The use of Blackboard as a tool for the teaching and assessment of large classes in mathematics education: a case study of second year level Bachelor of Education students in one university in South Africa.

Submitted by:

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DECLARATION BY THE RESEARCHER

I, Alanna Riley, hereby declare that this research submitted by me to the Faculty of Education at the University of Fort Hare was not previously submitted for any other degree at any other institution. I further declare that this research is a product of my original work in conceptualisation, design and execution.

I have collected the data for this research in line with appropriate ethical considerations, adhering to existing guidelines for the data collection from human research participants. I have analysed the data consistent with a scientific approach to data analysis and declare that all sources and materials have been acknowledged appropriately.

_____ _____

Alanna Riley Date

DEDICATION

This work is dedicated to the following people:

To my husband *Craig*, your inexhaustible well of love, patience, understanding and support while I undertook this study has been and continues to be my motivation and inspiration.

To my three children *Caylin, Cade and Tanyth*, your love and laughter teaches me more every day than books ever will.

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ABSTRACT

This study locates the Blackboard Learning Management System as a Technology Enhanced Learning tool within the bounds of the discipline of eLearning and aimed to interrogate the use of Blackboard for the purposes of teaching, learning and assessment in large classes. It is evident from the literature reviewed that changes in both Higher Education in the South Africa with regards to policy and legislation in addition to international shifts towards increased access and participation in a fast paced, ever-evolving knowledge-based economy, providing the context for this work. The theoretical framework for this study is not unidimensional due to the fact that the educational field of eLearning as an area of specialisation draws on a multitude of theories in terms of their utility value for instructional design of courses utilising Information and Communications Technology as a mode of delivery. This study was conducted within the bounds of an interpretivist paradigm as the researcher sought to focus on the use of Blackboard and the experiences of the lecturers and students involved in the implementation thereof. The research design for this study took the form of a case study and a multiple case method was employed. The researcher collected data through personal interviews conducted with participating lecturers, while student data was collected by means of a qualitative survey which was conducted through the Blackboard Learning Management System. The data was analyzed by means of a thematic analysis, consistent with the interpretive paradigm chosen for this study. The findings of this study revealed that Blackboard was utilised effectively in order to facilitate communication, access to course resources and promoted more efficient assessment processes. The implementation was however not without challenges many of which were systemic and focused on the lack of resources available to the students. The implications of using Blackboard for teaching and assessment of large classes include the use of the Learning Management System as part of a multimodal method of course delivery in an effort to reach the multitude of registered students both conceptually as well as electronically. The recommendations arising from this study include consideration on the part of the faculty for a unified approach in the use of Blackboard for communication as well as deployment of resources. Additionally, this study may form the foundation of further studies in this field, with a focus on the active engagement and training of lecturers in order to integrate traditional teaching methods with blended learning opportunities.

Keywords: large classes; learning management system; Blackboard; assessment; blended learning.

LIST OF ACRONYMS

AC	Abstract Conceptualisation
AE	Active Experimentation
CE	Concrete Experience
CHE	Council on Higher Education
DoE	Department of Education
DP	Duly Performed
HAI	Historically Advantaged Institutions
HBI	Historically Black Institutions
HDI	Historically Disadvantaged Institutions
HE	Higher Education
HE ACT	Higher Education Act 101
HEI	Higher Education Institutions
HET	Higher Education and Training
HOS	Head of School
HWI	Historically White Institutions
ICT	Information and Communication Technology
LMS	Learning Management System
MCQ	Multiple Choice Questions
MKO	More Knowledgeable Other
NCHE	National Council on Higher Education
NPHE	National Plan for Higher Education
NQF	National Qualifications Framework
NSFAS	National Student Financial Aid Scheme
RO	Reflective Observation
SAHEI	South African Higher Education Institution
SAQA	South African Qualifications Authority
S-O-R	Stimulus – Organism – Response
S-R	Stimulus-Response
TeL	Technology Enhanced Learning
ZPD	Zone of Proximal Development

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CHAPTER 1

INTRODUCTION AND OVERVIEW OF THE STUDY

1.1 Introduction

This chapter presents a broad overview of this work drawing attention to the key components of this study. This chapter delineates the research problem statement as conceptualised by the researcher and the main research question and sub-questions which effectively framed the study. Additionally, this chapter provides brief definitions of key concepts drawn on by the researcher throughout the work. Furthermore, this chapter outlines the rationale which informed the study addition to as well as significance of the study.

1.2 Background to the study

A number of authors have noted massive increases in student enrolment and participation rates at higher educational institutions around the globe, a trend from which South African Higher Education Institutions (HEI's) were not exempt. (Botha, Fourie & Geyser, 2005; Rouhani, 2007; Kraak, 2001; Shofer & Meyer, 2005 and Barnes, 2006). However, the socio-political and historical context informing increasing enrolment targets provides a slightly different slant on the transformations that have occurred throughout the South African Higher Education (HE) landscape over the past twenty-five years in comparison to its international counterparts with a specific focus on the openly prioritised the need to widen access to Higher Education as highlighted by the South African National Department of Education during this period with a view to make provision for those students previously excluded from accessing particular institutions or programmes based on the specified criteria such as race or gender.

This unequivocal call to increase student numbers and diversify student populations was accompanied by legislation in the form of the Higher Education Act of 1997 (HE Act) placing the responsibility of increasing access on to South African Higher Education Institutions (SAHEI's). This drive to increase opportunities for access to Higher Education was, and remains to be an equity-driven concern, observable in the adoption of specific strategies and procedures that institutions have undertaken to make its' educational services accessible to a diverse range of students. Generally speaking, HE institutions in South Africa have increased target enrolment in an effort to comply with the mandate of widening access and increasing participation rates, resulting in a greater number of student applications and enrolments at South African HEI's than previously experienced. This growing phenomenon translates into a greater number of students enrolled for undergraduate courses than previously imagined which together with economic constraints in the context of a historically imbalanced South African HEI landscape has subsequently resulted in a higher student to lecturer ratio.

The massive increases in student numbers, particularly at undergraduate level, have by and large not been accompanied by reciprocal increases in staff numbers (Botha et al., 2005) and as such, provides lecturers with a number of challenges in both teaching content and concepts effectively as well as providing adequate and fair 'airtime' in order to afford all students the opportunity to engage sufficiently with concepts in class. In addition, teaching large classes presents additional challenges in meeting the students where they are at in terms of affording them the opportunity to make use of a variety of learning styles and collaborative learning strategies. This in turn translates into lecturers being unable to provide them with the requisite support and feedback required to facilitate academic success. Furthermore, adequate and regular assessment is compromised as student numbers increase, creating a situation where lecturers enter 'survival mode' providing only the required number of summative assessments in order to comply with university assessment policy (Buchanan & Rogers, 1990).

The role of assessment in HE can be defined in a number of ways, however, commonly held notions focus on the measurement of requisite knowledge, skills and competency. Therefore, assessment and devised assessment tools should effectively measure the extent to which the students have mastered concepts and content related to the course(s) for which they have enrolled. In a course such as Mathematics in the Faculty of Education, solid conceptual understanding is fundamental to the success of the students, South Africa's future mathematics teachers. Therefore, it can be argued that the ideal assessment situation would be one where the conceptual understanding of the class is assessed on a regular basis with constructive and timeous formative feedback used in a strategic manner in order to build strong foundation (Gibbs, 1999). Botha et al. (2005) notes that as class sizes increase, assuming that staff numbers remain constant; assessment of student learning is compromised in terms of number of assessments, quality of assessments and feedback given to students.

In addition to challenges pertaining to teaching and assessment of large classes as a result of increased enrolments, fundamental changes in the nature of knowledge and knowledge acquisition have impacted and continue to impact on the Higher Education context. Education cannot and should not be viewed as operating in isolation to the socio-economic and political context and therefore needs to be responsive to local and international changes in order to remain relevant. The question of relevance in terms of knowledge, skills and competencies presently relates profoundly to the 21st Century context of information accessibility.

The advent of the internet and specifically developments witnessed over the past ten years in the development and refinement of Web 2.0 have undoubtedly altered traditionally held notions of knowledge and knowledge acquisition, with a strategic focus on accessibility, utility and applicability. Resultantly, concepts such as e-learning, online learning, open and distance learning and blended learning have become hot topics in the context of Higher Education and Training (HET) worldwide. Nagel & Kotze (2011) have identified a phenomenal increase in the uptake of online courses internationally while blended or technology enhanced

learning options have remained relatively constant. However, it seems that in South African tertiary institutions a multi-modal approach is being employed in an effort to 'blend' traditional face-to-face lectures with a Learning Management System (LMS) where students can access course content and course related activities such as online discussions and collaboration, assignments and assessments online.

According to Clarke (2008), available eLearning tools make provision for the lecturer to engage with the students on a one-to-one level in a one-to-many environment. In addition a variety of learning styles can be incorporated into the blended learning environment in ways that are currently unavailable in large classroom situation (Clarke, 2008). The adoption of an LMS for course delivery, student assessment and support in either an online or blended learning context affords the lecturer the opportunity to utilise available tools in order to support learning otherwise hindered by large class numbers and in ways consistent with global trends thus developing crucial aspects of 'graduateness' in terms of requisite knowledge, skills and competencies in order to satisfy the requirements of the labour market in the form of future employers.

While there are a number of LMS's currently available to SAHEI's , the difference in terms of tools available across the different platforms is considered to be largely cosmetic as each LMS serves similar functions that of course delivery and support. This LMS utilised for the purposes of this study is the Blackboard LMS as this is the system currently utilised by the institution selected for the study.

Blackboard provides a number of tools to lecturers and students for a technologically enhanced learning experience. The assessment tools available in Blackboard in particular have been identified as being able provide a possible solution for the lecturers who struggle to create and distribute vast amounts of course material, develop and administer regular assessments and provide timeous and quality feedback to their vast numbers of students. It must however be noted that Blackboard tools are just that, they are tools similar to a hammer, garden hose

or high pressure cleaner, efficacy is largely dependent the manner in which the tool is utilised. Ineffective utilisation will result ineffective results while the opposite is also true. The meticulous planning, implementation, utilisation and evaluation of said LMS forms an integral part of ongoing programme development.

1.3 Statement of the research problem

In the context of the South African Higher Education system where the mandate to improve access and increase student enrolment at undergraduate level while meeting the need to educate the nation, has been fraught with a number of challenges for lecturers. The nature of these challenges are varied but include the need to find creative ways to reach the vast numbers of students in their lectures, being aware of diverse academic needs of said students in addition to the provision of ongoing quality assessment as well as providing timeous, fair and meaningful feedback. To this end, electronic approaches including the utilisation of LMS's such Blackboard have been assumed to offer solutions to teaching and learning challenges including efficient distribution of course material, timeous support, effective communication and assessment-related concerns. In the context of Foundation and Intermediate Mathematics Phase studies, the acquisition of foundational concepts by student teachers is of core concern as further development of mathematical knowledge hinges on a strong foundation, one which can be compromised in the context of large classes where the opportunity for developmental support is limited.

The use of an LMS (Blackboard) has been identified as a possible solution to the abovementioned concerns and as such has been tentatively implemented in an effort to address identified issues related to the teaching and assessment of large classes. However, the effectiveness of any implementation involves the taking up of and effective utilisation of the system and consequently, this study scrutinises the initiative to use Blackboard in this context. Additionally, this study serves to shed light on the enablers and constraints associated with the implementation and

utilisation of Blackboard as an LMS as experienced by both the lecturers and student participants involved in this study, with a specific focus on the Faculty of Education, Mathematics Phase Studies courses at second year level at one South African university.

1.4 Research Questions

The following research questions frame the study:

1.4.1 Main Research Question

How do lecturers use blackboard as a tool for the teaching and assessment of large classes?

1.4.2 Sub Research Questions

- What challenges do lecturers face in the teaching of large classes
- What challenges do lecturers face in the assessment of large classes?
- What are the benefits and challenges of using Blackboard for large classes?
- What implications does the use of Blackboard have for teaching and learning?

1.5 Delineations and Limitations

Delineations:

This study focused on the use of Blackboard as a tool for the teaching and assessment of large classes. Therefore, the study was bounded by the *utilisation* of the Blackboard LMS tool for the abovementioned mentioned purposes in addition to the experiences of the participants involved in this implementation. Although the following areas are associated with teaching, learning and assessment, the impact thereof was excluded from the study:

- Teaching methodologies;
- Assessment practices falling outside of Blackboard related assessment;
- Alternative strategies in managing large classes aside from Blackboard.

Limitations:

The study was limited to two lecturers who were responsible for teaching mathematics phase studies within the context of the second year level Bachelor of Education qualification offered at one South African university. The lecturers selected for this study taught second year Foundation and Intermediate Phase mathematics studies respectively. The staff members were selected based on their interest in the implementation of Blackboard as a tool for the enhancement of their teaching practice in the context of increasing student numbers. The students enrolled for the respective mathematics courses formed the second part of each case study and although the entire cohort was eligible to participate in the study, participation was voluntary and as such, a total of 60 students in addition to the two selected staff members formed the cases for this study.

1.6 Definition of concepts

1.6.1 Massification

The Collins Online English Dictionary defines 'massification' as the process whereby luxury products are made available for mass consumption (http://www.collinsdictionary.com). In the context of Higher Education and Training this translates into a fundamental shift from an elitist view of HE, towards an open-system, affording an increasing number of citizens the opportunity to access HEI's (Kraak, 2001). Massification in the South African context is conceptualised both in terms of widening access to institutions and academic programmes previously earmarked for certain groups based on race, gender or both race and gender as well as widening access in terms of size and shape of the HE landscape through

increasing the number eligible students actively accessing HEI's in the South African context.

1.6.2 Participation rates

The concept of 'participation rates' has been borrowed from the discipline of economics whereby the participation rate refers to the percentage of eligible adults actively employed or seeking employment (Oosthuizen & Bhorat, 2004). In the context of HE, participation rates refer to the number of enrolments in SAHEI's in relation to the total population between 20 and 24 years of age (CHE, 2009).

1.6.3 Large Classes

Large classes as defined by Buchanan & Rogers (1990) and Botha et al. (2005) refers to the number of enrolments per class whereby traditional teaching and learning practices are rendered impractical and as such require the exploration of alternative strategies. Buchanan & Rogers (1990) arbitrarily quantify large classes as those which have reached or exceeded 80 enrolments, noting that this appears to be the point at which challenges related to traditional teaching, learning and assessment practices tend to be amplified causing undue stress on both staff and students.

1.6.4 Graduateness

'Graduateness' can generically be described as qualities valued by employers in terms of knowledge, skills, competencies and attitudes coupled with the expectation that graduates are in possession of such qualities. Steur, Jansen & Hofman (2012), note the complexities involved in the accurate conceptualisation of 'graduateness' as not all employers hold equal expectations in relation to graduate employees. Murphy & Calway (2008), identify emergent skills related to 21st Century competencies as key graduate qualities including the ability to make use of initiative; the potential utilise innovative and effective problem-solving strategies;

demonstrable competency in utilising available technologies; demonstrable capacity for lifelong learning and excellent self-management and time-management skills. Although the term ‘graduateness’ is regarded loaded, largely subjective concept, for the purposes of this study it refers to a combination of discipline specific knowledge and competencies in concert with technology based skills in addition to soft skills such as self-management and effective problem-solving skills.

1.6.5 Web 2.0

According to Dabbagh and Reo (2011), Web 2.0 cannot be defined in terms of one specific technology, but rather describes the emergence of specific types of technologies, web-based tools and services, the first of which appeared in rudimentary form in the public domain approximately ten years. The initial movement gained momentum with the advent of massive internet companies such as Yahoo! and Google, creating spaces for online users in ways previously unimagined. Dabbagh and Reo (2011) note the impact of such tools and services on the way in which users interact with online material as well as with each other, creating a user-centered Web which is socially connected through the mass utilisation of social networking sites such as Facebook, MySpace, Twitter, LinkedIn, Youtube, Flickr and the like. In addition to social networking, Dabbagh and Reo (2011) identify the fairly recent development of what has been termed Learning Management Systems, utilising the web for formal learning purposes.

1.6.6 Learning Management System

Dabbagh and Reo (2011) locate the development of Learning Management Systems (LMS’s) as taking place during advent of the Web 2.0 epoch as outlined in 1.5.5 above. LMS’s include systems such as Web CT and Moodle which are defined as open-source packages allowing for customisation of the package by institutions in addition to more structured packages such as Blackboard which provide specific social constructivist learning tools for course development and implementation. Watson & Watson (2007) discuss LMS’s in contrast to other computer-based education strategies which mainly function as course deployment

mechanisms. Watson & Watson (2007), further note that LMS software packages differ in both their structure and function in that they have been developed with a view to assist in the overall course management process by offering a variety of tools such as resource deployment tools, interactive discussion tools, communication tools, assessment tools, tracking tools and course related self-help tools.

1.6.7 Blended Learning

Bach, Haynes & Lewis-Smith (2007) describe blended learning as mixed mode of delivery whereby lecturers and associated teaching support staff such as tutors or teaching assistants, make use of contact sessions in addition to an online learning component of the course. Accordingly, teaching and learning practice is 'blended' to include both online and face to face interaction.

1.6.8 Enabling Factors

For the purposes of this study, enabling factors have been conceptualised as factors identified by the participants as being facilitative in nature in relation to the effective implementation and utilisation of the Blackboard LMS. These factors include but are not limited to:

- human capital in terms of consultants, colleagues and peers;
- situations such as consultations, help-desk assistance, training sessions and workshops;
- physical resources such as university laboratories; public access electronic devices and personal electronic devices; and
- technologies including network infrastructure and software programmes.

1.6.9 Constraining Factors

For the purposes of this study, constraining factors have been conceptualised as factors identified by the participants as being restrictive in nature in relation to the effective implementation and utilisation of the Blackboard LMS. These factors include but are not limited to:

- personal competencies related to technology-based skills;
- physical resources such as university laboratories; public access electronic devices and personal electronic devices;
- challenges related to the LMS itself; and
- technology-based challenges including network infrastructure and software programmes.

1.7 Assumptions of the study

The following assumptions were implicit in the conceptualisation of this study:

1. Each staff member and student participating in this study bring with them a specific set of experiences, values, skills sets and competencies
2. Each staff member and student participating in this study would freely provide the researcher with truthful accounts relating to their Blackboard experiences and would willingly reveal both positive and negative aspects as experienced through their personal engagement with the system.

1.8 Rationale of the study

The researcher is currently employed as an eLearning consultant in the academic development centre of the selected university, as such; she has been involved in the implementation and ongoing support of the Blackboard LMS in a number of academic departments. The implementation process is one that constantly requires improvement and the experiences of staff and students who engage with the

system, provide valuable information with regards to the ongoing improvement of the implementation processes including feedback informing future training sessions, workshops and support structures. In addition, the researcher observed that many of the lecturers taking up the opportunity to make use of Blackboard tasked with teaching larger classes and were making use of the available tools as a strategy to better manage the teaching and assessment of these classes. The rationale for this study can therefore be described as an empirical interrogation of the initiative to use Blackboard as a tool to manage some of the challenges associated with the teaching and learning and assessment of large classes.

1.9 Significance of the study

The findings of this study provide an in-depth account of the challenges and benefits of utilising the Blackboard LMS for teaching, learning as assessment purposes as highlighted by both student and staff participants. This case study although extremely specific in nature affords the academic community the opportunity to view this work as an example from which they can draw contrasts and parallels informing future developments and adding to the existing body of knowledge regarding the implementation, support and utilisation of Blackboard as a tool for teaching, learning and assessment of large classes.

1.10 Chapter overviews

This study consists of five chapters outlined below:

Chapter One

Chapter One is the foregoing chapter. The chapter provides an overview of the dissertation briefly orientating the reader by contextualising the study and delineating the research questions which framed the research. In addition, this chapter defines key concepts as they pertain to the study and acknowledges assumptions on which the study was based. Furthermore, this chapter outlines the

significance and rationale of the study as conceptualised by the researcher as well as delimitations of the work. This chapter therefore operates as a map of the study providing cues which afford the reader the opportunity to contextually locate the forthcoming chapters.

Chapter Two

Chapter Two provides a review of relevant literature pertaining to each aspect of this study. This chapter traces the changes observed in the South African Higher Education landscape since the birth of democracy, contextualising policy implementation and global trends by way of explicating the size and shape of SAHEI's in the form of mass enrolments as experienced today. In addition, it focuses on the theoretical aspects of teaching and learning including emerging eLearning theory it pertains to this study. Furthermore, it focuses on current and potential assessment practices in the context of this study. Finally, it engages with available literature pertaining to the implementation and use of the Blackboard LMS as a course management tools for the enhancement of teaching and learning and as a possible solution in managing the challenges implicit in the teaching of large classes.

Chapter Three

Chapter Three outlines the research methodology, locates this work within the bounds of the interpretivist paradigm and subsequently delineates the choice of research design. In addition, this chapter describes in rich detail the data collection and data management strategies utilised by the researcher. Furthermore, this chapter provides clarity with regards to measures taken to ensure maximum trustworthiness of the findings. This chapter also discusses ethical considerations impacting on the study with a specific focus on confidentiality and anonymity of the participants. Finally, this chapter addresses issues of reflexivity at length, specifically as the researcher played a multitude of roles in terms of Blackboard related consultation, implementation and support.

Chapter Four

Chapter Four of this work presents the findings of this study through the identification and categorisation of the broad themes and related codes as highlighted by the participants. In addition, this chapter provides a rich description of each theme including a preliminarily analysis of the data collected. Finally, this chapter summarises the results in preparation for the discussion chapter to follow.

Chapter Five

The fifth and final chapter of this study focuses on the in-depth analysis and discussion of the data presented in the preceding chapter framed by the research questions and informed by relevant literature. In addition, this chapter provides tentative recommendations for the future use of Blackboard as a teaching and assessment tool for the management of large classes.

1.11 Summary

This chapter aimed to orientate the reader by providing an overview of the entire dissertation. This was achieved by focusing on each aspect of the research independently. The background to the study contextualised the research in both historical as well as conceptually, identifying socio-political as well as global factors for the increases in student numbers at SAHEI's. In addition, this chapter framed this study in terms of the identified research problem which was the teaching and assessment of large classes and outlined the research questions conceptualised by the researcher. This chapter further provided definitions of pivotal concepts in the context of this study and subsequently described the rationale and significance of the work in terms of the future implementation of the Blackboard LMS as a teaching and assessment tool. Finally, this chapter provided a synopsis of the study by way of a succinct summary of each chapter.

Chapter 2

Literature Review & Theoretical Framework

2.1 Introduction

The preceding chapter provided a broad overview of the study, by locating the study within a specific context and delineating each component of the research process as engaged with by the researcher and presented in chapters of this dissertation. The focus of this chapter is the presentation of the theoretical framework and review of literature conceptually underpinning this study and as such forms the foundation of this work. Literature sourced for this chapter includes the coverage of both South African as well as international research drawing on both local and global influences as they impact on the South African HET context. The intended function of this literature review is to contextualise the study with regards to the current higher education climate in South Africa over the past two decades with a view to trace the transformation processes and to explore current challenges and trends impacting on course delivery and assessment in the training of pre-service teachers at institutions of higher education.

This chapter provides some insight into the historical context of change and change management as has been experienced by lecturers and students alike in HET institutions. Changes alluded to include the implementation of legislation aimed at improved access and the development of responsive curricula in line with socio-economic trends both locally and globally. This chapter also highlights the challenges related to the provision of quality education in the South African HET context in light of the local and global trends of massification of education with a particular focus on current teaching and assessment practices in line with these challenges.

Additionally, this chapter offers a theoretical perspective with regards to the changes observed in the conceptualisation of nature of learning in the context of both 20th and 21st century education. In line with this, the chapter observes the development and introduction of technologies in the form of LMS's as an integral part of developing curricula in light of the changing landscape of Higher Education and Training, consistent with the adoption of new technologies and rapidly evolving knowledge in both industry and education.

Furthermore, this chapter examines the concept of assessment and related assessment practices and strategies prevalent in Higher Education in South Africa particularly in the context of a transformed Higher Education landscape against the backdrop of a constantly evolving knowledge economy both locally and globally.

Finally, this chapter scrutinizes factors identified as impacting the taking up of and resistance to the implementation and utilisation of technology as a 21st Century teaching, learning and assessment tool while briefly outlining what Blackboard as an LMS has to offer.

2.2 Higher Education Context

The face of Higher Education in terms of both purpose and structure has over the past two decades undergone dramatic transformations both locally and globally shifting from an elitist to open system affording greater levels of participation than ever before. Kraak (2001) links this fundamental discursive shift in the conceptualisation of HET to advancements in the complex global economy including advancements in technology and far-reaching changes in the nature of knowledge and knowledge production played a pivotal role in informing the need to increase participation in HE. This in conjunction with the specific South African socio-economic and political context has impacted on the changes which have characterised the HE landscape over the past twenty years.

2.2.1 The South African Context

The advent of democracy in South Africa in the form of the first democratic election in 1994 saw the beginning of a new chapter for the HE System. The Apartheid legacy had, amongst other things, left a deeply segregated education system for the new leadership to deal with. Boughey (2012) identifies the complexity of the divisions which she describes as multifaceted in nature and was characterised by segregation along racial lines, types of institutions (Universities in contrast to Technikons), language of instruction and location of institutions. The initial establishment of universities under the apartheid regime, many of which were located in the old homelands or on the peripheries of the old Republic, was specifically earmarked for the restricted or limited education of non-white South African's. As such, these particular institutions, now known as Historically Disadvantaged Institutions (HDI's) were provided with limited resources and substandard infrastructure available for the development of both staff and students in stark contrast to their previously advantaged counterparts referred to as Historically Advantaged Institutions (HAI's). The prevailing HE landscape provided a mammoth task for the newly appointed democratic government in a quest for the development of a new and improved integrated education system. The overarching aim informing this process was to achieve an equitable distribution of resources to previously disadvantaged academic communities and increase opportunities for access to HE programmes specifically for students previously excluded based on pre-existing education policy (Maharasoa, 2003).

To this end, the South African Higher Education landscape, post-1994 saw the introduction of a number of initiatives aimed at the positive transformation of Institutions of Higher Education (Badat, 2010). These initiatives focused on areas such as governance, funding and academic structure in policy adoption and implementation. 'Access' became the buzz-word in the re-visioning of the existing education system with access to Higher Education and is seen as a vehicle through which to capacitate South Africans in terms of lifelong learning as well as providing the labour market with competent graduates through the development of responsive curricula thereby consistently meeting demands of an ever-changing economy

(Badat, 2010). This translates not only into the challenge of dealing with increased student numbers but also effectively employing newly developed resources including emergent technologies in creative ways so as to keep up with current trends, equipping future graduates with the tools to succeed in a competitive economic marketplace and modelling innovative and alternative teaching methods for the teachers of the future.

2.2.2 Higher Education Policy

Education Policy proved to be the main driving force in the development and transformation of South Africa's Higher Education and Training sector. In order to facilitate the transformation process a body was appointed in the form of the National Commission on Higher Education (NCHE) in February 1995 and was mandated to investigate the prevailing status quo and subsequently provide an informed framework regarding a possible way forward for the envisioned transformation process (Sehoole, 2001). Following the evaluation of the context, the NCHE submitted a report in August 1996 entitled 'A Framework for Transformation' which was to form the foundation on which the subsequent Green and White papers were based (Green Paper, 1996).

The Green Paper was a positive step in the transformation process and aimed at the identification, preservation and development of existing strengths within South Africa's Education system while simultaneously identifying areas of potential change and development in terms of what was required to transform the Higher Education Sector.

According to Sehoole (2001), the following recommendations based on the NCHE report were included in the Green Paper in 1996:

- The definition of Higher Education as a single, programme-based, coordinated system of higher education;
- The recommendation for the existence of a single distance education institution within the HE structure;

- The incorporation of teacher education programmes which were offered existing colleges of education in the system envisioned by the higher education sector; and
- The establishment of a redress fund in order to facilitate access for the purposes of redress.

Sehoole (2001) observes that there were a number of points of contention between the NCHE recommendations and the Ministry, however the main focus pertained specifically to the model on which the estimation for the massification of the Higher Education Sector was based. Consequently, further market research was undertaken by the Ministry in order to identify practical limitations for the recommended planning and development of the growth of Higher Education in terms of both size (student numbers) as well as programmes (Sehoole, 2001)

Following a consultative process, Education White Paper 3 which incorporated the recommendations from the Green paper on Education based on the report by the NCHE, was released in July 1997 entitled 'A Programme for the Transformations of Higher Education'. This document provided a blueprint for HE institutions in South Africa for addressing the shortcomings of the inherited education system the most obviously identifiable difference being the increase in access to a wider spectrum of applicants, many of which would not have been eligible for consideration by most, if not all South African Higher Education Institutions under the previous system.

White Paper 3 envisioned a transformed HE system whereby 'goodness of fit' for current local and global contexts was deemed central to the success of this transformation process. This piece of legislation called for the development of 'a single, coordinated system' whereby issues related to planning, governance and funding were to be understood in the context of redress in terms of access and the development of responsive curricula in order to address social needs and contribute in a meaningful way to the development of emerging knowledge from a uniquely African perspective. In addition, White Paper 3 identified what was deemed the

purposes of Higher Education in relation to the overarching aim of redress and development within the South African context. The following purposes are identified in Chapter 1 of White Paper 3:

- To address the learning needs of individuals by providing opportunities to develop new knowledge and skills base which can be utilised in order to make the best use of their talents as well as prospective learning and employment opportunities;
- To address emerging development needs from a socio-economic perspective, providing the labour market with competent, cutting-edge graduates in order to develop as a stakeholder in global market economies. Thus, identifying development areas in specialised professions is crucial;
- Contribution to the development and socialisation of an enlightened, responsible and reflexive generation who have the ability to critically reflect on the existing social order and are willing and able to generate new or improved policies and practices for the enhancement and well being of society;
- Meaningful contribution to existing communities of knowledge through engagement in academic review and analysis in the production and evaluation of knowledge through the channels of academia in the context of teaching, learning and research.

(Education White Paper 3, 1997)

White Paper 3 went on to clarify both needs and challenges in relation to the purposes outlined above. Although it was acknowledged that the pre-existing system of education provided in some ways, a good foundation for further development in particular niche areas, it was also noted that the education system as a whole fell short of what was needed to service the needs of the new, democratic South Africa. As such, the policy outlined in the White paper was underpinned by a particular set of principles, the first and most important of which being that of equity and redress, providing both fair opportunities for access and success within the context of Higher Education.

White Paper 3 made specific provision for an increase in enrolments for programmes at Masters and PhD level in order to cultivate high end skills required for the development of both the economy and the increasing demands of the labour market. In addition, it made further provisions for increasing enrolments for particular groups of students focusing on aspects of redress. Furthermore, White Paper 3 identified issues related to funding for students with potential to succeed but who were unable to access the Higher Education system based on financial pressures by providing for the use of earmarked funds for the purpose of financial aid schemes with a view to facilitate the access and success of such students (Sehoole, 2001). Other principles on which the White Paper was based include Democratisation; Development; Quality; Effectiveness and Efficiency; Academic Freedom; Institutional Autonomy and Public Accountability (Education White Paper 3, 1997).

From a policy and legislation perspective, the wheels of transformation seemed to turn relatively quickly as April 1997 saw the release of the Higher Education Bill. This culminated in the passing of the Higher Education Act in December 1997 (Act 101, 1997), thereby making provision for the implementation of the policy which effectively transferred responsibility for transformation process from government to Higher Education structures.

2.2.3 Policy in Practice

The dawn of democracy, cemented by HE policy resulted in an observable change in both attitude and expectation amongst prospective students and in particular black students, not only in terms of accessing Higher Education but being able to access Historically White Institutions (HWI's) and as such saw an increase in numbers of black students at HWI's from the early 1990's (Marahasoa, 2003). However, Marahasoa (2003) further notes that this influx and subsequent diversification in the student population across the board pre-empted the review of the notion of student access as understood by government and stakeholders alike. According to Cooper and Subotsky (2001), as cited in Marahasoa (2003) planning

for increase in enrolments was subsequently outlined in the National Plan for Higher Education (NPHE) (2001) with a specific focus on Science, Technology, Business and Commerce which were all areas of study which were previously inaccessible to the vast majority of South African students based on previous Education Policies.

Marahasoa (2003) predicted that an expansion of the initial conceptualisation and understanding of 'access' would prevail as time passed and arguably this has, to some extent, been realised in the development of the National Student Financial Aid Scheme of South Africa (NSFAS) in 1999. NSFAS, in collaboration with additional funders who came on board over the past decade, have focused on the development of skills in particular sectors other than those initially outlined by the NPHE (2001) such as the Department of Social Development and the Department of Basic Education in the form of contractual bursaries (http://www.nsfas.org.za). In addition efforts from the private-sector should be acknowledged for their commitment to sponsoring students and becoming involved in partnerships with HEI's for example Sasol and Eskom (Notshulwana, 2011).

In terms of the Higher Education landscape, 2004 and 2005 saw the initialisation of a two phase restructuring process during which Higher Education institutions in South Africa went through a series of mergers in an effort to rationalise programmes, improve capacity and responsiveness, and ultimately develop a new HE identity for South African HEI's in the public sector (HE Monitor 8, CHE, 2009). During this process, the number of institutions was decreased from thirty-six to twenty-three, however, no campuses were closed as a result of the restructuring process and thus HE provision was not compromised. Currently, South African HEI's are classified into the following types of institutions:

- Eleven Traditional/ Research Focused Universities where offerings include Bachelors Degree programmes. Traditional Universities have a strong post-graduate presence and high research output;

- Six Universities of Technology which are vocationally-orientated institutions and offerings are focused on higher certificates, diplomas and degrees in technology. Universities of Technology also have some postgraduate presence and a level of research capacity;
- Six Comprehensive Universities: offering a combination of Bachelors and Technology qualifications. The focus is on both teaching as well as postgraduate development and Comprehensive Universities also have a strong research capacity;

(Adapted from http://www.ieasa.studysa.org)

Current Institutions of Higher Education In South Africa		
Institution		**Current Enrolments**
Universities		
1	University of Cape Town	24 674
2	Rhodes University	7 222
3	University of Pretoria	57 115
4	University of the Free State	29 902
5	University of Fort Hare	10 735
6	North-West University	55 732
7	University of KwaZulu-Natal	41 244
8	University of Limpopo	18 177
9	University of the Western Cape	18 009
10	Stellenbosch University	27 372
11	University of the Witwatersrand	29 745
Universities of Technology		
12	Cape Peninsula University of Technology	32 167
13	Central University of Technology	12 581
14	Durban University of Technology	25 184
15	Tshwane University of Technology	51 797
16	Mangosuthu University of Technology	10 033
17	Vaal University of Technology	21 423
Comprehensive Universities		
18	Nelson Mandela Metropolitan University	26 123
19	University of South Africa (UNISA)	293 238
20	University of Johannesburg	48 373
21	University of Venda	10 679
22	University of Zululand	14 727
23	Walter Sisulu University	26 772
TOTAL ENROLMENTS FOR 2011		**893 042**

Table 1: Enrolments per institution for 2011 Intake

Adapted from information available in: Leaps and Bounds, Higher Education in Context (http://www.ieasa.studysa.org/resources/Study_SA_11)

Table 1 above provides a snapshot of the Higher Education community as it exists in its current form. Which when placed in the context of Figure 1 below, illustrates the extent to which student numbers have increased over the past 10 years at approximately **300 000** additional students enrolling for HE qualifications over the past decade.

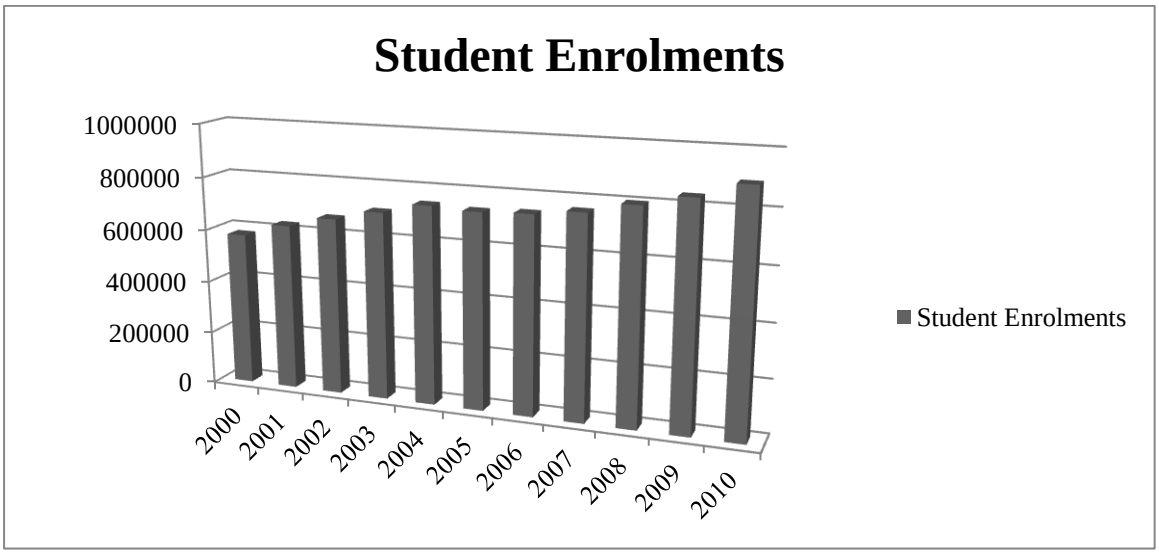

Figure 1: Student Enrolments(http://www.ieasa.studysa.org/resources/Study_SA_11**)**

Botha et al. (2005), note these massive increases in student enrolment over the past decade, and further observe that the alignment of such increases with South African legislation and National Plans for Higher Education as presented in earlier in this chapter. Botha et al. (2005) additionally concur that increases in student numbers are in line with trends emerging in HEI's around the globe and it is therefore acknowledged that a pervasive paradigm shift from elitist access to mass enrolments in the South African HE context education was not only in response to a disproportionate approach to education inherited from a historical perspective, but in combination with a reactionary response to world trends of increasing enrolments in Higher Education along with the adoption of Web 2.0 technology worldwide promoting high levels of reliance on a knowledge based economy. This is evident in prevailing HE policy and legislature in that the identified role that universities should be taking up is that of key role-players in terms of responsiveness to both local and global factors and the active participation in the meaningful expansion of a knowledge-based economy (Notshulwana, 2011).

