefficient was used to measure the reliability or internal consistency and after analysis it was found that there was a correlation between the items of the factors. The data from the statistical tests, e.g. independent t-tests, dependant t-tests and ANCOVA were analysed and interpreted for year 1 and year 2 respectively. Regarding the qualitative research process, the analysis of the interviews from both year 1 and year 2 of the study was reported and discussed respectively and the relationship between the qualitative and quantitative data was drawn. In the next chapter, a summary of the most important aspects of the study and a conclusion with recommendations for further research will be given.

Chapter Seven

Conclusion and recommendations

7.1 Introduction

In this chapter the results of the literature study and the empirical research are discussed in terms of the aim and sub-aims of the study. The aim of the study was to determine how an LMS could be used to enhance SDL. In order to achieve this aim, the following sub-aims were stated:

i) To identify guidelines to improve students' SDL skills;
ii) To investigate how SDL guidelines can be adopted in an LMS;
iii) To develop an eFundi™ site with the necessary components that will enhance SDL;
iv) To evaluate to what extent a newly-constructed eFundi™ site could enhance SDL.

This chapter focuses on conclusions regarding each of the sub-aims of this study. Limitations of the study are identified and recommendations for further research are made. This study was performed from a constructivist perspective which relates to the researcher's belief that knowledge and meaning are constructed in the mind of the individual. The literature study was followed by an empirical study with a mixed-method research approach (QUANT→qual).

Two groups of students enrolled for a basic literacy module (AGLE 121) were used, one as the control group (2010 enrolment) and one as the experimental group (2011 enrolment). The LMS used at the NWU was a SAKAI product, named eFundi™. An eFundi™ site for the AGLE 121 module was designed and used as intervention in 2011. A SDL questionnaire measuring their SDL skills was completed by both groups prior to the presentation of the module and after completion of the module. Follow-up interviews were conducted with a smaller sample of the students from each group to enrich and clarify the qualitative data.

7.2 Conclusions

In the following sections, conclusions regarding the sub-aims of the study are discussed.

7.2.1 Conclusions regarding sub-aim one: To identify guidelines to improve students' SDL skills

In Chapter 2 of this study, the researcher focused on a number of aspects concerning SDL in general. A brief history on SDL (§2.3) was given and a number of existing SDL models were discussed (§2.4). The characteristics of a self-directed learner (§2.5) and the role of the educator (§2.6) were identified and listed. After all the above-mentioned aspects were taken into consideration the researcher was able to formulate the following eight guidelines to improve learners' SDL skills (see Figure 7.1):

- Help learners to assess their own learning needs, goals and interests.
- Provide a flexible learning environment in which learners have the responsibility and freedom to make choices to meet their specific needs concerning goals, resources and participation.
- Foster a collaborative learning environment that is democratic, challenging and non-threatening.
- Make sure learners know what is expected of them in terms of aims and objectives, learning resources and assessment criteria.
- Situate learning in real-life contexts by choosing learning activities and assignments in familiar situations that can show students the importance of the learning content;
- Guide them to use a variety of resources.
- Help learners to evaluate and validate their learning accomplishments and experience.
- Vary the amount of SDL guidance and provide learners repeatedly with opportunities to increase responsibilities.

