

# Design Thesis 2018





**Students' and lecturers' perceptions of the usefulness of LMSs in studio-based teaching and learning spaces at a University of Technology**

by

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Master of Technology: Graphic Design

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At the Cape Peninsula University of Technology,  
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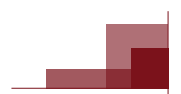
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**Co-supervisor:** Professor Eunice Ivala

**September 2018**

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# Students' and lecturers' perceptions of the usefulness of LMSs in studio- based teaching and learning spaces at a University of Technology

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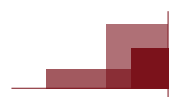
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## **DECLARATION**

I, Blessed Aspinas Mhangu, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

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## ABSTRACT

Rapid advances in information technology and the Internet continue to create higher education learning solutions for the networked-world learner. Given the potential of these resources, opportunities and initiatives must be seized to promote the enhancement of student learning in higher education. The promise of faster communication networks and changes in students' expectations have rendered urgent the understanding of technology and online learning for use in studio-based teaching and learning spaces in the networked global village of the 21<sup>st</sup> century. Paradoxically, however, the use of e-learning solutions in design-related education remains limited. In studio-based courses such as graphic and architectural design, for example, the facilitation of learning through electronic media at South African universities ranges from the minimal to the non-existent. A hands-on approach to studio-based teaching and learning is preferred, supported by the argument that it is hard to facilitate experiential learning through semi-synchronous online tools. The danger of this unsubstantiated model of thinking is that it is likely to lead to under-usage of Learning Management System (LMS) tools by educators in studio-based teaching and learning spaces. The problem is that no research has been done on this area in South Africa that is capable of providing conclusive evidence on which corrective measures can be based. Hence, the aim of this study is to understand the reasons for the limited adoption and use of LMSs in studio-based teaching and learning in South African higher education design-related disciplines. Within the interpretive epistemological paradigm, a qualitative research approach was adopted to source and analyse interview data from design students and lecturers at the Cape Peninsula University of Technology (CPUT). An Activity Theory (AT) analytical framework was employed. The findings suggest that reservations regarding the use of LMSs are more a function of prevailing perceptions than they are substantive. Unfounded negative assumptions about the functionality, relevance (usefulness), accessibility and ease of use of the systems emerged as the leading constructions of and explanations for the challenges faced. The study provides not only clarity on LMS usage patterns in studio-based educational spaces, but also useful comparative data on how an activity theory-grounded in ActAD framework can enhance the analysis of LMS activities in studio-based teaching and learning within the curricula for subjects like graphic design and architecture.

**Keywords:** *Learning Management Systems; Activity Theory; ActAD; E-Learning; Virtual Design Studio; e-studio; Studio-Based Spaces*

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## **DEDICATION**

I dedicate this piece of work to all my friends and family.  
A special dedication goes to my mother, Ms Ntini, for all her unwavering support, encouragement and prayers that kept me strong during the perilous journey of studying for the M.Tech, and to my uncle Mr S. Ntini, for financial support during my studies. It was not an easy road.  
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## GLOSSARY

<b>ActAD</b>	-	Activity Analysis and Development
<b>AR</b>	-	Architecture
<b>AT</b>	-	Activity Theory
<b>AT</b>	-	Architectural Technology
<b>CET</b>	-	Centre for e-learning Technology
<b>CPUT</b>	-	Cape Peninsula University of Technology
<b>FID</b>	-	Faculty of Informatics and Design
<b>GD</b>	-	Graphic Design
<b>HE</b>	-	Higher Education Environment
<b>HEIs</b>	-	Higher Education Institutions
<b>IT</b>	-	Information Technology
<b>LMS</b>	-	Learning Management Systems
<b>SB</b>	-	Studio-Based
<b>TA</b>	-	Teaching Assistant
<b>TL</b>	-	Teaching and Learning
<b>VLE</b>	-	Virtual Learning Environment