2.2.4 Impact of Policy on the teaching context

Acting in accordance with legislation, and providing opportunities for South African citizens to further their education, the Department of Education (DoE), in consultation with HE institutions saw the massification of education as a way of increasing participation and addressing issues of equity in the HE realm (Mlisa 2006). This effectively resulted in increased and widened paths of access to HE being made available to students who were formerly constrained by the then Higher Education, however, due to the legacy of the Apartheid regime of segregated education, large numbers of South Africans, mainly Black South Africans, found and continue to find themselves at a disadvantage due to inadequate levels of schooling afforded to them under the old system (Green and Hayward, 1997 as cited in Mlisa, 2006). Increasing opportunities for access is therefore met with the challenge of student readiness for the demands of higher education in all spheres including social, economic and academic demands.

Transformations in the size and shape of Higher Education in South Africa provides the foundation for the contextualisation of this study as change no matter how large or small has a knock-on effect and ultimately impacts the end result which in the context of this study is identified as the teaching and learning environment (Mlisa, 2006). Botha et al (2005) reflect on the meaning of large classes by looking at numbers of students, venue size, access to resources and staff complement. Buchanan & Rogers (1990, as cited in Botha, Fourie and Geyser, 2005:63) define large classes as a combination of factors culminating in a classroom situation which is described as “too many students to teach effectively”. Buchanan & Rogers (1990) identify the number of eighty students as the threshold at which traditional teaching methods are no longer a viable option and innovation in teaching and assessment methodology is required.

Furthermore, as increases in student numbers are not necessarily met with increases in staffing this effectively reduces the teaching capacity of lecturers who prior to the restructuring of the HE landscape in South Africa were teaching small

numbers of students who have been sufficiently prepared by the schooling system (CHE, 2001). Large numbers of students in addition to escalating levels of student under preparedness impacts significant on the teaching and learning at many if not most South African HEI's. As such, the vast majority of HEI's in South Africa have begun operating at what might be termed a high-risk profile, as a result of accepting and enrolling students who had not been afforded the opportunity to develop skills they would require in order to cope with the demands of Higher Education. Although there has been some provision for the development of Foundation programmes, the fact remains that there are a limited number of places available for students in such programmes. This translates into the vast numbers of the remaining underprepared students being left with limited opportunity for development of key skills and sufficient induction into the abstract requirements of academic discourse unless they seek these out for themselves. Consequently, a situation is created where many university students struggle to cope with the basic requirements they are expected to have mastered prior to admission thus disadvantaging them from the start. This in turn impacts on high dropout rates and poor graduation rates raising additional questions related to 'graduateness' particularly in light of the fact that the majority of students spend the bulk of their academic career catching up on deficit skill sets. This raises further questions related to the responsiveness of HE to produce quality graduates.

The function of Higher Education, it can be argued, is the production of graduates, highly skilled critical thinkers, who will be able to not only survive in a competitive labour market, but transcend current limitations in order to further develop society (White Paper 3, 1997). This concept of 'graduateness' is considered as the ability to use knowledge and skill in effective and responsible ways, an ability to be both innovative and responsive in their chosen field. Therefore, the need to foster deep learning and instill in the students the knowledge and skill to be able to critically evaluate information is central to achieving this mandate. The development of this skill requires that students engage deeply with course material, the kind of engagement that is labour intensive and promotes a student centered approach to knowledge acquisition providing students with the opportunity to take responsibility for their own learning and develop new realms of knowledge.

The fast paced evolutionary nature of knowledge, in addition to increased enrolment targets, adds to an already challenging situation for many lecturers both in South Africa and globally. Mlisa (2006) identifies that this provides an uneasy marriage for many institutions of Higher Education in South Africa as increasing enrolments are impacting on standards of teaching and learning. Mlisa (2006) asserts that certain Universities are heading towards what Daniel (1999) terms mega-universities. Daniel (1990) as cited in Mlisa, (2006), describes mega-universities as extremely large higher education institutions which incorporate distance education strategies as a mode of course delivery. Increasing enrolment quotas across the board are therefore forcing the issue of transformation in terms of embracing technology through the development of teaching staff in order to utilise available tools for the enhancement of teaching and learning.

Furthermore, large enrolments per class, particularly at undergraduate levels, continue to exacerbate issues of under preparedness as sheer student numbers to increase the workload on academic staff as in many cases staff numbers have remained constant. Consequently, this provides enormous challenges for the lecturers in terms of marking volume and does not facilitate sufficient, regular and effective diagnostic evaluation of large classes. Large class sizes has brought with it and continues to bring a number of challenges, not least of all are the direct implications for effective teaching practices, access to resources, quality in terms of teaching and assessments and capacity to provide the requisite support and feedback for ‘at-risk’ students in order to facilitate success. Innovation can therefore be identified as playing a pivotal role in addressing issues of staff-student contact, regular formative, summative and diagnostic assessment, enhanced teaching practice and developmental feedback.

2.3 Theoretical Framework: Learning theories, Learning Styles and Instructional Design

Theoretical assertion with regards to the nature of learning is a concept that pervades history and reaches back as far as the Ancient Greeks. It can be argued that the development of each learning theory can be linked to its historical and socio-economic context in accordance with accepted paradigms particular to that context. E-Learning as a relatively new discipline tends to draw on a plethora of existing learning theories effectively informing instructional design as opposed to having developed a specific eLearning theory. Consequently, the choice of theories drawn on is largely dependent on their efficacy as enablers in the enhancement of the learning process through the use of technology as opposed to driving the use of technology. This section of the chapter draws on a selection of paradigm specific learning theories in addition to late 20th Century theoretical assertions and practical applications of learning styles in as they pertain to the context of teaching and learning.

2.3.1. Learning Theories from Behaviourism to Constructivism

For the purposes of this study, the theories of Behaviourism, Cognitivism, Social Learning and Constructivism will be ***briefly*** examined as the foundations and forerunners for the 21st Century context and emerging e-learning pedagogy in the form of connectivism. While there are many more applicable learning theories in existence, these four theories provide a scaffolded view of the development of learning theories as each was either developed in response to a previous theory or was a natural progression from the preceding theory.

2.3.1.1 Behaviourism

According to Ashworth, Brennan, Egan, Hamilton and Saenz (2004), the development of Behaviourism was rooted in the context of a fast paced environment and the development of cutting edge technology that characterised the industrial age. Ashworth et al. (2004) identify tensions inherent in the uncertainty of transformative change linked to the formalisation of labour coupled with the idea of scientific progress being viewed as beneficial to wider society. The emergence of Behaviourism was embedded in the scientific school of thought consistent with the dominant paradigm. As a learning theory, Behaviourism dominated the first half of the 20th Century and was based on experiments and carefully documented research on animals which was then generalised to human beings. The main aim of Behaviourism was to identify methods in which behaviour could be both predicted and controlled. Learning was thus defined as an observable change in behaviour through a process or multiple processes of conditioning (Ashworth et al., 2004). Although a number of theorists fall under the umbrella of behaviourism, the most widely used Behaviourist theorist is arguably Skinner whose work was heavily influenced by the initial work of Pavlov at the turn of the 20th Century.

Pavlov postulated that behaviour could be controlled through a carefully managed system of stimuli and responses (S-R) this theory was known as Classical Conditioning. He illustrated the principles of this theory by conducting an experiment with a dog; pairing a neutral stimulus (bell) with an unconditioned stimulus (food) and thereby eliciting an unconditioned response from the dog (salivation). Once sufficient pairing of the neutral stimulus with the unconditioned stimulus (food) had occurred, the bell became known as the conditioned stimulus as it elicited the same response (salivation) when it was rang without being accompanied by the food (Mergal, 1998). Pavlov further noted the decreasing strength (extinction) of the conditioned response to the conditioned stimulus without the re-introduction of the unconditioned stimulus (food).

Although Pavlov's theory of Classical Conditioning was widely acknowledged, a number of theorists subsequently added to or improved on these initial behaviourist developments. Watson included the Law of Recency asserting that increased frequency of paired responses translated into a stronger S-R pairing. Similarly, Thorndike added to the Behaviourist argument by including the concept of positive and negative reinforcement as a means of strengthening or weakening S-R connections. In addition, Hull further added to behaviourist theoretical assertions by introducing the concept of the organism into the S-R equation: Stimulus-Organism-Response (S-O-R). It can be argued that Hull paved the way for other learning theories by noting the possibility of the impact of the internal motivation of the individual (organism) on the strength of the S-R connections (Mergal, 1998).

Finally, and arguably the most influential behaviourist theory came in the form of Operant Conditioning as posited by B.F.Skinner. Skinner built his theory on what has become known as the law of effect as originally proposed by Thorndike (Herrnstein, 1970). Essentially Skinner's theory focused on the impact of stimuli operating on an organism in order to effect observable changes in behaviour which thus implied that learning had occurred. Skinner postulated that desired behaviour can be reinforced through a schedule of positive and negative reinforcement and similarly, undesired behaviour could be limited through the removal of positive stimuli or through the addition of a negative stimulus referred to as punishment (Mergal, 1998). Table 2 below summarises the basics of Skinner's Operant Conditioning Theory.

Operant Conditioning Summary		
Stimulus	**Increase/Reinforce Behaviour**	**Decrease Behaviour (Extinction)**
Positive Stimulus	Positive Reinforcement (Add Stimulus)	Response Cost (Remove positive stimulus)
Negative Stimulus	Negative Reinforcement (Remove Stimulus)	Punishment (Add Negative Stimulus)

Table 2: Operant Conditioning Summary

In addition to the manipulation of stimuli in order to facilitate the acquisition or extinction of specific behaviours, Skinner further developed this theory to include a variety of reinforcement schedules which could be utilised in order to further reinforce desired patterns of behaviour. Table 3 below provides a summary of the various reinforcement schedules as devised by Skinner for the maintenance of behaviour.

Summary of Skinner's Reinforcement Schedules	
Fixed Interval	Reinforcement at regular intervals (Time)
Variable Interval	Reinforcement at irregular intervals (Time)
Fixed Ratio	Reinforcement after a certain number of responses (Best for introducing desired behaviour)
Variable Ratio	Reinforcement after irregular no of responses (Best for maintaining desired behaviour)

Table 3: Summary of Skinner's Reinforcement Schedules

(Adapted from Mergal, 1998)

Behaviourism as a collection of theories as outlined above addresses issues of learning in terms of what is observable with a specific focus on the management of behaviour. Arguably, a number of assumptions underlie the theories impacting on how the individual is viewed and by extension how they are able to learn. The assumptions of Behaviourism can be identified as follows:

- organisms are born in a 'tabula rasa' or blank slate state;
- observed changes in behaviour imply learning has occurred and conversely, lack of observable behaviour change implies that learning has not occurred;
- principles of learning are universal in nature;
- learning is described as a linear, stimulus and response relationship (S – R)
- internal cognitive processes cannot be observed and are therefore excluded from scientific study;
- learning takes place as a result of environmental factors or events.

The assumptions of Behaviourism as outlined above, provide a specific view of learning impacting on the teaching strategies and methods that can be employed in the classroom. The emphasis of this theory on behaviour and behaviour modification translates into an active learning environment whereby students should be engaged with the learning process and course material, actively demonstrating their acquisition of knowledge and skills. Similarly, assessments within the Behaviourist model would require demonstration of competency, knowledge and skill with a large degree of repetition of required skills and knowledge in order to reinforce desired outcomes. Arguably, Behaviourism leaves little room for innovative problem solving or lateral thinking within the domain of learning.

2.3.1.2 Cognitivism

It has been noted by a number of theorists that Cognitivist learning theory developed in response to the limitations presented by the Behaviourist theory, specifically the definition of learning as observable changes in behaviour. Although Cognitive theorists did not dispute the notion that some learning involves a large degree of repetition and reinforcement in order to create desired associations and effect behaviour change, the cognitivist argument was that this description was too simplistic and therefore took the opportunity to expand on this theory. Cognitivists posited that while learning manifested in changes in behaviour, there was a more complex process than a simple stimulus response relationship as proposed by Behaviourists. The model of learning proposed by Cognitivism was the acquisition, internalistion and categorisation of knowledge through the development of new or existing cognitive structures or schema.

Although there exist a number of cognitive theorists, it can be argued that two in particular have been instrumental in terms of their impact on modern pedagogy in the form of Piaget and Bloom. Piagetian theory can be conceptually divided into

three interrelated components, firstly the concept of preexisting or innate schema, secondly the acquisition of conceptual knowledge through the processes of assimilation and accommodation and finally the existence of five stages of cognitive development spanning through childhood and adolescence. Accordingly, the successful resolution of each phase of cognitive development was required prior acquiring the conceptual competency to move onto the subsequent phase (Jarvis, Holford and Griffin, 1998).

Summary of Piaget's proposed stages of Cognitive Development		
Stage	**Age in Years**	**Characteristics**
Sensori-motor stage	0-2 years	The child develops ability to differentiate between self and external objects in his/her environment.
Pre-operational thought	2-4 years	The child is ego-centric in interactions with environment and begins to classify objects in according to unidimensional characteristics e.g. colour or shape not colour and shape.
Intuitive	4-7 years	The child begins to think according to classifications or schema, however they are not cognisant of these thought processes as yet.
Concrete Operations	7-11	The child is able to use logical thought processes such as classification and reversal but only with the assistance of concrete apparatus/objects in order to assist them with their logical processes.
Formal Operations	11 – 15 and older	The child begins to test abstract conceptualisation.

Piaget postulated both the existence of innate schema facilitating initial cognitive development as well as the expansion of existing schema and the development of further schema through processes of assimilation and accommodation whereby new information was either assimilated into existing schema or led to the development of new schema in the event of the information being completely new to the individual (Jarvis et al. 1998). These assimilation and accommodation processes according to Piaget, occurred against the backdrop of human development through cognitive stages which were approximate in relation to

physical and emotional development at each stage and is outlined in Table 4 below adapted from Jarvis et al. (1998:30)

Although Piagetian theory focuses on the development of cognitive reasoning through childhood, the latter two stages of concrete operations and formal operations can be applied throughout adulthood as cognitive processes of acquisition of each new skill, competency or knowledge base. Arguably, initial concrete engagement is required prior to abstract conceptualisation.

A second cognitivist who bears some reflection in terms of learning theory is that Bloom and in recent response to Bloom's Theory, offering a revision thereof, Anderson. Bloom posited that cognitive development can be described in terms of a taxonomy of learning, systematically increasing depth of engagement from a pure knowledge/repetition (surface or content type) base at the lowest level to eventual Analysis, Synthesis and Evaluation of concepts and content (deep learning engagement). See Figure. 2 below adapted from Anderson (2006) in Pickard (2007:47)

Bloom's Taxonomy

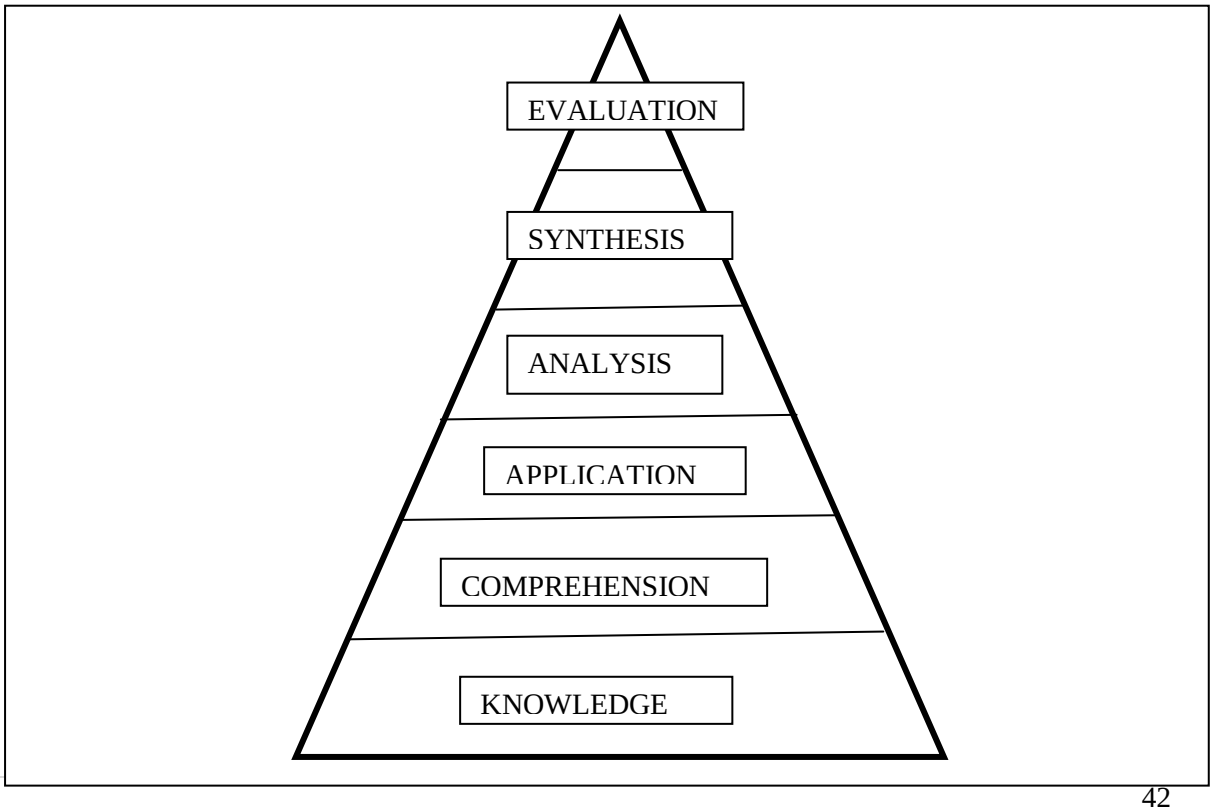

Figure 2: Bloom's Taxonomy

Pickard (2007) reflects that Bloom's taxonomy was unidimensional in nature focusing solely on cognitive processes whereas a revision of this taxonomy takes into account these cognitive processes in addition to knowledge dimensions giving a more complex view of knowledge and thought acquisition. See Figure 3 below adapted from Anderson (2006) in Pickard (2007:47).

Anderson's Revised Taxonomy of Learning

Knowledge Dimension

Cognitive Processes Dimension

	1. Factual	2. Conceptual	3. Procedural	4. Metacognitive
F. Create				
E. Evaluate				
D. Analyse				
C. Apply			C3	
B. Understand		B2		
A. Remember	A1			

Figure 3: Anderson's Revised Taxonomy of Learning

Both Bloom's original taxonomy as well as Anderson's revised version of the taxonomy bring the notion that cognitive processing and knowledge acquisition although not mutually exclusive require the acquisition of surface level knowledge prior to being able to operate at meta-cognitive levels. These taxonomies, in

particular the revised version is useful in identifying the level at which a student is operating providing accounts of knowledge and cognitive operations as processes from the concrete to the abstract from surface level knowledge to complex understandings. Both of the highlighted cognitive theories can be identified as informing progression within the Higher Education context as there is clear expectation of consistent progression from initial acquisition of new knowledge as a concrete knowledge base which is required at undergraduate level prior to abstract theorising in post-graduate studies.

In light of the abovementioned Cognitivist theories, the key assumptions of cognitivism can be summarised in the following way:

- behaviour is indicative of internal thought processes;
- cognitivism assumes the existence of mental structures for the storage and categorisation of information;
- learning is viewed as a combination of mental processes in terms of acquisition, storage and retrieval of knowledge;
- certain developmental stages impact on qualitative differences with regards to cognitive abilities;
- cognitive skills cannot be acquired prior to the acquisition or resolution of previous level of reasoning;
- cognitive functioning with regards to particular realms of knowledge cannot be reached without acquiring and understanding basic concepts linked to that knowledge base.

The utilisation of cognitivist theories in the context of teaching and learning translates into the need for an acute awareness on the part of lecturers pertaining to differing levels of cognitive development within the classroom situation regardless of the age of the students. This in turn impacts on the level of flexibility required regarding the curriculum and varied methods of course delivery as well as the adoption of more student-centred approaches. In addition, cognitive learning

theory implies the use of context relevant examples in order to provide a concrete understanding of concepts, which may be a challenging expectation for lecturers of numerically large and culturally diverse classes.

2.3.1.3 Social Learning Theory

According to Ormrod (1999), Social Learning Theory proposed by Albert Bandura, although rooted in traditional learning theories, was critical of the notion that all learning can be accounted for by direct reinforcement. While Social Learning Theory took both Behaviourist as well as Cognitivist principles of learning into account, it included the social environment as a factor (Ormrod, 1999). Bandura theorised the impact of learning through observation, imitation and modelling, therefore learning through other's experiences and not necessarily requiring the concrete personal experience of reinforcement or punishment in order to acquire knowledge or skills (Jarvis et al, 1999). Bandura further posited that learning did not necessarily manifest in observable changes in behaviour, instead, he argued that negative reinforcement or punishment observed as a result of a peer's behaviour may result in sufficient learning taking place internally on the part of the observer that the undesired behaviour would not necessarily be modelled or imitated in future (Ormrod, 1999). Bandura also acknowledged that cognition forms an integral part of the learning process through the processes of observation, evaluation and internalisation as well as intrinsic reinforcement such as a sense of pride or satisfaction (Ormrod, 1999).

Bandura identified four necessary conditions for successful modeling, these being *attention, retention, reproduction and motivation*.

- **Attention**: In order to learn, the learner's attention needs to observe and be focused on the desired behaviour, anything or anyone that serves as a distraction will have a negative effect on the learning process.
- **Retention**: The ability to retain, retrieve and act on information observed forms a vital part of the learning process

- **Reproduction**: Once modelled behaviour has been observed and retained, practice of the learned behaviour is required to master the observed skill or behaviour
- **Motivation:** The final and perhaps the most influential prerequisite for the successful acquisition of observed behaviour is motivation to imitate the behaviour that has been modelled is required. Bandura argues that reinforcement and punishment play an important role in motivation, while experiencing these motivators can be highly effective, so can observing other experience some type of reinforcement or punishment.

(Adapted from Ormrod, 1999).

Arguably, Social Learning Theory has a number of implications for teaching and learning and as such the concept of observation can be utilised as an effective learning strategy. In this context, the implication of observation and modelling as a learning strategy translates into lecturers being placed in a considerable position of power and therefore are required to model appropriate learning behaviours to their students. In addition, students are required to be sufficiently motivated in order to model desired behaviours and by extension, academic tasks. Following this line of reasoning, social learning theory necessitates a certain level of self-belief on the part of the students in terms of their capability in accomplishing set tasks. Lack of self-confidence will thus render them insufficiently motivated to engage meaningfully with tasks and assignments and as such lecturers should be mindful of this and therefore set appropriate tasks in order develop students.

2.3.1.4 Constructivism

The emergence of constructivism as a learning theory can be viewed in terms of a fundamental paradigmatic shift in terms of both the conceptualisation of the nature of reality and the nature of knowledge. Jonassen (1991) as cited in Cooper (1993) locates the learning theories of Behaviourism and Cognitivism, within the paradigm

of objectivism whereby the nature of reality can be described as a known entity residing outside of the individual. Therefore, in line with objectivist principles, the nature of learning involves the acquisition and processing of information. In contrast to this, constructivism offers an alternative view of reality as being constructed and makes provision for individual agency in the construction and production of knowledge. As such, the emergence of constructivist theory fundamentally changed teaching and learning practices over the past three decades. It is noted that there has been and continues to be some debate with regards to the categorisation of Piagetian learning theory as either cognitivist or constructivist in nature as some Piagetian principles involve concrete, activity-based learning and therefore could fall within the constructivist framework, however for the purposes of this study Piaget will remain in the cognitivist camp. Although a number of theorists can be categorised as falling within this school of thought, the major theorists can be identified as Vygotsky and Bruner where both the role of individual agency and activity based learning can be clearly identified.

Constructivism or social constructivism acknowledges the magnitude of the role played by social interaction in the construction of knowledge and conceptual development. Vygotskian constructivist theory hinges on the premise that conceptual learning is primarily a social act, based on the initial interaction between parents/older siblings/peers/teachers and the individual culminating in the internalisation of the concept in a matured state (Bunce, 2003). Vygotsky formulated his theory based on the concept of collaborative learning identifying the value of learning from the another more capable peer which he termed the More Knowledgeable Other (MKO) emphasising the role of social interaction in cognitive development. As such, Vygotsky subsequently focused much of his theorising on development of cognitive tools in terms of that which can be acquired by an individual operating in isolation in relation to what can be achieved in collaboration with a MKO. Vygotsky terms this learning potential the Zone of Proximal Development (ZPD), which he described as the opportunity for learning between what the individual can achieve in isolation in comparison with what is achievable by the same individual in a collaborative social setting whereby scaffolding takes

place as a result of interacting with a cognitively more able peer or peers (Bunce, 2003). From a teaching perspective this does not necessarily have to mean physical face to face collaboration, but can imply different kinds of collaborative learning including those facilitated through the use of available technologies.

Bruner (1985) reflects on Piaget's cognitive development theory as a forerunner to Vygotsky's constructivist learning theory. He rejects Piaget's notion of structured stages of cognitive development in addition to the notion of readiness or maturity as a prerequisite for next stage learning. Alternatively, Bruner proposed a theory of cognitive growth facilitated through a system of skills outlined by Bruner as modes of representation, which despite the description thereof as what appears to be a stage orientated theory, are only loosely related to ages and involve a greater measure of flexibility. Bruner's three modes of representation or systems of skills are described as follows:

- Enactive - largely activity based with no abstract language or imagery involved;
- Iconic – representation based largely on the concept of internal imagery and represent a concept in its concrete form ; and
- Symbolic – characterised by symbolic representation and advanced abstract thought.

(Adapted from Bigge & Shermis, 2004: 140)

Bruner's version of constructivism relies heavily on the notion of the construction of an initial knowledge base adopted from the immediate environment of the child, steeped in cultural models of understanding. These culturally-informed models are subsequently morphed or adapted into more individual models through the exposure to alternative models of reality (Bigge & Shermis, 2004). In relation to didactics, Bruner's work involves the use of a scaffolded approach with regards to the introduction of new concepts not unlike Vygotsky's zone of proximal

development which has implies a shift from a teacher-centered approach to an activity-based, learner-centered approach to teaching and learning including the conceptual acquisition of existing knowledge as well as affording the learner the opportunity to construct their own versions of knowledge within a particular socio-cultural framework.

2.3.1.5 Emergent Connectivist Learning Theory

In addition to existing learning theories of which there are many more than presented in this particular study, a number of writers have over the past ten to fifteen years begun to theorise with respect to the nature of learning in the context of technology. Technological advancements over the past twenty years have in many ways changed the face of knowledge in ways that were previously unimaginable to theorists like Vygotsky, Bruner, Skinner, Bandura and Piaget.

Siemans (2004) acknowledges the place for traditional learning theories in informing instructional design when employing technologies as a mode of course delivery. However, Siemans (2004) notes that these theories were developed in a context where knowledge was relatively enduring, which when contrasted with the current knowledge economy informs a number of tensions in terms of applicability of these theories in their entirety. The magnitude of the impact that technology has had and continues to have in terms of access to knowledge and the production of knowledge is almost inconceivable in that knowledge has become mobile and is no longer restricted to a specific time and place and is instantly accessible, fundamentally altering engagement with knowledge in terms access, process and application.

Davis, Edmunds & Bateman (2008) discuss this concept of the changing nature of knowledge in terms of what is termed by Gonzales (2004) as cited in Davis et al. (2008), as the ‘Half-life of Knowledge’. This term specifically refers to the time-span

between the acquisition of knowledge and the subsequent decline in the applicability of said knowledge. Consequently, the volume of knowledge available to any individual is essentially infinite and instantly accessible. This therefore raises questions pertaining to the ability of the individual learner to engage conceptually with the sheer volume of information available to them.

Siemans (2004) reflects on the challenges emerging as a result of digital advancements and proposes an alternative learning theory to existing theories, that of Connectivism. He identifies trends in the changing nature of learning including the value of informal learning which take place through a wide variety of media and within heterogeneous contexts. Siemans (2004) further claims that technological advancements have fundamentally altered the way in which learning takes place defined by the tools at our disposal including the acquisition of knowledge in a non-linear manner. Siemans (2004) draws on the structure of networks in the development of the theory of connectivism positing the existence of multiple nodes connected in a multiplicity of ways interacting with and acting upon other nodes. Siemans (2004) theorises that the nature of learning is less important than the ability to learn therefore, the potential to know or to source knowledge is of greater value than the knowledge itself.

Siemans (2004) bases his theory of Connectivism on the following principles:

- Learning and knowledge rests in diversity of opinions;
- Learning is a process of connecting specialised nodes or information sources;
- Learning may reside in non-human appliances;
- Capacity to know more is more critical than what is currently known ;
- Nurturing and maintaining connections is needed to facilitate continual learning;
- Ability to see connections between fields, ideas, and concepts is a core skill;
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities; and

- Decision-making is a learning process in itself, choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality.

Comparison of Learning Theories					
Key Components	**Behaviourism**	**Cognitivism**	**Social Learning**	**Constructivism**	**Connectivism**
Nature of Learning	Observable change in behaviour	Processing of information, cognitive structures	Acquisition of modelled behaviour based on observation.	Personal meaning constructed by individual	Distributed, social, technologically enhanced.
Influential Factors	Stimulus-Response, punishment, reinforcement	Cognitive Schema, experiences.	Attention and motivation through observation/ modelling	Engagement, active participation, social collaboration.	Diversity of Network
Role of Memory	Memory hardwired through reinforcement/ punishment	Encoding, storage, retrieval	Memory based on outcome of the modelling process – motivation based	Prior knowledge informing social construction of new knowledge	Adaptive patterns representative of network membership
Knowledge Acquisition	Stimulus - Response	Duplicating knowledge constructs	Modelling desired behaviour	Social interaction	Connecting to networks, nodes (can be through individuals or groups)
Types of Learning	Task-based	Reasoning, clear objectives, problem-solving	Varied learning – both task-based and problem-solving involving modelling	Socially constructed learning	Complex learning, rapid changing core, diverse knowledge sources.

Table 5: Comparison of Learning Theories

In light of the recency and largely untrialled nature of the theoretical work related to the emergent theory of connectivism, is it imperative that critical voices are taken into account in ascertaining the relevancy of the postulated theory. In comparison to the other theories outlined in this work, connectivism is the only 21st century theory and while this theory can be viewed as true to context it requires some critical reflection. Ertmer & Newby (1993) propose five questions guiding the assessment of a theory. These are outlined below:

- How does learning occur?
- Which factors influence learning?
- What is the role of memory?
- How does transfer occur?
- What types of learning are best explained by this theory?

In juxtaposition of these questions, connectivism is arguably based upon on constructivist principals and effectively expands on these in order to incorporate the information-age context in which current learning trends are so heavily embedded. It offers an alternative way in which to view teaching and learning. It proposes new understandings of how learning occurs with a particular focus on the strategic nature of learning influenced by the digital age with mass access to electronic devices affording individuals the opportunity to engage with material at will as necessitated by context and requisite application. In addition, connectivist theory suggests the speed of transfer between user and machine has impacted on the way in which cerebral connections occur translating into the 'rewiring' of the brain in order to accommodate, synthesise and effectively apply multiple levels of information (Siemans, 2004).

Kop & Hill (2008) interrogate the validity of connectivism as a learning theory by drawing on the work of Miller in order to effectively evaluate the proposed theory. Miller (1993) as cited in Kop & Hill (2008) outlines the following qualities to be satisfied by a developmental theory:

- The description of changes within one or more areas of behaviour;
- The description of changes in relationships between areas of behaviour; and
- An explanation charting the development described in terms of the above points.

In relation to the requisite qualities of a developmental theory, connectivism addresses the changes in learning behaviour based on the connected nature of knowledge through the World Wide Web (www) and facilitated by the advent of Web 2.0 in the proliferation of social networks in the construction and dissemination of knowledge. Resultantly, observable changes in behaviour have been noted by a number of authors such as Siemans (2004) and Downes (2006) pertaining the access and application of new knowledge through the medium of technology in a strategic sense. According to Kop and Hill (2008) the connected nature of knowledge requires context and the specific context prevailing in HET's worldwide is an uncomfortable one where the drive to make use of electronic media for the purposes of teaching and learning is not necessarily well received by the generation of lecturers who were educated in an age of instructivism and while many of them may have adopted the principals of constructivism in their teaching practice, specifically for small class facilitation, the fast paced nature of learning as is experienced as the norm by current students in addition to massive increases in participation rates at HEI's, may view the theory of connectivism and eLearning an extremely daunting prospect. Consequently the implementation of an LMS as a course management tool while attractive to some is likely to cause anxiety, particularly in terms of adequacy and validation within the HET environment.

In the context of this study, the Blackboard LMS has been implemented as a tool to manage the teaching and assessment of large classes. As such, a selection of learning theories have been presented with a view to both chart the changes in the practices of teaching and learning as they have occurred over the last century in relation to ongoing developments and changing socio-political contexts. As noted in the introductory remarks for this section, learning theories serve to inform teaching and learning methods and are inextricably linked to the approach taken by lectures

in the design of courses, specifically in the areas of content, activities and assessment. Consequently, a selection of relevant theories informing learning styles providing an additional lens through which to view learning in terms of the acquisition and application of knowledge, competency and skill will be examined they pertain to the study.

2.3.2 Learning Styles

As stated above, a number of theorists have hypothesised the existence of different learning styles which effectively impact on the way individuals learn acting as enabling or constraining factors in the acquisition, synthesis and application of knowledge. For the purposes of this study two theories of learning have been selected in the form of Gardner's theory of multiple intelligences and Kolb's theory of experiential learning. Additionally, two models of learning styles are addressed parallel to these theories as they can be identified as the practical application of the abovementioned theories, namely Fleming's model of learning styles linking to Gardner's theory and Honey and Mumford's Model of Learning based on Kolb's theory thus providing alternate lenses through which to view the learning process.

2.3.2.1 Gardner's Theory of Multiple Intelligences

Gardner's (1993) theory of Multiple Intelligences (MI) was largely developed in response to the 'objective' nature of Intelligence Quotient (IQ) tests developed by Binet at the turn of the 20th Century. This claim to effectively quantify intelligence became highly regarded by many in the scientific community, a notion that despite a number of criticisms pertaining to the unidimensional conceptualisation of intelligence, continues to pervade society in a variety of contexts. Gardner (1993), in an effort to provide an alternative to IQ measurement, focuses on the nature of intelligence (s) by defining intelligence as " the ability to solve problems, or to fashion products, that are valued in one or more cultural or community settings" (Gardner, 1993: 7). Therefore Gardner identifies the contextual nature of intelligence which in light of the aforementioned learning theories proves consistent,

particularly with regards to social influences in the acquisition of and subsequent reinvention or creation of knowledge.

As such, Gardner identified the existence of seven types of intelligence ranging from traditional conceptualisations such as logic to kinesthetic and interpersonal intelligences. Gardner hypothesised that particular types of intelligence were suited to particular kinds of career paths. Gardner's theory was however not prescriptive in this regard as he noted the possible existence of more than one dominant intelligence type within a single individual allowing for depth of engagement in a variety of ways. Gardner's seven intelligences are outlined in outlined in Table 6 below adapted from Gardner and Hatch (1989:6).

Gardner's Multiple Intelligences		
Intelligence	**Description**	**Possible career path**
Logical-mathematical	Ability to handle long chains of mathematical reasoning	Mathematician, Auditor, Software Developer, Accountant
Linguistic	Sensitive to sounds, rhythms and meanings of words and the functions of language	Poet, Journalist, Lawyer, Author
Musical	Ability to produce and appreciate rhythm, pitch and timbre and the expressive nature of music.	Musician, Composer, Music Therapist
Spatial	Ability to perceive the visual-spatial world accurately and to react accordingly.	Architect, Quantity Survey, Photographer, Graphic Designer, Pilot
Bodily-Kinesthetic	Ability to control one's body movements and handle objects skillfully.	Dancer, Sportsman, Physical Therapist, Mechanic, Carpenter
Interpersonal	Capacities to discern and respond appropriately to the moods, temperaments, motivations, and desires of other people.	Teacher, Manager, Psychologist, Nurse, Public Relations Officer
Intrapersonal	Access to one's own feelings and the ability, to discriminate amongst them and draw accurately upon them to guide behavior of self and others.	Psychologist, Counsellor, Social Worker, Project Manager, Entrepreneur

Table 6: Gardner's Multiple Intelligences (Adapted from Gardner and Hatch, 1989:6).

In the context of mass education, specifically in South African HEI's which enjoys an unusually diverse student body, an increasing number of lecturers have had to take into account the possibility of alternative methods of meaning making drawing on theories such as Gardner's Multiple Intelligence theory facilitating a multi-modal approach to course delivery.

2.3.2.2 Fleming's model of learning styles (VARK)

Fleming posited the existence of four learning styles commonly referred to as the VARK model of learning styles, the components of which are Visual Learners, Auditory/Aural Learners; Read/Write Learners and Kinesthetic Learners (Zapalska & Dabb, 2002). Fleming thus developed a learning styles questionnaire as a tool for students and lecturers to utilise in or to shed light on dominant learning styles each of which have implications for teaching strategies employed and consequently impact on instructional design. Importantly, Fleming's theory allows for more than one dominant learning style in a similar fashion to Gardner's theory of Multiple Intelligences.

Visual Learners

Visual learners as identified by Fleming learn best when they are engaged visually and are thus able to better assimilate, synthesise and apply new information when it is graphically represented. As such this implies the need for the lecturer to make effective use of teaching and learning strategies which will effectively engage visual learners such making use of presentations, graphs, mindmaps, Youtube videos, pencasts, and podcasts.

Auditory/Aural Learners

Auditory/Aural learners as described by Fleming learn best through listening and engaging collaboratively with new material. As such, this implies the use of collaborative tools such as paired learning and group work. Additionally, lecturers could include sound clips in presentations as well as making use of audio and media in the form of Youtube video clips, pencasts and podcasts.