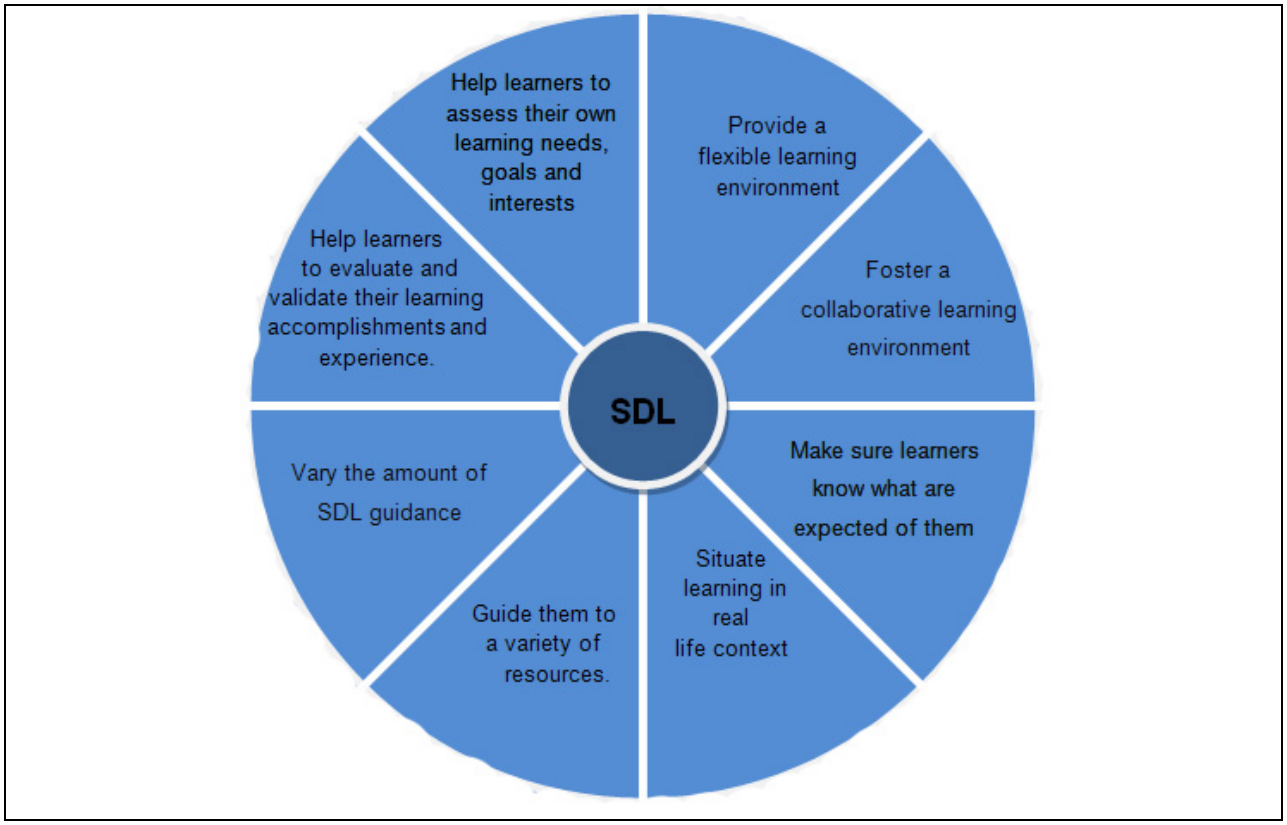


Figure 7.1 General SDL guidelines

Although these guidelines can be used to foster SDL in a classroom, they were derived from general SDL literature and not necessarily literature that focused on SDL in an online environment. The researcher found it necessary to further refine the SDL guidelines in order for them to be relevant in an online environment so that they can be integrated into a LMS. The adjustments of these guidelines helped to reach the second research aim, which is discussed in the following section.

7.2.2 Conclusions regarding sub-aim two: To investigate how SDL guidelines can be adopted in an LMS

As seen in the previous section, the guidelines compiled to reach sub-aim one do not focus on SDL in an online learning environment but are set for learning environments in general. In order to reach sub-aim two, two things needed to be done. The researcher had to determine a) how each of the identified guidelines should be practically implemented in an online environment; and b) which LMS functionality could be used to implement each of those aspects. The following characteristics of

LMSs have played a role in adopting the SDL guidelines: Functionalities (§3.2.1); Roles of users (§3.2.2); Limitations (§3.2.3) and Advantages (§3.2.4) of LMSs in general (§3.2). A model for SDL in an online environment (§3.3.1) and the Technological Pedagogical Content Knowledge (§3.3.2) model were also analyzed. In table 3.1 a summary of the guidelines, the aspects to focus on when implementing the guideline in an online environment and the LMS functionalities that can be used to implement the specific aspect was given (see Figure 7.2). These guidelines may be used to foster SDL in a classroom with the help of the LMS. However, the researcher found that it was necessary to refine these guidelines even more to personalise them for a specific LMS, namely eFundi™. To be able to reach sub-aim three, as discussed in the following paragraph, the researcher identified specific aspects of the SDL for implementation in eFundi™.