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# CHAPTER ONE

## CONTEXT OF THE STUDY

## 1.1 Introduction

Rapid changes in technology and the use of the Internet have influenced students' expectations of education and how it is delivered (Bennett, 2009; Dutta et al., 2011). The use of networked digital communications tools for educational purposes is now accepted as the norm (Dutta et al., 2011). A growing variety of technological innovations has led to an increasing demand for flexible learning and lifelong learning opportunities in the academy (Nwokeafor, 2015; Selwyn, 2016). Internet-based systems in particular have influenced the ways students approach learning, with more of them opting for e-learning courses and mobile technology than ever before (Ng'ambi et al., 2016; Gachago et al., 2013). For instance, in the United States the number of students who took at least one e-learning course increased in 2011 to 6.7 million (Allen & Seaman, 2013). In Australia, a recent report from the Grattan Institute indicates that the proportion of off-campus students stood at 18% in 2013, twice as large as in the early 1990s (Norton, 2014). There is clearly a growing demand for e-learning worldwide, and this demand is driven not only by advances in technology but also by students' desire for more flexible learning opportunities, including ones that serve the notion of lifelong learning. In this evolution, students are becoming creators of their own content online via the Internet, making their use of digital technology a truly unique experience through ever-increasing digital literacy skills (Brown et al., 2016; Ng'ambi et al., 2016).

Confidence in the use of electronic tools for educational purposes is therefore growing in academia, despite a myriad of resource- and skill-related challenges across varying institutional contexts. The problem is not new in higher education. For example, Australian universities started to report challenges of constrained resources such as funding and teaching spaces in 2008 (Ostwald & Williams, 2008), and design education was singled out in 2009 (De La Harpe et al., 2009). Also affected are universities in SA, UK and USA (Brown et al., 2016; Ng'ambi et al., 2016).

## 1.2 Studio-based design courses

The literature suggests that studio-based teaching and learning is a central component of courses like graphic design and architecture (Anthony, 1991; Broadfoot & Bennett, 2003; Demirbaş, 2003; Demirbas & Demirkan, 2007; Dutton, 1987; Kuhn, 2001; Park, 2011; De La Harpe et al., 2009). Through their practical focus, such courses assist students to gain creative skills and produce innovative solutions, and this is considered the real value of design studio teaching and learning (Demirbas & Demirkan, 2007). According to Demirbas and Demirkan (2007), creative skills gained through studio-based courses help students build creative problem-solving skills that can be applied to real-world design problems. On the potential of technology to facilitate teaching and learning generally, the perception among academics in higher education across South Africa is that e-learning facilities such as those provided by learning management systems (LMS) are suitable tools for teaching and learning across all disciplines. The only real disagreements occur at the level of pedagogical format, system and process (Mlitwa, 2011), though the general aim is to facilitate access to learning materials anywhere and at any time (Goi & Ng, 2009; Mlitwa, 2011). With the continuous proliferation of e-learning tools across different disciplines in the higher education sector, it might be expected that all students and lecturers would engage with such technologies regardless of subject-specific requirements. As a graphic designer, the author wanted to understand how such electronic learning solutions might be exploited to enhance learning in studio-based design subjects in South African universities. Yet a number of research anecdotes point to a lingering scepticism among academic staff regarding the role of technology in facilitating practice-based curricula (Souleles, 2011). Central to the scepticism is the belief that most design courses are centred on practice-based learning activities (Oxman, 2003; Park, 2011). Nevertheless, there are many progressive institutions and academics who demonstrate an understanding of the key characteristics of studio-based learning and how it can be facilitated via online media (Simkins et al., 2003; Adiloglu, 2011; Southwell & Morgan, 2009). Thus while relevant knowledge is clearly available and accessible, in order to be accepted it must be presented in such a way as to overcome the resistance of the sceptics.