Read/Write Learners

Learners falling within the Read/Write learning style can be described as having a strong linguistic affinity and as such prefer information displayed as text. These learners will appreciate the inclusion of journal articles and class notes in order to facilitate their conceptual understanding of information. These learners will also tend towards lengthy assignments as tools of assessment as opposed to short answer format.

Kinesthetic Learners

Finally, Kinesthetic learners can be described as learning through tactile engagement. As such, Kinesthetic learners appreciate being able to engage physically with material and gain a thorough understanding of concepts through the concrete manipulation of apparatus. In order to accommodate Kinesthetic learners, concrete application of theory should be included wherever appropriate including the use of interactive media requiring student input.

Although no specific work has been sourced in linking Flemings model of learning styles to Gardner's theory of Multiple Intelligences, parallels can be drawn between the two models observable in the following ways:

Parallels between Gardner and Fleming's Theories	
Gardner's MI Theory	**Fleming's VARK Learning Styles**
Spatial and possibly logical-mathematical	Visual
Musical	Auditory/Aural
Linguistic	Read/Write
Bodily-Kinesthetic	Kinesthetic

Table 7: Parallels between Gardner and Fleming's Theories

2.3.2.3 Kolb's theory of experiential learning

Kolb's theory of experiential learning provides an alternative to Gardner and Flemings models outlined above. Kolb and Kolb (2005a) theorise that learning is process based and as such all learning can be viewed as relearning as it is based on some form of experience. Tulbure (2012) reflects on Kolb's theory in two parts: firstly, Kolb posits the existence of four learning styles in relation to what he identifies as a four-stage cycle of learning.

Kolb & Kolb (2005) assert that learning can be conceptualised as having two primary dimensions in terms of locating experiences which are defined in terms concrete Experience (CE) and Abstract Conceptualisation (AC), similarly, Kolb and Kolb, Boyatzis & Mainemelis (2000) note the existence of two modes of transforming experience, defined as Reflective Observation (RO) and Active Experimentation (AE).

Additionally, Kolb posited the existence of a cycle of learning stemming from a process-based approach to learning (Kolb and Kolb, 2005). Tubure (2012) identifies the components of Kolb's learning cycle as follows: *Concrete experience* informing *observations and reflections* leading to the formation of *abstract concepts and*

generalisations which in turn forms the basis of application in the form of *testing implications of concepts in new situations*. Figure 4 below provides a graphic representation of the learning styles identified by Kolb in relation to the learning cycle.

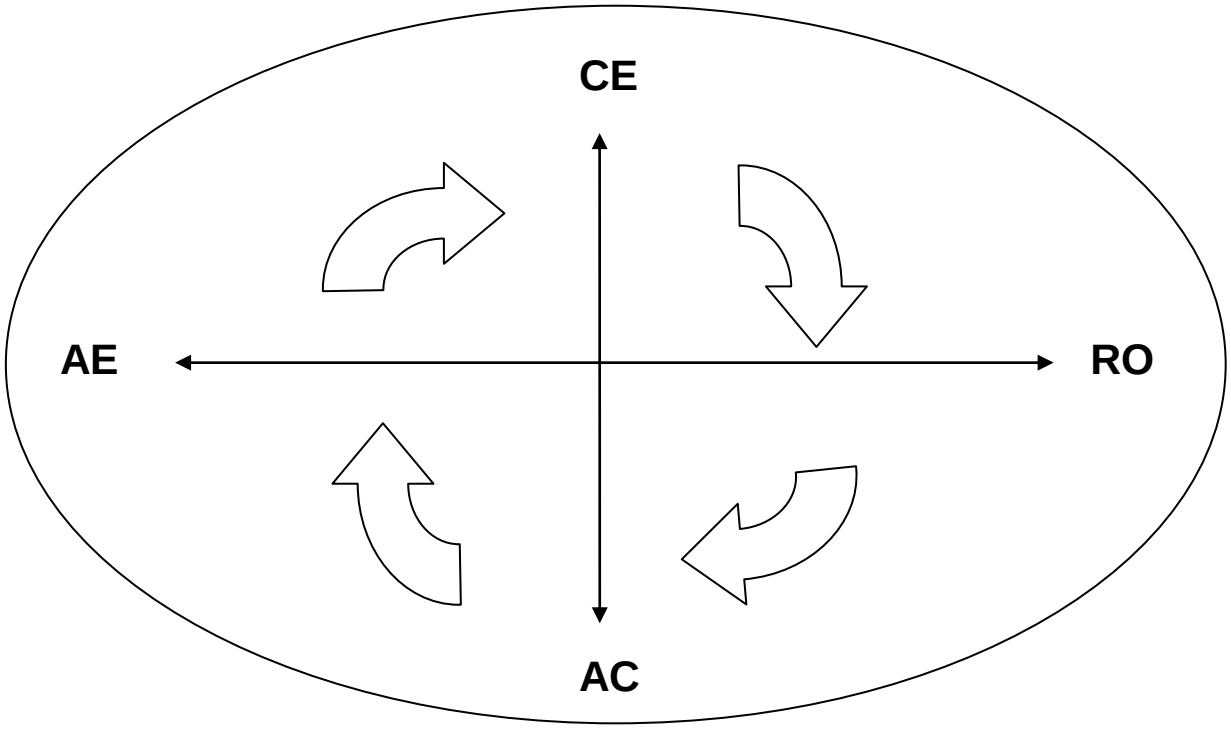

Figure 4: Kolb's Model on Experiential Learning and learning cycle

(Adapted from Kolb and Kolb, 2005)

Figure 4 above illustrates the learning cycle as proposed by Kolb in relation to the perception and information processing dimensions. In the context of teaching and learning, this theory provides the lecturer with a particular perspective on the nature of learning in the context of concrete versus abstract perception in addition to assimilation in terms of observation in relation to application of theory in terms of active experimentation.

2.3.2.4 Honey and Mumford's model of Learning Styles

Honey and Mumford presents a practical application of learning styles which builds on Kolb's theory (Rayner & Riding, 1997 and Cassidy, 2004). Honey and Mumford identify the existence of four distinct learning styles which influences the processes informing the type of engagement exhibited by an individual learner (Cassidy, 2004). Honey and Mumford posited the existence of the following four distinct learning styles; the activist; the reflector; the theorist and the pragmatist each of which are outlined below:

The Activist

Honey and Mumford (1992) characterise the *activist* as a task-based learner, one who learns through engaging actively with learning material without a great deal of planning or theoretical engagement. In addition, Honey and Mumford (1992) note that the activist is easily bored with material, especially once he/she has mastered the concepts. The activist is further described as being outgoing, gregarious and exciting and open-minded. Due to the enthusiasm with which they approach learning, it has been observed that they often tend to listen only to part of the instructions for a given activity. The implication for teaching and learning strategies when faced with an activist in the classroom would be to provide many concrete examples in order to afford them the opportunity to engage with concepts in a tangible way. In addition, it would be prudent to ask many questions in order to ascertain the level of comprehension with regards to the task at hand.

The Reflector

In contrast to the *activist*, Honey and Mumford (1992) characterise the *reflector* as cautious, in nature, preferring to observe as opposed to taking up leadership roles. The *reflector* has the tendency to collect as much information with regards to a concept of activity prior to engaging physically with the material. The reflector will

therefore be inclined to read widely prior to engaging with a topic and according to Honey and Mumford may choose not to act on available information. Typically, the decision making process for a reflector can be described as extensive and thorough, incorporating theoretical underpinnings in addition to the opinions of both themselves as well as knowledgeable others. In light of this description, the presence of reflective learners in the classroom situation translates into the need for lecturers to make provision for them by providing access to extensive resources for their reflection and subsequently afford them the opportunity to seek clarity once they have engaged sufficiently with available material.

The Theorist

The third learning style as identified by Honey and Mumford (1992) is that of the *theorist*. The *theorist* can be characterised by their intensive engagement with abstract conceptualisation. Honey and Mumford (1992) describe the *theorist* as being primarily concerned with the theoretical underpinnings informing claims, preferring to explore phenomenon in terms of underlying principles and making use of objective, logical methods in order to draw conclusions. In addition, *theorists* are described as being particularly uncomfortable with notions of subjectivity and ambiguity and will extensively question validity of evidence presented in support of claims. From a teaching and learning perspective this translates into an involved, inquiring student requiring in-depth explanations of content and concepts.

The Pragmatist

The fourth and final learning style as categorised by Honey and Mumford (1992) is that of the *pragmatist.* The pragmatist according to Honey and Mumford (1992) is characterised as an activity-based theorist. They are described as displaying interest in theoretical underpinnings only in so far as these theoretical assertions prove useful in the process of activity and are sufficiently disinterested in the extensive dissecting of results. Instead they are interested in problem-solving processes and the development of new ideas. Practical implications for the

teaching and learning context includes the need for a structured environment where information is presented clearly in a logical, linear fashion, in addition, clear links between theory and practice should be made explicit.

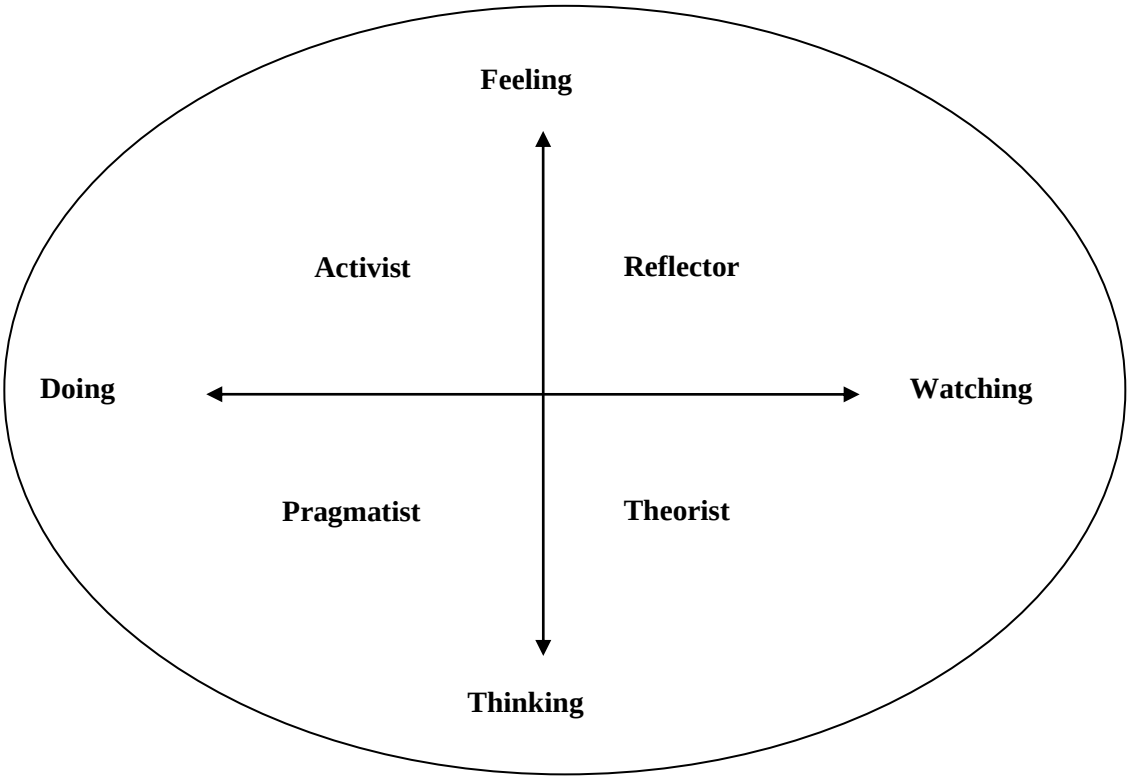

Figure 5: Honey and Mumford's Model of Learning Styles

Gardner, Fleming, Kolb and Honey and Mumford have in their identification of learning styles provides an additional dimension for consideration when preparing courseware including activities, assessment and activities to facilitate meaningful learning, particularly in a large class situation where diversity in numbers characterises undergraduate enrolments.

2.3.3 Instructional Design

As alluded to in the beginning of the theoretical framework, there lack of e-pedagogy within the emerging discipline of e-learning has led to a multi-theoretical approach to didactics, utilising appropriate models of learning in order to inform

instructional design in the context of multi-modal methods of course delivery. In the context of this study, each of the learning theories drawn on regardless of the context in which they were developed provides particular enabling factors in their application and in the context of instructional design to include blended learning strategies.

Learning Theories and Instructional Design					
Key Components	**Behaviourism**	**Cognitivism**	**Social Learning**	**Constructivism**	**Connectivism**
Nature of Learning	Observable change in behaviour	Processing of information, cognitive structures	Acquisition of modelled behaviour based on observation.	Personal meaning constructed by individual	Distributed, social, technologically enhanced.
Influential Factors	Stimulus-Response, punishment, reinforcement	Cognitive Schema, experiences.	Attention and motivation through observation/ modelling	Engagement, active participation, social collaboration.	Diversity of Network
Role of Memory	Memory hardwired through reinforcement/ punishment	Encoding, storage, retrieval	Memory based on outcome of the modelling process – motivation based	Prior knowledge informing social construction of new knowledge	Adaptive patterns representative of network membership
Knowledge Acquisition	Stimulus -Response	Duplicating knowledge constructs	Modelling desired behaviour	Social interaction	Connecting to networks, nodes (can be through individuals or groups)
Types of Learning	Task-based	Reasoning, clear objectives, problem-solving	Varied learning – both task-based and problem-solving involving modelling	Socially constructed learning	Complex learning, rapid changing core, diverse knowledge sources.
E-Learning Application	Facilitates fact based learning, particularly in the area of assessment	Organisation and structure of information. Encourage the linking of previously learned concepts to new ideas.	Online collaboration, electronic modelling, essentially facilitates task-based learning and problem-solving utilising the social-networking platform.	Communication tools such as discussion tools facilitate a collaborative learning environment in addition to use of media-based scaffolding strategies.	Collaborative tools including communication and discussion tools, strategic learning and immediate application of new knowledge. Dissemination of knowledge in the form of online assessments and assignments.

Table 8: Learning theories and Instructional Design

A variety of authors (Ertmer & Newby, 1993; Mergal, 1998; Conole, Dyke, Oliver & Seale, 2004; Hung, 2010; and Guney & Al, 2012) have reflected on the utility of learning theory as enablers for the instructional design of online and blended learning models. As such, each learning theory discussed in the theoretical framework enables specific types of learning to occur. Table 8 above is an expansion of Table 5 in an effort to contextualise the theory and synthesise of the abovementioned work on instructional design illustrating the potential enablers in drawing on a multitude of theories in a multimodal setting.

2.4 Assessment in Higher Education

The notion of assessment is one which when unpacked becomes a complex concept which cannot and must not be viewed in isolation but in the context of purpose. The modern concept of assessment in HE has developed to such an extent that the South African Qualifications Authority (SAQA) promotes the development of HE staff as certified assessors and frowns upon the notion of underprepared and underqualified staff taking part in formal assessment processes. In spite of this, it could be argued that a vast number of lecturers continue to assess in traditional ways regardless of ongoing changes in the HE context such as the diverse profile of current students; increasing numbers of enrolled students; demands and expectations of future employers in terms of "graduateness" of students; stakeholder demands and expectations; assessment policy and ongoing changes in economies of knowledge worldwide.

2.4.1 Defining Assessment

The concept of assessment can be defined in a number of ways; first and foremost the notion of assessment is linked to measurement of student learning, a way in which one can as objectively as possible, methods or instruments devised to ascertain whether students are grasping concepts and meeting expected objectives linked to a particular course or module. In addition, assessment can be diagnostic

in nature providing lecturers with information about whether their students are coping with particular sections of work and if developed and administered with the requisite rigour and critical evaluation, can provide valuable information pertaining to both the context of knowledge gaps as well as possible areas of development both from a teaching methodology perspective given the particular needs of a specific cohort.

According to the Criteria and Guidelines for Assessment of National Qualifications Framework (NQF) Registered Unit Standards and Qualifications, Assessment is viewed as a

> *"structured process for gathering evidence and making judgments about an individual's performance in relation to registered national standards and qualifications*."
>
> (SAQA, 2001: 16)

This can be taken to mean that assessment should be a process whereby a lecturer can identify what is required of a student in order to be deemed competent in a particular area of expertise/module, that said lecturer should be able to articulate the requirements clearly and should systematically provide the student with ongoing opportunities to demonstrate articulated competencies/knowledge/skills in a specific context. Therefore, assessment can be defined as the structured processes whereby lecturers identify the criteria for competency, making criteria explicit to students from the outset and adhering to the strict application of criteria in the process of collecting evidence in order to make a judgment with regards to a students' academic performance. In the context of large classes, the rigourous and ongoing collection of assessment data, be it formative or summative in nature, proves challenging for the most committed of lecturers.

2.4.2 The value of Assessment in Teaching and Learning

It is accepted that learning and assessment are concepts which are inextricably linked. Gibbs (1995) identifies the relationship between the concepts of teaching and learning in terms of lower order skills, whereby the student reproduces (surface learning) fundamental facts and processes and higher order skills, whereby the student engages meaningfully (deep learning) with learning content and concepts. Similarly, teaching method is related to the expectations of learning on the part of the lecturer. If the lecturer expects the students to engage with the material only to reproduce it, the teaching method would be closed and will only test surface learning. In contrast, if the lecturer expects the students to operate at a higher level, he/she will use a more open teaching method whereby students learn through facilitation and are free to explore related concepts rather than focus on specific facts. It can however be argued that both types of learning, both surface and deep learning, have a place in higher education depending on the year level as well as the subject. In many cases surface learning of basic concepts is required as a starting point in order for deeper engagement with the concepts to be possible. Botha et al. (2005) note that in contrast to deep learning, surface learning covers only superficial content and does not encourage depth of engagement, critical thinking or problem solving. Martin and Saljo (1976, as cited in Botha et al. 2005) identify a third level of engagement which is particularly pertinent to the 21st Century context, that of strategic learning, involving the strategic engagement of students with material specific to their needs at specific times. Thus, engagement with material on a superficial level forms part of the strategic learning equation, and increased depth of engagement occurs only when necessary, for example as a requirement for an assessment or assignment .In an evolving global, knowledge-based economy where knowledge relevance has a shorter and shorter lifespan, strategic engagement provides an alternative to the traditional concept of deep learning.

Gibbs (1999) notes that assessment can be utilised in a way that fosters learning that is assessing for learning as opposed to assessment of learning. Gibbs (1999)

further identifies that students are strategic in nature and are prone to making choices which will facilitate them in taking the shortest route in order to achieve a goal and therefore can be deemed assessment savvy. In other words, they are tuned in to what is expected of them from a particular assessment and focus on the scope rather than the bulk of the content. Therefore, they focus only on what they think is important for assessment and often fail to really engage with the content thus only skimming the surface. Subsequently, it is becoming increasingly important to utilise assessment as a learning strategy in order to 'force' students to engage meaningfully with course content at regular intervals thus fostering deep learning and providing opportunity for ongoing development rather than allowing for a strategic learning approach which lends itself to an all or nothing summative assessment at the end of a course. It can be argued that assessment can be a particularly powerful tool in leveraging learning amongst students who would otherwise not have engaged meaningfully with the content of a particular module, in order for this to occur however, assessment must be specific and strategic in terms of criteria used.

As was noted at the beginning of this section, assessment is not a standalone concept; it has utility value outside of making judgments about student performance in what is expected in terms of results by numerous stakeholders. Stakeholder expectations will invariably impact on the type of assessment employed as well as the criteria for the assessment. Identified stakeholders include university management where the focus is on improvement of throughput /graduation rates as successful completion translates into funding and funders (including parents) want to see return on investment in terms of graduating students. In the case of pre-service teacher training, many students enrolled in the Faculty of Education across the 23 HEI's are recipients of Ufundza Lushaka contractual bursaries and therefore required to pass, graduate and teach in government posts for the duration of time equal to the number of years for which they received the bursaries (http://www.nsfas.ac.za).

2.4.3 Quality and Credibility in Assessment

Another aspect of assessment which requires some consideration is the quality and credibility of assessments. When considering the concepts of quality and credibility in assessments a number of catch phrases/ key words seem to constantly keep coming up these being fairness; validity; reliability and practicability. According to SAQA (2001) and Luckett & Sutherland (2000) fairness of assessment is vital and any ambiguity forming part of the assessment itself or the assessment process should be eliminated as far as possible. It is further argued by Luckett & Sutherland (2000) that student achievement should not form the basis of a comparison as this may further compromise the fairness of the assessment.

The issue of validity in relation to the appropriateness of an assessment is one that is often raised, particularly in the context of assessing large classes where quality and quantity of assessments are placed under the microscope. Luckett & Sutherland (2000) identify the following types of validity: face validity; content validity; concurrent validity and construct validity

- *Face validity* relates to what is actually being evaluated by an assessment at face value, including the appropriateness of the questions as well as the level at which the questions in the assessment are pitched;

- *Content validity* refers to the coverage of the content in the assessment and spread of tasks or questions. An assessment with a limited scope as opposed to a fair spread would easily be questioned in terms of the criteria of content validity;

- *Concurrent validity* speaks to the use of an assessment as a benchmark on which to base other similar assessments; and

- *Construct Validity* relates to the assessment of a particular construct or a loaded concept. Luckett & Sutherland (2000) argue that while broader

conceptualisations impact negatively on the validity of an assessment, narrower or more specific conceptualisations of a construct may lead to the student being penalised or disadvantaged as a result of this.

In the context of this study, the use of multiple choice questions is one which bears some reflection, particularly in terms of the constructs of validity outlined above. The use of multiple-choice questions (MCQ's) as a method of assessing large classes as been in existence for a number of years and should not be considered a new strategy in coping with the assessment of large classes. Anderson (1984) provides an account of an array of strategies which students employ in order to successfully answer ill-constructed multiple-choice questions. Multiple-choice tests which are not properly constructed will therefore be testing the test-taking ability of the test taker rather than their understanding of and engagement with the required material. For example, the stem needs to be structured in such a way so as to test a particular concept without providing the test taker with clues that will assist in choosing the correct answer, similarly the distracters and correct answer must take the same or similar format in order for them to be plausible. If such questions are not well thought out, the test taker may take their cues from the stem and distracters in order to be successful in an assessment where they failed to engage with the material as would have been required. The validity of such an assessment would thus be compromised.

Another further concept which is inextricably linked to the quality and credibility of assessment is that of reliability. Luckett and Sutherland (2000), define reliability as the extent to which the performance on an assessment can be replicated, and is specifically related to assessment criteria. Explicit assessment criteria and criterion referenced assessment is deemed to be more reliable than norm referenced assessment. Additionally, anonymity in marking serves to increase the reliability of the assessment as the lecturer's own biases would not enter into the assessment equation.

Lastly, the concept of practicability requires some consideration. The conceptualisation of practicability can be considered as the following: The more complex the assessment in terms of requirements of personal acquisition of competencies and skills outside of the subject being assessed as well as reliance on external resources, services or service providers, the greater the chances of reliability, validity and fairness being compromised.

Online assessments for instance requires a particular level of skill on the part of both the lecturer and student but are also heavily reliant on external resources such as fully functioning computers, functioning networks and servers, technical support from various departments as well as electricity. If any of the abovementioned variables are questionable, the assessment process will be compromised. In addition, it is important to bear in mind that large numbers of students have not been exposed to technology as a result of their socio-economic circumstances and therefore reliance on technologies as the sole method of assessment may further disadvantage students who may already be struggling to cope with the academic demands of HE courses.

2.4.4 Using Assessment to develop student learning

The preceding section provides a number of considerations which need to be taken into account in the process of developing an assessment. It is imperative not only to take into account the purpose for which the assessment is being set; for the intention of assessing learning; but also to take into account the numerous stakeholders who may utilise the assessment results for particular ends in addition to the structure and conceptualisation of the assessment itself in terms of quality and credibility. Thus, the type of assessment chosen needs to speak to each of these points and cannot be chosen randomly.

Luckett and Sutherland (2000:115 - 120) identify numerous types of assessment which can be utilised for the formative and summative assessment both of and for student learning including but not limited to examinations, essay type questions; reflective journals; practical application of theory; projects; reports; presentations; observations and portfolios. Each type of assessment provides the student with different opportunities to demonstrate their engagement with and understanding of course concepts. Some methods such as projects, reports, portfolio's, reflective journals and essays require deep engagement with subject material on the part of the students requiring the collection, analysis and synthesis of content arguably developing students' skills and competencies that could be classed as the foundation of graduateness which is what they should be aspiring for. Boughey and van Rensburg (1994) argue for the inclusion of formative assessment in order to develop research and writing skills in conceptual development in terms of synthesis of information by students from the outset. This however requires constant feedback on concepts which will later form the foundation of the students' knowledge base for the course they are studying and while it is doubtful that many will dispute the need to develop a solid foundation of core concepts at an early stage. These concepts will form the basis of later understanding and development of ideas, in essence foundational deep learning. However, writing intensive assessments, be they formative or summative in nature, tend to be less and less popular with the advent of massification of HE as lecturers simply do not have the time to provide adequate and timeous feedback to students.

As highlighted above, the creation of an assessment should involve considerations informed by stakeholder requirements such as external accreditation bodies, university management in addition to what is deemed best practice by SAQA in terms of transparent and fair assessment. In addition to this, assessments should be pitched at appropriate levels ensuring student engagement with course content appropriate for the year level The expectation to apply and synthesise information at higher levels should be a given. Consequently, the issue of appropriate engagement needs to be addressed

Learning theories such as Bloom's Taxonomy discussed in the preceding section provides a tool which can be useful in the identification of the level at which students are engaging with learning material. It is therefore paramount to identify the level at which the students should be processing the subject content and subsequently construct questions appropriate to determine their level of engagement. First year level engagement for example, may appropriately include mostly content-type questions in the first semester in order to immerse students in the terminology and language of the discipline and provide them with a content foundation for more in-depth engagement at a later point in their academic development. In contrast, content coverage at surface level would no longer be deemed appropriate at third year level as students should have developed a critical eye to the extent to which they are able to engage at a deeper level and demonstrate this through the assessment process.

Assessment forms a critical component of the teaching and learning process, not only does it provide lecturers with a synopsis of how the cohort or individual students are grasping concepts but it provides opportunities for intervention if done timeously and followed up on efficiently and effectively. In addition, formative assessment can form the basis of strategic and deep learning instilling in the students skills, competencies and knowledge they will be able to draw on in industry upon graduation. In the context of large classes, Buchanan and Rogers (1990) identify assessment as the breaking point at which lecturers tend to turn to survival tactics in order to manage volume as such, this study offers a potential solution to assessment challenges experienced by lecturers.

Additionally, technology-based skills and competencies are fast becoming a feature in both teaching and learning processes globally and a component of graduateness referred to earlier is the ability to effectively engage with technology. Therefore the selective utilisation of technology as a teaching, communication, resource and assessment tool in 21st century Higher Education forms a pivotal role in ensuring graduate preparedness for the workplace.

2.5 Technology and Higher Education

Le Grange (2004) reflects on the trend towards utilising technology for education purposes. In an ever advancing world of social networking, online collaboration and information rich environments, the utility value of effectively employing a Learning Management System such as Blackboard is unimaginable. Dabbagh & Reo (2011), reflect on the learning opportunities available through the use social software specifically when juxtaposed with advancements in Web 2.0 technology. Specifically, the creation of online environments which include participative as well as collaborative platforms where user created content and social networking are trends are beginning to impact on the Higher Education environment (Dabbagh & Reo, 2011). Furthermore, the skills required to engage with online or blended learning environments although not unlike traditional skills required of students, align with skills required by future employees of our graduates in the national and international labour market.

It must however be noted that the level of skill and attitude on both the parts of the lecturers and the students impacts the effectiveness of the implementation of such a system. While benefits of implementing an LMS may be far reaching, it is important to acknowledge the challenges from the outset. Authors Ng'ambi & Rambe (2008) have identified a number of challenges related to implementation of an electronic learning tool including lack of commitment to change; fear of change; time investment in acquiring the necessary skills to utilise the online tools effectively; time investment in developing online resources and lack of tangible benefits from using the system. Each of these factors operates effectively as a barrier in the adoption of an eLearning strategy as a tool for the enhancement of learning, making learning relevant, contextual and current. The uptake of LMS's such as Blackboard has not been universal on a global or local scale.

Nagel & Kotze (2011) have identified a phenomenal increase in the uptake of online courses internationally while blended or technology enhanced learning options have

remained relatively constant. However, it seems that in South African tertiary institutions a multi-modal approach is being employed in an effort to 'blend' traditional face-to-face lectures with a Learning Management System where students can access course content and course related activities such as online discussions and collaboration, assignments and assessments online (Nagel & Kotze, 2011).

2.6 Blackboard (Bb) as a Learning Management Tool

Learning Management Systems currently available to South African HE institutions include open-source, customisable systems such as Moodle and WebCT in addition to complete LMS packages such as Blackboard. In the context of this study, Blackboard has been invested in by the management of the selected university and as such the deployment of the system has been planned and implemented over a period of years.

Blackboard provides a number of tools to lecturers and students for a technologically enhanced learning experience. The assessment tools available in Blackboard in particular have been identified as being able provide a possible solution for our lecturers who struggle to create, administer and provide timeous and quality feedback to their vast numbers of students. It must however be noted that Blackboard tools are just that, they are tools and like a hammer, garden hose or high pressure cleaner, efficacy is largely dependent on how the tool is utilised. Blackboard affords lecturers and students with the opportunity to move a large part of the learning environment online in order to facilitate better managed contact sessions. Popular Blackboard tools include the following:

- ***Course content***

Course content is essentially the homepage, the first page that students can view when they login to a Blackboard-based course. This space allows the lecturers to provide the students with a variety of content related to their course including pencasts; podcasts; policy documents; course material; additional readings and the like, limited only by the skill and initiative of the lecturers. The danger of this is content dumping, which can be described as the transfer of traditional courses online wholesale without sufficient reflection or development for the online environment and without adding much value to the student experience.

- ***Announcements***

The announcements tool allows for the lecturer to broadcast announcements to his or her class by way of electronic communication. Announcements function as an electronic notice board and are public to the group, alleviating the need for students to come onto campus unnecessarily or informing them of requirements for a specific lecture.

- ***Email***

The email tool in Blackboard functions in the same way as other email applications. The Blackboard email however, is specifically linked to enrolled groups and allows for small group or individual communication between group members and between students and lecturers.

- ***Discussion tools***

Discussion tools are divided into three categories: threaded discussions; blogs and journals. Threaded discussions can be initiated by students or staff and the 'threaded' nature of the discussions makes for the easy following of an argument or

discussion topic. Students can also utilise threaded discussions as an open forum for solutions to commonly-held campus or course-based issues, questions or challenges, the utilisation of the tool is at the discretion of the users and as such is user-driven. Blogs can be described as a narrative posted by either staff or students and can be set up as either open for comment with a read-only setting. Blog topics can be utilised by the lecturer to initiate discussion or as a mini-presentation to the group by individual students on a specific topic to which grades can be assigned. Finally, journals are the online version of a traditional journal and are set as private between the student and lecturer.

- ***Assessment tools***

The assessment tools available on Blackboard pertain specifically to traditional test-type assessments. These are in the form of quizzes; surveys and self-tests. The quiz option is employed for graded assessments providing the lecturer with a selection of question types including but not limited to MCQ's; True/False; matching; calculated; short or long answer questions. While many of the options allow for pre-determined answers and instant marking upon submission, some question types such as short or long answer questions will require a level of lecturer input prior to the results being released to the students. The survey option allows for anonymous evaluation of the course, lecturer or programme by the students and the self-test option is set up in the same way as a quiz but is not attached to grades, allowing the student to take the test more than once in preparation for a summative assessment such as exams.

- ***Assignment tool***

Assignment tools afford the student the opportunity to submit their assignments online. The lecturers then have the option of reviewing the assignment online or printing the assignment for manual marking.

- ***Calendar tool***

The calendar tool is essentially a self-management tool providing staff and students automated notifications of assignment due dates, assessment dates and course related events. Students also have the option to personalise their own calendars.

The Blackboard tools outlined above are limited only by the user in terms of staff and students and present unimaginable opportunities for the enhancement of teaching and learning. Increased student enrolment has without question impacted on the ability of the lecturers to engage with students in the same way as they had in the past. The online/blended learning tools have been identified as possible solutions to some of the challenges experienced by lecturers teaching large classes. Additionally, the HET context and business landscape is changing as a result of the inception of the Information Age, requiring new sets of skills by graduates entering the workforce including those skills required to navigate and effectively utilise online learning opportunities. As such, the Blackboard LMS provides a potential solution not only in terms of managing large classes but additionally it affords lecturers and students the opportunity to engage with knowledge in a way applicable to the 21st Century.

2.7 Summary

The literature reviewed in this chapter contextualised the study by locating the study in both locally and globally and focused on legislation as it pertained to the changing HET landscape including the implementation of said legislation specifically aimed at improving access to HEI's in addition to the development of responsive curricula in line with socio-economic trends both locally and globally.

Furthermore, this chapter highlighted challenges related to the provision of quality education in a mass-education environment with a particular focus on current teaching and assessment practices in line with these challenges.

Additionally, this chapter presented a multitude of theoretical perspective with regards to the changes observed in the conceptualisation learning as it pertains to both 20th and 21st century educational trends. In line with this, the chapter addressed the theoretical implications of the development and introduction of technologies advancements as they pertain to the discipline of teaching and learning. Following this, the researcher has defined the concepts of assessment in terms of SAQA requirements, focusing on definitions and requisite assessment-related considerations as they impact on assessment in the HET context.

Lastly, this chapter has addressed factors identified as challenges and benefits of utilising technology as tool in multi-modal method course delivery affording the lecturer and students opportunities to engage both individually and collaboratively a blended teaching and learning environment.

2.7.1 The Higher Education Context

The researcher briefly contextualised the prevailing Higher Education landscape in South Africa in an effort to orientate the reader to the context specific issues in terms of the structure of the HE climate. To this end, the researcher focused on tracing changes implemented as a result of policy development and implementation in the form of the NHCE report which informed the drafting of the 1996 Green Paper which subsequently culminated in the release of White Paper 3 in July 1997 which focused on the transformation of Higher Education in South Africa. As such, White Paper 3 outlined the purposes of Higher Education as they were conceptualised by the newly elected democratic government focused in particular on issues of redress as they related to the previous regime in addition to future developments in Higher Education in terms of responsiveness and goodness of fit in terms of graduates, programmes and knowledge production within the South African as well as the global context. The release of the Higher Education Bill in April 1997 and subsequent passage of the Higher Education Act in December 1997 traced the shift

from the process of policy development to implementation which subsequently led to the restructuring of the South African HE landscape into its present state.

Transformations as experienced by HEI's were far reaching and South Africa witnessed multitude of changes in the HE landscape. Changes included the physical restructuring of the size and shape of HE in South Africa with a reduction in the number of institutions from thirty-six to twenty-three without closing any campuses and thus not compromising existing HE provision. Additionally, transformations included increasing the size of HE by converting to programme-based offerings and increasing access by means of addressing finance-related factors in addition to eligibility. Resultantly, SAHEI's saw the incremental expansion of enrolments as greater numbers of students from a diverse range of socio-economic and racial backgrounds took up the opportunity to access HE. The increase in enrolments has subsequently provided many lecturers with a number of challenges in terms of the teaching, support and assessment of a larger and more diverse student intake. Resultantly, programmes are compromised in terms of efficacy as lecturers no longer have the luxury of making use of regular assessments in order to inform them of the level of conceptual understanding amongst their students and which translates into lack of support for 'at risk' students who are thus likely to drop out of the system. Additionally, depth of engagement is compromised as larger numbers denote fewer writing intensive assignments and superficial engagement with course material which in turn impacts on the type of graduate institutions are producing. In the context of this study, the abovementioned factors in addition to changes in the access, quality and quantity of information available through electronic media, have impacted the HET context in an unparalleled way.

2.7.2 Conceptual Framework: Learning theories, Learning Styles and Instructional Design

In light of the changes observed in the socio-political and economic arena both locally and globally, the researcher also looked at changes in the way learning has

been conceptualised over the past century in an effort to identify the contextual nature of knowledge as related to teaching and learning. As such changes in terms of dominant paradigms were discussed in terms of the theories of behaviourism; cognitivism; social learning and constructivism were outlined. Additionally, the emergent theory of connectivism was presented and critically evaluated. Furthermore, the researcher discussed theories pertaining to the 'how best' of learning in terms of the existence of multiple intelligences as posited by Gardner, additionally alternative theories encompassing learning styles as postulated by Kolb, Fleming and Honey and Mumford were also outlined. Each of the abovementioned theories addressed a specific aspect of learning as it pertains to the concept of blended learning and the development of effective instructional designs. The blended learning model of course delivery allows for the inclusion of a multitude of opportunities for learning in ways which not only suit learners in terms of various strengths and weaknesses in the incorporation of concrete and abstract engagement with material; the utilisation of various visual and auditory media, but also reach them where they are at in terms of technology.

2.7.3 Assessment

Assessment has been highlighted by a number of authors as the breaking point at which lecturers of large classes adopt survival tactics by reverting to traditional instructivist rather than constructivist methodology. Consequently, the quantity, range and quality of assessments are often compromised in an effort to manage the numbers. As such the researcher revisited the construct of assessment by drawing on the bodies and concepts informing assessment criteria including stakeholders such as SAQA, funders including NSFAS, parents, regulating bodies and university management. Additionally, the researcher outlined concepts of validity and reliability as they inform the construction of assessment. The researcher further reflected on the utility of assessment in terms of managing the strategic engagement of students with learning material including the utilisation of technology-based assessment in order to achieve this.

2.7.4 Blended Learning and the HET Context

Finally, the researcher focused on the introduction of technology in the HET context drawing on existing literature in order to highlight the learning opportunities available through the use of social software in the form of Learning Management Systems. A specific focus of this section was placed on the participative and collaborative learning environments in terms of skills, knowledge and competencies as valued by the labour market both locally and globally. In addition, the researcher reflected on the challenges of implementing an electronic learning tool in terms of resources, skills sets of both staff and students and attitudes towards technology. Despite the challenges identified, the researcher identifies that the opportunities presented through the use of a LMS such as blackboard cannot be ignored and as such outlines the available Blackboard tools including the Course content tool; Announcement tools; Email tool; Discussion tools; Assessment tools; Assignment tools and the Calendar tool.