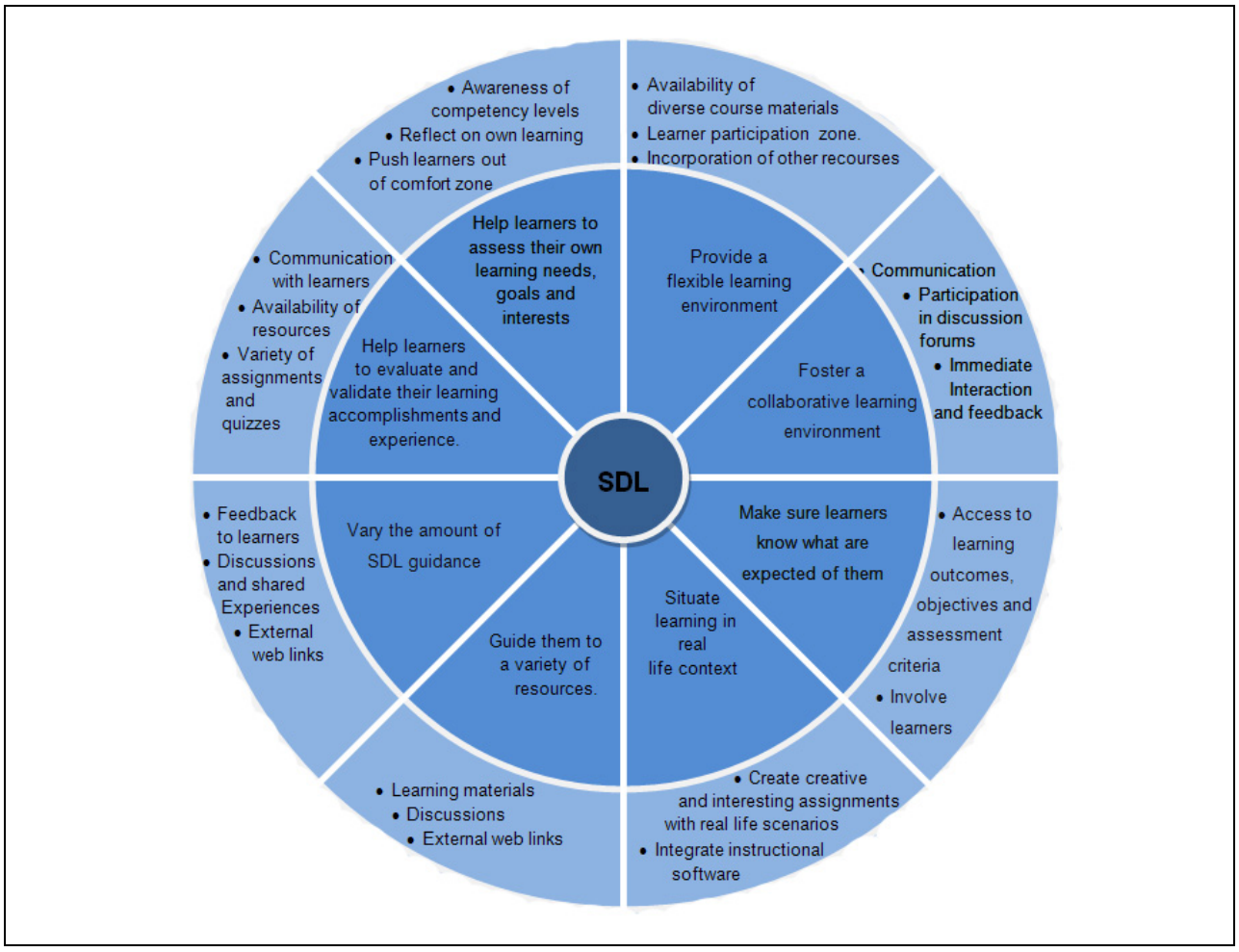


Figure 7.2 SDL guidelines refined for online environment

7.3 Conclusions regarding sub-aim three: To develop an eFundi™ site with the necessary components that will enhance SDL

After sub-aim two was reached, the researcher had to break down the guidelines even further (see Figure 7.3). This study focused on the AGLE 121 module at the NWU and as seen in §7.1 the LMS used by the NWU is called eFundi^{TM}. Although, in general LMSs share several common functionalities, each LMS still has its own specific features. The researcher found it necessary to refine the guidelines in table 3.1 in order to create an eFundi^{TM} site that will help to foster SDL. The nature of the module and the abilities of the students were also taken in consideration when the eFundi^{TM} site was created. The researcher focused on each of the guidelines as they were adapted for LMSs and decided whether the identified aspects of each guideline could be implemented effectively in the eFundi^{TM} site and whether it would contribute to the outcomes of the module. Most of the aspects as listed in table 3.1 were integrated into eFundi^{TM}, with the exception of the forum. The lecturers felt that the students weren't ready to participate successfully in a discussion forum. They were also concerned that there were too many students and that the topics covered in the module weren't suitable for such an exercise.

A number of activities and exercises (§4.2) were given to the students on eFundi$^{TM.}$ Most of them didn't contribute significantly towards the module mark and the students were expected to do them on their own time. In general the responses gathered from the interviews were positive concerning the eFundi ^{TM} site for the AGLE121 module. As seen in §6.3.10 the students felt that even though it didn't count for marks, they