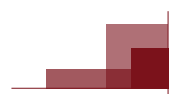
### 1.3 Research objective

The purpose of this research was to understand a certain contradiction implicit in the usage patterns of LMSs among students and lecturers in studio-based teaching and learning courses such as graphic design and architecture. An attempt was made to identify factors influencing LMS usage in studio-based teaching and learning courses, with an emphasis on explanation of the low adoption rate and inconsistency in the use of LMSs among students and lecturers in these courses. The ultimate objective was to contribute towards mechanisms to enable students and lecturers to actively adopt and implement technological innovations such as e-learning tools, as a supplement to the traditional studio-based learning approaches. For this reason, the Graphic Design and Architecture departments of the Cape Peninsula University of Technology (CPUT) were selected for an inferential case study involving both lecturers and students. In summary, the objectives of this research were to:

- Identify the status of LMSs and related web-technology usage by students and lecturers in studio-based subjects such as graphic design and architecture at CPUT;
- Understand reasons for the usage (or non-usage) of these tools in studio-based teaching and learning spaces;
- Identify key design features to enable a potentially successful studio-based LMS platform;
- Understand how an LMS should be designed for successful interactivity inside studio-based practices;
- Identify logical mediators for a more successful adoption and use of networked educational technology in studio-based education environments similar to those involved in the CPUT graphic design and architecture courses.

### 1.4 Background to the research problem

As a result of rapid changes in technology and in students' expectations of education and how it is delivered (Bennett, 2009), educational institutions such as CPUT have invested heavily in online e-learning tools such as LMSs over the last decade, and are continuing to do so. As have many other universities, CPUT has purchased LMSs to provide students with online or blended courses. Not only have the number of installations increased in recent years, but also the number of tools provided by the LMSs (Goi & Ng, 2009). LMSs are believed to have improved educational efficiencies, and are considered a significant means to address educational challenges in higher education environments in the developing world. However, the provision of these tools is not without drawbacks, especially in CPUT's graphic design and architecture department within the Faculty of Informatics and Design (Gachago et al., 2013). First, the sheer size of a typical LMS, can be a challenge to both students and lecturers. According to Mott (2010), most limitations associated with current LMSs are to do with course delivery using these systems, which is time bound. This means that once a course is completed, students are locked out of the system and cannot return to make any changes. Mott (2010) claims that this limitation may have serious consequences in studio-based courses. For instance, students end up having fewer opportunities for extended learning; they cannot access valuable educational resources from previous courses, or look ahead to future classes (ibid.). As a result, educators tend to employ only the most basic tools, for purposes such as content delivery, assessments and discussion forums (Ng'ambi et al., 2016). Another challenge associated with current LMSs arises from their typically complicated, fragmented structure, with too many nested tabs that are difficult to navigate. Design students and lecturers consequently become reluctant to use such e-learning aids, and prefer to rely on traditional face-to-face teaching and learning tools, or other social networking facilities that are easier to use (Ng'ambi et al., 2016; Gachago et al., 2013). Another limitation associated with current, well-established LMSs is the perception that their practical applicability to subjects like graphic design and architecture is low (Pektas & Dermikan, 2011; Ng'ambi et al., 2016), resulting in scepticism regarding their capacity to facilitate practice-based pedagogy (Souleles, 2011). If one adds the real possibility of system technical failures, the potential of LMSs to supplement the traditional studio approach to teaching and learning begins to look tenuous. In effect, there has been fierce contestation among graphic design and architecture students and lecturers over whether or not their courses can be administered through LMSs.



## 1.5 Problem statement

It is unfortunate that there has been overwhelming confusion among students and lecturers over the relevance and usefulness of computer-assisted technology in studio-based design subjects generally (McGill et al., 2011; Pektas & Demirkan, 2011), and at CPUT in particular (Ng'ambi et al., 2016; Gachago et al., 2013). The inconsistent use of LMSs among students and lecturers in studio-based courses at CPUT is a case in point. While networked and mobile technological innovations have transformed education from a rigidly space-constrained environment into an “anytime, anywhere” environment, conservative resistance to these can mean that learners will continue to be limited to a fixed, traditional studio setup. They will consequently fail to gain maximum benefit from web-based technologies that have the potential to improve the experience of teaching and learning in studio-based courses.