2.7.5 Concluding Remarks

Despite the challenges presented by the available literature, the drive to equip our students as competitive graduates in the labour market through the use of technology in order to enhance their learning, coupled with the need for the adoption of responsive and innovative teaching methodologies in the context of large and diverse classes translates into the identification of Blackboard as a possible solution to enhance the teaching and learning experiences of both staff and students at this institution.

Chapter three delineates the methodology employed for the purposes of this study outlining the selected research paradigm, design and methodology including ethical considerations and measures of trustworthiness including reflexivity of the researcher.

CHAPTER 3

RESEARCH DESIGN & METHODOLOGY

3.1 Introduction

The previous chapter provided a review of existing literature in an effort to contextualise this study. Literature reviewed focused on the importance of legislation and policy in the current Higher Education landscape in South Africa in terms of increasing student numbers as a response to the mandate to increase participation rates. South African HE policy, in combination with worldwide trends of massification, and in the context of the advent of the information age, whereby access to knowledge and knowledge production hinges on the concept of efficient mobile access to information provides the framework for this study. Chapter 2 further outlined the challenges of teaching in the HE context in a large class environment where challenges experienced in small homogenous classes are amplified as student numbers and diversity expand exponentially. The point at which this provides a major challenge is in the area of assessment.

This study proposes the use of Blackboard (a Learning Management system) as a tool in order to enhance teaching in the context of large classes and facilitate ongoing assessment in an effort to maintain small class standards and quality in a large class environment. This chapter outlines the methodology employed for the purposes of this study focusing on the chosen research paradigm, design and methodology. This chapter also provides the rationale for the use of the chosen paradigm and research design for the purposes of this study along with a description of the research methods utilised, specifically, descriptions of the sample for this study; methods of data collection and the processes engaged in with regards to data management and analysis. In addition this chapter also forms a reflexive function in that concerns pertaining to reliability, validity, trustworthiness,

ethical considerations and researcher reflexivity are addressed. As this study takes the form of a case study the researcher will not focus on issues of transferability but focus on the Blackboard related experiences of the various participants in this study and consequently, each aspect is outlined and explained extensively in reference to the study.

This study is framed by a main research question and additional sub-research questions. The main research question is formulated as follows:

How do lecturers use blackboard as a tool for the teaching and assessment in large classes?

In order to effectively answer the main research question, four sub-questions have been devised for the purposes of this study. The sub-questions are formulated as follows;

Sub Questions

1 What challenges do lecturers face in the teaching of large classes
2 What challenges do lecturers face in the assessment of large classes?
3 What are the benefits and challenges of using Blackboard for large classes?
4 What implications does the use of Blackboard have for teaching and learning?

As this study is not unidimensional, each sub-question addresses a particular aspect of implementing a new system such as Blackboard.

3.2 Research Paradigm

This study is qualitative in nature and was conducted within the parameters of the interpretivist paradigm. According Schostak (2002) the chosen paradigm forms the framework for a scientific study by providing the discursive parameters in which to map the study and operates effectively as both an enabling and constraining tool in terms of theoretical underpinnings and discursive structure. Qualitative enquiry is a particularly broad term including a variety of methods of data collection each one allowing for the in depth investigation of phenomenon from within the chosen context by engaging with the participants through a variety of data collection methods (Babbie and Mouton, 2001). Denzin and Lincoln (2005) identify three crises or challenges to be mindful of when engaging in qualitative research. These challenges are identified as: representation; legitimation and praxis. Denzin and Lincoln (2005) define the challenge of representation as to the extent to which the researcher is able to, in the context of the study adequately represent the lived experiences of the subject.

Furthermore, the challenge of legitimation is explained as the rigorous interrogation on the part of the researcher the discursive construction of commonly held post-positivist concepts of reliability, validity and generalisability in the context of qualitative study and concomitantly in the context of the post-structural research backdrop. Lastly, the challenge of praxis as argued by Denzin and Lincoln (2005) can be described as the uncertainty of place or value in within the realm of post-structural research. Onwuegbuzie & Leech (2007) note that the crises or challenges identified by Denzin and Lincoln (2005) pose a threat to the validity of qualitative research and as such place focus on sampling as a point of departure. Onwuegbuzie & Leech (2007) note that incorrect assumptions have been made as to the processes involved in the sampling and data collection processes involved in qualitative research and as such have marred the value of such research. To this end, much investment has gone into refuting the non-scientific nature of qualitative research.

This study has been located within the bounds of the interpretivist paradigm. According to Merriam (2002), an interpretive paradigm affords the researcher the opportunity to interact with the research participants in order to gain an understanding of the participants' meaning making process and to identify the extent to which participants experience and attribute meaning to a particular phenomenon. In the context of this research, the focus on how participants have experienced the implementation and utilisation of Blackboard is of key concern and therefore the interpretivist paradigm is deemed appropriate in order to explore such experiences. Consistent with this argument, interpretivist enquiry requires the researcher to explore and understand a phenomenon from a particular perspective; that of the research participants (Merriam. 2002). Babbie and Mouton (2001) identify that interpretivist enquiry requires the researcher to take in insider perspective and represent the data collected in a way that is true to the participants from their perspective, therefore it is paramount that the researcher be mindful of her own subjectivity during the research throughout the data collection and analysis process. To this end, in order to ensure the integrity of the study, the researcher has engaged extensively in self-reflection processes informed by Reason (2001).

Willis (2007) argues that the interpretivist paradigm is far more complex than other prevailing research paradigms (these being post-positivism and critical theory) as the interpretivist approach is more open and less clearly defined, the nature of reality is socially constructed and the purpose of research and specifically this study is to shed light on understanding and meaning making. In addition, an emic approach is adopted therefore data collected is subjective in nature and context specific. Willis (2007) further notes that the relationship of research and practice within the interpretive paradigm is closely interwoven and the one informs the other in a feedback loop rather than a post-positivist linear relationship of exclusive research informed practice.

Lichtman (2006), notes that interpretivism requires an inductive approach to the data collected, beginning with the specific focus of the study and culminating in the drawing of conclusions based on the data collected supported by available

literature. An interpretivist paradigm was deemed an appropriate choice for this study as the implementation of an alternative system such as Blackboard, while affording previously unimagined opportunities for both the lecturers and students to engage in a new environment, also brings with it a number of challenges specific to those involved. Implementation of new or alternative methods and systems such as Blackboard require a thorough understanding of the specific context in terms of those utilising it, their experiences in terms of enabling and constraining factors as well as the greater socio-economic and political climate. The nature of conducting an enquiry within the bounds of an interpretivist paradigm allows for the thorough investigation of personal experiences allowing for the generalisation of specific lessons learned in the context of mass deployment of such a tool.

3.3 Research Design

Babbie and Mouton (2001) identify three main research designs which fall under the umbrella of interpretivism; ethnographic studies; case studies and life histories. Babbie and Mouton (2001) further note that the difference between the three research designs lies largely within the definition of scope for each. While an ethnographic study would be deemed appropriate for large scale research, case studies tend to focus on smaller units of investigation. Maxwell (2005) notes the importance of carefully selecting an appropriate research design for the study in question as the comprehensiveness of a well chosen design will ultimately determine the level of success of the study.

The research design selected for this particular study was the case study method. Creswell (1997) as cited in Lichtman (2006), identifies the case study method as one of the traditional qualitative methods of enquiry. Flyvberg (2011:301) utilises Merriam-Webster's dictionary in an effort to provide a practical definition of a case study.

Case Study: "an intensive analysis of an individual unit (as a person or community) stressing developmental factors in relation to the environment"

Yin (2003) argues that a case study design is deemed an appropriate method of inquiry when the research problem(s) focus on the 'why' and 'how' of the phenomenon in question. Yin (2003) further notes that a case study is appropriate when the actions of the participants cannot be controlled or manipulated by the researcher for the duration of the study. In addition, Yin (2003) identifies the context as an integral focus of a case study design to the extent to which the phenomenon and the context are interrelated and not mutually exclusive.

Willis (2007: 238), identifies the following distinguishing features of a case study:

- *Particularistic* – the focus of the study is specific ;
- *Naturalistic* – the data collected is real in the sense that it emanates from a natural setting comprising of human beings in real situations;
- *Thick descriptive data* – data sources can be numerous and varied in that they can include but are not limited to interviews, observations, journal reflections, diaries, surveys and tests;
- *Inductive* – case studies are inductive in nature in that while the focus of the study is specific, general conclusions may be drawn from the data collected;
- *Heuristic* – case studies afford the researcher the opportunity to gain a deeper understanding of the phenomenon in question, thus either broadening their knowledge base or confirming pre-existing assumptions.

Lichtman (2006) notes that the parameters of a case study are broad in the sense that an single human being may constitute a case study but by the same argument, a case study may also be an entire cohort, school or university. Lichtman (2006) asserts that conceptualisation of what constitutes the case study needs to be clearly defined by the researcher before embarking on the research. Willis

(2007:243 -244) identifies variations in the case study method of enquiry and in doing so makes the following classifications: Ethnographic case study; Microethnographic case study; Situational analysis; Historical case study; Historical organisational case study; Life history case study, Psychological, sociological and educational case study; Descriptive case study and Interpretive case study. This study can be identified as an Educational case study as the focus for this study is on the use of a Learning Management System as a teaching an assessment tool within an educational context.

Yin (2003) asserts that the purpose of a case study as a method of inquiry is to contribute to the existing knowledge base of a variety of stakeholders invested in the study. These stakeholders can be identified as the researcher, the participants and the wider community in the form of social, political and organisational groups. Stake (2005) as cited in Denzin and Lincoln (2011:247) notes that case studies are not necessarily focused on specific cases within a particular context but rather in a series of cases or processes whereby the researcher is able to describe or identify dominant themes. The exception of course would be cases of interest where the lived experience as identified by participants that presents contrary to the general experience of the case group.

Despite the proliferation of the case study method as a strategy of inquiry, the credibility of the method continues to fall under speculation by the scientific community. Flyvberg (2011:302) identifies and challenges the following five misunderstandings commonly associated with the case study method.

a. *General theoretical knowledge is more valuable than concrete case knowledge;*

Flyvberg (2011) makes two pertinent points regarding the first misunderstanding. Firstly, he notes that the production of concrete, context-bound research forms a fundamental part of the knowledge development process as identified by

mainstream learning theorists such as Bloom, Piaget and Vygotsky. The focus on the concrete is therefore a necessary step prior to engaging in abstract theoretical claims. Secondly, he notes that human-based investigation is personal, it is context-dependent and human experiences of phenomenon cannot be extricated from the environment from which they are located.

b. *One cannot generalise on the basis of an individual case; therefore, the case study cannot contribute to scientific development;*

In order to challenge the second commonheld misunderstanding, Flyvberg (2011), utilises an argument put forward by Anthony Giddens regarding the generalisability of data yielded from the case study method. Giddens (1984) as cited in Flyvberg (2011) notes that although specific cases researched with a limited scope in mind cannot be generalised with certainty, they can if utilised as a pilot study be operationalised in such a way that they can yield data that can be generalised. Therefore, case studies while not generalisable in themselves can lead to a significant contribution to scientific development by providing a concrete precedent for large scale research and as such the impact of case studies is severely underestimated.

c. *The case study is most useful for generating hypotheses; that is in the first stage of a total research process, while other methods are more suitable for hypotheses testing and theory building;*

Flyvberg (2011) argues against the supposition that asserts that while case studies have been identified as producing knowledge upon which to base theoretical assertions, they are not useful in the latter stages of theory building. Instead Flyvberg (2011) posits that it is not in the area generalisability that case studies provide a valuable input in the development of theory but in the form of the critical or dissenting case where theory can be challenged and developed more completely due to the richness of available data.

d. *The case study contains a bias towards verification, that is, a tendency to confirm the researcher's preconceived notions;*

Flyvberg (2011) draws on Bacon's argument to challenge this misunderstanding as only pertaining to case studies. Bacon (1853) as cited in Flyvberg (2011) asserts that all human understanding hinges on the support of commonly held notions. Therefore in the quest for knowledge, it is not the refuting of commonly held notions but the verification thereof that drives knowledge production. Flyvberg (2011) argues instead that due to the richness of available data, the chances of falsification in a case study are greater than with alternative methods of inquiry.

e. *It is often difficult to summarise and develop general propositions and theories on the basis of specific case studies.*

Flyvberg (2011) identifies that the issue raised with regards to the challenge of summarising effectively is due to the nature of the narrative rich data collected using the case study method. As case studies focus on real life contexts, including the complex nature of diverse and individual experience of participants it is not necessarily wise to reduce the study to the lowest common denominator as the value of the study may be lost.

The case study method has been deemed an appropriate choice for this study as the focus is on multiple cases within a specific case context; that of second year mathematics courses run for pre-service teachers at one university in South Africa. This method affords the researcher the opportunity to collect rich data with regards to the human experience of a technological advancement in Higher Education within the bounds of this study, providing a concrete knowledge base for the expanded implementation of Blackboard.

3.4 Sampling

According to Babbie and Mouton (2001), sampling involves the process of selecting subjects for the purposes of a study. There are two types of main sampling methods which are utilised by researchers each with a selection of sampling strategies available depending on the chosen paradigm and research design, these being probability and non-probability sampling. Babbie and Mouton (2001) note that non-probability sampling is appropriate for social science research where specific cases require selection in order to facilitate the success of the study.

3.4.1 Sampling Strategy

As this study is qualitative in nature and is bounded by an interpretive paradigm and the aim was not generalisation but to ascertain the impact of the use of Blackboard as a tool of assessment for large classes through the experiences of both students and lecturers, non probability sampling was deemed appropriate for the selection of cases. According to Merriam (2002:179), the selection of cases for case study method of inquiry is done purposefully as opposed to randomly as the cases selected exhibit particular characteristics identified for study by the researcher. Thus, since the nature of this study requires a sample from a specific group, exhibiting specific characteristics, purposive sampling, a form of non-probability sampling was been employed as a sampling strategy. Gray (2004) identifies the strength of purposive sampling in that it lends itself to clarity of focus and depth of engagement with regards to data collection and analysis.

3.4.2 Sample Characteristics

Multiple cases were selected for the purposes of this study. According to Babbie and Mouton (2001), the selection of multiple cases as opposed to an individual case strengthens the study and provides a more complete data. Multiple case studies also afford the researcher the opportunity to draw comparisons between the cases (Yin, 2003). However, it is important to note that if cases in a multiple case

study are divergent in finding possibly weaken the findings of the study. Yin (2003) identified three types of case design focusing on the purpose of enquiry namely exploratory; explanatory and descriptive in addition to these classifications, alternatively, Stake (1995) identified three types of case study design based on the nature of the inquiry namely intrinsic; instrumental and collective. Following this argument, the cases that have been selected for the purposes of this study fall into multiple categories; they can be classified as both explanatory and descriptive as categorised by Yin (2003) and are intrinsic, instrumental and collective in nature as categorised by Stake (1995).

The cases selected for this study comprised of two second year Mathematics lecturers; one intermediate phase mathematics lecturer and one foundation phase mathematics lecturer and the students enrolled for their respective courses. As such a total of two lecturers and 60 students participated in this study. The selection of the lecturers and their courses was based on both their willingness to participate in the study and pilot the Blackboard system for the purposes of assessment as well as their scale of their 2012 enrolments. As identified by Buchanan & Rogers (1990, as cited in Botha, Fourie and Geyser, 2005) the number at which enrolments render traditional teaching methods obsolete and require innovation particularly in the area of assessment is eighty students per class. It can be confirmed that each of the two lecturers selected for the purposes of this study experienced enrolments of eighty and above for the courses in question.

The two lecturers selected for this case study were heterogeneous in terms of teaching background, ethnicity, age and gender and technological expertise and experience. Similarly, the students population enrolled for each of the selected courses were heterogeneous in terms of socio-economic background, ethnicity, age, gender and technological expertise and experience.

Identified Cases				
Case	**Gender**	**Ethnicity**	**Course**	**Enrolments for selected courses**
Lecturer A	Female	Indian	Foundation Phase Mathematics	87
Lecturer B	Male	White	Intermediate Phase Mathematics	80

Table 9: Identified Cases

3.5 Accessing the Participants

The data for this study was collected from a real life teaching context within one university in South Africa. The participants were located in the Faculty of Education and were identified through the rollout and implementation of the Blackboard LMS through already existing channels within the university structures. The researcher was positioned as a Technology Enhanced Learning (TeL) consultant and formed part of the consultation process in inviting the Faculty to pilot the Blackboard LMS as a possible solution to the identified challenge of managing large classes. Initial consultations took place with the Head of School (HOS) who approved the implementation for those lecturers who wished to take up the offer of utilising the Blackboard LMS. Shenton and Haytor (2004) identify this initial gain of access as an act of reciprocity, whereby the implementation of the LMS and the subsequent research related to piloting Blackboard in the faculty would be shared with the faculty in an effort to inform future teaching and assessment practice. Identification of possible cases for the study hinged on the willingness of the Education lecturers to take up the offer of implementing the LMS as a teaching and assessment tool for their courses. Once the interested parties had committed to utilising Blackboard for their courses they were approached by the researcher. Lecturer participation in the study was endorsed by the HOS. For the sake of anonymity, the lecturers are referred to as Case A and Case B and the university in question shall remain anonymous.

3.6 Implementing the Blackboard Learning Management System

The implementation of the Blackboard LMS required training for both the lecturers and the students involved. This training was delivered by the TeL consultants including the researcher at the beginning of the academic year. Training was conducted for all pre-service student teachers regardless of whether their lecturers had opted to make use of Blackboard as a teaching and learning tool. Student Training took the form of PowerPoint presentations using real time screen shots in order to facilitate a basic understanding of the LMS. The aim of the training was to provide the students with sufficient information so as to enable them to log onto Blackboard and begin basic navigation of the system with a proviso that they could contact the Blackboard helpdesk should they get stuck, forget their usernames or passwords or require any additional assistance. Ideally Blackboard training should be hands on so that the students get a real feel for the system during training; however student numbers and limited resources to a large extent restricted the delivery method of the student training. Students it seemed requested blackboard assistance en masse prior to a Blackboard based event. Such an event may be an assignment, test, tutorial, required participation in a discussion topic or accessing requisite Blackboard-based resources.

Staff training took place on a much smaller scale and therefore afforded the lecturers the opportunity to engage more deeply with the basics of the LMS. Although initial training also utilised PowerPoint presentations in order to facilitate a basic understanding of how to log onto Blackboard and begin initial navigation of available teaching and learning tools, the smaller numbers afforded the lecturers the opportunity to log onto the system during the training and begin to engage with some of the tools. Lecturers, like the students, were provided with contact details for the TeL consultants, affording them the opportunity to book consultations or have telephonic or online queries regarding the use of specific Blackboard tools addressed as they arose. It is important to note that although some lecturers enjoy engaging with the possibilities of implementing a new tool for teaching and learning purposes at their leisure, others required a more direct line of support in the form of weekly or fortnightly consultations. To this end, Case A engaged with Blackboard

mostly independently while Case B requested set consultations initially on a weekly basis, moving to a fortnightly basis and finally to a needs basis. Neither Case A nor B had prior experience with Blackboard. Case B, however had engaged with another LMS in the form of Moodle through an externally funded project.

3.7 Data Collection

Willis (2007) acknowledges the skeptical lens through which qualitative studies are viewed by the post-positivist research community and as such recommends a process of eliciting data from multiple sources (triangulation) in order to build a solid argument for the conclusions drawn from the collected data. Willis (2007) notes that in order to devise solid case study design requires the eliciting of data from multiple sources is paramount. To this end, the data for this study was collected by making use of both anonymous surveys (students) as well as semi-structured interviews (lecturers). In addition to the data collected from the two cases, the researcher also engaged in a self-interview as outlined by Reason (2001) in an effort to ensure that researcher subjectivity was accounted for during the research process, particularly as the researcher was inextricably invested in the implementation of the Blackboard LMS and the subsequent successful adoption of the LMS from a professional perspective. Finally the researcher engaged in the Blackboard implementation process as a participant observer, utilising a journal method to record field notes.

3.7.1 Personal Interviews

Personal interviews were conducted with the participating lectures as one of the data collection methods for this study. According to Arksey and Knight (1999) the utilisation of personal interviews as a data collection method is a particularly popular approach in the eliciting information from participants during data collection process. They caution that the use of the interview as a data collection tool, if not meticulously planned and systematically carried out, may yield information that does not pertain to the research questions. The design of the interview schedule was semi-structured with a selection of open-ended questions devised to elicit rich

and specific data through dialogue with the lecturers. Seidman (1998) identifies the importance of utilising open-ended questions in order to afford the researcher the opportunity to tap into data which may be relevant in the answering of the research questions but which may have been unknowingly excluded by the researcher. Seidman (1998) further notes the dangers of employing leading questions or closed questions as this may only serve as a verification tool as opposed to a quality data collection tool.

3.7.2 The interview process

Kvale (1996) identified that the quality of the interview(s) determines the quality of the data elicited from the interview(s) during the data analysis stage of the project. He went on to identify the following six guidelines or criteria to be kept in mind by interviewers as a quality control mechanism:

- A quality interview should according to Kvale (1996) elicit spontaneous, rich and focused answers from the interviewee;
- It should be characterised by short questions on the part of the interviewer accompanied by long answers by the interviewee;
- It should involve a dialogue during which the interviewer follows-up on unanswered questions and seeks clarification were necessary;
- Quality interviews should involve an initial interpretation during the course of the interview;
- Which should be verified by the interviewee;
- Finally, wherever possible the interview should be largely 'self-communicating' so that additional clarification is not necessary on the part of the interviewer.

(Adapted from Kvale, 1996:145)

Prior to the interview taking place, the lecturers were provided with a covering letter providing them with an overview of the research and clearly detailing participation in the study (Appendix 1). They were afforded the opportunity to clarify any misconceptions or misunderstandings before, during or after the interviews had taken place. They were also informed of their option to withdraw from the study at

any time. The participants retained the covering letter for their own reference purposes. In addition they signed an informed consent form retained by the researcher (Appendix 2).

Interviews were conducting in the respective offices of the participating lecturers and Kvale's (1996) guidelines for conducting a quality interview were acknowledged during the interview process and adhered to on the part of the researcher. As the data analysis process required a detailed transcript of the interviews, the interviews were audio taped and were then transcribed verbatim including pauses and repetitions so as not to alter possible meanings (Kvale, 1996). The participants were therefore also required to sign a 'Permission and Release' form in order to consent to the use of the recordings of the interviews for the purposes of transcription and subsequent analysis by the researcher (Appendix 3).

The interview schedule was constructed with a view to elicit particular information regarding the use and the utility of Blackboard on the part of each lecturer, therefore a semi-structured interview schedule of fourteen main questions was devised for this purpose (Appendix 4). The lecturers were encouraged to speak freely and as such were afforded the opportunity to focus on any particular question or questions as their experiences formed a pivotal role in this study. During the data analysis process, however, the researcher identified additional questions which required input from the lecturers (Appendix 5). These questions focused on the teaching philosophy of each lecturer and the extent to which their teaching philosophies informed their practice and the extent to which they were able to utilise their beliefs with regards to teaching and learning in terms of their Blackboard instructional design. The lecturers forwarded their individual reflections with regards to teaching philosophy and instructional design to the researcher via email for incorporation in the collected data.

3.7.3 Qualitative Student Surveys

Babbie and Mouton (2001:232) identify that surveys are an appropriate method employed to collect exploratory, explanatory or descriptive types of data. Fink (2003) as cited in Jansen (2010) describes qualitative surveys as a data collection tool used to elicit information about a sample population with regards to their experiences and meaning making process related to a specific topic. The utilisation of an anonymous survey for the purposes of collecting data from the 2nd year pre-service teachers enrolled for the respective Foundation Phase and Intermediate Phase mathematics courses was an appropriate choice of tool. The survey was conducted online using the Blackboard LMS as a method of deployment. The covering letter outlining the study and informing the students of their role in the study was published on their course homepage for their perusal. In addition, the researcher read the covering letter out to the students during class time affording them the opportunity to ask questions pertaining to the research and their participation therein (Appendix 6). The survey questions aimed at exploring issues which may have had a direct impact on the students' experiences of the use of technology for teaching and learning purposes such as the students' level of technological expertise, students' access to Blackboard both on and off campus, student experiences of training, support and the use of Blackboard for assessment purposes (Appendix 7). The survey was made available to the students for a two week period and their participation was both anonymous and voluntary. As such 60 students chose to participate in the study.

3.7.4 Self-Interview and Researcher Reflexivity

Engaging in qualitative research raises the issue around researcher subjectivity and positioning within the study. Finlay (2002) notes that the researcher plays a pivotal role in all aspects of the research process from the conceptualisation of the study; data collection; analysis and discussion narratives. It would therefore be naive to assume that the positioning of the researcher with her local knowledge and individual context (from both a professional and personal perspective) does not

impact on the final product. On the contrary, the researcher's subjectivity determines the final outcome of the study.

As each participant brings with him or her particular kinds of expertise and expectations to the table during the interviews and surveys conducted, so too does the researcher. Finlay (2002) further notes that meaning is constructed between people and within particular social contexts, thus each interviewee tends to provide information consistent with the flow of the research project and often aims to fulfill tacit expectations during the interview process. These expectations are communicated by the researcher with or without her being conscious of them. Cooper and Burnett (2006) discuss the concept of "voice" in that the notion of providing the interviewed with a space to "voice" their opinions, meaning making processes and lived experiences within the bounds of a specific study is ironic as their "voices" may be muted due to the filter of interpretation that is imposed during the data analyses processes. Atkinson and Silverman (1997) as cited in Cooper and Burnett (2006) reject the belief that the voice of the interviewed are untainted by the researcher and instead advocate the notion of shared understanding and construction between the researcher and her participants. It is also naïve to assume that participation in a study will not alter perceptions of the participants. Jootun, McGhee & Marland (2009) identify that by acknowledging her own positioning, values and expectations in relation to the research, the researcher will increase levels of trustworthiness and credibility of the study.

Although researcher reflexivity forms an integral part of qualitative research, the researcher conducting this study was positioned in such way that her professional motivation for the positive adoption of the Blackboard LMS could easily impact on the findings of the study. The researcher was responsible for the implementation of the Blackboard system in the Faculty of Education at the university in question; therefore she may have afforded her participant lecturers more support and feedback during the consultation processes so as to improve the probability of a positive Blackboard experience. Therefore the researcher has opted to take a particularly critical stance in the research process and engaging in a process of

critical self-reflection. To this end, a self-interview was conducted by the researcher drawing on the work of Reason (2001) as a self-interview resource.

Reason (2001:6) identifies the following generic questions for the purposes of researcher self-reflection:

- Who am I?
- What is important to me?
- What is worthwhile engaging with?
- What frameworks of thinking/feeling do I bring to my life and work?
- What creative/distorting perspectives do I bring?
- Am I stuck in one frame or am I able to appreciate and delight in alternative frames?
- What is the quality of my behaviour?
- Do I have a range of behaviours appropriate to the situation?
- In particular, can I act in such a way as to increase the quality of the conversation?
- Am I flexible, diplomatic and outrageous, cunning and simple, wise and foolish?
- Is my behaviour congruent with my purposes?
- Am I awake to what is happening within me and in the world around me?
- How do I act now to increase the quality of dialogue and inquiry?

While this self-interview schedule is very generic, it provided a useful starting point for the researcher in an effective engagement of the self reflection process. The abovementioned questions were used as to inform the construction of a critical self-reflection interview specifically designed so as to address issues trustworthiness and credibility in this study pertaining to researcher bias (Appendix 8). The researcher focused in particular on the embedded nature of her position in this research, personal investment in the successful uptake of the Blackboard LMS as well as both extrinsic and intrinsic profession motivators.

3.7.5 Data Management

An analysis of the interviews required a transcript of the interview, therefore the interviews were audio taped and were then transcribed. Although the initial transcriptions were verbatim so as not to alter possible meanings as advocated by Kvale (1996), upon reflection, the transcripts were cleansed of glaring grammatical errors such as long pauses or instances where lecturers stumbled for words or repeated themselves. This grammatical cleansing of the transcripts was undertaken so as to facilitate the flow of the data and the researcher was meticulous in her editing so as not to change meanings through this process.

The transcribed interviews were then uploaded into Atlas.ti in order to facilitate the data analysis process Muhr (1994). As the student surveys were conducted online, the survey data was exported from Blackboard into an excel spreadsheet and then uploaded into Atlas.ti for further analysis. The value of utilising a data management programme such as Atlas.ti, in the analysis of the data, lies in the tools available to the researcher. According to Seale (2000) the progression in the development of Atlas.ti has led to a greater level of complexity in the programme, thus affording the researcher the opportunity to code the data while working laterally across a number of different documents. It therefore facilitates the identification of complex links between different data sources and records these codes in a systematic way (Silverman, 2001). Seale (2000) recognises the benefit of the analytic function of the programme, including the graphic representation of interrelated codes. Seale (2000) further observes that the utilisation of computer aided data analysis lends itself to a more rigorous level of analysis impacting positively on the trustworthiness of the data analysis.

3.8 Data Analysis

Babbie and Mouton (2001) assert that a seamless approach to the analysis of qualitative data is non-existent. The nature of qualitative data does not lend itself to

tightly packaged analysis as with quantitative data, but is rather subject to the construction and interpretation of meaning on the part of the researcher and between the researcher and the research participants. Jones, Tores & Arminio, (2006), however, note the importance of phenomenological reflection as it is through the ongoing process of writing and reflecting that social phenomena within particular contexts are made explicit. Silverman (2000) argues that data analysis begins prior to the point at which the researcher actively engages with the data at an analytic level. Data analysis can rather be described as an ongoing process informed by engaging with the study from start to finish. Coffey and Atkinson (1996) as cited in Silverman (2000) describe the data analysis process as the shift from the process of coding the data in the conceptualisation or construction of an interpretation.

Lichtman (2006) notes that the general guideline for the analysis of qualitative data lies in the identification of common themes or threads throughout the data collected as identified by the researcher. Lichtman (2006) further argues that the identification of common themes requires depth of engagement with the collected data on the part of the researcher. Lichtman (2006) also notes that the process of identifying themes or coding the data is a personal process for the researcher and the level at which she extracts codes may vary from a micro to macro level depending on the research context. Van Mannen (1997 as cited in Jones et al., 2006) argues that the description provided by the researcher must be precise in its nature so as not to detract from the individual experience(s) of the participants.

The data analysis process for this study can be divided into four phases. The initial phase of data analysis involved the identifying of possible codes or themes during the interview process. This allowed for the clarification of information provided on the part of the researcher during the interview as opposed to after the fact. The process of transcribing the interviews also formed part of the initial phase of data analysis as the researcher transcribed the interviews personally, thus engaging with the data at surface level.

The second phase of data analysis involved the organisation of the data in a logical manner and immersion of the researcher in the data by reading and re-reading the texts of all three data sources (interviews, surveys and self-reflection interview).

The third phase of data analysis involved the identification of categories and themes apparent in the data. The following main themes were identified in the lecturer interviews: (1) challenges of teaching larger classes, (2) challenges of assessing larger classes, (3) utility value of Blackboard as a teaching and assessment tool. Similarly, the following main themes were identified in the student surveys: (1) utility value of Blackboard as both a course tool and an assessment tool, (2) challenges of personal competency related to the initial implementation of Blackboard, (3) accessibility of resources on Blackboard, (4) challenges related to student access to physical resources such as computer labs.

The fourth phase of data analysis engaged in by the researcher involved the linking of the identified instances of coded themes across the data sources and selecting suitable examples from the data sources for use in the analysis. The focus of this stage was to provide a structured view of the data collected and to present it in a cogent format utilising Atlas.ti to produce visual representation in the form of diagrams clearly demonstrating the logic in the analysis process.

3.9 Addressing issues of trustworthiness

The issue of validity in qualitative studies is one that continuously requires attention. Shostak (2002) identifies tensions inherent in reporting of research as some researcher, particularly young researchers may be inclined to be selective in reporting their findings. As such, reported findings are required to stand up to rigorous scrutiny in an effort to validate the study in question. According to Silverman (2000) the process of validation for qualitative research is a tenuous one as there is no set standard for the evaluation of qualitative research as there are for quantitative studies. In contrast, the validation of qualitative studies is contextual in

nature the chosen research design and data collection strategies tends to determine the criteria required in order to legitimise the study (Denzin and Lincoln, 2011).

Lichtman (2006) discusses developments in the focus of validity for qualitative studies post-1990 by tracing a move away from traditional post-positivist notions of validity as criteria for judging qualitative studies towards an alternative framework in order to evaluate qualitative studies in a more meaningful way. As such, studies falling within a qualitative framework are now required to adequately address issues of trustworthiness by framing the study in terms of credibility, dependability, transferability and confirmability.

3.9.1 Credibility

According to Lichtman (2006), credibility refers to the extent to which the reported findings correctly reflect the lived experiences of the participants, the extent to which their responses are accurately reflected. However, as noted by Lichtman (2006), this simplified approach requires a critical eye as there are many stakeholders involved in any piece of research and credibility needs to be determined on multiple levels. To this end, Babbie and Mouton (2001:277) have identified what they have termed six 'procedures' which have effectively utilised for the realisation of credibility in this study:

- *Prolonged engagement* required the complete immersion of the researcher in the context until such time as saturation occurs. The researcher is positioned in such a way that ongoing engagement with the study was required;

- *Persistent observation* involved the continuous collection of data, alternative interpretations of the data and ongoing search for multiple influences for a

phenomenon which was achieved through the formal data collection processes along with detailed reflective field notes;

- *Triangulation* involved the collection of data from multiple and diverse sources including researcher reflexive accounts ;
- *Referential adequacy* reflected the chosen methods utilised to elicit data and the acknowledgement of the possible impact of the data collection strategy on the findings;

- *Peer debriefing* involved the discussion of the findings with a colleague of similar status to the researcher who was positioned outside of the study and was therefore able to offer critical reflection untainted by researcher subjectivity;

- *Member checks* involved the inclusion of the participants in the data analysis process through ongoing discussion in an effort to verify interpretation of the data collected.

In addition, Denzin and Lincoln (2011:586-578) locate the following focus areas requiring careful and consistent consideration throughout the research process in the quest for credibility:

- The relationship between what is being researched and the context in which the data is collected;
- The relationship between the researcher, the participants and the setting;
- The role of the audience (Who is this being written for?);
- The issue of representation and authorial style (Are the participants being authentically portrayed and does the writing style of the researcher/author lend itself to scrutiny by the participants?)

The first two considerations outlined above are incorporated into the self-interview conducted by the researcher in order to address issues of researcher positioning within the study and researcher subjectivity. In addition, multiple sources of data have been utilised and a wide selection of literature was consulted in an effort to triangulate the findings of the study. Furthermore, Kvale's (1996) guidelines for conducting a quality interview informed the interview process allowing for clarification of responses on the part of the interviewees. The consideration of audience is one that proves difficult to account for as this is an academic piece of work which will be made public, a variety of readers may engage with the text. However, the researcher is working on the assumption that since this is an academic piece of work for the purposes of a qualification, the audience will be academic in nature at both higher and lower levels (supervisor, examiners, colleagues and students). So too in consideration of representation and authorial style this work is academic in nature and as such adheres to academic and ethical guidelines.

3.9.2 Transferability

Babbie and Mouton (2001:277) define transferability as "the extent to which the findings can be applied to another context or with other respondents". Lichtman (2006) refers to transferability as conceptually related to generalisability. Although, case studies are not by nature conceptualised for the purpose of generalisability, Flyvberg (2011) argues that the specific nature of a case study provides rich data in a specific context that if operationalised correctly can be utilised as a pilot study for a larger population. Guba and Lincoln (1984) as cited in Babbie and Mouton (2001:277) identify two strategies which can be utilised for increased transferability in qualitative studies:

- *Thick descriptions* outlining the specific context of the study using multiple data sources detailing the study and findings provides the reader with the opportunity to take an emic perspective and subsequently immerse themselves in the study. This immersion in the research context through descriptive text affords the reader with the opportunity to make informed decisions with regards to the level of transferability of the findings;

- *Purposive sampling* provides the researcher with a strategy to select participants particularly suited to the study and therefore positioned in such a way so as to provide data directly relevant to the research questions. The specific nature of the data therefore translates into a more transferable study.

3.9.3 Dependability

Babbie and Mouton (2001) describe dependability as the provision of evidential support that the repetition of the study would yield similar results. However, the context of a study conducted in a natural setting can never be guaranteed, this will need to be taken into account. Lichtman (2006) refers to this changing nature of the research context and describes dependability as relative the researcher's ability to accurately account for changes and reflect such changes into the analysis of the study. Lincoln and Guba (1984) as cited in Babbie and Mouton (2001) posit the use of an inquiry audit whereby the researcher accounts for and provides evidence for all research strategies utilised, documented data collection methods and reflects changes impacting on the study in order to ensure the dependability of the study. In effect transparency leads to a more dependable study.

3.9.4 Confirmability

Lichtman (2006) describes confirmability as the extent to which the findings can be confirmed. Babbie and Mouton (2001) discuss confirmability in relation to dependability and detail a similar approach in ensuring the confirmability of the study. The researcher aimed to address issues of confirmability in this study by making available the following six classes of data for a confirmability audit:

- *Raw data* in the form of voice recordings, field notes and survey results;
- *Data reduction and analysis products* as produced by the researcher during the data analysis process, this included data coding and analysis utilising Atlas.ti;

- *Data reconstruction and synthesis products* developed from the initial data reduction and analysis including findings, conclusions and final write-up;
- *Process notes* highlighting changes which may impact on trustworthiness including methodological notes;
- *Material relating to intentions and dispositions* taking the form of research proposals and applications for ethical clearance
- *Instrument development information* including any draft schedules or surveys.

3.10 Ethical Considerations

Ethical considerations should according to Babbie and Mouton (2001) frame every study. According to Robson (2002), practicalities of carrying out real world research without the consent of the participants and the provision of information regarding the nature of the research is a major cause for concern. Robson (2002:69) outlines ten questionable practices in social research which have been adapted by the researcher as ethical guidelines:

It is unethical to:

- Involve people in research without their knowledge or consent;
- Coerce people to participate in research;
- Withhold information from participants about the true nature of the research;
- Otherwise deceive the participant;
- Induce participants to commit acts which may lead to diminished self-esteem;
- Violate rights of self-determination;
- Expose participants to physical or mental stress;
- Invade the privacy of the participants;
- Withhold benefits of participating in the research from some of the participants;
- Treat participants unfairly or without consideration or without respect.