really did benefit from the exercises. They believed the exercises helped them to understand the work better and to practice some of the skills they gained in the module (§6.3.10). It was evident that these activities helped the students to attain the outcomes of the module, but the researcher still needed to investigate how this LMS enhanced SDL. To be able to reach sub-aim four, as discussed in the following paragraph, the researcher had to evaluate to what extent this newly-constructed eFundi™ site enhanced SDL.

Figure 7.2 SDL guidelines refined for eFundi™

7.4 Conclusions regarding sub-aim four: To evaluate to what extent a newly-constructed eFundi™ site could enhance SDL

In order to reach sub-aim four, to evaluate to what extent a newly-constructed eFundi™ site could enhance SDL, the researcher did an empirical study to gather valid and reliable data. A mixed methods inquiry approach was used to obtain reliable evidence (Refer §5.2). Initially there were four groups involved in the research process (§Refer 5.3). Two groups from year 1 (control group) and two groups from year 2 (experimental group). The first set of statistical tests were done to determine whether the two groups from year 1 and the two groups from year 2 were equal and could be combined in only one control and one experimental group. Independent t-tests, dependent t-tests and ANCOVA's indicated that there were no statistically significant differences between the SDL skills of the learners from the two control groups (Refer §6.2.4). The same tests were done on the experimental group and there were no statistically significant differences between the SDL skills of the learners from the two experimental groups either (Refer §6.2.8). Thus the two control groups and the two experimental groups were merged and all further analysis of the data was done on the merged groups.