## 1.6 Main research question and sub-questions

Given the increasing student demand for online learning, and the increasing use of learning technology and immersive virtual environments, it is important to understand how a studio-based learning paradigm could potentially work through an LMS. In seeking to meet this requirement, the research focussed on the following questions:

**1.6.1** What is the extent of e-learning systems use in studio-based design courses (Graphic Design and Architecture) at CPUT?

**1.6.1.1** What specific tools (LMSs) or Web technologies do lecturers and students use in their studio-based teaching and learning practice?

**1.6.1.2** How can the current usage/non-usage patterns of e-learning systems in graphic design and architecture be explained?

**1.6.1.3** How does the current structure of LMSs and the environment – including design features, institutional policies and lecturers – promote or hinder their usage in studio-based spaces?

**1.6.1.4** What are key design features required for a potentially successful studio-based LMS platform?

**1.6.1.5** How should LMSs be designed for successful interactivity inside studio-based practices?

**Table 1.1 :** Summary of Research Questions and Objectives

Research Problem	Low adoption and use of LMSs in studio-based spaces	
Main Research Question	What is the extent of e-Learning systems adoption and use in studio-based design courses (Graphic Design and Architecture) at CPUT	
Objectives	Research Sub-questions	Research Methods
Identify the status of LMSs and related web-technology usage by students and lecturers in studio-based subjects such as Graphic Design and Architecture at CPUT.	What is the extent of e-Learning systems adoption and use in studio-based design courses (Graphic Design and Architecture) at CPUT?	Literature review, document analysis, in-depth interviews and web analysis;
Identify specific tools, LMSs or web-technologies that students and lecturers are currently using in studio-based spaces;	What specific tools (LMSs) or Web technologies do lecturers and students use in studio-based teaching and learning practices?	Literature review, document analysis, in-depth interviews and web analysis;
Understand explanations for the usage or non-usage of these tools in studio-based teaching and learning spaces;	How can the current usage/non-usage patterns of e-Learning systems in graphic design and architecture be explained?	Literature review, in-depth interviews and web analysis;

Identify key design features to enable a potentially successful studio-based LMS platform;	What are the key design features required to enable a potentially successful studio-based LMS platform?	Literature review, document analysis and in-depth interviews;
Understand how an LMS should be designed for successful interactivity within studio-based practices.	How should LMSs be designed for successful interactivity within studio-based practices?	In-depth interviews.

## 1.7 Clarification of key terms

This section provides a clarification of key terms utilised in the study. Although many new terms emerge and acquire different definitions, uses and interpretations, key terms have been defined in context to avoid any confusion. Clarification of the terms used in this thesis should help readers to understand the research and enhance their engagement with its content. The key terms to be defined are listed and glossed in alphabetical order, below.

### 1.7.1 Blended learning

There are numerous definitions of blended learning (also known as hybrid or mixed learning) and what it involves in different disciplines. According to Garrison and Kanuka (2004), blended learning is a combination of face-to-face (f2f) classes with online teaching. In the context of this study, blended learning draws upon the work of So and Bonk (2010) and is defined as the integration of traditional studio face-to-face learning or ‘learning by doing’ (Schön, 1983) with online learning, which makes it possible to benefit from the advantages of both teaching methods (So & Bonk, 2010). Blended learning supports and enhances studio activities in the age of new information and communication technologies (ICTs) (Afacan, 2013).

### 1.7.2 Blended studio

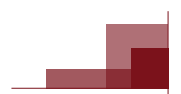
A blended studio can be defined as a space that incorporates the possibilities offered by online teaching through digital media, to expand beyond the traditional limits of physical space and time (Pak & Verbeke, 2012). In this study, the definition of a blended studio primarily references the work of Pektas (2015) and is characterised as the use of technology to support face-to-face studio learning activities and environments (Pektas, 2015).