These principles were utilised by the researcher as a guideline for the development of ethical protocol (Appendix 11), thus ensuring the safety and anonymity of her participants at all times and at all levels as such the following documents were developed in line with ethical considerations for this study specifically pertaining to the protection of the participants in terms of anonymity and informed consent:

- Covering letter to participating lecturers stating the nature of the study as well as their assured anonymity (Appendix 1).
- Informed consent form for participating lecturers (Appendix 2).
- Permission and release form to tape interviews (Appendix 3).
- Covering letter to participating students stating the nature of the study and assured anonymity (Appendix 6).
- Informed consent form for participating students (Appendix 9)

3.10.1 Informed Consent and Confidentiality

Initial discussions, consultations and presentations with the Faculty regarding the implementation of the Blackboard LMS both as a HE initiative as well as a research opportunity provided lecturers the occasion to interrogate the system and volunteer themselves for the study. As such transparency played a pivotal in the introduction of the study to the lectures and the student participants. Prior to data collection in the form of interviews, lecturers were provided with a covering letter which detailed the study as well as expectations with regards to participation (Appendix 1). They were also informed of their option to withdraw from the study at any time. The participants retained the covering letter for their own reference purposes. In addition they signed an informed consent form retained by the researcher (Appendix 2).

Interviews were non-invasive and as such took place in the offices of the individual lecturers. Since the data analysis process envisaged by the researcher required a detailed transcript of the interviews, the interviews were audio taped. The participant lecturers were therefore also presented with ‘Permission and Release’

form prior to the start of the interview. This form was required for their consent with regards to the use of the recordings of the interviews for the purposes of transcription and analysis by the researcher (Appendix 3). In keeping with the ethical principles, the data elicited from the lecturers was not coerced in any way and the lecturers spoke freely during the course of the interviews, focusing on issues relevant to their context.

Similarly, the student participants were afforded the same level of information as the lecturers with regards to the study. The students were provided with a covering letter outlining the study and informing the students of their role in the study. This covering letter was different from the one provided for the lecturers as the student participation in the study had different parameters. The survey was conducted online using the Blackboard LMS as a method of deployment. The covering letter was published on the student participant's course homepage and was signed by the researcher. In order to provide the students with the opportunity to clarify any issues pertaining to the research, the researcher read the covering letter out to the students during class time (Appendix 6). The student survey available to the students for a two week period and was set up in such a way that the anonymity of the students was adhered to. All participants in this study have been assured complete anonymity and as such no personally identifiable information has been made available in any way.

3.10.2 Position of the researcher in this study:

As indicated in throughout this study, there exist a number of tensions inherent in this research pertaining not only to kinds of roles the researcher found herself taking up, but the embedded nature of these roles within the context of this study. The researcher therefore notes the possible and probable impact of her own subjectivity on the analysis of the data as an important ethical consideration which has been carefully managed in order to ensure the integrity of the data collection and analysis (Holliday, 2002). This self-reflection interview in terms of researcher

subjectivity is of particular importance to this study as the researcher's vested interest in the successful implementation and subsequent uptake of Blackboard as a Learning Management System may skew her view of the findings, causing her to be inclined to paint a more optimistic picture of the implementation process than may be experienced by the participants. Conversely, the tendency to overcompensate and thus be overly critical of the findings in an effort to divorce herself from impacting on the findings may also be to the detriment of the study. Thus, researcher reflexivity formed a constant theme throughout the research but specifically during the data collection and analysis processes.

3.10.3 Researcher Self-Reflection

In an effort to effectively triangulate the data and increase the level of trustworthiness of this study, the researcher has engaged in an extensive self-reflection process informed by Reason (2001). To this end, the researcher has identified the multiple roles that she has taken up during the research process and reflected on each individually:

- Researcher as Consultant
- Researcher as Project Manager
- Researcher as Blackboard support
- Researcher as Assessment Support
- Researcher as Researcher

3.10.3.1 Researcher as Consultant

The first role that requires some reflection is that of the researcher as a professional consultant within the HET context. The role of the consultant in this instance was to introduce the concept of Technology Enhanced Learning to the Faculty of Education. This concept is not Blackboard itself, but rather a concept which addresses issues of accessibility, efficiency, the nature of learning and instructional

design, contextualising these aspects of teaching and learning in the current context of an ever changing knowledge economy. As such, the introduction of Blackboard as an LMS, was merely one alternative in the pursuit of the enhancement of learning through the medium of technology. However, the reality of the situation is that in the context of this study, Blackboard has been identified as the LMS which institutional management has chosen to invest in and consequently is something that required the attention of the Faculty. The role of the consultant in this process was therefore also to provide training and support for the lecturers who chose to make use of the LMS as part of their instructional design for the current academic year.

3.10.3.2 Researcher as Project Manager

In addition to the consulting role, the researcher took the role of project manager in the implementation of Blackboard for the lecturers who chose to take up the opportunity to make use of the LMS. All lecturers were afforded the opportunity attend an orientation workshop in order to get a feel for the Blackboard tools. By way of introduction, the researcher utilised PowerPoint presentations in order to provide the lecturers with a very basic overview of Blackboard. In addition to this, the training took place in a computer laboratory which afforded the lecturers the opportunity to login to the system and experience the available tools first hand. This workshop was viewed by the researcher as a 'gateway' as opposed to a comprehensive training programme. The aim was for interested lecturers to initiate consultations with the researcher in the ongoing development in the utilisation of these tools. It was decided by the Head of School (HOS) that regardless of the uptake of this opportunity, ALL pre-service teachers would attend Blackboard training so as to facilitate any additional implementations that would take place throughout the year. As such, Blackboard training was scheduled to take place during the Faculty orientation programme. As has already been reflected in this chapter (4.4.3 Implementation of Blackboard), the training of the pre-service students was less than optimal due to the lack of available computer laboratories and therefore had to take place in the unidimensional form of PowerPoint

presentations with no-hands on component. The researcher is critical of the use of PowerPoint as the sole method of training the students as this did not afford the students the opportunity to engage with the system immediately.

3.10.3.3 Researcher as Blackboard Support

A third role that the researcher took up in the context of the implementation of Blackboard in the Faculty of Education and subsequently in the context of this study was that of Blackboard support for both students and staff. This included the timeous resolution of student queries sent via the Blackboard helpdesk, walk-in consultations with students, telephonic consultations with staff, online assistance for staff and one-on-one consultations with staff both scheduled and incidental in nature. As it would have been easy for the researcher to only pay special attention to the staff and students participating in this study, she reflected on this point and consequently went to great lengths in order to ensure staff and students regardless of their involvement with the study, obtained quality support.

3.10.3.4 Researcher as Assessment Support

The role of assessment support is one that could be considered part of the preceding role of Blackboard support; however, as this study focuses on the implementation of Blackboard for the teaching and assessment of large classes, the researcher felt that it was important to reflect on the issue of Assessment support separately. To this end, the researcher focused once again on a unified approach regardless of the involvement of the students or lecturers in this study. As such, the approach to support for assessment was identical to the approach employed for the general implementation of Blackboard. The researcher did not focus on the participating lecturers or students but afforded them the opportunity to raise issues and request consultations on an individual basis as their needs dictated. Upon reflection, it must be noted that Lecturer B requested a greater number of scheduled consultations than Lecturer A, who preferred a needs-based approach. This too was consistent with the general implementation throughout the Faculty.

3.10.3.5 Researcher as Researcher

The final role that was identified by the researcher during the self-reflection process was that of the researcher. While the researcher did play the role of participant observer in this case study, she noted that this afforded her the unique opportunity to engage with the case studies in a way which would not have been possible should this study have been conducted by an outsider. The insider perspective (emic perspective), although subjective in nature has afforded the researcher the opportunity to provide a rich description of the data particular to this context.

3.10.3.4 Lecturer reflections and field notes

In an effort to triangulate the data collected and presented in Extracts 1 -91, the researcher engaged the participant lecturers in a reflective exercise in conjunction with field observations in order to ascertain a more holistic view of the implementation. Through this process, it was identified that this implementation although viewed with a measure of success was not without weaknesses, consequently, a SWOT analysis was employed in order to reflect on Strengths; Weaknesses; Opportunities and Threats which continue to inform the ongoing evaluation and implementation of such a programme:

- Strengths identified as a result of this implementation included the utilisation of Blackboard for assessment purposes affording the lecturers the opportunity to test a wider range of skills and competencies; reducing workload in terms of marking; increased objectivity in terms of marking; student access to the memo post-assessment which can be utilised for revision purposes; multiple modes of teaching through the available tools in Blackboard; and twenty-four hour access to the system for both staff and students.

- Weaknesses in the system included the competency levels of lecturers in developing middle and higher order type questions in a limited format of Multiple Choice Questions (MCQ's) and True/False type questions; the accuracy of marking is dependent on the input of the lecturers and as such is continues to fall prey to human error; limited physical resources in terms of laboratory space and number of laptops impact on the number of sittings required for ever-increasing enrolments; student engagement with the system appears limited and somewhat superficial; limited laboratory space impacts on conditions of assessment requiring additional staff resources to monitor the assessment process effectively and the absence of a lockdown browser for increased security during assessments.

- Opportunities for the future use of this LMS are varied and possibly currently unimagined including the use of identified strengths, weaknesses and threats to inform future practice; the improved utilisation of the Blackboard LMS to engage students in a meaningful (strategic) way as opposed to simply transferring traditional methods to an online format (dumping); and the use of lecturers as a resource in the further implementation of the system throughout the Faculty and institution.

- Threats related to this implementation include the use of Blackboard in a superficial way rather than an opportunity to integrate the LMS into current practice; use of the limited question format approach for assessments on Blackboard in an uninformed way, thus impacting on the validity and reliability of the assessments; students becoming creative in cheating the system during assessments; and the use of Blackboard being viewed as an addition to lecturer workloads rather than an enhancement of current teaching and learning practice.

The lecturer and researcher reflections in this section identify important points to be noted in the overall analysis of this case study and implementation in order to provide as complete a description as possible of this case.

3.11 Summary

This chapter provided an outline of the research methodology employed for the purposes of this study. The study was qualitative in nature and conducted within the bounds of an interpretive paradigm. The case study method of inquiry was selected as the research design and a multiple-case design was employed. The cases selected for this study were identified as two second-year Mathematics lecturers; one intermediate phase mathematics lecturer and one foundation phase mathematics lecturer and the students enrolled for their respective courses at one university in South Africa. These cases were purposefully selected by the researcher.

In this chapter, the researcher described the case study method as well as data collection methods which took the form of personal interviews; qualitative student survey; self-reflective interview and field notes. In the self-reflection interview, the researcher clearly outlined the various roles that she took up within the bounds of the project and reflected extensively on the identified roles. The data collection process as well as the transcription of the interviews was clearly outlined and the data analysis procedures were described including the use of computer assisted data analysis by utilising the Atlas.ti programme. The data yielded from the analysis was analysed according to emergent themes and codes.

In addition, the measures of trustworthiness that were applicable to the study were detailed in particular the concepts of credibility, transferability, dependability and confirmability.

Finally, the researcher reflected on the importance of addressing ethical issues related to the study. This included the identification of accepted ethical principles and the active use of carefully constructed informed consent and permission and release forms and detailed covering letters. The following chapter will present the data and analysis of the study.

Chapter 4

PRESENTATION ANALYSIS AND INTERPRETATION

4.1 Introduction

The previous chapter discussed the research methodology employed for the purposes of this study including the selected research paradigm, research design, sampling, data collection strategies, researcher reflexivity and ethical considerations and included the rationale for each choice. The purpose of this study was to ascertain the extent to which lecturers teaching Mathematics to second year pre-service teachers engaged with and subsequently utilised the Blackboard LMS as a tool for formative and summative assessment in the context of large classes. The focus of the study was primarily on the experiences of both the staff and students in terms of enabling and constraining factors. The results of this study aim to inform the further implementation and use of Blackboard as a tool for teaching and learning in these and other courses. In this chapter, the researcher delineates the study in relation to the research questions and presents the findings of the study including selected excerpts from the collected data.

4.2 Research Questions

This study took the form of a case study and interrogated the use of the Blackboard Learning Management System as a tool of assessment in mathematics phase studies of second year level Bachelor of Education students in one university in South Africa. The study was framed by a main research question and four sub-questions. The main research question hinges on the utilisation of the Blackboard LMS on the part of lecturers as a tool of assessment for large classes and the sub-questions support the main question by identifying the enabling and constraining factors experienced by both the lecturers and the students as well as the benefits of

using Blackboard for large classes and further implications for the use of Blackboard on teaching and learning in the HET context. The questions are outlined below:

Main Research Question: How do lecturers use blackboard as a tool for the teaching and assessment of large classes?

Sub-Questions:

- What challenges do lecturers face in the teaching of large classes
- What challenges do lecturers face in the assessment of large classes?
- What are the benefits and challenges of using Blackboard for large classes?
- What implications does the use of Blackboard have for teaching and learning?

4.3 Composition of the sample

The sample for this study comprised of two mathematics lectures teaching within the framework of phase studies for second year level of the Bachelor of Education qualification offered at the selected university. The lecturers taught second year Foundation and Intermediate Phase studies respectively and the students enrolled for their respective courses formed the second part of each case study. Since second year Bachelor of Education students are required to enroll for either Foundation or Intermediate Phase Studies in Mathematics, the entire second year cohort for this qualification was eligible to participate in this study. As such 60 students chose to respond to the survey. In order to comply with ethical requirements, both of the lecturers will remain anonymous and as such pseudonyms were utilised in the transcribing of the interviews. In addition, care has been taken not to release any information regarding the interviewees in any personally identifiable form. In addition, the survey was created in such a way so as to protect the student respondents and consequently protect their anonymity.

4.4 Demographic characteristics of the cases

As discussed in the methodology chapter, this study employed a multiple-case study design. Each case comprised one lecturer and the students enrolled for the selected courses.

Summarised Descriptions of Selected Case Studies				
Case	**Gender**	**Course**	**Total Enrolments on Blackboard**	**Total Survey Respondents**
Case A	Female	Foundation Phase Mathematics	87	29
Case B	Male	Intermediate Phase Mathematics	80	31

Table 10: Summarised Descriptions of Selected Case Studies

4.4.1 Case A

Lecturer A is a female lecturer whose initial qualification was a Foundation Phase teacher. She reported in the interview that she had over twenty-five years teaching experience which was mainly in the Foundation Phase but also noted that she had taught Intermediate Phase when she was required to “fill in” in the absence of colleagues. She obtained her Honours degree in Education while teaching and was then offered employment at the university while studying for a Masters degree in Education. She currently lectures Foundation Phase Studies for the Bachelor of Education Degree at levels one, two and three. While her main focus is Foundation Phase Mathematics, she also lectures Life Skills and Language which fall under the umbrella of Phase Studies along with the mathematics component. Lecturer A had 87 students enrolled for her Foundation Phase Mathematics course on Blackboard.

Lecturer A identified her teaching approach as mainly constructivist in nature, specifically in the area of mathematics as this requires a concrete foundation in order to facilitate the learning of new concepts and a scaffolded approach in order to build on a conceptual foundation. Upon reflection, Lecturer A noted that she drew heavily on the works of Lev Vygotsky, Jerome Bruner and Howard Gardiner in her approach to teaching.

4.4.2 Case B

Lecturer B has been teaching since 1985 and as such has twenty-seven years teaching experience. He reported that his first teaching portfolio was at a post-matric level and reflected on the fact that he considered his lecturing journey to be atypical in that his initial focus was at post-matric level with a subsequent focus on teaching pre-and in-service teachers at various levels, leading to his present portfolio of lecturing future Intermediate Phase teachers. Lecturer B also reported that he had over the past three decades taught approximately 50 - 60 different subjects none of which were related to his initial teaching portfolio, however, he further noted that he had always taught mathematics and continues to do so. Lecturer B is qualified at masters level completed his Masters Degree in Education during his tenure as a lecturer. Lecturer B had 80 students enrolled for his Intermediate Phase Mathematics course on Blackboard. Lecturer B also identified that he has a personal interest in the use of technology as both in terms of teaching innovation as well as role modeling appropriate use of technology for future teachers and as such has personally invested in a variety of technology based teaching tools. He also noted that he has been involved in a project focusing on the use of an open-source LMS (Moodle) as a distance learning tool.

Lecturer B noted that his teaching approach has been largely informed by constructivist principles based on the works of a number of different theorists including Ausabel, Piaget, Vygotsky, Bruner, Gardner and most recently on the works of Varela. Upon reflection he identified that although some aspects of the abovementioned theorists present tensions in one form or another, his aim is not to

use a particular theorist wholesale in his teaching practice but aims to utilise elements of the various theories in such a way so as to develop a model of best practice in the current context.

4.4.3 Student Participants

The student participants selected for the purposes of this study were attached to the mathematics courses lectured by Lecturers A and B. All students were enrolled for the Bachelor of Education qualification at second year level and as such registration for either Foundation Phase Mathematics or Intermediate Phase Mathematics was a requirement. Due to the fact that the student survey was anonymous in nature so as to elicit more authentic data, personal data was not collected by the researcher.

4.5 Presentation and analysis of data

The intention of this chapter is the presentation and analysis of the reported experiences of both the staff and students related to the specific implementation of Blackboard for second year level phase studies in the area of mathematics as a teaching and assessment tool. The following section identifies six emergent themes as they were coded in Atlas.ti. These themes can be broadly categorised in logical manner so as to answer the research questions effectively: Challenges related to teaching of large classes, implementation of Blackboard, benefits of utilising Blackboard as a teaching and assessment tool and challenges of utilising Blackboard as a teaching and assessment tool. The seven themes that emerged were identified across data sets and as such converge and overlap in certain areas.

SUMMARY OF IDENTIFIED CATEGORIES, THEMES AND CODES	
Category	**Specific Theme(s) and related codes**
Challenges related to the Teaching and Assessment of Large Classes	• **Challenges related to the Teaching of Large Classes** ➢ Teaching strategies ➢ Loss of rapport with students • **Challenges related to the Assessment of Large Classes** ➢ Types of Assessment ➢ Workload
Complexity of Blackboard implementation	• **Implementation of Blackboard** ➢ Quality of Blackboard training and student support ➢ Staff orientation and support ➢ Experience of using Blackboard
Access to Blackboard	• **Access to Blackboard** ➢ Personal resources ➢ University resources ➢ Personal and University Resources
Benefits of Utilising Blackboard as a Teaching and Assessment tool.	• **Benefits of using Blackboard(Staff)** ➢ Teaching strategies ➢ Assessment ➢ Convenience of Blackboard • **Benefits of using Blackboard (Students)** ➢ Blackboard as a course resource ➢ Blackboard as an assessment strategy ➢ Convenience of Blackboard
Challenges of Utilising Blackboard as a Teaching and Assessment tool.	• **Challenges of using Blackboard (Staff)** ➢ Personal Challenges ➢ Blackboard Based Challenges ➢ Resource Based Challenges ➢ Student Based Challenges • **Challenges of using Blackboard (Students)** ➢ Personal Challenges ➢ Blackboard Based Challenges ➢ Resource Based Challenges ➢ Lecturer Based Challenges
Future use of Blackboard.	• **Suggested Future use of Blackboard** ➢ Unified adoption of throughout programmes ➢ Additional training for Smartphone access ➢ Varied use of technologies ➢ Integration module

Table 11: Summary of identified categories, themes and codes.

4.5.1 Challenges related to the Teaching and Assessment of Large Classes

The focus of this study is the use of Blackboard in the teaching and assessment of large classes. As such, the first code presented in this chapter is the contextualisation of the concept 'large' as experienced by participant lecturers. This code, highlights the shift from small class teaching to the teaching of larger classes as necessitated by increased enrolments which have not necessarily been accompanied by increases in resources in terms of staff complement, staff development or physical resources as required for the effective teaching and assessment of larger classes. According to Buchanan and Rogers (1990), the definition of a large class hinges on a number of issues related to the resources available in order to facilitate large class instruction, they do however identify that approximately 80 students enrolled for a course is the point at which teaching methods employed for lower numbers of students become obsolete as the increase in numbers needs to be accompanied by alternative teaching methods. Consistent with this, the identification of large classes as conceptualised by Lecturers A and B according to their specific context and their notions of large is relative to their previous teaching experiences. The extracts below illustrate the increases in student numbers as experienced by these lecturers over the past five to ten years.

Lecturer A:

> *…13 in a class I still remember my very first year that I taught 13, 15 if you had a class of 15 , uh foundation phase, students, then it was a big class, then it went on to bigger numbers, we went on to about 40 foundation phase students and now we're talking in about excess of 90…*

Lecturer B

> *…in our university I would imagine that a typical class would've been somewhere between 30 and 40 students, sometimes quite a bit smaller, in fact there was one year when we had 12 students as a total intake. I can't remember if I taught them maths, but with that as a total intake you can imagine they were a small group. again 30 to 40 maybe 50 would have been a typical scenario 8 or 10 years ago….many of the classes are running at 50 to 70 and 80 and my biggest single class in this subject mathematics is currently 180…*

The above extracts illustrate the scale of the changes in terms of increasing student numbers as experienced by the participating lecturers from the smallest identified class of approximately 12 to 15 students to the currently identified largest mathematics class of 180 students. The extracts above serve to demonstrate the increases in enrolments as they have been experienced by these particular lecturers over a period of time and as such forms the backdrop against which the challenges experienced by these lecturers in both the areas of teaching and assessment of these classes can be located. Although challenges related to teaching and learning in large classes and those related to assessment of large classes will be dealt with separately, teaching and learning is inextricably linked with assessment and therefore, some overlap will be expected.

4.5.1.1 Challenges experienced in the Teaching of Large Classes

Lecturers identified the following challenges in the teaching of large classes as represented in Figure 6 below.

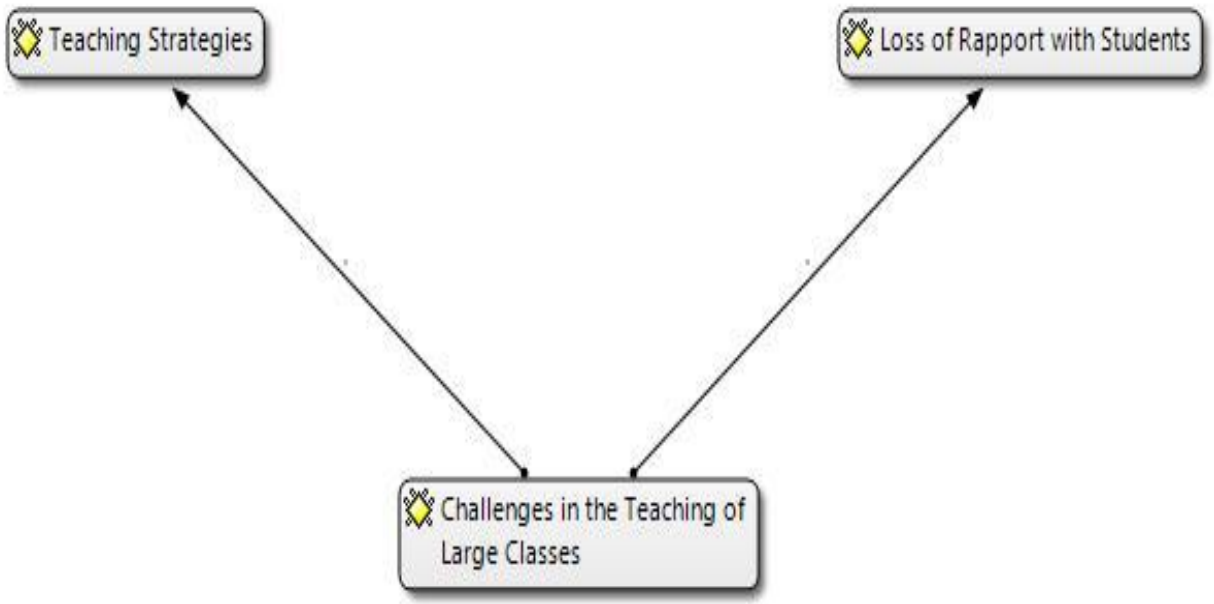

Figure 6. Challenges in the Teaching of Large Classes

Increases in student numbers all other factors remaining constant ultimately translates into a very different teaching context and therefore alternate methods of teaching are required in comparison to previously employed teaching strategies.

Teaching Strategies:

Lecturers in this study identified specific challenges experienced by themselves in the teaching of large classes. The identified challenges are illustrated in the extract below.

Lecturer B

> *…the biggest single challenge is let me just think this through , you lose the capacity to unpack and develop deep concepts and skills, and you lose the capacity to provide scaffolding and support to individuals; thus you may end up perpetuating the very thing you wish to alleviate, math anxiety, with all the baggage that that entails, you become more of a lecturer than a teacher, you become more of a demonstrator than a facilitator who enables students to participate. I like activities-based teaching and learning, and I like student-participation and I continue to encourage it but now it happens less on a very limited level, again because of the limited contact time and the pressure of large class sizes …the efficacy of my classroom-based presentations is questionable…*

The above extract identifies a number of challenges related to the teaching of large classes as experienced by the participant lecturers illustrating the negative impact of increased student numbers in terms of depth of concept coverage. The increased student numbers have, according to the empirical data collected, limited the ability of the lecturers to engage students in their own learning through a participative classroom environment and thus have reverted to a more traditional method of lecturing whereby the mode of course delivery tends to be dominated by a lecturer than student centered approach diverging from the ideal constructivist paradigm as identified by both lecturers. Botha et al. (2005) validate this trend whereby lecturers revert to an instructivist paradigm as one regularly employed as a means to manage the challenges associated with high student enrolments.

Loss of rapport with students

Maharasoa (2003) argues that one aspect of policy as identified in White Paper 3 (1997) along with an increase in participation rates was the requisite support of enrolled students in order to facilitate academic success. This code reflects the challenges highlighted by lecturers in terms of the timeous identification and support of 'at risk' students as a limitation of teaching large classes. In relation to this notion of support, a further challenge raised by lecturers was the loss of rapport with students in the context of large classes. The extracts below illustrate the impersonal nature of teaching large classes:

Lecturer B

> *…a second thing which I have noticed is you lose well for example I don't know the names of all of the students in my classes anymore you certainly lose that one-on-one personal relationship which was possible with a group of 30 or 40 students, so many of the students remain anonymous…*

Lecturer B above illustrates an increase in anonymity of the students in the large class situation. Literature reviewed in this study corroborates this phenomenon identifying lack of personal connection between students and lecturers in large classes as a factor impacting on levels of student motivation which in turn may impact negatively on academic results (Isbell & Cote, 2009). In addition, Mulryan-Kyne (2010) reflects on a number of challenges linked to the concept of student anonymity including the proliferation of classroom management challenges in the context of greater student numbers. She argues that students have a greater tendency to actively engage in uncharacteristic deviant behaviours as a result of feeling anonymous or invisible in the classroom, specifically as the lecturer is viewed as having less power over the students in the context of large classes.

4.5.1.2 Challenges experienced in the Assessment of Large Classes

In addition to challenges experienced in the teaching of large classes, lecturers identified the area of assessment as particularly challenging in terms of both

increased workload and their ability to make use of assessment in order to support student learning.

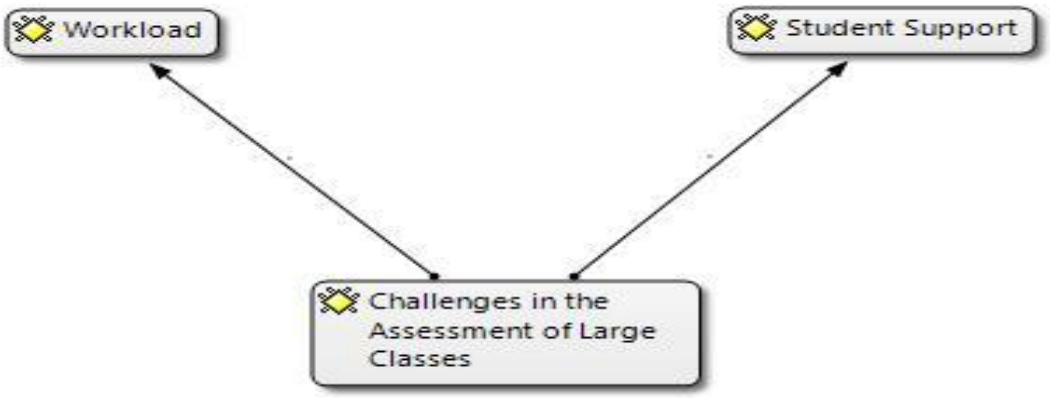

Figure 7: Challenges in the Assessment of Large Classes

Workload

Botha et al. (2005) identify that increased student numbers are often not accompanied with an incremental increase in staff numbers. This therefore translates into a higher workload with regards to the assessment of students and necessitates the utilisation of alternative teaching and assessment methods. This code refers to the increased workload as a result of increased student numbers and

Lecturer A

> *…then of course when it comes to academic assignments it's so difficult to mark because of such big numbers and then also the assessments that we used to do in each cycle marking is becoming really, really challenging …so much so that it ends up that you are spending most of your time with the marking, but this is time that you should be spending with the students working with them and helping them learn how to really teach the subject…and turnaround time used to be a few days in the past but with the big numbers in each class and you're giving assignments to each class turnaround time becomes ineffective for your assessments because the students have almost forgotten what they have written and things like that because it's taken quite a while to mark and to give them feedback…*

Lecturer B

> *…if we put aside any particular group and talk about my global work requirement the marking workload and just keeping on top of assignments and tests using our traditional techniques has just become stupidly out-of-kilter…*

Both Lecturers A and B have identified practical concerns regarding the increase in workload as a direct result of increased enrolments. They specifically identify the challenge of managing increased workloads in terms of bulk marking and subsequently longer turnaround times as highlighted by Lecturer A above. This in turn results in compromised feedback as opposed to focusing on the teaching aspect, lecturers feel that they are constantly focused on marking as opposed to teaching and learning and as such the utility of assessment as a teaching and learning tool is compromised. In line with this, Buchanan and Rogers(1990) identify that increased workload related to marking assessments is the breaking point forcing many lecturers into survival mode when faced with large student numbers.

Student Support

As a result of the increased workload and longer turnaround times related to higher enrolments in terms of marking larger numbers of assessments and assignments highlighted above, lecturers feel that their ability to interact with students and provide them with the requisite support is compromised. This is illustrated in the extracts below:

Lecturer A

> *…well we don't have that one-on-one contact like we used to have in the past where you could really support your weaker student and really get to know what their problems are…*

Lecturer B

> *…I would suggest that often times, and because of many intermeshing mistakes, myths, and misunderstanding of the big mathematical ideas many students just don't get it – they have nothing to hold onto. The large class sizes conspire against the on-the-spot monitoring and remediation which was possible with the smaller groups…*

As illustrated in the above, one challenge of large class teaching as identified by both lecturers A and B is that of connecting with students. This code is inextricably linked with the loss of student rapport as highlighted under the previous code. Mulryan-Kyne (2010) identifies the link between anonymity, motivation and student performance. Similarly, Isbell & Cote (2009) identify the positive impact on staff-student interaction on the academic results of students within the large class context. In addition, Cuseo (2007) corroborates the data collected noting the difficulties involved in managing student performance as a result of large classes, specifically in terms of frequency of assessment which can serve diagnostic purposes, particularly during the beginning stages of a course while foundational concepts are being addressed.

The extracts selected for this section have provided a snapshot as to the challenges experienced by lecturers when faced with large classes. Lecturers identified that increased student numbers impacted negatively on their teaching practices in terms of the types of teaching strategies they were able to employ under the circumstances. While both lecturers identified that they preferred to teach from within a constructivist paradigm, which centers on the active participation of students and their engagement with course material in class, both lecturers identified that they were only able to do this in a limited capacity and in the interests of classroom management have reverted largely to instructivist principles. Furthermore, lecturers have identified the loss of rapport with students as an additional challenge experienced by them in the context of large classes, hampering on their ability to connect with students in the way that was possible in a small class situation. Literature reveals that this loss of rapport or anonymity of

students in large classes can impact negatively on student motivation, classroom behaviour and grades.

Additionally, lecturers highlighted the impact of increased enrolments in the area of assessment focusing in particular on the sheer volume of marking involved in the ongoing assessment of their students. As such, they reflected that the marking load impacted on their ability to assess their student's progress in order to identify problem areas in the content as well as 'at risk' students. Furthermore, the utility value of late feedback to the students was questionable as it was often out of context. In line with this, the lecturer's ability to effectively support students learning in the context of these challenges was compromised.

While teaching practice should be informed by the identified teaching philosophies in order to facilitate the learning and support of students in such a way that engages them with the course material, constraints in both physical resources and in terms of human capital tend to put lecturers on the back foot in terms of managing large classes effectively as well as providing ongoing quality in all forms of assessment.

4.5.2 Complexity of Blackboard Implementation

The implementation of Blackboard as part of a possible teaching and assessment strategy in order to assist in the management of some of the challenges highlighted in 4.4.1 above was particularly complex in nature involving a number of processes and requiring the ongoing input of various role-players. As such, this theme includes codes which identify the various role-players in addition to factors impacting both positively and negatively on the quality of the training and support available to staff and students' experiences of using the Blackboard LMS and issues pertaining to accessibility of Blackboard.

The implementation of Blackboard as a Learning Management System in the faculty of education involved the initial training of all pre-service students as part of the departmental orientation programme. Due to the vast numbers of students which required training on Blackboard and the limited resources available for the allocated time slots, students were trained according to year groups through the medium of PowerPoint presentations. It must be noted that it would have been preferable to make use of a computer laboratory and have the students log in to the system during the presentation, however, the researcher worked within the limits of available resources. To this end, the researcher made use of screenshots of the Blackboard login screens and course home pages in order to talk the students through the log in process and provide them with an overview of the available tools. The purpose of the training was to provide them with sufficient information in order to login and begin basic navigation of the available tools. Students were also provided with the Blackboard helpdesk email address and the contact details of consultants who would be able to assist them with any Blackboard related issues.

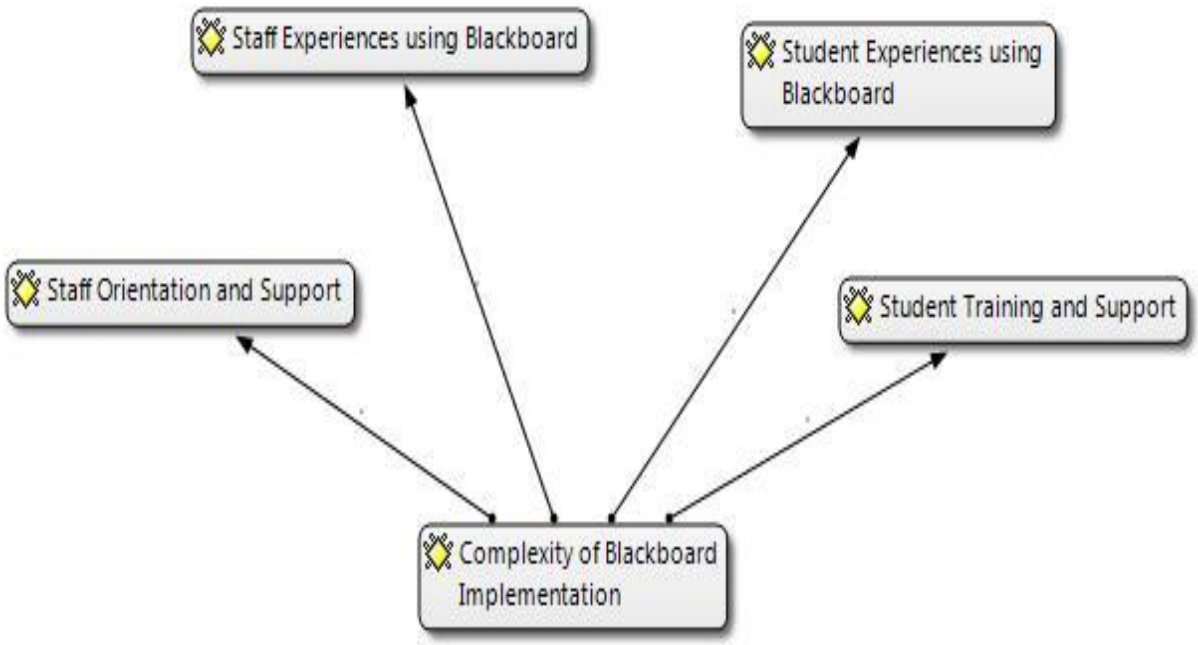

Figure 8 Complexity of Blackboard Implementation

As illustrated in Figure 8 above, the codes drawn from identified theme of complexity of implementation can be grouped into the following two categories as identified by both staff and students: Blackboard training and support; and experiences of using Blackboard, each of which are illustrated in the extracts in the sections which follow.

4.5.2.1 Blackboard Training and support

As noted previously, the complex nature of Blackboard implementation required a hands on approach from a variety of role-players to ensure both the smooth running of the programme from a technical perspective as well as the ongoing administrative and consultative support for both staff and students. To this end, the section below illustrates the extent to which staff and students required support for the successful implementation and utilisation of the LMS.

Staff training and Support

The implementation of the Blackboard LMS was one which required a hands-on approach with regards to staff members. As a rule, the researcher took a consulting role with the staff members regarding the implementation of Blackboard and provided assistance when it was requested so as not to impose particular use of the tool and thus positively skew the implementation process and by extension, the outcome of the study. Therefore, lecturers were offered an initial general workshop on Blackboard introducing a variety of tools available to the lecturers for the distribution of resources, organisational tools, communication with students, discussion tools and assignment and assessment tools. Thereafter, it was up to the individual lecturers to request consultations with the researcher regarding requisite support. As such each case was treated on its merits and an individual approach was utilised. The extracts below illustrate the lecturers' experience of Blackboard support received from the researcher:

Lecturer A

> *…well all the support that I got, fortunately for me, you were just a phonecall away or just an email away so all that has been fantastic I just know that if I had a problem I could just email you or call you…I wouldn't have been able to do it alone because I'm a little bit of a dinosaur when it comes to technology but the kind of support I got from you was fantastic so I didn't ever feel that I am going to sound stupid if I ask if I can't do something…*

Lecturer B

> *…I think like so many things we can work very superficially on these things and stumble along and I think that that's happening right across the university in terms of all the software programmes that we use but in this particular case I was hand-held from my introduction to Blackboard all the way through to a position where I was pretty competent on my own this does not mean that I don't need any support now or in the future and I think that this did expedite my easy adoption of Blackboard…*

As illustrated by the above two extracts, the two lecturers participating in this study required different kinds of support. Lecturer A preferred to request assistance as the need arose, while Lecturer B required regular consultations in order to scaffold his progress in terms of utilising the Blackboard LMS. Lecturer B reflected that the scheduled consultations forced his engagement with the system at regular intervals and as such developed a wealth of knowledge in terms of the potential use of the LMS far beyond the scope of this study.