When the independent t-test was done between the pre-tests of the control and the experimental groups (Refer §6.2.8.1), it was found that the initial SDL skills of the learners from the control group were slightly higher than the experimental group. The students from year 1 tested higher in desire for learning and self-control. The differences from these two factors were statistically significant but had a low practical significance. This means that the differences between the two groups were so small that it didn't really influence the results. However, it was interesting that the students from both groups rated themselves extremely high in the pre-tests. Most of the students chose the (1) strongly agree or the (2) agree option on the 5-point Likert scale. They rated themselves as students with very high SDL skills and there was not much room left for improvement in the post-test. However, the literature clearly indicated that learners need to be guided towards SDL (Refer §2.6.3). According to Grow's model (Refer figure 2.6) the students that participated in this study fall into the profile of a stage 1, and in exceptional cases, stage 2 learner. The students that took part in this study, came from an educator-centered school system were learners were passive and dependant. These students need to be guided towards SDL readiness. It's highly unlikely that students belonging to Grow's stage 1 or 2 will become students with high SDL skills in a matter of six months at university without proper and SDL-specific guidance. Thus, the researcher is of the opinion that the students' perceived perceptions of their SDL skills are not necessarily accurate.

The dependant t-tests showed that in year 1 of the study (control group) there was no practically significant change in the SDL skills of the students from the beginning to the end of the module (Refer §6.2.8.1). However, in the second year (experimental group) of the study, the students tested slightly lower in two of the three factors, namely desire for learning and self-control at the end of the second year. The differences were statistically significant but the effect size were so small that it didn't really influence the results (Refer §6.2.8.1). Because of the researcher's concern mentioned in the previous paragraph, the possibility to get a large effect size in any of the factors was unlikely. The students rated themselves much too high in the first questionnaires and even if they felt that their skills developed throughout the duration of the course, they could not necessarily indicate it in the questionnaires. However, even if quantitative data was of small practical significance and indicated that the learners from the second year of the study did not necessarily improve their SDL-skills, the qualitative data indicated the learners did score better in two of the three factors after they used the newly developed eFundi^{TM} site, in the second year of the study. Self-management is the only factor in which the students from the second year of the study didn't improve from the beginning to the end of the module. However, as discussed in §6.4.1 the students rated themselves extremely high in the pre-tests and there was no room for improvement in the post-test.

Thus, when results gathered from the quantitative data and the data from the qualitative research were interpreted together, the intervention seemed to have had an influence on the SDL-skills of 2011 AGLE 121 students. The researcher does however realise that there were limitations to the study and there are some aspects to reconsider in future research in order to get more meaningful results. The limitations and recommendations for further research are discussed in the next paragraphs.

7.5 Summary and recommendations

In this study, the potential of learning management systems to enhance self-directed learning was researched. The study consists of seven chapters. Chapter one was the introduction and problem statement. In this chapter the motivation for the study was explained and the aim and sub-aims of the study were determined. Chapter two was the first of three literatures chapters and dealt with SDL in general. A brief history of SDL was given and a number of SDL models were discussed. These models were analysed in order to compile a list of guidelines to foster SDL. These guidelines didn't focus on any specific learning environment and it was necessary to refine these guidelines for an online environment. This was done in chapter three. To be able to refine the guidelines for an

online environment, learning management systems in general were discussed and a few models for SDL in an online environment were reviewed. In chapter four the SDL guidelines were further refined for implementation in eFundi™. The nature of the AGLE 121 module and the specific functionalities of eFundi™ were discussed and taken in consideration when the final set of guidelines was compiled. Chapter five and six focused on the empirical research. In chapter five the research design and methodology, viewed from a constructivist perspective were discussed. A mixed-method research approach was used and both the quantitative and qualitative methods were outlined. In chapter six the results for the quantitative and qualitative research were given and the relationship between these two methods was explained. In the final chapter the conclusions pertaining to each of the sub-aims were given.

After the literature study, empirical research and results of this study was taken in consideration, the researcher identified the following limitations:

- The participants of this study appeared to have had misconceptions about their initial SDL skills which, according to the researcher, influenced the way in which they answered the questionnaire.
- The fact that there were six lecturers responsible for the AGLE 121 module complicated the administration of this project.
- The duration of the course was too short. Not all the guidelines could be implemented to their full potential because of the time limit.
- The number of learners registered for this module was too many for a project. The lecturers struggled to guide and support all the students.
- The number of learners on which interviews were conducted can be increased in order to make more accurate conclusions.
- Students' attitudes and their level motivation at the beginning of a module might have an influence on their performance and the way the experience the module. Measuring instruments should compensate for this.