### 1.7.3 Curriculum

Curriculum commonly refers to the totality of learning experiences that enable students to attain general skills and knowledge at a variety of learning sites (Keller, 2009). In this study, curriculum is used to describe the course of study students undertake in a learning context (e.g. a studio-based context) (Hetland, 2013).

### 1.7.4 Design studio

In this study a design studio is a physically shared environment meant to provide students with ‘learning by doing’ expertise and knowledge necessary to produce innovative, creative and competent design solutions through reflection-in-action (Schön, 1983).



### 1.7.5 E-learning

The definition of electronic learning (e-learning) in this study borrows from the work of Czerniewicz et al. (2007), who refer to the use of electronic methods to support, facilitate and enhance learning beyond time and space (Czerniewicz et al., 2007).

### 1.7.6 Integration

Integration is understood as the process of making LMSs part of the studio-based space through their adaptation, appropriation or incorporation into the studio environment, to be used by students and lecturers to enhance teaching and learning (Garrison & Vaughan, 2008).

### 1.7.7 Learning management systems (LMSs)

A learning management system is the term generally used for software that delivers courses, and tracks and manages training for teaching and learning over the Internet in higher education environments (Mahnegar, 2012). In this study, Blackboard is an example of such an LMS, a software application used for online critiques, downloading of course materials, design briefs and the submission of design sketches and design projects in the design studio (Pektas, 2012).

### 1.7.8 Studio-based learning

Studio-based learning is a learning model commonly employed in the design curriculum (Davies & Reid, 2000). Traditionally situated in a design studio environment under the tutelage of a master designer, it encourages 'learning by doing' in a professional environment similar to what might be experienced in the industry. In this study, studio-based learning is defined as 'learning through action' (Zehner et al., 2009). This definition is borrowed from Schön (1983) and describes a process in which students learn through an iterative process of designing.

### 1.7.9 Studio

A studio is a workspace where students explore a set of skills with or without the presence of an instructor. It is a place or space where a student learns to design through a process of learning by doing (Brandt et al., 2013).

### 1.7.10 Teaching and learning

The notion of teaching and learning as used in this research refers to any activity or process by a lecturer or a group of lecturers through formal or informal contact to foster and promote learning for students (Breier, 2006).

### 1.7.11 Virtual studio

A virtual design studio is a fully online studio-learning environment where students can collaborate with their peers using a variety of means, including CAD and Web 2.0 tools (Fleischmann, 2014).

## 1.8 Significance of the study

This study covers two research gaps identified in the existing literature:

- 1.8.1** research offering a deep understanding of studio-based courses such as graphic design and architecture, specifically of the important role of studio-based learning in the above courses; and
- 1.8.2** studies that investigate actual or potential ways of adapting LMSs in studio-based spaces to a

fully online environment.

Given the growth of new technology, the expectations of increased participation in higher education and the challenges faced by contemporary universities, it is logical to argue that studio-based courses like graphic design and architecture need to become more available online through e-learning technological tools like LMSs. There is very little research available that provides guidelines or information for institutions or academics on how moving to this online environment might be done effectively. Understanding studio-based teaching and learning in the context of graphic design and architecture, then developing an understanding of how these courses might be taught fully online through e-learning tools such as LMSs constitute significant contributions to the field. The results of this study will benefit a wide range of higher education providers and individual academics as they deploy LMS technologies for the delivery of courses either fully online or in a blended capacity. The research is also expected to provide insight for curriculum planners, instructional designers and general management at the University on what needs to be done to improve the low adoption and inconsistent usage of LMSs among students and lecturers in studio-based courses. The research will, therefore, provide policy makers, decision makers and relevant stakeholders with information and a set of principles that can contribute to improving the teaching and learning experience of students and lecturers in studio-based courses, through the use of LMSs.