Student training and support

The training and support approach adopted for the students was similar to that strategies utilised to support staff. All pre-service students were provided with Blackboard training during their orientation prior to the start of lectures. The focus of the training was the provision of sufficient knowledge of the system in order to enable students to login to Blackboard and begin initial navigation of the LMS.

Additionally, a helpdesk in the form of email support as well as student consultations with Blackboard support staff were available to students upon request.

Student Survey

> *…the training we received helped with working with blackboard. If there is something that we don't know how to use we can get help…*

The extract above is indicative of the aforementioned structures which were in place for the training and support of students impacting on their experiences with the Blackboard LMS supported by the extract from Lecturer B below:

Lecturer B

> *…none of them seemed to have any problems with it…young people seem to have no fear of them whatsoever in fact, in my experience they look forward to making use of these technologies in their lives and I think that their positive view of technology was abundantly evident in the online exam be did earlier in the year. They seemed to be really, really comfortable using Blackboard...*

This extract illustrates the fact that lecturers were largely unaware of challenges experienced by the students relating to the technical use of Blackboard as the students directed their queries through the Blackboard helpdesk rather than eliciting lecturer support. This illustrates two points, firstly, tacit assumptions with regards to the student's levels of competency as understood by the lecturers and on the other hand the student's experiences of support as was available from the Blackboard support team both electronically and physically on campus and speaks directly to the complex and interactive nature of implementing and supporting a LMS as a teaching strategy identifying this project as a team effort rather than a standalone tool which can be implemented in isolation.

The extracts chosen to reflect this code highlight the fact that the students knew where to go for Blackboard assistance thus reflected that the Blackboard training provided them with sufficient information to request assistance. In addition, obtaining assistance from the Blackboard support team would have impacted positively on their overall Blackboard experience as technical difficulties would have been dealt with within 48 hours of receiving the query.

4.5.2.2 Experiences of using Blackboard

The experiences of both lecturers and students in terms of both implementation and support form a crucial part of the project in that the type of experience each of the participants have had impacts on the success of the implementation.

Staff experiences:

Empirical data elicited from staff indicated that the use of Blackboard was extremely successful and as such will inform their practice in the future. This is evident in the extracts below:

Lecturer B

> …*without a shadow of a doubt in fact this has been one of the highlights of my last 2 or 3 years here, this is the big one, this is a game changer that's my view and that's not because I am one of those people who loves IT and I do, I don't deny it but in Blackboard, we're talking about a software package that has the capacity to profoundly and positively change the learning experience of our students…*

As illustrated above, both staff members who participated in this study have noted the success of this implementation through their experiences in making use of the LMS. Lecturer B in particular referred to Blackboard as a 'game changer' and identified the possibilities of utilising Blackboard for the enhancement of student learning.

Student experiences

Student experiences reported in the survey were overwhelmingly positive, however, it is important to note the negative or dissenting voices as these provide perspective and highlight issues which may have been experienced by the population of students who chose not to participate in the survey. The following extracts illustrate reflections pertaining to Blackboard experiences elicited form the 2nd year cohort.

Student Survey

> *...it was nice to be on a pc to do maths sums and maths questions as I find it quicker as I type faster than I can write...*

Student Survey

> *…at first I thought it would be a big challenge, but when I was using it, it was easy as it was my first time using blackboard…*

As identified both staff and student participants, the use of Blackboard was exceptionally well received. Although there were some students who identified that they were anxious at the challenging prospect of ultilising the system, the vast majority of the respondents noted that their initial and overall Blackboard experience was a positive one. The final question of the survey requested that the students rate their experience of Blackboard. The survey question and the results below show that 51% of student participants had extremely positive experiences with regards to Blackboard and wished to use the LMS for more of their coursework. Similarly 41.1% noted that they had a positive experience with regards to utilising Blackboard for mathematics. 5.9% were non-committal and only accessed Blackboard in order to obtain coursework made available for them online and 2% of students did not have positive Blackboard experiences and would prefer a traditional approach to their coursework.

Question 11 of the Student Survey

How would you rate your Blackboard experience so far? Please choose one of the following options:

1. Extremely Positive - I would like to use Blackboard for more of my coursework.

2. It's been a good experience so far.

3. its okay, I am getting the hang of it.

4. I use it because I can access the course material online.

5. I have had too many challenges related to Blackboard and would prefer only classroom based teaching and assessment.

Figure 9: Question 11 of the Student Survey

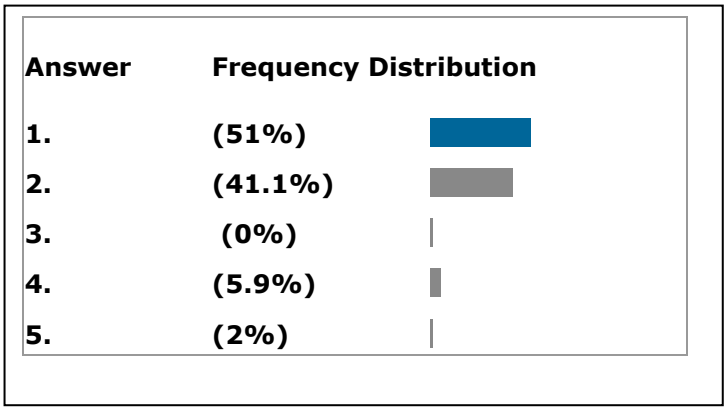

Figure 10. Results of Question 11 of the Student Survey

The survey results for question 11 indicate that there was a strong positive slant as reported regarding the student experience of using Blackboard for Mathematics indicating that 5.9% of respondents reported to *only* use Blackboard in order to access their coursework which implies a negative or non-committal attitude towards

the use of the tool. Furthermore, as only 2% of participants noted that this experience was negative in nature and thus were more inclined to give preference to traditional methods of teaching and learning, it can be inferred that the issue of accessing Blackboard on or off site did not significantly impact on the kind of experience the students reported to have had.

4.5.3 Access to Blackboard

The rationale for including this theme as part of the analysis focuses on context and availability and access to resources. Within the context of HE in South Africa not all Universities are equal in terms of infrastructure, access to resources and student population. As such, an inquiry as to how the student participants accessed Blackboard is an important consideration as their access to and availability of resources impacts profoundly on the implementation of a system which relies on access to electronic resources. Figure 11 below provides a graphic representation of how students accessed Blackboard.

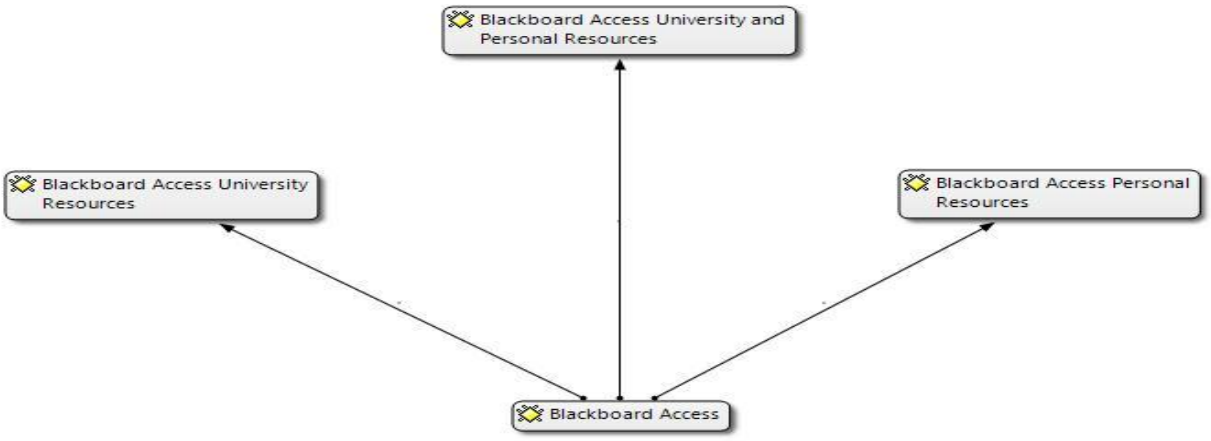

Figure 11 Access to Blackboard

The survey question addressing the issue of access requested the student participants to reflect on their access to Blackboard by identifying where or how they had accessed Blackboard . As such, 40 % of student respondents identified that they only accessed Blackboard by making use of university resources. This

meant that they either accessed Blackboard at one of the available university public access computer laboratories and/or accessed Blackboard at a university residence. The following extracts exemplify the student responses with regards to access using the resources made available to them by the institution:

Student Survey:

> …*university computer lab and university residence…*

The survey indicated that only 9% of student participants indicated that they mainly accessed Blackboard from the comfort of their own home using personal electronic resources such as laptops, Smartphones and the like. Since they were required to sit for Blackboard assessments on campus they would have also accessed Blackboard for assessment purposes using university resources in a limited way. However, the majority of the students were able to access Blackboard both on and off campus as illustrated in the extract below:

Student Survey

> *…these are my access places, it only depends at that time which one is suitable for that time; University Computer Labs/ Home internet on your Laptop or PC/ Smartphone/ University Residence…*

The survey identified that the remaining 51% of participants accessed Blackboard through a multitude of resources including personal devices such as Smartphones and personal laptops in addition to making use of the available university resources dependant on contextual factors.

Two pertinent issues can be highlighted in the survey regarding access to resources. Firstly an overwhelming total of 60% of the student participants had access to personal resources in addition to available university-based electronic resources which speaks to the concern of students being inadequately prepared or

unable to access the system. Conversely, 40% of the student participants only had access to electronic resources on site, therefore limiting their exposure to the system. In spite of the fact that almost half of the students were only able to access Blackboard through university-based resources when superimposed on the survey results presented in the previous section, the response to the use of the system overall was overwhelming positive indicating that physical access did not significantly impact on the student's ability to access their course on the LMS.

4.5.4 Benefits of Blackboard

The benefits as identified by both the lecturers who participated in this study as well as the student participants were many. As such, broad themes or meta-codes were identified within the framework of the general theme of Benefits of Blackboard Subsequently each of these meta-codes have been broken down and into smaller codes and dealt with separately. Figure 12 below depicts a graphic representation of the meta-code: Benefits of Blackboard as identified by staff and similarly Figure 13 depicts the meta-code: Benefits of Blackboard as identified by students.

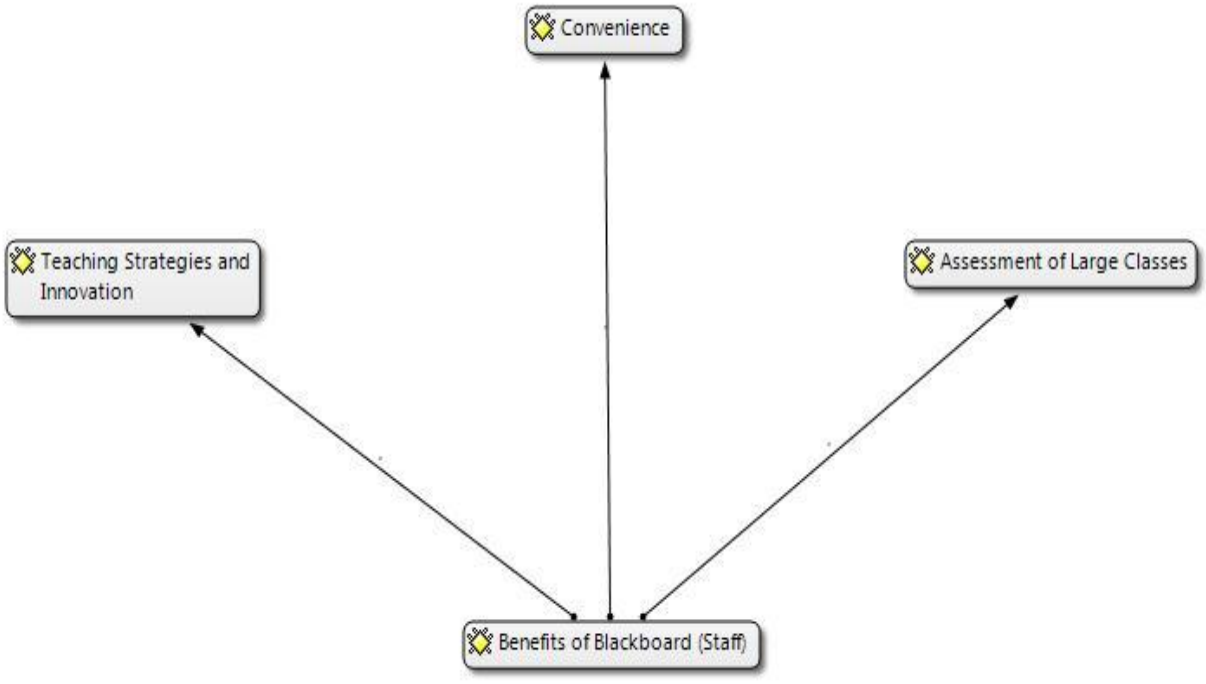

Figure 12 Benefits of Blackboard as identified by Staff

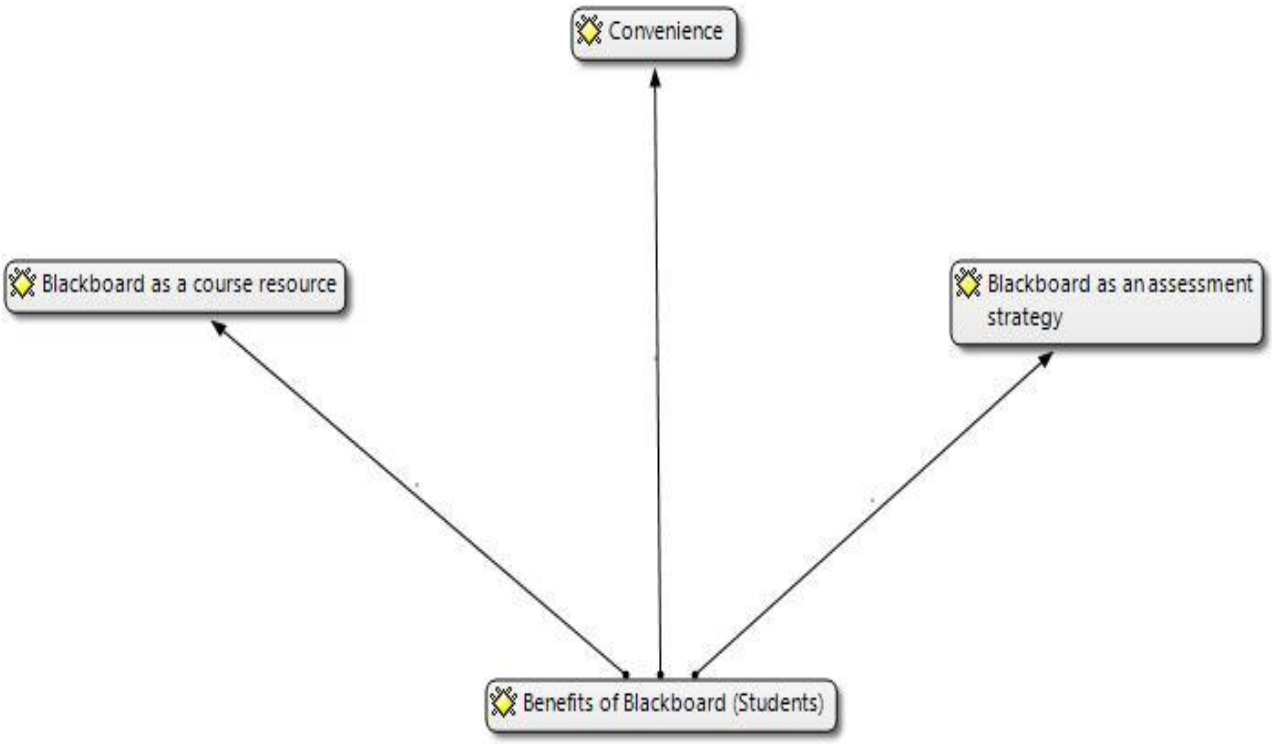

Figure 13 Benefits of Blackboard as identified by Students

Figure 12 and 13 above provide a visual representation of the three meta-codes as identified by each category of participant (staff and students) and show how these categories are interrelated. It was observed by the researcher that the codes identified from the staff data are effectively mirrored in the codes identified in the student data. For this reason, it seemed counterproductive to separate the Benefits of Blackboard as identified by staff and students and as such they will be presented in the following way:

- *Teaching Strategies (staff) in relation to Course Resources (students)*
- *Assessment of Large Classes (staff) in relation to assessment strategies (students)*
- *Convenience of Blackboard as identified by both staff and students*

4.5.4.1 Teaching Strategies and Course Resources

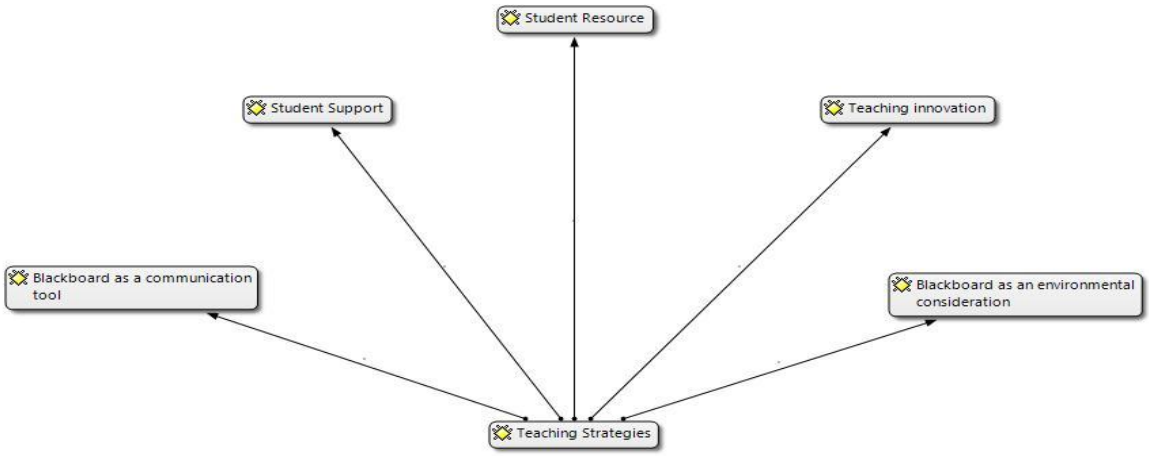

Figure 14 Teaching Strategies as identified by Staff

Staff identified a number of teaching strategies and innovations that they were able to utilise as a result of making use of the Blackboard LMS, namely Teaching Innovation; Student Support; Blackboard as a communication tool; Blackboard as a student resource and Blackboard as an environmental consideration.

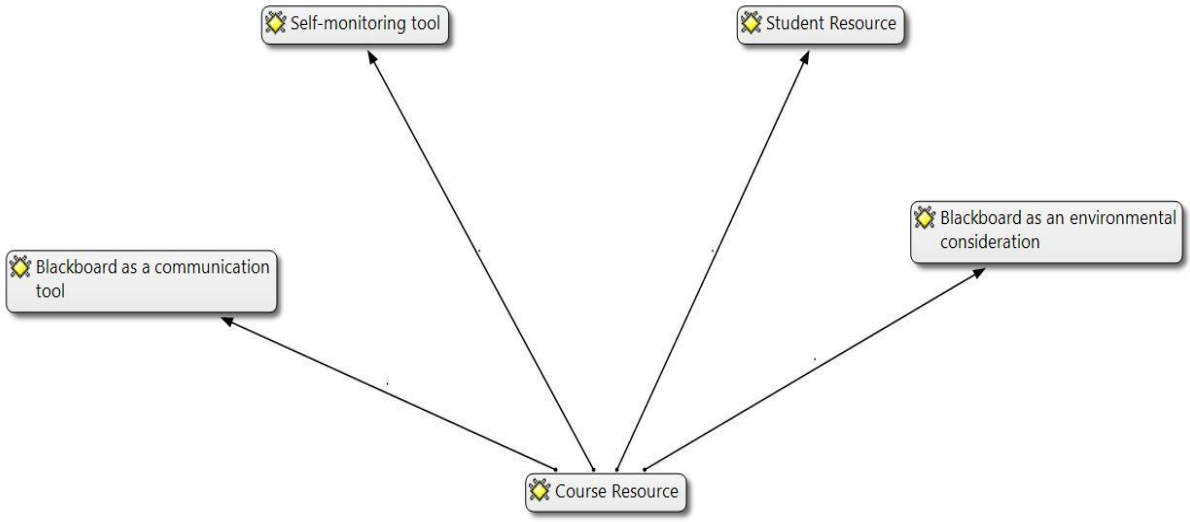

Figure 15: Blackboard as a course resource as identified by students

While staff identified the opportunity to utilise blackboard as a deployment mechanism to provide students with course resources, additional resources and value add course material and micro-lessons in addition to improved communication, support and monitoring students, the student participants enjoyed the access to resources but focused on factors of accessibility, efficiency, turnaround time and convenience. According Botha et al (2005) this forms part of the profile of a 21st century student who engages with course material strategically.

Teaching innovation

As identified in the literature, due to the advent of large classes, it has become necessary to employ different teaching strategies in order to engage students with material outside of the classroom. To this end, different lecturers use different methods to engage with their students outside of the immediate teaching context of the classroom. Below is an extract from Lecturer B providing an example of one such strategy accompanied by a screenshot of one of the courses selected for this study depicting 'Pencasts' and 'Micro Lesson' video clips which are utilised as a scaffolding resource to both introduce and consolidate mathematical concepts:

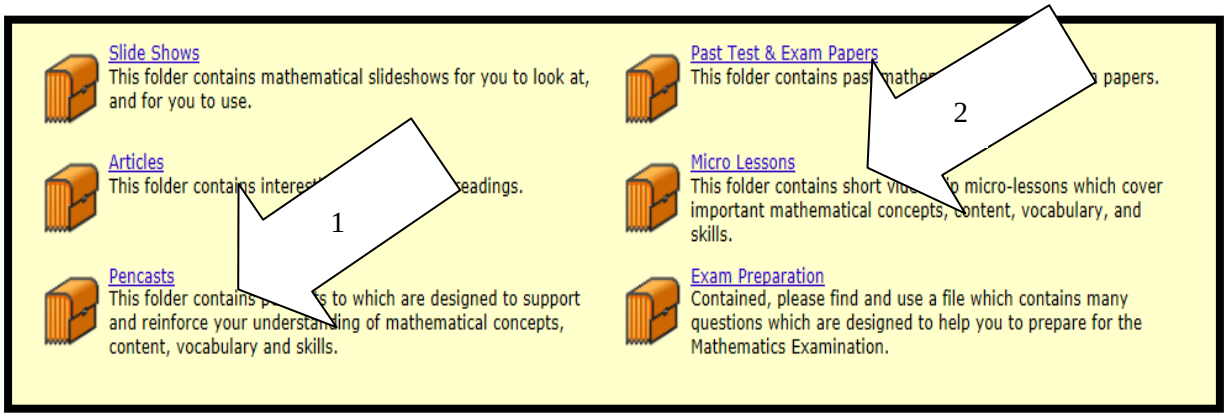

Figure 16 Extracted from Lecturer B's course on Blackboard

In Figure 16, arrow's 1 and 2 point to innovative strategies employed by one of the lecturers in the study who made use of visual electronic resources in order to assist the students in understanding the core mathematical concepts for the course. Arrow 1 points to the folder for 'Pencasts' developed by the lecturer with the use of an electronic pen whereby the lecturer has recorded lessons in a step by step fashion in order to scaffold specific geometric concepts. Arrow number 2 points to the 'Micro Lessons' folder which houses lesson clips in a dynamic visual format for the students to access and download in order to augment their conceptual understanding of key mathematical concepts.

Blackboard a student resource

One of the main benefits identified by students was the access to electronic resources through the Blackboard LMS. Figure 17 provides a view of Lecturer A's course illustrating the types of resources that were made available for her students.

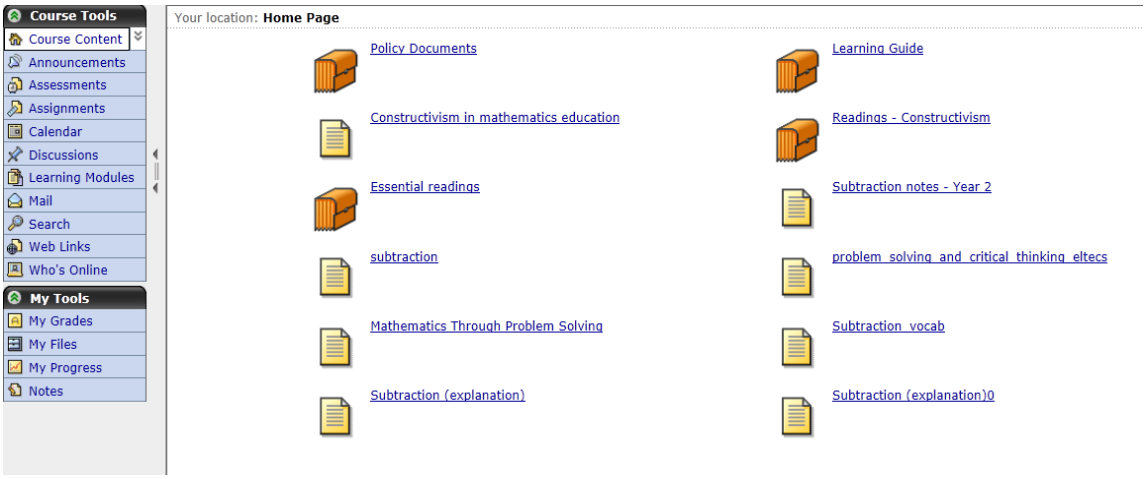

Figure 17 Student resources available on Blackboard

Although a local network drive is available for all students to access electronic resources posted by their respective lecturers, it has been viewed with aversion by some students as it seems rather unorganised and anyone, who can access the

network is able to post documents onto this drive for shared access. In addition, since it is a local network drive it requires local access, forcing students to be on campus in order to access the resources. The extracts below illustrate the aforementioned points:

Student Survey

> *…I find blackboard a useful tool in that we can all experience a different way in using mathematics with technology and can go and take this experience with us in the classroom…*

Student Survey

> *…It is so great to be able to go home and access Blackboard and get notes and messages from lecturers and it is a nice accessible way to communicate with lecturers. It is a pity that many lecturers don't use blackboard and only opt for the v-drive. The v-drive is not conducive as it spreads viruses and can never get a computer…*

As illustrated in the extracts above, students have highlighted the benefit of being able to access course resources at their leisure and convenience. Students also indicated that the virus protection software protecting this drive is also questionable as many resources obtained from this local drive are corrupted or contain viruses.

4.5.4.2 Student Support

Lecturer B pointed out that Blackboard offered him the opportunity to monitor students' performance fairly regularly and this afforded him the opportunity to support students as the need arose. This is illustrated in the extract below:

Lecturer B

> *…Blackboard offers me this opportunity to quite effectively monitor and evaluate the students' performance regularly…*

Regular monitoring of the students performance through ongoing assessments for either formative, summative or diagnostic purposes by making use of the Blackboard assessment tool affords the lecturers the opportunity to manage some of the challenges identified in relation to teaching large classes including issues linked to effective monitoring of students in order to identify ‘at-risk’ students and provide them with the requisite support.

4.5.4.3 Blackboard as a communication tool

The Blackboard communication tools such as the email and announcement tools have been highlighted by both staff and students as particularly beneficial in facilitating easy communication by opening up an alternative channel through which staff and students can communicate effectively and efficiently.

Staff Perspective:

One of the challenges identified by lecturers in dealing with large classes is the anonymity of students, their ability to become ‘invisible’ in a large class and often drop out as a result of not being able to grasp core concepts. While the lecturer may have been able to identify that certain students were not coping with the work accessing the students has always been a problem since not all students provide student administration with correct or up to date contact details. In addition, changes in lecture times or lecture cancellation or postponements due to unforeseen circumstances occur regardless of the most meticulous planning and as a result contacting students may be necessary. Blackboard affords the lecturer with the unique opportunity to access the students electronically without the risk of the communication going to an unattended mailbox or incorrect cellphone number. The extracts below illustrate how the lecturers noted the benefits of the built in communication tools on the Blackboard LMS.

Lecturer A

> *…if I need for them to come to a lecture or have something ready for a lecture before I see them I can post all that on Blackboard…*

Lecturer B

> *…at the stroke of a pen or in this case a keyboard I can make an announcement to the students requesting them to bring things to class similarly I can send them covering letters for assignments…*

The above extracts illustrate the convenience factor of Blackboard in terms of communication and accessibility. While, Blackboard affords the lecturers the opportunity to communicate with the group as a whole, it also allows for small group communication in addition to confidential communication between lecturer and student.

Student Perspective:

Similar to the benefits noted by lecturers, student participants highlighted the benefits of the built-in communication tools in the Blackboard system. The students seemed to enjoy the convenience of being able to access notices through the 'Announcements' tool rather than having to come onto campus and go to the Faculty notice board in order to see the announcement of a cancelled lecture. The extracts below from the student survey illustrate this point.

Student Survey

> *…It is so great to be able to go home and access Blackboard and get notes and messages from lecturers and it is a nice accessible way to communicate with lecturers…*

Student Survey

> *…also accessing work on blackboard makes it very useful instead of coming in all the way to university…*

Student participants appeared to focus more on the utility value of Blackboard in terms of convenience and accessibility in the area of communication as opposed to having personal contact with their lecturers as illustrated in the extracts above. The convenience factor in being able to access communiqué without having to physically come to campus was viewed as particularly beneficial.

4.5.4.4 Blackboard as an environmental consideration

Both student and staff participants have referred to Blackboard as a savings option. The extracts below highlight this notion of saving paper:

Student Survey

> *...I would like to use blackboard to help save paper, all of the lecturers can use it...*

Lecturer A

> *...all my readings that I need for them to have I put on Blackboard because it's number one it's saving a hell of a lot on paper the other thing is that the students get it immediately and then they can choose to save it and have it constantly um or they can choose to print it on hard copy if that's what they need...*

Although both staff and students have referred to Blackboard in terms of paper savings, it is inferred that savings on printing has monetary value attached to it. At present, students pay a mandatory fee for handouts per registered course, however

the advent of electronic distribution of resources can impact dramatically on the amount of printing required.

4.5.4.5 Blackboard as a self-monitoring tool

Blackboard has also been identified as useful for purposes of self-monitoring on the part of the students. This once again feeds into the notion of the strategic learner as identified by Botha et al. (2005) as students like to know what their results to date are as this informs them of their positioning in terms of summative assessments mainly in relation to Duly Performed (DP) minimum results for admission to examinations. As such, Blackboard provides the students with a student tool section affording them the opportunity to map their progress on the Blackboard based course and view their grades (See Figure 18 below).

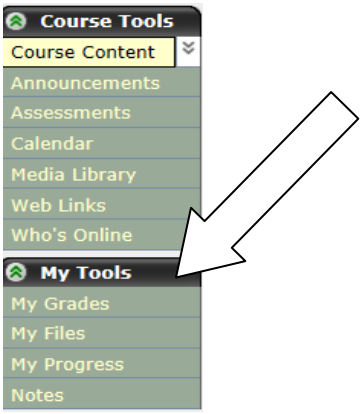

Figure 18 Student Tools available on Blackboard

Students identified that the timeous availability of results on Blackboard as well as the feedback available for them as one of the main benefits that Blackboard has to offer.

Student Survey

> *…accessing work and announcements and also easy to see results of tests…*

Student Survey

> ...*I like the fact that I can view my marks…*

This section has presented and described data elicited from staff and students with regards to the use of Blackboard as a tool to implement teaching strategies on the part of the lecturers and Blackboard as a course resource tool on the part of the students. The next section of data to be presented focuses on Blackboard as a tool of assessment as administered by staff and engaged with by the student participants.

4.5.4.6 Blackboard as a tool of assessment

The following benefits have been highlighted by both staff and students: Quality of assessment; Types of Assessment and Efficiency of Blackboard

Quality of Assessment

The quality of assessment in any academic programme is of primary concern as this not only relates to the acquisition of knowledge, skills and competencies of the student, but also impacts on the image of the university in terms of the quality of their graduates. As such, issues of objectivity in assessment particularly when it comes to large classes plays a pivotal role in the decision to use a LMS such as Blackboard in managing the assessment process. The extracts below illustrate the experiences of both students and lecturers in this regard:

Student Survey

> *...personally it was great knowing that maths normally deals with numbers yet this year we had face the linguistic side of it and using blackboard it came out easy...*

Student Survey

> *...the fact that maths could be changed to more approachable approach and not boring pencil, pen, book, etc...*

Lecturer A

> *...it's also fair because it's not subjective… at the same time I know that my students are getting the kind of assessment that they need...*

The extracts above identify factors related to the quality of assessment which have been highlighted as having being enhanced through the use of Blackboard for assessment purposes. Assessment as identified by Buchanan and Rogers (1990) is the critical area of teaching and learning where large classes effectively impact on quality and type of assessment in a tangible sense. While this study has interrogated the use of Blackboard for teaching and learning purpose, the specific focus has been in the area of assessment. For example, if one reflects on Howard Gardiner's theory of Multiple Intelligences, it is important to include a number of types of question structured in ways that tap into different intelligences and so afford each learner the opportunity to excel in specific areas. To this end, Blackboard allows for a variety of question structures even within the most limited framework. Multiple choice questions for example can be structured purely mathematically utilising equations, include graphics for geometry type questions or be linguistically structured requiring logic to infer or work out the answers. In addition to this point, Lecturer A identifies a crucial aspect of assessment, that of objectivity. Luckett and Sutherland (2000) argue that subjectivity is a threat to the quality of assessment and therefore needs to be as controlled as possible

Types of Assessment:

In terms of quality, the ongoing assessment of students plays a fundamental role in the identification of teaching and learning gaps, mapping progress and the

identification of ‘at risk’ students. To this end there are a number of types of assessment available to lecturers in order to ascertain the level of learning and conceptual grasp of students in their classes. To this end, LMS technology affords them the opportunity to assess more often, not only for summative purposes but for formative and diagnostic purposes as well. The extracts below illustrate this point:

Lecturer B

> *...many things go right over them go past them and you only pick this up in tests… blackboard offers me this opportunity to quite effectively monitor and evaluate the students’ performance regularly...*

In the above extract, Lecturer B highlights the importance of assessment for diagnostic purposes, to identify the extent to which students have grasped course concepts and content. This extract points to Blackboard as a tool of assessment for both the monitoring and evaluation of students’ concept development on a regular basis.

4.5.4.7 Efficiency of Blackboard

High workload and inefficiency was one of the challenges related to large classes that was identified by lecturers and was highlighted in the first theme of this chapter “Challenges related to the Teaching and Assessment of Large Classes”. In order for assessments to be useful in terms of course progress and highlight issues pertaining to conceptual development, assessment feedback needs to be both useful and timeous. To this end, both Lecturers and students have identified that Blackboard has afforded them the opportunity to streamline processes with a particular focus on turnaround time. The extracts below illustrate this point:

Lecturer A

> *…oh it is fantastic to know that at the end of the test when everyone walks out that I’ve got my list of marks already…*

Student Survey

…I thought that it was quite a good experience with regard to the marks being shown to me as soon as í had submitted the assessment…

As illustrated in the extracts above, both staff and students identify the benefit of utilising Blackboard for assessment purposes and highlight in particular the efficiency of obtaining useful feedback almost instantaneously depending on the nature of the assessment.

Convenience of Blackboard

One of the recurrent benefits that appeared consistently throughout the data was that of convenience. Students and staff alike noted the convenience of being able to access Blackboard in a variety of ways around the clock more specifically the accessible nature of the system in terms of both physical access as well as user-friendly interface.

User-Friendly

Although both students and staff are trained on the Blackboard LMS, as a rule students tend to be more willing to interact with the interface and 'fiddle' in order to find out what tools are available to them. In line with this, many of the student participants identified the user-friendly nature of the LMS. The user-friendly nature of this system was echoed by staff data illustrated in the extracts below:

Student Survey

…blackboard is very easy to use…

Lecturer B

> *...I must say that I found Blackboard intuitively easy to use, I love Blackboard...*

The above extract illustrates that staff and students alike indicated that staff also found Blackboard particularly easy to use.

Accessibility of Blackboard

In addition to the easy-to-use interface that has been alluded to by both staff and students, the code of convenience related to the 24-hour access to Blackboard has been a consistent thread apparent throughout the data. The extracts below illustrate this point:

Student Survey

> *…access blackboard from anywhere…*

Lecturer B

> *…Blackboard doesn't restrict my opportunity to work with my students to a particular time and place it offers us a seven-day-a week 24 hour service I think that that's hugely beneficial…*

Accessibility of lecturers to students and students to lecturers through the Blackboard platform around the clock as noted by Lecturer B is a feature of the LMS that contributed to the innovative use of Blackboard and subsequently noted as a massive benefit.

As has been demonstrated through the identified codes in this particular theme, "Benefits of Blackboard", a number of benefits have been highlighted by both staff and student participants including aspects of communication, convenience, access

to resources, teaching strategies and innovations and an improved assessment feedback loop. However, as it is important to evaluate any innovation or implementation on its merits, the researcher focused on the use of Blackboard as a whole and as such interrogated the topic of drawbacks or challenges as experienced by the participants in engaging with the LMS. The following theme highlights the drawbacks to Blackboard as a teaching and assessment tool as identified by the participants.