The following recommendations for further research are made:

- Conducting a longitudinal study where it would be possible to guide the learner from Grow stage one, through to Grow stage four, to foster their SDL skills.
- Conducting the same study on students from different year groups.
- Expanding the study to other subject areas.
- Critically evaluate the quantitative questionnaire in terms of what the students want others to belief about them and how it differs from their honest answers.

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Addendum 1

Student consent form

VOLUNTARY CONSENT FORM

PARTICIPATION IN RESEARCH PROJECT IN THE AGLE 121 MODULE

Dear participant

Thank you for your time and for making an informed decision.

Please provide me with your written consent by reading through section 1 and 2 and completing section 3. If you do not wish to participate in this research by not completing the questionnaire, it will not be held against you, as participation is voluntary. Please return the consent form to me. Your input and opinions are greatly appreciated!

Yours faithfully

Chantelle Tredoux

Section 1: General project information

1. Project title:

The potential of a learning management system to enhance self-directed learning

2. Institution:

North-West University, Faculty of Education Sciences

3. Names and contact information:

Contact person		Project leader	
Title, name, surname	Ms Chantelle Tredoux	Title, name, surname	Prof Elsa Mentz
Qualification	HonsBEd	Qualification	PhD
Telephone (work)	018 299 2003	Telephone (work)	018 299 1858
Cellphone	0843927016	Cellphone	0836607181

4. Purpose of the project:

This study aims to determine how a Learning Management System (eFundi™) could be used to enhance self-directed learning (SDL). Learners will be asked to complete the questionnaire to

establish their level of SDL readiness at the beginning of the module. At the end of the module, the questionnaire will be completed once again to determine whether there are any changes in their level of SDL.

5. What will be expected of the participants:

Students will only be expected to complete the two questionnaires referred to above.

6. Participants' confidentiality will be ensured in the following way:

The questionnaires will be completed online; student numbers will therefore be required for the results. The researcher will, however, ensure that the information is treated confidentially. Data will be extracted immediately after completion and no access to results will be possible via the internet. Results will be saved on an external storage medium, which will be kept in a safe place.

Section 2: General principles

It is important to understand and take into consideration the following before deciding to participate in this project:

1. It is possible that you will not personally derive any benefit from your participation in the project. However, the results may help to benefit students in the future.

2. By agreeing to participate in the project, you also consent that the data that will be generated by the researcher may be used for scientific purposes.

3. Your participation remains voluntary and you may at any time withdraw from the research.

4. Your personal information will be treated as confidential at all times.

5. Should you be interested, the research findings will be made available to you.

Section 3: Consent

Permission for Research Project:

The potential of a learning management system to enhance self-directed learning.

STATEMENT OF CONSENT: RESEARCH PARTICIPANT

I, _____, (name and surname)

a student from _____ (name of university)

hereby agree to participate in the above research project. I am aware that my participation in this study is voluntary and that I may withdraw from the research at any time. I understand that if I do not wish to participate in this research by not completing the questionnaire, it will not be held against me, as participation is voluntary. I also understand that all personal information will be treated as confidential by the researchers.

_____

Name and signature

_____

Date

Addendum 2

Ethics approval of project at NWU

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 4850
Fax +27 18 293 5329
Email Ethics@nwu.ac.za

Prof E Mentz

2010-09-05

ETHICS APPROVAL OF PROJECT

The North-West University Ethics Committee (NWU-EC) hereby approves your project as indicated below. This implies that the NWU-EC 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: The potential of a learning management system to enhance self-directed learning.