### 1.9 Limitations and delineation of the research

Due to time and budget constraints, the researcher was not able to investigate all the studio-based teaching and learning courses offered by CPUT's Faculty of Informatics and Design, but concentrated on the two most important studio-based disciplines. The uniqueness of the study within this context makes it difficult to replicate exactly in another context (Creswell, 2007). The research might in the future be extended to other educational institutions within the Western Cape and South Africa more generally, to increase the validity and generalisability of the findings. Another possible limitation is that the data was obtained from interviews and consisted of participants' opinions, thoughts, beliefs and non-verbal cues. It is important to bear in mind that these were subjective responses reflecting the respondents' personal experience in their respective programmes, and thus open the door to the possibility of bias. Also, the participants' comfort level with technology may have affected their responses. If a participant was not comfortable with the technology involved, then s/he might have been predisposed to believe that studio-based courses like graphic design and architecture cannot be successfully delivered using e-learning tools such as LMSs.

### 1.10 Overview of thesis

The thesis consists of six chapters followed by a reference list and appendices. The chapters are structured in such a way as to speak to each other in developing the overall argument. They are organised as follows:

**Chapter One** provides an overview of the thesis, describing the context of the research, its significance and the keys terms used. This chapter also sketches the background of the research problem, and describes the aims and objectives of the research via the research question and sub-questions guiding it. It clarifies the meaning of several key terms and concepts, briefly delineates the research and points to some of its limitations.

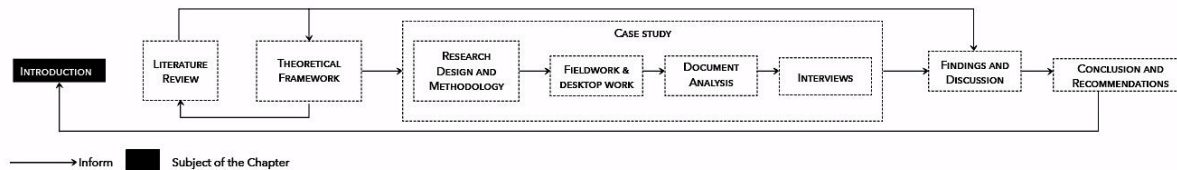
**Chapter Two** offers an account of the relevant published literature. It also explains what is meant by studio-based spaces, and provides a historical perspective on e-learning in such spaces, pointing out exactly when LMSs were introduced inside the studio and the current state of their usage. To further develop a knowledge and understanding of LMSs inside studio-based spaces, this chapter provides an overview of the process of selecting appropriate LMSs for studio-based learning spaces, and of the types of LMS currently in use. The chapter also sheds light on the challenges associated with selecting and implementing appropriate LMSs in studio-based spaces. These challenges include the contextual tensions and interactions between students and lecturers in studio-based spaces with the e-learning tools available to them. This chapter also highlights the type of activities commonly occurring in the studio and the importance of having the right ICT tools to facilitate the process of teaching and learning.



**Chapter Three** in this thesis outlines the theoretical framework supporting the collection and analysis of data. This framework provides both a practical and a conceptual basis for the methodologies and research approaches discussed in Chapter Four.

**Chapter Four** focuses on the raw data collected in the field as well as the fieldwork activities undertaken by the researcher. It describes the application of each data collection method and the associated challenges and disadvantages. Reasons for selecting specific units for analysis are provided, together with an account of the data analysis techniques used and relevant ethical considerations. The data is analysed and interpreted in anticipation of the summaries and discussion of the research findings in Chapter Five.