4.5.5 Challenges of Using Blackboard

As with the preceding theme, the 'Challenges of Using Blackboard' can be viewed in terms of two meta-codes or broad themes, these have been categorised as the "Challenges of using Blackboard" as identified by staff as well at the "Challenges of using Blackboard" as identified by students. Figures 19 and 20 below provide a graphic representation of the codes attached to each of the aforementioned meta-codes:

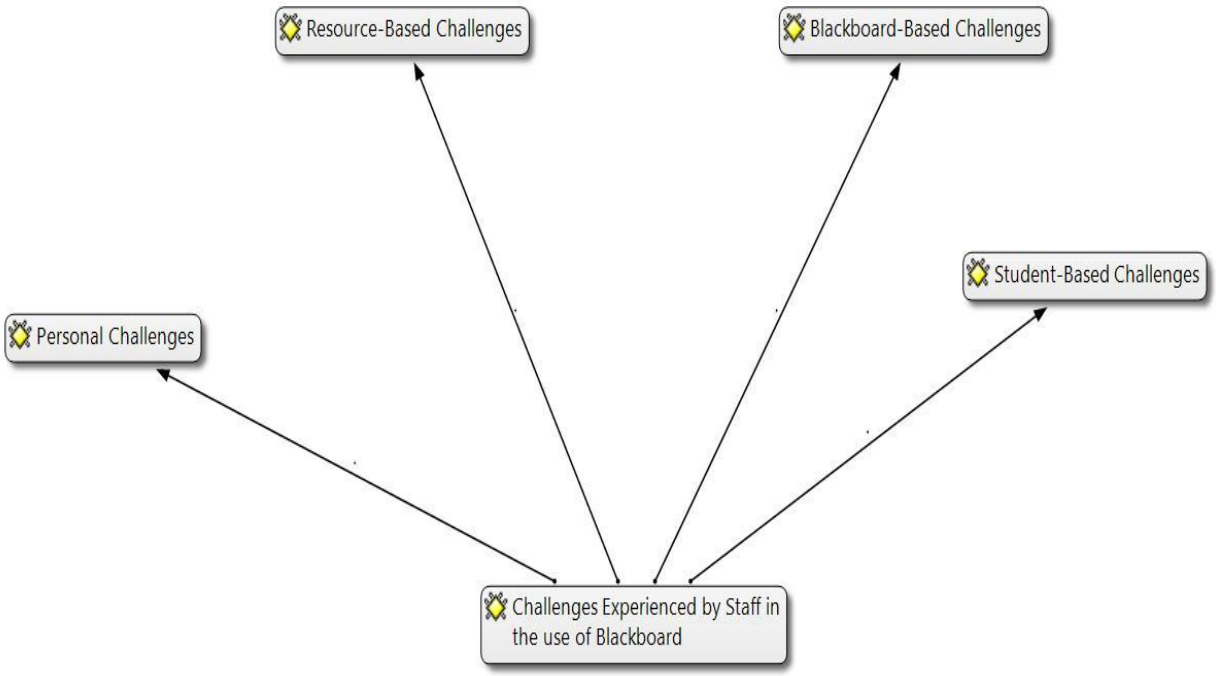

Figure 19: Challenges experienced by Staff in the use of Blackboard

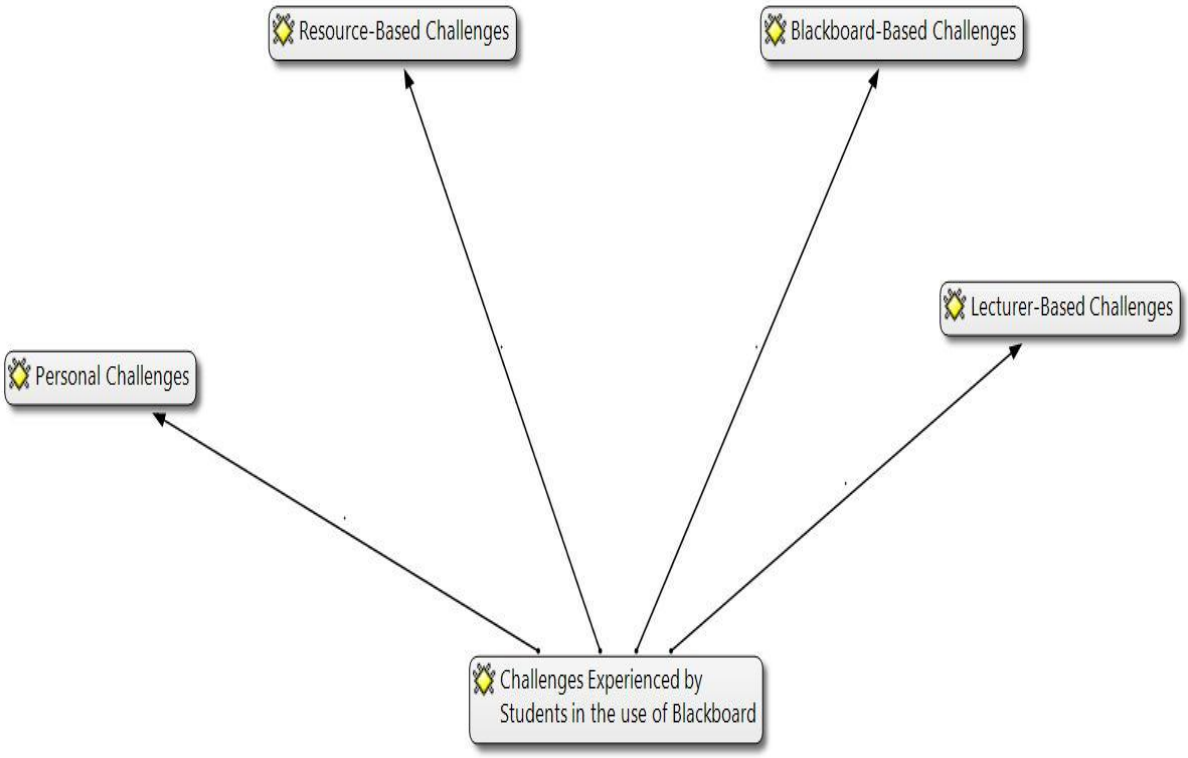

Figure 20: Challenges experienced by Students in the use of Blackboard

At a glance, it is possible to identify common themes which have been identified by both staff and students relating to challenges of using Blackboard. These include:, personal competencies, access to resources and Blackboard specific challenges as well as challenges pertaining to the 'other', that is, challenges that students identified as being staff-related and similarly, challenges that lecturers identified as being student-related. As such, the data in these two codes will be categorised and presented as follows:

- Personal challenges as identified by staff and students;
- Resource-Based challenges as identified by staff and students
- Blackboard-Based challenges as identified by staff and students
- Lecturer-Based challenges as identified by students
- Student-Based challenges as identified by staff

4.5.5.1 Personal challenges in using Blackboard

In the data collected for this study, both staff and students reported some personal challenges in the initial use of the Blackboard LMS. These challenges were categorised in terms of challenges pertaining to personal competency when it came to the use of technology in general and challenges pertaining to the learning curve involved in the acquisition of knowledge, skill and competency using the Blackboard system. These challenges are illustrated in the extracts that follow:

Blackboard challenges relating to personal competency in terms of technology

Both staff and students have identified that personal competency in terms of technology has been a factor in the acquisition of skill required to effectively navigate the Blackboard LMS. These are illustrated in the extracts below:

Lecturer A

> *…I'm a little bit of a dinosaur when it comes to technology…*

Student Survey

> …*I was struggling to use it because it was my first time to use computer…*

As illustrated by these extracts, lecturers and students alike noted a skills deficit when it came to utilising the technology and it must therefore be noted that personal competency or lack thereof could have caused much distress for some participants. Lecturers in particular benefitted from individual consultations during the implementation process as was highlighted earlier in this chapter. Student support was also available both through the Blackboard helpdesk as well as booked consultations with the Blackboard consultants. It must also be acknowledged that many of these students have been utilising Blackboard for 1st year courses prior to this implementation for 2nd year mathematics, therefore the majority of the students

in this study would not have been experiencing Blackboard for the first time in this instance although the content in the form of mathematics would have been new to them.

Learning curve in using Blackboard

In terms of acquisition of new skill, one often experiences a learning curve in terms of the newly acquired skill. The introduction to Blackboard was no exception and this learning curve was identified as part of the Blackboard experience by both staff and students. This is illustrated in the extracts below:

Student Survey

> *…it frightened me at the beginning but as I continuously using it I am getting along with it, and it's good so far…*

Lecturer B

> *…from my fledgling startup, I have grown in competence and now have the capacity to create more cogent learning paths for my students…*

Lecturer A

> *…I am now getting more and more comfortable with it so I do think that I will be using it even more…*

The above extracts illustrate learning curve involved in the acquisition of skill on Blackboard with both staff and students noting of the development of increased levels of competency with the increased use of the system.

4.5.5.2 Resource-Based challenges

Access to resources or lack thereof will have impacted on the experience of the participants in this study in either an enabling or constraining manner. The specific resources to which this code refers are the physical space resources as well as the network and software resources.

Network Constraints

The Blackboard LMS is a networked technology and as such relies heavily on network systems to run smoothly in order to facilitate the seamless navigation with untold speed that 21st century technology users (in this case students and lecturers) have come to expect. Unfortunately, downtime for maintenance or issues that are server related translates into different kinds of challenges in terms of access as experienced by the participants. The extracts below illustrate the frustrations identified by students in particular pertaining to network-related constraints:

Student Survey

> …*when the systems are down, one cannot access important info needed…*

Student Survey

> …*delays, frozen computers, not being able to access it…*

As highlighted by the extracts above, the network and associated factors such as site maintenance has impacted on access to Blackboard, fortunately, for the institution which forms the context of this study, Blackboard has been running off of a dedicated server and as such has not been subject to the standard network glitches which occur with regularity. However, since not all participants were sufficiently skilled with regards to bypassing the institution intranet or internet sites

in order to access Blackboard during standard network maintenance or unscheduled ‘downtime’ they were unable to access the LMS during this time. In addition to this, institutional network driven policies such as firewall and virus protection software updates have on occasion caused access issues with the LMS.

Access to programmes/software updates

Another challenge identified by participants relating to resource-based constraints impacting on the access of Blackboard and material on Blackboard is that of access to specific software programmes or software updates. These challenges impact heavily on the staff and students ability to either access Blackboard or access the resources on Blackboard. The extracts below illustrate this frustration:

Student Survey

> …*can’t open folders-due to not having a program on my personal laptop…*

This particular issue was also raised upon reflection by Lecturer A who noted that her students were unable to view the documents uploaded by her as a result of the students either not having access to the software required to view the documents or not having access to the correct version of the software.

Student Survey

> …*Windows 9 does not support blackboard…*

The above extract illustrates the aforementioned challenge relating to compatibility, as many students make use of personal electronic equipment, the version of Blackboard currently being utilised by the institution is not always supported by newer operating systems.

Lack of Physical Resources

The final code identified in the theme of resource-based challenges raises the question of physical resources. As participation rates increase, so too does the need for additional physical resources in the form of electronic equipment, laptops/computers in public access labs and e-assessment venues. As a result a number of tensions have arisen in line with these concerns which are illustrated in the extracts that follow:

Lecturer B

> …*there are infrastructural tensions in terms of access to the laboratory…*

This extract identifies one of the tensions related to this code in that the computer laboratory utilised for e-assessment is in fact a public access laboratory, earmarked for the general use of the student body. Thus, utilising the laboratory for assessment purposes ultimately renders the general student population resource-less in terms of access to the laboratory during testing. If one contextualises this in terms of the global number of lecturers making use of the e-assessment option at this particular institution, this becomes problematic.

Student Survey

> …*the large number of non-working laptops in the university's computer lab…*

In addition to tensions identified by Lecturer B, the above extract identifies a further issue in that despite the limited number of laptops available, even less are operational, therefore impacting negatively on their ability to access Blackboard on site.

4.5.5.3 Blackboard-based challenges

As with any software implementation, seamless integration although desirable is impossible. The following challenges specifically related to the Blackboard system have been identified by both staff and student participants: lack of integration; browser security during assessment; and upload restrictions.

Lack of integration

This code identified by both staff and students refers to integration on two levels: Firstly, the frustration experienced by both lecturers and students with regards to student access to their courses on Blackboard. Due to the fact that there is not currently an integration module with the institutional database student registration on the Blackboard database relies on human input and as such is subject to human error, specifically when it comes to students who are repeating a subject. This leads to login issues as some students were not provided access as a matter of course along with the rest of their cohort and therefore required manual uploading of their student profile in order to access the course. Extract 73 below illustrates this point:

Student Survey

> *…in the first term I could not log in and it took time for me to be able use blackboard but now it's resolved…*

In addition to not being able to access course(s) on Blackboard the student above noted that it took time for him/her to be able to use the system and therefore placed at a disadvantage in terms of developing personal competency on the system due to the fact that he/she was not able to access the system along with the rest of the cohort. The second level of integration noted by the researcher during the data analysis process was that of software integration. Lecturer B identified that the process of developing suitable questions within the chosen Multiple Choice

framework for his assessments proved to be extremely time-consuming, in addition to this, he further reflected on the process of having to create the questions separately and subsequently upload them individually into Blackboard. Although he did identify that benefit was to be gained by utilising the system for assessment purposes, the setup process was experienced as labour intensive. This point is illustrated in the extract below:

Lecturer B

> *…in my use of Blackboard the writing up of tests for example is onerous, the payback of course is when the results come through but it really is quite a mammoth task to generate a suitable question list based on multiple choice questions or true or false questions, or whatever other combination of questions that one might use…*

Browser security

The issue of security measures before and during assessment is one that requires careful consideration, although the lecturers participating in this study have reflected on the matter extensively with the researcher, highlighting the need for the acquisition of a secure browser, it was curious that it was the students who identified this as a possible threat to the utilisation of Blackboard as an assessment tool. The extracts below illustrate this point as identified by the students:

Student Survey

> *…I would suggest that if it can use that criteria of showing one question at a time because there many people use blackboard as to copy from Google, and would be better if it can be secured from Google search…*

Student Survey

> *…all other websites should be temporarily closed whilst a Blackboard Test is in progress…*

Although there are security measures built into Blackboard in the form of an IP-mask and password-access for tests administered on site, the challenges pertaining to student cheating continue to present a challenge, particularly in an age where information is available at the click of a button on a variety of platforms including mobile phones. As such, assessments which have been administered on the Blackboard system have been administered with the assistance of a team so as to minimise the above-mentioned risk. It must be noted however, that regardless of the security measures taken in the implementation of Blackboard, student dishonesty in the area of assessment presents a significant risk to the validity of such an assessment.

Upload restrictions

The code 'upload restrictions' refers to the size of the file that will be accepted by Blackboard for access by students. In terms of resources available and the number of courses, lecturers and students currently accessing the Blackboard database, this restriction has been set at a fairly conservative 10 megabits. Consequently, the lecturers participating in this research have identified the challenges that they have encountered as a result of this file restriction. This is illustrated by the extracts that follow:

Lecturer A

> *…what I did find also though is that sometimes a document is too big then it refuses to let you upload it…*

Lecturer B

> *…I have produced, but cannot download onto Blackboard numerous video clips, numerous lessons, numerous learning opportunities for the students which I have already recorded and which are available to them at the moment on occasion through the local network drive but not on Blackboard because of the upload restriction of 10 MB… the problem is that a typical Youtube file or recording is 16 to 20 MB…*

Although these file restrictions have frustrated the lecturers in question, this code has in effect been instrumental in the identification of very specific a gap in the current training material which would need to be incorporated into further implementations pertaining to different file formats for media files in terms of file quality and size. Although most professionals are now expected to have a certain level of competency with regards to the manipulation of software, media manipulation is not something that falls into this category. As such it remains a point to bear in mind for further implementations.

The final two codes identified in the theme of “Challenges of Using Blackboard” are interrelated and as such will be addressed as such. These codes refer to challenges related to the ’other’ which in the context of this study is lecturers to students and students to lecturers.

4.5.5.4 Lecturer-Based challenges as identified by students

The student participants in this study identified the following challenges which they perceived to be lecturer-based some of which were corroborated by lecturer interviews. The extracts below illustrate these challenges:

Student Survey

> *…notes that are posted on black board seem to be a lazy route out for lecturers rather than lecturing to us on the notes…*

The above extract identifies that some students perceive the use of Blackboard as an ‘easy option’ or the lazy route for lecturers who do not wish to cover work in class with them. This point bears some reflection in that further clarity may be required in terms of course outlines with regards to the use of the tool between students and lecturers in the identification of core course material as opposed to is additional/optional resources for enrichment/scaffolding purposes.

Student Survey

> *…have all lecturers using blackboard and not just the V-drive. Lectures teach us about multicultural education and how we need to adapt to all learners...*

The extract above refers to the inconsistent adoption of technology throughout the institution. Some lecturers are prepared to make use of technology in the form of the local network drive; some have put a lot of their course material onto Blackboard or use a combination of the two, while a number of lectures persist in utilising traditional methods of teaching and assessment.

While students are calling for a unitary approach which may or may not be the best way forward for the faculty, it is important to be mindful of the fact that e-Learning is not a one-size-fits-all approach, but rather a tailored approach to complement and add value to the programmes in terms of enhancement rather than total revision.

4.5.5.5 Student-Based challenges as identified by lecturers

In relation to the previous code highlighting challenges specifically related to the lecturers' use of the system, This code identifies student-based challenges as identified by the lecturers participating in this study as illustrated by the extracts below:

Lecturer A

> *…is that a lot of students just don't bother to check what's on Blackboard …but also I think it's something that they [are] going to get used to with time but you generally have to remind and remind them while some students are very good at making sure they check Blackboard regularly if there's anything that I've put on there's always those who will say oh I haven't seen it or oh I didn't have a chance to go on…*

Student Survey

> *…forgot to check my announcement every day…*

Lecturer A notes a pertinent point in that the face of a new implementation, the culture of online presence of the students seems to the lacking. The extract from the student survey confirms Lecturer A's concern as this student identified that they forget to check Blackboard regularly. This can be attributed to one of two things, firstly the use of Blackboard in addition to the normal course load, this relates to how the lecturers conceptualise the use of the system, secondly as identified by Lecturer A above, the implementation of a new system involves the development of new competencies' and the acquisition of new habits and as such, the students are still in the process of acquiring the 'habit' of online presence.

Lecturer B

> *…students have just not come to the party although they're young and they know how to use these technologies so all of the positive indicators are there but in many cases they're not… and if you look into the monitoring options for different things um you will find that many students are going onto Blackboard frequently but many are browsing superficially we call it butterfly syndrome and many have not even got on board at all…*

The above extract illustrates a particular frustration that Lecturer B highlights in terms of the amount of time students spend on Blackboard. Despite the numerous resources available to students for their conceptual scaffolding and enrichment in the area of mathematics they continue to browse the system in a superficial manner engaging with material on a strategic basis. This reflects the strategic approach to learning as referred to earlier in this chapter and this is in line with a 21st century learner. Martin and Saljo, (1976), as cited in Botha et al. (2005) notes that in order to engage the students teaching and assessment techniques should be leveraged in order to facilitate deep learning.

4.5.6 Improvements in the use of Blackboard

The successful implementation of a system involves a number of role players who can provide invaluable input for the improvement of future implementations, in this case both staff and students who participated in this study have identified possibilities for the improved use of the system.

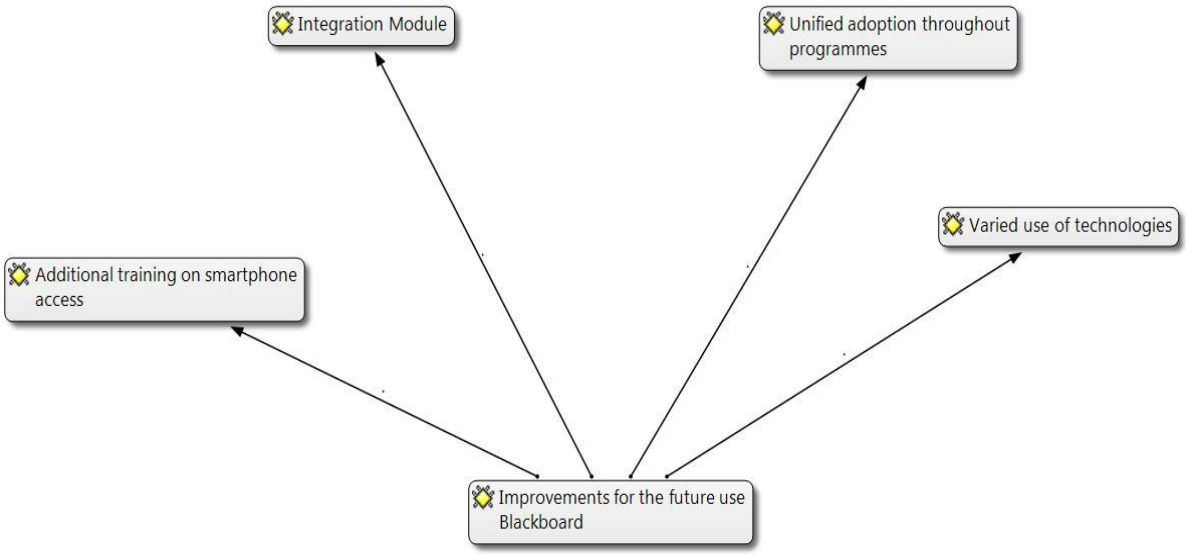

Figure 21: Future use of Blackboard

Figure 21 above provides a graphic representation of the suggested improvements for the future use of the Blackboard LMS including a request for additional training with regards to accessing Blackboard on Smartphone platforms; the acquisition of an integration module; varied use of technologies and most notably, a call for the unified adoption of Blackboard by lecturers throughout academic programmes.

4.5.6.1 Additional Training on Smartphone access

Increasingly, students are able to access the internet and associated applications through the use of Smartphone technology in the form of Blackberries, iPhones and the like, as such, this includes accessing their Blackboard profiles on the move, however, due to differences in operating systems, specific settings need to be altered in order to facilitate the access of Blackboard across these platforms. Therefore students are suggesting that Blackboard training for Smartphones is included for future training.

4.5.6.2 Integration module

The challenges related to integration of Blackboard with institutional systems remains a point for consideration in the future implementation of the programme and indeed the acquisition of add-on software in order to facilitate the integrated use of Blackboard across the board. This is illustrated by the following extract

Student Survey

> *…each person should have a folder of his or her own, containing all the courses and it could be of great pleasure if they could be automatically installed…*

In the above extract, this student makes reference to the ideal situation whereby the process of uploading students onto the Blackboard database would be an automated process. Although this is not a feature of the current version of Blackboard being utilised by the institution, the upgraded version does include an integration module which can address a number of issues raised under Blackboard challenges, particularly in relation to the accurate enrolment of students for courses on Blackboard.

4.5.6.3 Unified adoption of technology throughout programmes:

The student survey reflected a strong call for staff members to adopt a unified approach to the implementation and utilisation of Blackboard. The rationale cited for this is varied, however students have identified the utility value in the convenience of accessing material online twenty-four hours a day and indicate that it would be preferable to have all of their courses available on Blackboard. This is illustrated in the following extracts:

Student Survey

> *…all lecturers should post their notes and PowerPoint presentations on blackboard. We should also be allowed to do more tests on Blackboard…*

Student Survey

> *…I would prefer it if all the lecturers stuck together- either they all use blackboard or they don't. it's very frustrating trying to organise things when half are using and half aren't…*

4.5.6.4 Varied use of Technology

This code is almost a sub-code of "Unified adoption of technology throughout programmes" in that the students acknowledge that some of them still engage with and make use of the local network drive in terms of accessing course resources. However, the point made is that part engaging with teaching pedagogy for these pre-service teachers involves adapting to learners preferred learning styles through engagement with multi-cultural education practices. Similarly, student participants are calling for the varied use of technology as both learners and future educators. This point is illustrated in the extract below:

Student Survey

> *…lecturers teach us about multicultural education and how we need to adapt to all learners. Some learners prefer v-drive and some prefer blackboard and therefore lecturers should accommodate all learners…*

The extract above illustrates aspects of diversity related to preference in terms of accessing online course material. While many lecturers accommodate a variety of learning styles into course planning and delivery, it is deemed appropriate by the student participants that they also accommodate the various electronic access needs as noted by the student in the abovementioned extract. However, while this

may be a point to take into consideration it is important to note that Blackboard is a LMS encompassing so much more than simple resource deployment, but includes other aspects of course management including staff-student communication, collaborative tools such as online discussions, journals and blogs in addition to assessment and tracking tools.

4.6 Discussion of Findings

Lecturers participating in this study have identified that their classes had increased in student enrolments over a number of years. The findings of the data collected for this study made explicit the challenges experienced by these lecturers in the teaching and assessment of large classes. Additionally, the data revealed the benefits and challenges as experienced by both staff and students in the utilisation of the Blackboard LMS as a possible solution to these challenges.

4.6.1 Challenges identified in the teaching of large classes

Increases in student numbers as a result of the massification of education both locally as well as globally has impacted on the teaching and learning context in the classroom. A multitude of authors including Mulryan-Kyne (2010); Cuseo (2007); Isbell & Cote (2009); Buchanan & Rogers (1990) and Botha et al. (2005) have identified and described a number of challenges related to the teaching of large classes. In line with this, empirical evidence from data collected in this study revealed that within the large class environment, lecturers were unable to teach in ways consistent with the identified teaching paradigm, that of constructivism, and as a result of increased class sizes they were forced to revert back to more traditional approaches of teaching and learning such as presentation-based teaching. Consequently, their ability to connect with the vast majority of their students was compromised and ‘on the spot monitoring’ was no longer possible as one lecturer so succinctly noted.

4.6.2 Challenges identified in the assessment of large classes

Lecturers who participated in this study were unequivocal in their identification of an increased workload as a massive obstacle to the effective teaching and assessment of classes with large enrolments. In particular, they noted the turnaround time in providing relevant feedback to their students post-assessment as being far too long resulting in feedback occurring out of context and therefore rendering said feedback ineffective as possible tools of formative learning for their students. Authors, Buchanan & Rogers (1990); Mulryan-Kyne (2010) and Botha et al. (2005) concur that larger student numbers unquestionably translate into higher workloads in terms of marking, course development and management and classroom management. Blackboard has once again been identified by lecturers as having the potential to better manage the area of assessment in large class situations by affording them the opportunity to assess more often without the added workload thus freeing their time for other types of engagement with their students.

4.6.3 Benefits of Utilising Blackboard as a Teaching and Assessment tool.

The benefits of utilising Blackboard for the teaching and assessment of large classes were identified as many with the overarching benefit of utilising the LMS as identified by both staff and students being that of convenience and accessibility. In the context of the information age, 21st century education has a very different look and feel in comparison to previous epochs. Siemans (2004) notes the fast paced manner in which knowledge is created, distributed, accessed, applied and subsequently rendered obsolete. In this context, students expect to be able to access their official courses in much the same way that they can access social networks, webmail and search engines. It thus becomes a question of lecturers meeting students where they are at while still maintaining the integrity of HET programmes.

Lecturers have noted the benefits in terms of the value which can be added by adopting a blended learning approach by including technological components in

addition to face-to-face contact. They utilised Blackboard as efficient in terms of resource deployment and reflected on the utility value in being able to upload a variety of resources for convenient student access at the click of a button. Additionally, lecturers noted the potential which Blackboard offered them in terms of including multi-media resources as micro-lessons or as a tool to scaffold complex mathematical concepts. In relation to the convenience of being able to efficiently deploy course material and multi-media files for student access, student participants mirrored this benefit in their responses by focusing on the convenience of being able to access their course material as and when it suited their needs. Similarly, both students and staff found that access to the other in terms of simplified communication was a tangible benefit adding to the convenience factor of utilising the LMS. Furthermore, both lecturers and students alike noted the possible positive environmental spinoff from the use of Blackboard in terms of the dissemination of resources necessitating less printing of resources. As noted by one lecturer, students are able to print the resources should they require them, however since much of the available academic resources are accessible through the web, many students may only choose to print resources if absolutely necessary impacting positively on the environment as well as a cost-saving measure.

In line with benefits noted with regards to communication, lecturer's further noted both the potential benefits and experienced benefits of utilising Blackboard in order to effectively support their students which in the context of large classes is becoming increasingly more difficult to do. Isbell & Cote (2009) highlight the benefits of increased student-lecturer contact in terms of motivating students and facilitating the provision of requisite support, regardless of whether it is comes in the form of online or face-to-face contact.

From a lecturing perspective, assessment of large classes by making use of the Blackboard assessment tool has lightened the workload considerably in terms of marking, however it must be noted that as it was reflected by the lecturers that appropriate assessment even through the use of short answer questions such as MCQ's or True/False type questions is dependent on the amount of work put in

during the creation of the assessment and while this is particularly time-consuming, especially during the early stages of an implementation, the payoff is without question realised in terms of marking turnaround time, efficient feedback and potential timeous diagnostic evaluation of ‘at risk’ students in order to offer requisite support.

4.6.4 Challenges of Utilising Blackboard as a Teaching and Assessment tool

In spite of the overwhelmingly positive reception of the implementation of Blackboard was not without its challenges it is important to be mindful of the fact that it is merely a tool, the utilisation of which brings with it a host of new challenges. This is corroborated by the work of Czerniewicz and Brown (2009) who reflect on some of the challenges experienced in the implementation of Information and Communications Technology (ICT) in the HET context and in line with this staff and students alike noted a number of challenges experienced in the utilisation of Blackboard. Lecturers in particular acknowledged the generational gap in terms of their personal acquisition of ICT related skills in relation to the majority of current students in terms of both aptitude and attitude. Data collected in this study revealed that it is accepted that older staff in particular are less able to access technology in both a literal and figurative sense and conversely, the majority of the student population is technology driven. Although the system was identified as ‘intuitive’ and ‘easy to use’ the issue of personal competency and the development of the skill required to use the system effectively was raised by both lecturers and students alike a number of students noted initial challenges in the acquisition of skill required to navigate the Blackboard system.

The introduction of technology in the context of inequitable distribution of resources is in itself problematic. Additionally, in the context of massification the subsequent diversification of the student population, acquisition of the requisite skills for the effective utilisation of technology by all staff and students is impacted by prior access to learning opportunities in this area. Czerniewicz & Brown (2009) reflect on

the disparity in technological ability due to the diverse nature of the student population and note this as a constraining factor in the implementation of technology in HET's.

In addition to this, challenges related to access to resources in terms of laboratory space, functional computers and lack of a dedicated e-assessment venue were noted. Students in particular were frustrated by lack of physical access to Blackboard on campus and also noted the impact of network constraints on their access to the system including scheduled and unscheduled downtime during maintenance.

4.7 Summary

This study has through the elicitation of data from both students and staff who participated in the study, identified strengths and weaknesses for the use of the Blackboard LMS as a means to address the issues identified in the teaching and assessment of large classes in addition to adopting a methodology in order to engage students in their academic learning processes in ways consistent with 21st Century trends.

The use of Blackboard for the purposes outlined in the study undoubtedly afforded the lecturers the opportunity to assess a wider range of skills and competencies through being able to assess more often without the concern of additional marking thus rendering them more able to utilise the results in a diagnostic manner in order to identify and subsequently support 'at risk' students in addition to utilising the assessments in order to reflect on their teaching practices in the coverage of complex concepts and associated content. Additionally, online assessment provided the immediate benefit of effectively reducing lecturer workloads in terms of what was noted as previously untenable marking requirements while concomitantly increasing the validity of assessments in terms of increased objectivity in marking by eliminating the opportunity of the lecturers to be subjective in mark allocation.

Furthermore, the benefit of students being able to access test memoranda post-assessment afforded them the opportunity to analyze their assessment related achievements effectively plan and revise as necessary thus impacting on the creation of self-regulated learners. Finally, the utilisation of the system allowed for convenient deployment of, and access to, a variety of resources while facilitating streamlined student-staff communication.

As noted in this study, the implementation of Blackboard was not without its weaknesses which although were not noted as having impacted significantly on the overall Blackboard experience of staff or student participants, require some reflection for further refinements and re-implementation. Human capacity, knowledge and skill are noted as the weakest points in this study, in particular the proliferated utilisation of Multiple Choice Questions (MCQ's) and True/False type questions as the preferred method of assessment has led to a heightened awareness of the skills required in the effective use of these assessment formats which are presently limited by ability to access higher order cognitive processes through the use of these question types. Additionally, in keeping with the theme of human capacity, another identified weakness of the system is that of accuracy which is wholly dependent on the accurate input of the lecturers who are under high pressure circumstances such as limited time, are more prone to make such errors. Furthermore, the limited university resources available as highlighted by both staff and students in terms of both dedicated assessment laboratory space as well as public access laboratories severely weakens the implementation as access is key to the successful utilisation of the system.

This chapter focused on the presentation and analysis of the data collected in this study. In addition the findings of the data were discussed in so far as they addressed the first three sub-questions framing the study. The following chapter is the final chapter and focuses on an in-depth discussion of the fourth and final sub-question addressing the implications for the future utilisation of Blackboard in addition to the main research question leading the study.

Chapter 5

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The previous chapter presented, analysed and interpreted the empirical data. This chapter provides a comprehensive discussion of the findings drawing on theoretical underpinnings and literature presented in chapter two in an effort to ground the findings, draw conclusions and make recommendations based on the findings.

The aim of this study was to explore the utilisation of Blackboard lecturers who implemented the LMS as a teaching and assessment tool in an effort to manage the challenges inherent in the teaching and assessment of large classes. In order to ensure complete coverage of all pertinent aspects and arising issues, the following questions guide the discussion of the findings revisited below and addressed in the sections that follow:

- *How is Blackboard used as a tool for teaching and learning in large classes?*
- *How is Blackboard used as a tool for the assessment of large classes?*
- *What implications does the use of Blackboard have for teaching, learning & assessment?*

5.2 Contextual nature of Large Classes

The definition of a ‘large’ class is somewhat arbitrary as noted by Buchanan and Rogers (1990) who identify a ‘large’ class as exceeding 80 students. Mulryan-Kyne (2010) concurs with the arbitrary nature of defining large classes and additionally reflects on the impact of resources on the definition of ‘large’. Consequently, large is not necessarily only a numbers-based equation, but needs to take into

consideration the resources available to facilitate effective learning in the teaching and learning environment regardless of the physical number. During the interview process, participating lecturers identified that increases in student numbers over the past few years ranging from a class of approximately fifteen to thirty students enrolled for a mathematics course to the present enrolments of eighty and upwards have impacted significantly on their ability to teach and manage their classes effectively and efficiently. Buchanan and Rogers (1990), note that issues pertaining to the management of large classes are not significantly different from small classes, they are however magnified due to the increases in the volume of students, particularly with regards to administrative, communication and assessment related challenges. This is echoed by the participant lecturers and problematises the delivery and support of quality courses.

5.3 Using Blackboard for the teaching and learning of large classes

Botha et al. (2005) and Buchanan & Rogers (1990) note the impact of numbers on teaching methodology. In the context of this study, both lecturers indicated their preference in using constructivist teaching methodology, drawing on the work of Vygotsky, Piaget , Bruner and Gardner, all of which call for a hands-on approach. As such, the methodologies employed in an ideal situation would be socially defined and constructed in such a way so as to engage the learners meaningfully through the practice of scaffolded group work. However, lecturers can simply not employ the same methodology for a class of eighty students as they would for a class of thirty for a number of reasons including physical space and effective classroom and time management (Cuseo, 2007). Therefore, as reflected upon by the lecturers, their lectures tend to be reduced to what may be termed more traditional methods of teaching which fall outside of the constructivist framework, drawing instead on an instructivist model of teaching and learning through the utilisation of presentation-based instruction.

5.3.1 Use of Blackboard as a course deployment tool

In the context of the teaching challenges linked to large classes as identified by participant lecturers, the introduction of Blackboard as a LMS provided the lecturers with the opportunity to blend their teaching methods as informed by the constructivist model with online methods, thus providing the opportunity for them to enhance their students' learning through the distribution of online scaffolded material. The findings of this study identify that the lecturers made use of Blackboard as a platform to deploy course material to their students including learning guides, core readings as well as additional readings, mini or micro lessons in the form of pencasts and small video clips, scaffolding resources for complex concepts, policy documents and exam preparation material. In the context of a traditional face-to-face unidimensional mode of course delivery, many of these resources would be unavailable to the students due to financial constraints as the sheer number of students enrolled for each course would translate into a phenomenal amount of photocopying and printing. However, by making use of electronic delivery, the lecturers were afforded the opportunity to make a larger volume of resources available to the students without the added cost of photocopying and printing. Additionally, the deployment of course resources through Blackboard alleviated the need for students to access physical resources in the university library providing them with access to the resources without necessitating their physical presence thereby promoting the use of technology off campus wherever possible and releasing the pressure of growing student numbers on the limited physical resources available to them in terms of library access.

5.3.2 Use of Blackboard as a communication tool

In addition to the challenges identified by the lecturers pertaining to resource deployment and preferred teaching methodology in the context of larger classes, the participating lecturers further reflected on the impact of high student enrolments on their ability to engage with their students on an individual level. In particular, their inability to learn the names of all of the students enrolled for their courses. Cuseo

(2007) notes the benefit of individual student-lecturer interaction as impacting positively on student grades implying the converse when large numbers of students are involved, consequently decreasing the student lecturer interaction and negatively impacting on the ability of the lecturer to ascertain the extent to which their students have grasped complex concepts within any given contact session. Additionally, Mulryan-Kyne (2010) reflects on the concept of anonymity of students taking courses with high enrolments, noting that larger student numbers result in increased levels of anonymity of students impacting on the numbers of students engaging in uncharacteristically deviant behaviour within the classroom situation. Isbell & Cote (2009) further note the negative impact of large student numbers on student grades due to lack of motivation as a result of reduced contact with lecturers.

To this end, the communication tools in the form of the Announcement, Discussion and Email tools available within the Blackboard package provided the lecturers and the students with an alternative medium of communication the use of which has been reflected upon extensively in the preceding chapter. Empirical evidence revealed that the announcement tool in particular has been highlighted by both students and staff participants as having high utility value in terms of student-lecturer contact allowing for lecturers to communicate with students on a digital notice board accessible by students around the clock thus, assisting in the overall course management of large classes through in the facilitation of a more streamlined communication processes. This in turn alleviated much pressure caused by student driven discussions pertaining to administrative issues during class time and thereby allowing for more meaningful interaction during contact lectures.