Ethics number: NWU-00644-10-A2

Approval date: 2010-08-26 **Expiry date**: 2015-08-25

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-EC:*
  - *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-EC. 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-EC and new approval received before or on the expiry date.*
- *In the interest of ethical responsibility the NWU-EC 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-EC 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 MMJ Lowes
(chair NWU Ethics Committee)

Addendum 3

SDL questionnaire

Self-directed learning readiness scale

Nurse Education Today, vol 21, Fisher, King and Taque, Development of a self-directed learning readiness scale for nursing education, 516-525, Copyright Elsevier (2001).

Instructions

Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box.

Self-management

1. I manage my time well

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

2. I am self disciplined

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

3. I am organized

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

4. I set strict time frames

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

5. I have good management skills

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

6. I am methodical

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

7. I am systematic in my learning

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

8. I set specific times for my study

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

9. I solve problems using a plan

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

10. I prioritize my work

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

11. I can be trusted to pursue my own learning

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

12. I prefer to plan my own learning

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

13. I am confident in my ability to search out information

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

Desire for learning

14. I want to learn new information

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

15. I enjoy learning new information

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

16. I have a need to learn

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

17. I enjoy a challenge

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

18. I enjoy studying

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

19. I critically evaluate new ideas

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

20. I like to gather the facts before I make a decision

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

21. I like to evaluate what I do

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

22. I am open to new ideas

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

23. I learn from my mistakes

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

24. I need to know why

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

25. When presented with a problem I cannot resolve, I will ask for assistance

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

Self-control

26. I prefer to set my own goals

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

27. I like to make decisions for myself

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

28. I am responsible for my own decisions/actions

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

29. I am in control of my life

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

30. I have high personal standards

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

31. I prefer to set my own learning goals

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

32. I evaluate my own performance

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

33. I am logical

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

34. I am responsible

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

35. I have high personal expectations

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

36. I am able to focus on a problem

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

37. I am aware of my own limitations

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

38. I can find out information for myself

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

39. I have high beliefs in my abilities

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

40. I prefer to set my own criteria on which to evaluate my performance

Strongly agree	Agree	Undecided	Disagree	Strongly disagree

Addendum 4

License agreement for the use of the SDL questionnaire

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Addendum 5

Semi-structured interview questions

Semi-structured interview questions

1. What is your main incentive to spend time on your AGLE 121 module?
2. What do you do if you have a problem that you can't solve?
3. What is preventing you from succeeding in AGLE 121?
4. Which factors contribute most to you success in AGLE 121?
5. What criteria would you suggest should be used to evaluate you performance in AGLE 121?
6. What learning goals did you set for yourself for AGLE 121?
7. How do you manage your time in order to pass AGLE 121?
8. If you were challenged with something that requires a new skill, for example to participate in a discussion forum, how would you react to it?
9. Do you think the eFundi site added any value to the module? Motivate.
10. Do you have any suggestions to make the eFundi site better?

Addendum 6

Letter from Statistical Consultation Service of the North-West University

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
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To whom it may concern

Re: Dissertation Ms C Tredoux, student number: 21393273

We hereby confirm that the Statistical Consultation Service of the North-West University has analysed the data and assisted with the interpretation of the results.

Kind regards

DR S M ELLIS Pr Sci Nat

Head: Statistical Consultation Services

Addendum 7

Letter from language editor

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Translating and Editing

SATI no 1002628

083 264 4520

CERTIFICATE

ISSUED ON 24 APRIL 2012

This is to certify that I edited the language of the dissertation

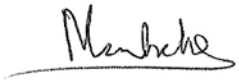
The potential of a learning management system to enhance self-directed learning

---

Chantelle Tredoux

21393273

Dissertation submitted in fulfilment of the requirements of the degree Magister of Education (Computer Science Education) at the Potchefstroom Campus of the North-West University



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Addendum 8

Qualitative data from ATLAS.ti available on CDROM at the back of the dissertation.