**Chapter Five** presents the findings through discussion of the usefulness and usage of LMSs among students and lecturers in studio-based teaching and learning spaces. This includes insight into what students and lecturers expect from the use of LMSs in the studio environment, their levels of satisfaction with current LMSs, and their views on what should be improved in the e-learning tools utilised. The chapter then furnishes a discussion of these findings based on an understanding of the factors or challenges that might hinder or influence LMS usage in studio-based teaching and learning spaces, with reference to the literature and the research questions described in section 1.6. The newly emergent themes and sub-themes are adapted to form a conceptual model for the research. In this process, emphasis is placed on the nature of studio activities and the LMS tools being used to carry out these activities. **Chapter Six** presents the conclusions of the research by returning to the research problem and providing a summary of the key findings by way of answers to the research questions. It offers a set of recommendations, describes the contribution and limitations of the research, identifies possibilities for further research, and reflects on the research journey. Figure 1.1, overleaf, provides a detailed diagram of the structure of the thesis.



**Figure 1. 1:** Structure of the Thesis

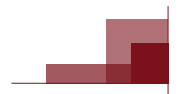
## 1.11 Conclusion

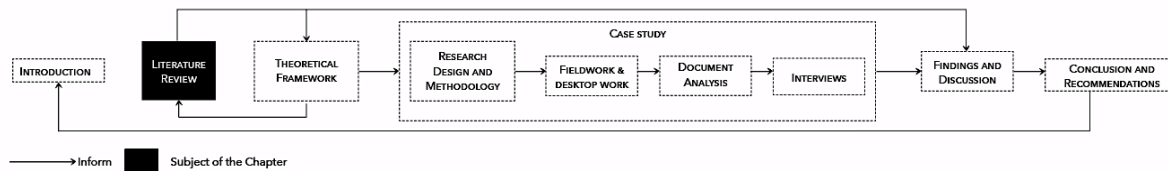
This chapter has provided some background to the research problem to be addressed, and has adumbrated the importance and benefits of LMS for teaching and learning, as well as the existence of challenges and contradictions when it comes to their use in studio-based spaces. The chapter has also described the research problem and the aims and objectives of the research. It has formulated the research question and sub-questions guiding the research process, and defined key terms and concepts for the benefit of the reader. The chapter also provides a summary overview of the structure of the thesis, clearly identifying what can be expected in each section.

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M Tech  
Graphic  
Design

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# CHAPTER TWO LITERATURE REVIEW





**Figure 2. 1:** Outline of chapter 2

## 2.1 Introduction

The notion that electronic tools and systems have the potential to enhance teaching and learning practices is longer disputed in academia. In effect, the question is no longer whether educational technology is useful, but to what extent it is being adopted by higher education curricula. Research points to the increasing integration of electronic systems into academic programmes since the dawn of the new millennium, albeit with varying estimates of its impact. As the problem statement, research question and objective of this study as set out in Chapter One suggest; however, understanding and acceptance of the value of technology in advancing educational processes does not automatically translate into its efficient integration into these processes. A certain reluctance to embrace technology has hindered its deployment in studio-based teaching and learning spaces – with arts- and design-related disciplines being most adversely affected.

If technology helps improve the quality of learning and educational experiences for the learner, then not to employ it is to deprive arts and design students of its benefits. Research on the use of technology for educational purposes in arts and design studio-related spaces remains limited and inconclusive. An exploration of the appropriateness and the extent of exploitation of LMS tools in design studio-based educational spaces in academia has, thus, become urgent. Since the studio phenomenon is contextually dominant in this discourse, its meaning and the nature of the actual studio environment is clarified in section 2.2, below, with the historical background of the design studio environment presented in sub-section 2.2.1.

Though the basic characteristics of an art studio and an educational design studio environment are shared, notable pedagogical features distinguish the latter. But despite its educational component, a design studio is a classroom environment that is different from that of traditional disciplines such as philosophy, mathematics, economics, history or even physical science. In section 2.2.2, ‘Educational design studio environments,’ further evidence is presented regarding what sets this environment apart from a traditional classroom. Insight into the complexities attaching to the adoption and use of educational technology solutions emanates from this contextual background.