5.4 Using Blackboard for the Assessment of large classes

Buchanan & Rogers (1990) point to the area of assessment as the breaking point for lecturers of large classes. Accordingly, out of sheer desperation these lecturers

either compromise assessment, and by extension student learning and development, in terms of assessment quality, quantity and category or consider innovative solutions as an alternative strategy. The implementation of a LMS can be considered an alternative to making the aforementioned compromises in the area of assessment.

The assessment and assignment tools available in Blackboard, allow for a variety of online assessments and the electronic submission of assignments. In the context of this study, lecturers made use of online Blackboard assessments through making use of the assessment tool in order to manage the challenge of assessment in their respective mathematics courses. Despite the variety in terms of question type available to the lecturers the starting point for both lecturers manifested in the form of the following “predefined answer questions”:

- *Multiple Choice Questions;*
- *True/False Questions;*
- *Matching Questions; and*
- *Fill in the Blank Questions.*

The lecturers opted to use the abovementioned question types in order to enjoy the automated marking feature associated with these question types. Additionally, these question types lend themselves to the subject of mathematics in ways that text-type productive questions required by text intensive courses such as language generally do not. While the students were still required to work out the answer manually as opposed to simply selecting the correct answer, thereby engaging them sufficiently with the content and concepts assessed, they were not required to produce text regarding the material during the electronic assessments. Assessments took place in a secured venue and were tightly monitored by an entire team including the lecturers, members of the Blackboard support as well as ICT personnel.

Empirical data showed that vast majority of students in this study engaged positively with the Blackboard-based assessments and most reported unambiguously the extent to which they enjoyed making use of the assessment tool, and in particular, the efficiency with which their results with relevant feedback was made available to them. Botha et al. (2005) reflected on the 21st Century learner as a strategic one, although arguably, HET students are strategic in nature and prefer an efficient approach to learning. Therefore, students comments on the efficient nature of Blackboard in terms of turnaround time and availability of their results through the progress tracking tool is consistent with Botha et al.'s (2005) argument as it informs the effort required to put in for personal learning goals whether this be gaining a distinction or simply accruing sufficient points in order to gain access to the examination.

5.5 Limitations of the implementation

The nature of implementation of a new system or innovation is such that no implementation is without challenges, some of which can be addressed in the course of the implementation through ongoing evaluation and subsequent adjustments while others are pervasive in nature and require a more long-term approach in terms of change management. Similarly, it is possible to identify some challenges from a theoretical perspective, while others require an emic perspective in order to ascertain limitations as experienced on the ground. Despite the undeniably positive experience as identified by the students and the lecturers in the use of Blackboard for teaching and assessment purposes, they also identified a number of limitations.

5.5.1 Student identified limitations

Students identified the limitation of utilising Blackboard selectively for specific courses in an academic programme, making the argument that selectivity compromised the efficacy of Blackboard in terms of communication and resource

deployment when viewed in the context of entire programmes as opposed to specific courses. As such, students called for the unified adoption of Blackboard by lecturers throughout programmes. Additionally, students identified a second limitation pertaining to the implementation in terms of the scope of the Blackboard training provided by the Blackboard team in that the focus of the training was limited to a PC/laptop platform and failed to cover the use of the system on other electronic devices, in particular, mobile electronic devices such as smart phones. The third limitation from the students was that the utilisation of Blackboard without the aid of a secure browser becomes an additional limitation in terms of assessment security.

5.5.2 Lecturer identified limitations

Lecturers identified administrative limitations related to the initial use of the system stemming from the absence of an integration module which would thus enable the automated upload of student details from the university database for a specific course. Lecturers further identified limitations related to the optimum use of Blackboard pertaining to their own expertise and skill in utilising the system in addition to the external constraints placed upon the use of Blackboard in terms of physical, electronic resources in addition to development of Blackboard specific materials.

5.6 Conclusions

The limitations highlighted by both students and lecturers point to a number of issues corroborated by the researcher, specifically, the limited way in which Blackboard was utilised in this study. Although the focus of the study was on the use of Blackboard as a tool to better manage the teaching and assessment of large classes, the level of skill and associated knowledge of lecturers impacted the way in which the LMS is integrated into existing teaching and assessment practices. Similarly, the accessibility of Blackboard to students both in terms of physical resources as well as access on personal electronic devices, combined with student knowledge and competency in the use of the system is viewed as a limitation to the

study. Furthermore, the limited question format can be viewed as a threat to the validity and reliability of the assessments also related to lecturer knowledge and skill of the appropriate construction of limited format questions in order to effectively assess appropriate skill, knowledge and competencies. Finally, the implementation has been viewed by many in a critical manner as the vast majority of staff members view Blackboard as increasing their workloads rather than considering the possibilities of integrating it in such a way so as to enhance their teaching, learning and assessment practices without the added strain of additional work.

5.7 Implications for the use of Blackboard for teaching, learning and assessment

Lecturers noted the potential of the Blackboard system in the development of a purely blended approach to teaching, learning and assessment as opposed to simply 'dumping' traditional materials online. However the implication for the use of Blackboard for teaching, learning and assessment of large classes is not simply a simple switch from one medium of teaching to another, but rather a fundamental shift in the way in which future courses may be conceptualised. While the transfer from traditional course delivery to electronic resource delivery is a step in the blended learning direction, freeing staff from some of the onerous marking associated with continuous assessment of large classes, the next step is the development of interactive learning materials as part of future recurriculation in keeping with the policy, vision and mission of Higher Education in South Africa espoused by the Higher Education Act 101 of 1997. This translates into a close working relationship between faculties and academic development practitioners in close collaboration with e-Learning consultants and ICT staff as the effective implementation of Blackboard as well as the ongoing development of electronic resources and staff and student support require a team approach.

5.8 Recommendations for future study

This study identifies that the opportunities for the future use of Blackboard as a tool of teaching and assessment are only restricted by the way in which the use of the tool is conceptualised. Students have identified the need for a unified approach the system across programmes, which along with the improved implementation of the system based on this study to include innovative ways of using the LMS strategically is key. However, decisions with regards to the complete adoption of Blackboard for communication and course deployment purposes may require some consideration by the Faculty. This study points to the opportunities for further study pertaining to the challenges and processes involved in the effective engagement of academic staff which is required in order to make the shift from purely traditional methods of teaching and assessment towards a thoroughly blended approach.

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APPENDIX 1: EXAMPLE OF COVERING LETTER TO PARTICIPANTS (Lecturers)

Dear Participant,

Your participation has been invited for the purpose of research. The topic of this research is "Using Blackboard as a tool of teaching and assessment in Mathematics phase studies: a case study of second year level Bachelor of Education students in one university in South Africa" This research is being conducted by Alanna Riley who is an Education Masters student at the University of Fort Hare, East London campus.

Participation will include, the implementation of Blackboard as a teaching and assessment tool, evaluation of the implementation in the form of a survey and an interview at the end of the course for which Blackboard has been implemented.

Your participation in this research is entirely voluntary. Although no discomfort or stress is foreseen in the participation process, you have the right to discontinue your participation at any point during the course of the research.

You will not be remunerated. Benefits from participating in this research include personal and professional development in the form of skills gained as a result of implementing Technology Enhanced Learning in your courses. You will not be counselled in any way by the researcher and interview questions will strictly be focused on the implementation of Blackboard in your courses for the purposes of assessment and your experience thereof.

Your participation will be kept confidential. While it is necessary to tape record the interviews for the purposes of analysis, identifying information such as your name will be omitted or changed from the transcript. The interview tapes will be destroyed once they have been transcribed. The transcripts will be kept on record in a secure file which will be stored within the education department at the university.

The data will be open to the perusal of the research supervisor and the completed dissertation will be examined by two other persons who are nominated by the university. The findings of this research can be made available to you. This requires that you notify the researcher of your wish to have a copy of the findings as well as furnish the researcher with your postal details. The researcher will answer any further questions that you may have about the research during the course of the project.

Thank you for agreeing to participate in this study.

_____ _____

Signature of the researcher Date

Alanna Riley, Telephone 043-704 7276, Email ariley@ufh.ac.za

Please retain this form.

APPENDIX 2: EXAMPLE OF CONSENT FORM (Lecturers)

I, _____ , agree to participate in this research.

The following points have been explained to me:

1. Participation is entirely voluntary and that I can withdraw my consent at any time.
2. The focus of this research is on the implementation of Blackboard as an assessment tool in my course (s) and the evaluation thereof
3. Participation involves the following:
    a. Implementing the use of Blackboard as a teaching and assessment tool
    b. Evaluating the implementation in the form of a survey
    c. Participation in an interview post implementation and evaluation.
4. Although no discomfort or stress is foreseen, I reserve the right not to answer any question at any time during the interview process.
5. Participation in this research will be completely confidential and will not be released in any individually identifiable form.
6. The researcher will answer any questions I wish to ask about this research now or during the course of the interview.

_____ _____

Signature of Participant Date

_____ _____

Signature of Researcher Date

Alanna Riley, Telephone 043-704 7276, Email ariley@ufh.ac.za

APPENDIX 3: EXAMPLE OF PERMISSION AND RELEASE FORM (Lecturers)

USE OF TAPE RECORDINGS, COURSE CONTENT AND WRITTEN MATERIAL FOR RESEARCH PURPOSES PERMISSION AND RELEASE FORM

Participant Name: _____

Contact Details:

Address: _____

_____

Telephone number _____

Name of Researcher: Alanna Riley

Level of Research: Masters

Brief title of project: Blackboard implementation in the Faculty of Education

Supervisor: Prof. X. Mtose

DECLARATION

(Please initial blocks next to statements that apply)

1. The nature of the research and the nature of my participation have been explained to me both verbally and in writing.	**Signature:**
2. I agree to be interviewed and to allow audio-tape recordings to be made of the interviews.	**Signature:**
3. The tape recordings may be transcribed only by the researcher.	**Signature:**
4. I agree to allow the researcher access to my course on Blackboard	**Signature:**
Date: **Witnessed by researcher:**	

Alanna Riley, Telephone 043-704 7276, Email ariley@ufh.ac.za

APPENDIX 4: DATA COLLECTION TOOL: INTERVIEW SCHEDULE (LECTURERS)

Thank you for agreeing to be part of my research. This research forms the basis of my Education Masters degree and the information provided by you during the interview process will remain confidential. Although no discomfort is foreseen, you are reminded that you may withdraw from the study at any time should you choose to discontinue your participation.

1. Tell me about yourself - your teaching context

2. What challenges do you experience in teaching larger classes than previous years?

3. Why did you choose to make use of Blackboard this year?

4. What value did you expect Blackboard to add to your existing teaching and assessment strategies?

5. To what extent were these expectations met/exceeded?

6. What enabling and/or constraining factors were experienced in the use of the Blackboard technology on the part of

- The students
- Yourself (Lecturer)

7. What kind of support was required for both yourself and your students?

8. Do you feel that the support provided was sufficient for the kind of technology which was implemented for both yourself and your students?

9. Please give an indication regarding the measure of success of the use of this technology.

10. Will you use the Blackboard Technology as a teaching and assessment tool in future courses?

11. If yes, will you use it in the same way as you have this year or will you make changes based on this experience?

APPENDIX 5: DATA COLLECTION TOOL: ADDITIONAL QUESTIONS FOR REFLECTION(LECTURERS)

1. Please identify your teaching philosophy/philosophies – i.e. Which theory underpins your teaching? For example constructivist/behaviourist/cognitivist etc

2. Did blackboard provide you with the tools to assess your students in line with your teaching philosophy?

3. Please identify the process you experienced of developing higher/lower order questions making use of MCQ's, True/False, matching etc (bearing in mind that this is a second year course)

4. Any other comments you would like to make regarding the use of Blackboard for assessment purposes.

APPENDIX 6: EXAMPLE OF COVERING LETTER TO PARTICIPANTS (STUDENTS)

Dear Participant,

Your participation has been invited for the purpose of research. The topic of this research is "Using Blackboard as a tool of teaching and assessment in Mathematics phase studies: a case study of second year level Bachelor of Education students in one university in South Africa" This research is being conducted by Alanna Riley who is an Education Masters student at the University of Fort Hare, East London campus.

Participation will be limited to anonymous participating in online surveys regarding the implementation of Blackboard as an assessment tool.

Your participation in this research is entirely voluntary. Although no discomfort or stress is foreseen in the participation process, you have the right not to complete the online surveys. You will not be counselled in any way with regards to your coursework by the researcher and survey questions will strictly pertain to your experience of using Blackboard for your course assessments.

Your participation will be kept anonymous and surveys will be kept electronically by the researcher until the completion of the research project and then destroyed.

The data will be open to the perusal of the research supervisor and the completed dissertation will be examined by two other persons who are nominated by the university. The findings of this research can be made available to you. This requires that you notify the researcher of your wish to have a copy of the findings as well as furnish the researcher with your postal details. The researcher will answer any further questions that you may have about the research during the course of the project.

Thank you for agreeing to participate in this study.

_____ _____

Signature of the researcher Date

Alanna Riley, Telephone 043-704 7276, Email ariley@ufh.ac.za

Please retain this form

APPENDIX 7: DATA COLLECTION TOOL: STUDENT SURVEY ADMINISTERED ONLINE

1. Informed consent:

I agree to participate in this research. The following points have been explained to me:

1. Participation is entirely voluntary and that I can withdraw at any time.
2. The focus of this research is on the implementation of Blackboard as an assessment tool in my course (s) and the evaluation thereof
3. Participation involves taking part in an anonymous online survey regarding my experience of using Blackboard to take course assessments.
4. Although no discomfort or stress is foreseen, I reserve the right not to answer any question in the survey.
5. Participation in this research will be completely confidential and will not be released in any individually identifiable form.
6. The researcher will answer any questions I wish to ask about this research now or after the survey has been submitted.

- I accept and understand the terms of participating in this research project survey

2. Please indicate your Phase Group

- IPS
- FPS

3. What was your first/initial experience of using of Blackboard for your Mathematics course this year?

4. What has been your overall experience regarding the use of Blackboard for the abovementioned courses this year?

5. What do you feel contributed to this experience (positive and negative impact?)

6. Where and how have you accessed Blackboard? For example University Computer Labs/ Home internet on your Laptop or PC/ Smartphone/ University Residence

7. What challenges have you experienced using Blackboard?

8. What did you like most about using Blackboard?

9. How did you experience using Blackboard for exam purposes?

10. How would you like Blackboard to be used in future?

11. How would you rate your Blackboard experience so far?

- 1. Extremely Positive - I would like to use Blackboard for more of my coursework.
- 2. it's been a good experience so far.
- 3. It's okay, I am getting the hang of it.
- 4. I use it because I can access the course material online.
- 5. I have had too many challenges related to Blackboard and would prefer only classroom based teaching and assessment.

APPENDIX 8: INTERVIEW TRANSCRIPT – LECTURER A

Interviewer: Alanna Riley (AR)

Interviewee: Lecturer A (LA)

AR: well, first of all, thank you for agreeing to be part of my research and as indicated in the covering letter, this research forms the basis of my education masters degree and the information provided by you during the interview process will remain confidential although no discomfort is foreseen you are reminded that you may withdraw from the study at any time should you choose to discontinue your participation

LA: okay

AR: okay firstly I want you to tell me about yourself specific to your teaching context so your teaching background

LA: mmm

AR: and then what you are teaching at the moment

LA: okay, teaching as in school teaching or teaching as in varsity teaching?

AR: well your teaching background, so a little bit of a history

LA: okay well I qualified as a teacher many moons ago with a specialisation in foundation phase and I taught for over twenty-five years my teaching background was predominantly foundation phase a little bit of intermediate phase when I needed to fill in but uh I started teaching in school which had grade 1 to matric so I also did a grade 9 subject when I was at that school and grade 7 also then after I finished well while I was still teaching at this school I decided that I needed to do my honours degree and then I started masters and that's when I came to teach here at the varsity and I lecture now foundation phase students, teaching students year one, two and three and while I do phase studies and phase studies includes maths, literacy and life skills but because I have a great interest in maths I do predominantly teach the students maths I do a little bit of life skills and) a little bit of language as well.

AR: Okay when you started teaching at university what were the numbers like in your classes

LA: oh 13 in a class I still remember my very first year that I taught 13, 15 if you had a class of 15 foundation phase students then it was a big class then it went on to bigger numbers we went on to about 40 foundation phase students and now we're talking about in excess of 90

AR: and obviously teaching strategies have to change

LA: oh absolutely, absolutely

AR: okay then, can you tell me what challenges you have experienced I mean you have identified that the numbers have increased over the years

LA: yes, yes

AR: can you identify the challenges that you have experienced in teaching these larger classes

LA: well we don't have that one-on-one contact like we used to have in the past where you could really support your weaker student and really get to know what their problems are and teach properly like that but the other thing is also that um it's almost impossible to um to give them the kind of assignments that we used to give them in the past we used to do lots of reading and then reflect on journal articles and when it came to how to teach and stuff and then and it's impossible to do that now we used to do like an article a week and everyone would hand in a reflection

AR: so almost like an honours seminar?

LA: yes, yes and then of course when it comes to assignments academic assignments it's so difficult to mark because of such big numbers and then assessments also, the assessments that we used to do each cycle and marking, marking is becoming really, really challenging

AR: so very time consuming?

LA: mmm so much so that it ends up like you spending more time with the marking that you should be spending with the students and working with them and helping them learn how to really teach the subject

AR: and in terms of turnaround time?

LA: turnaround time used to be a few days in the past, but with the big numbers in each class and you're giving assignments to each class turnaround time becomes ineffective, your assessments and all that because the students have almost forgotten what they have written and things like that because it's taken quite a while to mark and to give them feedback

AR: and the type of feedback that you can give them when you've got that many students is obviously going to be limited

LA: oh yes absolutely, I try to make notes as I mark but then you find that you're writing a whole manuscript

AR: okay let's talk about using Blackboard

LA: yes

AR: why did you choose to make use of Blackboard this year?

LA: well I use Blackboard as a teaching tool and for assessment so I do a lot of my lectures that I present electronically then I put all my notes on Blackboard all my readings that I need for them to have I put on Blackboard because it's number one

it's saving a hell of a lot on paper and the other thing is that the students get it immediately and then they can choose to save it and have it constantly or they can choose to print it on hard copy if that's what they need so I have been um using it to teach and I have been using it to assess as well

AR: okay this sort of leads into the next question which is what sort of value did you expect Blackboard to add to your teaching

LA: it's invaluable I find it absolutely invaluable because of the fact that even if I am reading something if I find something that's interesting I can put it immediately onto Blackboard for the students and if I need for them to come to a lecture or have something ready for a lecture before I see them I can post all that on Blackboard

AR: So in terms of communication and access to resources?

LA: fantastic, yes

AR: and then what enabling and constraining factors were experienced by using Blackboard technology firstly from your perspective as a lecturer and then from your perspective on the part of the students

LA: okay the constraint I find is that a lot of students just don't bother to check what's on Blackboard and but also I think it's something that they going to get used to with time but you generally have to remind and remind them while some students are very good at making sure they check Blackboard regularly if there's anything that I've put on um there's always those who will say "oh I haven't seen it" or "oh I didn't have a chance to go on" you know and things like that but that's the only constraint that I've found

AR: and would those be the same students

LA always, always

AR: the same students that would say I didn't see the notice on the notice board?

LA: yes, yes, yes, and it's always the same students even though they know how I use Blackboard so much but they will still say "oh we forgot to check" or "we didn't check" and yet they know that they should be checking it on a regular basis

AR: and you didn't find that there were any issues around their level of technology-based skill?

LA: no, no, no, no, no it's not a problem that what I did find also though is that sometimes a document is too big then it refuses to let you upload it

AR: there's a 10 megabite restriction

LA: yes yes yes

AR: that's something that is set at a higher level and we'll have to look into that

LA: yes, yes

AR: okay what type of support was required by both yourself and your students?

LA: well all the support that I got fortunately for me, you were just a phone call away or just an email away so all that that has been fantastic I just know that if I had a problem I could just email you or call you

AR: so the hands-on support?

LA: has been fantastic

AR: it's been important?

LA: yes, yes I wouldn't have been able to do it alone because I'm a little bit of a dinosaur when it comes to technology but the kind of support I got from you was fantastic so I didn't ever feel that I am going to sound stupid if I ask or if I can't do something

AR: and availability?

LA: oh well you have always been available thank you and of course the students also, the students, I found that the students latched onto this very quickly they were able to access it with no problems but you obviously did train them

AR: yes there was training, all of the students were trained at the beginning of the year

LA: at the beginning of the year, yes

AR: and could you give an indication of the measure of success, how successful do you think that this Blackboard implementation, however small was?

LA: well I think from my part it was extremely successful and I still plan on using it now when the students come back from school experience we're going to be doing a test it's fantastic I mean I set the test and while it may be true or false or multiple choice the students still have to do the working out and the minute they press submit, it's marked so it's like a huge weight off me but at the same time I know that my students are getting the kind of assessment that they need

AR: and of course it has been highlighted by students that they like the instant results

LA: yes, yes I like it and they do and also it's also fair because it's not subjective

AR: and you're not tired while you're marking scripts

LA: oh it is fantastic to know that at the end of the test when everyone walks out that I've got my list of marks already

AR: okay will you use Blackboard technology as a teaching and assessment tool for future courses

LA: absolutely, absolutely and you see I am now getting more and more comfortable with it so I do think that I will be using it even more

AR: okay last question would you use it in the same way or will you make changes based on this year's experiences

LA: well the more I learn the better I think I'll become at it and I'll definitely be using my experience from this year but hopefully next year I will be a little bit better at it.

AR: okay well unless you have anything else to add that's all the questions I have. Thank you and I will let you know how the project goes

LA: thank you so much

APPENDIX 9: INTERVIEW TRANSCRIPT – LECTURER B

Interviewer: Alanna Riley (AR)

Interviewee: Lecturer B (LB)

AR: okay first of all thank you for agreeing to be part of my research and as indicated in the covering letter this research forms the basis of my education masters degree and the information provided by you during the interview process will remain confidential although no discomfort is foreseen, you are reminded that you may withdraw from the study at any time should you choose to discontinue your participation

AR: first of all tell me about yourself your teaching context a little bit of history so um when you started teaching and where you are at now

LB: okay I started teaching in 1985. I have in the last thirty years taught nothing less than 60 different subjects I have from my very earliest days in teaching always taught mathematics I am currently teaching mathematics

AR: and your area of specialisation is intermediate phase?

LB: no not at all my real background in maths has been at a post-matric level and quite interestingly I have over many years slowly and methodically worked from a post-matric level down through the levels to where I am now and in this case I am working at an intermediate phase level maybe in 3 or 4 years time I will be working at foundation phase but that's an interesting reversal of a typical path and I've enjoyed it

AR: and at the moment you are teaching intermediate phase maths?

LB: yes, yes

AR: across the board?

LB: across many platforms yes, many different types of students pre-service and in-service students

AR: when you started teaching how many students would you have in a class?

LB: now are you talking 1985?

AR: let's say from when you started at this university

LB: at this university I would imagine that a typical class would've been somewhere between 30 and 40 students sometimes quite a bit smaller in fact there was one year when we had 12 students as a total intake I can't remember if I taught them maths but with that as a total intake you can imagine they were a small group but again 30 to 40 maybe 50 would have been a typical scenario 8 or 10 years ago

AR: and what are your class sizes now?

LB: many of the classes are running at 50 to 70 and 80 and my biggest single class in this subject mathematics, is currently 180

AR: and what challenges did you or do you experience in teaching large classes than previous years?

LB: the biggest single challenge is let me just think this through, you lose the capacity to unpack and develop deep concepts and skills, and you lose the capacity to provide scaffolding and support to individuals; thus you may end up perpetuating the very thing you wish to alleviate, math anxiety, with all the baggage that that entails, you become more of a lecturer than a teacher, you become more of a demonstrator than a facilitator who enables students to participate. I like activities-based teaching and learning, and I like student-participation and I continue to encourage it but now it happens less on a very limited level, again because of the limited contact time and the pressure of large class sizes, a second thing which I have noticed is you lose well for example I don't know the names of all of the students in my classes anymore you certainly lose that one-on-one personal relationship which was possible with a group of 30 or 40 students, so many of the students remain anonymous and the efficacy in terms of classroom-based presentation is questionable. I would suggest I would suggest that often times, and because of many intermeshing mistakes, myths, and misunderstanding of the big mathematical ideas many students just don't get it, they have nothing to hold onto many things go right over them go past them and you only pick this up in tests, The large class sizes conspire against the on-the-spot monitoring and remediation which was possible with the smaller groups

AR: okay so you've identified that you lose being in touch with the students, as in knowing exactly where they are at academically, knowing whether they have mastered a foundational understanding of the concepts?

LB: I agree

AR: and what about assessment

LB: well my assessment strategies are changing and in this regard Blackboard has been a particularly exciting opportunity or has offered a particularly exciting opportunity for me if we put aside any particular group and talk about my global work requirement the marking workload and just keeping on top of assignments and tests using our traditional techniques has just become stupidly out-of-kilter and Blackboard offers me this opportunity to quite effectively monitor and evaluate the students' performance regularly

AR: would you say that Blackboard gives you the opportunity to assess more often than if you were only using traditional methods?

LB: I think the Blackboard software itself gives me that potential but there are infrastructural tensions in terms of access to the laboratory which means that is also a compromised position

AR: okay well I think that we may have already covered the next question which is why you did choose to make use of Blackboard this year. Would you like to elaborate on that on what you have already said?

LB: well personally I have been looking into the whole e- learning condition for a number of years I think that it's an incredibly exciting time to be teaching I really love the quick interactions that one can generate between myself and Youtube between myself and Google between myself and other learning platforms and I am talking about e-and i-based learning platforms and for 2 or 3 years I been involved in a distance programme in which Moodle has been the learning what do you call these things?

AR: Learning Management System

LB: so there has been a proactive slant on my side but separately also reactive in terms of the requirement that I pick this thing up, but I must say that I found Blackboard intuitively easy to use, I love Blackboard

AR: what value did you expect Blackboard to add to your existing teaching and assessment strategies?

LB: I don't know that I wanted it to add value let me tell you that my personal view my own hopes and desires are based on the idea that I can support my students in many ways instantly using a platform like Blackboard and I think that Blackboard actually delivers that to me so Blackboard gives me the capacity to support my students in many innovative ways and Blackboard doesn't restrict my opportunity to work with my students to a particular time and place it offers us a seven-day-a week 24 hour service I think that that's hugely hugely beneficial and to that end I have been investing in various software and hardware technologies to support my students I have an intelligent pen which I use I have borrowed an intelligent data projector I make use of youtubes I write courseware that goes onto Blackboard

AR: so you feel that Blackboard was able to deliver on making use of those technologies and making them available to students and that your expectations were met

LB: oh yes, oh yes ,definitely and much more so I think, the only hiccup is that students are computer literate but they only see it in terms of Youtube and twitter, they haven't yet twigged how powerful Blackboard is but that will come

AR: okay well that comment leads onto the next question which is around enabling and constraining factors and you have alluded to these factors already during the course of the interview but let's talk about enabling factors for yourself and your students from your point of view and then also constraining factors so it's quite a big question let's start with yourself and your enablers

LB: the enablers what does it enable me to do? at the stroke of a pen or in this case a keyboard I can make an announcement to the students requesting them to bring things to class similarly I can send them covering letters for assignments similarly I can send them scaffolding documents to show them how to do things I have

produced, but cannot download onto Blackboard numerous video clips, numerous lessons numerous learning opportunities for the students which I have already recorded and which are available to them at the moment on occasion through the local network drive but not on Blackboard because of the upload restriction of 10 MB

AR: yes the current restriction is set to 10 MB per file

LB: the problem is that a typical Youtube file or recording is 16 to 20 MB

AR: okay and the enabling the factors for the students

LB: you know and I am sincere if I was a student and I know I am 55 years old but if I had Blackboard available to me and I had the resources that in this case I have made available to these students on Blackboard I think that I would be at the top of my game so as an enabler I think that it's incredibly powerful but now let's talk about the restrictions or what did you call them?

AR: the constraining factors

LB: the constraints are that and I don't think that the word constraints is quite appropriate but the constraints are that many students have just not come to the party although they're young and they know how to use these technologies so all of the positive indicators are there but in many cases they're not and now we have to find out why but one of the nice features of Blackboard is it's monitoring capacity and if you look into the monitoring options for different things um you will find that many students are going onto Blackboard frequently but many are browsing superficially we call it butterfly syndrome and many have not even got on board at all

AR: one of the things that I have picked up from literature is that students are strategic learners

LB: yes just in time

AR: so that they strategically go onto Blackboard to get what they need just to get enough so it becomes a question of prioritising and I don't think it's something that we will be able to change in a hurry but we can use the software to address some of those issues like engaging with course material online but if we go back to the issue of constraints you also mentioned some other issues earlier like in terms of lab space

LB: in my use of Blackboard the writing up of tests for example is onerous the payback of course is when the results come through but it really is quite a mammoth task to generate a suitable question list based on multiple choice questions or true or false questions, or whatever other combination of questions that one might use but for the rest no massive problems using it, it's pretty intuitive

AR: okay let's look at the kind of support required for both yourself and your students what kind of support was required, what worked, what didn't work?

LB: I think like so many things we can work very superficially on these things and stumble along and I think that that's happening right across the university in terms of all the software programmes that we use but in this particular case I was hand-held from my introduction to Blackboard all the way through to a position where I was pretty competent on my own this does not mean that I don't need any support now or in the future and I think that this did expedite my easy adoption of Blackboard

AR: okay and do you feel that the support that was available to the students was sufficient from the outset?

LB: I really wasn't privy to how it was done

AR: okay what happened with the students was that the entire pre-service cohort was trained on Blackboard as part of their orientation programme in February this year, the training was by means of presentation, because of the huge numbers it wasn't a hands-on type of training but the Blackboard support team was available, and is available to students through the Blackboard helpdesk and through consultations, so that was what is available to the students

LB: none of them seemed to have any problems with it young people seem to have no fear of them whatsoever in fact, in my experience they look forward to making use of these technologies in their lives and I think that that their positive view of technology was abundantly evident in the online exam be did earlier in the year They seemed to be really, really comfortable using Blackboard

AR: okay can you give an indication of a measure of success of this implementation?

LB: what do you mean?

AR: do you think that the Blackboard implementation was successful?

LB: without a shadow of a doubt in fact this has been one of the highlights of my last 2 or 3 years here, this is the big one this is a game changer that's my view and that's not because I am one of those people who loves IT and I do I don't deny it but in Blackboard, we're talking about a software package that has the capacity to profoundly and positively change the learning experience of our students

AR: would you use Blackboard technology as a teaching and assessment tool in the future?

LB: oh yes, without a shadow of a doubt

AR: and would you use it in the same way as you have this year or will you make changes based on your experience?

LB: from my fledgling startup, I have grown in competence and now have the capacity to create more cogent learning paths for my students

AR: unless there is anything else you would like to add thank you very much for you time.

APPENDIX 10: STUDENT SURVEY – SELECTED EXAMPLES

Question 2

What was your first/initial experience of using of Blackboard for your Mathematics course this year?

Response 9
I find blackboard a useful tool in that we can all experience a different way in using mathematics with technology and can go and take this experience with us in the classroom. Although it is preferred to write out the entire maths sum on paper and not just answer a multiple choice question. The steps need to be defined and shown step for step on how an answer is calculated

Response 15
it was good to be able to do tests on the computer. shows an advancement of technology. it was easier than writing a paper

Response 29
The best ever coz I have never really liked maths doing it on blackboard changed my view of it.

Response 35
It is an effective tool to conduct tests and communications. Convenient.

Response 43
I thought that it was quite a good experience with regard to the marks being shown to me as soon as í had submitted the assessment. overall I enjoyed the experience and would like to continue using blackboard.

Response 50
i liked the idea of using blackboard as marks could be distributed straight after the test. it was a lot easier and quicker to use, except when you have to wait for a laptop to use

Response 54
it was awesome, and it made things much easier. In such that it helped me with notes because in the classroom sometimes i cannot take notes due to some problems

Question 3

What has been your overall experience regarding the use of Blackboard for the abovementioned courses this year?

Response 4
I have found it very helpful in regards to getting notes off of blackboard from home instead of having to come into varsity to get the notes off of v-drive

Response 9
I LOVE LOVE Blackboard. It is so great to be able to go home and access Blackboard and get notes and messages from lecturers and it is a nice accessible way to communicate with lecturers. It is a pity that many lecturers don't use blackboard and only opt for the V-drive. The V-drive is not conducive as it spreads virus's and can never get a computer at the lab because people are too busy looking at other content on the internet other than study purposes.

Response 17
Personally it was great knowing that maths normally deals with numbers yet this year we had face the linguistic side of it and using blackboard it came out easy

Response 32
it was easy for me to work through the kind of tests and it was better than writing them on the paper.

Response 44
Blackboard keeps things organised yet i wish they would use it more often.

Response 53
I enjoy using Blackboard to do tests, the only problem i have is that there needs to be more working laptops. Other than that i also like the fact that we receive our notes over blackboard as it makes things easier.

Question 4

What do you feel contributed to this experience (positive and negative impact)

Response 10
I enjoy sitting in the comfort of my study area at home and accessing Blackboard when I want and can go on at anytime. It really is a great system.

Response 17
the lecture notes which were made available via blackboard and other notification that came about.

Response 27
The fact that maths could be changed to more approachable approach and not boring pencil, pen, book, etc

Response 34
The fact that we can get messages from our lecturers and can get our lecture notes

Response 40
The marks being immediately submitted after a assessment had been completed, contributed greatly to a positive experience!!

Response 47
positive-can access blackboard from anywhere negative-some students are not fortunate enough to have access to blackboard any time and therefore if they are not at varsity need to pay to access blackboard

Question 6

What challenges/constraining factors have you experienced using Blackboard?

Response 8
can't open folders-due to not having a program on my personal laptop and offline internet or university labs to full.

Response 15
when the systems are down, one cannot access important info needed

Response 30
delays, frozen computers, not being able to access it. .

Response 40
Windows 9 does not support blackboard

Response 49
The large number of non working laptops in the university's computer lab. Not knowing when messages are placed on blackboard. (people don't check every day, some people can't)

Question 7

What enabling factors have assisted you to use Blackboard?

Response 1
We are able to access university notes from anywhere, as well as we are able to receive messages from lecturers anywhere anytime as well.

Response 8
Being able to use Blackboard at home and can access Blackboard whenever I want and how I want and to get messages from lecturers about test, lectures etc.

Response 11
the training we received helped with working with blackboard. If there is something that we don't know how to use we can get help

Response 25
well, I would say blackboard is the true reflection of the 21st century, it saves time

Response 38
the blackboard supervisors

Question 8

What did you like most about using Blackboard?

Response 9
The interaction and tests between lecturers and being able to upload assignments and getting feedback via Blackboard

Response 15
very easy and convenient

Response 22
viewing assignments and communicating with the lecturers.

Response 30
Being able to get information from lecture notes and being able to download lecture notes

Response 36
The ease at which you can give and receive information.

Response 44
Accessing work and announcements and also easy to see results of tests.

Response 46
That certain things can be done from home such as certain assignments/tests and that learners can receive all the necessary notes on blackboard

Question 9

Intermediate Phase Maths Only: How did you experience using Blackboard for exam purposes?

Response 6
it was a good experience for me. would do it again

Response 22
It was amazing, the best, good, excellent and good for everyone both maths loving and not so maths loving.

Response 33
I enjoyed it! Was a great implementation!!!

Response 37
there were no problems at all, it would be good if they use it again in future

Response 40
it was great. With the click of the mouse you would have your answer filled in and the question status keeps you updated if you have not saved an answer or if you might have left something out.

Response 41
Found it better than working on piece of paper.

Question 10

How would you like Blackboard to be used in future?

Response 1
All lecturers should post their notes and PowerPoint presentations on blackboard. We should also be allowed to do more tests on Blackboard We should receive exam marks on blackboard.

Response 7
for all my courses so that i am able to access it from anywhere, because you cannot access the v-drive from home and the computer labs are always busy and so it becomes difficult to get notes whenever i want to.

Response 9
To have ALL lecturers using blackboard and not just V-drive. Lectures teach us about multicultural education and how we need to adapt to all learners. Some learners prefer v-drive and some prefer blackboard and therefore lecturers should accommodate all learners and not use the excuse that they don't know how to use it as it is a straight forward system. If people can use Facebook, BBM and twitter then there is no excuse to use Blackboard.

Response 19
All other websites should be temporarily closed whilst a Blackboard Test is in progress.

Response 22
i would prefer it if all the lecturers stuck together- either they ALL use blackboard or they don't. it's very frustrating trying to organise things when half are using and half aren't

Response 34
I would like notifications to be sent to my phone when i receive messages or assignments

APPENDIX 11: ETHICAL CLEARANCE CERTIFICATE

University of Fort Hare
Together in Excellence

ETHICAL CLEARANCE CERTIFICATE

Certificate Reference Number:	MTO02 ISRIL01
Project title:	Using blackboard as a tool of assessment in the mathematics phase studies: A case study of second year level Bachelor of Education students in one university in South Africa.
Nature of Project:	Masters
Principal Researcher:	Alanna Riley
Supervisor: Co-supervisor:	Prof X Mtose

On behalf of the University of Fort Hare's Research Ethics Committee (UREC) I hereby give ethical approval in respect of the undertakings contained in the above-mentioned project and research instrument(s). Should any other instruments be used, these require separate authorization. The Researcher may therefore commence with the research as from the date of this certificate, using the reference number indicated above.

Please note that the UREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the document
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

The Principal Research must report to the UREC in the prescribed format, where applicable, annually, and at the end of the project, in respect of ethical compliance.

The UREC retains the right to

- Withdraw or amend this Ethical Clearance Certificate if
  - Any unethical principal or practices are revealed or suspected
  - Relevant information has been withheld or misrepresented
  - Regulatory changes of whatsoever nature so require
  - The conditions contained in the Certificate have not been adhered to
- Request access to any information or data at any time during the course or after completion of the project.

The Ethics Committee wished you well in your research.

Yours sincerely

Professor Gideon de Wet
Dean of Research

04 February 2013