Nevertheless, since this is a literature review chapter, subsequent sections (2.3 and beyond) outline the state of research in the field. This section of the literature review begins with dominant conceptions of educational technology solutions, and their relevance to educational design studio spaces in (section 2.3.1). This is followed by section 2.3.2 which looks at research developments in the field, both globally and in South Africa, with conclusive evidence of the paucity of research on this subject in the South African context. This indicates the need for an empirical investigation into one of the leading higher education institutions in South Africa offering Design Education, the Cape Peninsula University of Technology.

## 2.2 The studio phenomenon

The academic fields of graphic design, architecture and even photography are studio-based environments, as are opera, ballet and cinema. The studio phenomenon is thus a common denominator across all these contexts. According to Goldsmith and O’Regan (2005), a studio is a workshop for artists and photographers, or a workshop or rehearsal space for dancers or actors, and its attributes are common to all practical arts-related fields. The Oxford Living English Dictionary (2017) defines a studio as a room or a place where an



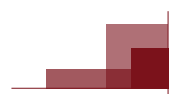
artist performs his or her artistic skills or records their music. A studio is also a room where cinema films are produced, or a place where performers, especially music, theatre and dance performers, practice their acting, playing or dancing skills (ibid., 2017). Indeed, emphasis on practical skill and dexterity development in graphic design and architecture places the disciplines squarely within this tradition, with a historical bias in favour of practice rather than pedagogy. Throughout history, a studio has largely been a one-stop mentor-apprentice space where skill and dexterity are developed and perfected.

### 2.2.1 Historical Overview of a Studio Environment

Archaeological evidence suggests that in its earliest form, a studio was a creative area in a cave where hunters and gatherers would depict various paintings of their kills on cave walls (Shwebler, 1981). In such spaces, design artistry was effected and completed, both as an individual and as a collective effort, with skills being transferred from one generation to the next over time (Dewey, 2005). A studio has thus always been a domain for mentoring, apprenticeship and practice. The use of specific tools and special methods is the basis of the traditional studio, and this still holds true today. For analytical purposes, five constructs have emerged in this account: (i) the actual art, product, service; (ii) operational space & environment; (iii) tools; (iv) special skill, processes & methods (how to design, including knowledge transfer and quality controls); (v) actors (designers, mentors, apprentices, consumers of design products). In varying combinations, these have since been the defining characteristics of a design studio environment throughout history. From the earliest hunter-gatherer period to the early 10th century AD, for example, the studio was a workshop where artisans served a master or teacher (Meggs & Purvis, 2011). During the guild system in Europe's medieval era around the 16th and 17th centuries, the idea of master and apprentice also developed, with the studio serving as a centre for teaching and the philosophical consideration of the arts, while the artist at work also became a pictorial theme (ibid.).

Added emphasis on education and training during the Enlightenment era in the 18th century saw a studio evolve into a privately-run academy belonging to wealthy aristocrats where artists were commissioned to produce various works deemed important. The studio environment thus evolved into an important site of professional training and aesthetic discussion, becoming an artist's creative sanctuary in the 19th century. From a graphic design perspective, a studio was no exception to this rule – though work in the pre-digital era remained manual, and stone- or paper-based (Meggs & Purvis, 2011). By all accounts, a studio was therefore a place where an artist or artisan could escape to and express their creativity in relation to the world around them. Interestingly, the development of photography and film in the 20th century meant the introduction of new technology into the studio environment, as artists found alternative means to paint and brushes to depict the world around them. This sudden shift in the materials, media and tools used in the studio also redefined the worksites, subjects, materials, production processes, and operational methods used in studio environments (Shwebler, 1981). The introduction of new technology led to massive developments such as the Hollywood and other movie production studios (Goldsmith & O'Regan, 2005), where the innovative use of advanced technologies accompanied the traditional combination of skill, learning and practice development.

Generally, this new studio (or studio complex) evolved to include silent and sound stages, set preparation workshops, stores, make-up salons, dressing rooms, offices and video editing suites, among others. Stages usually incorporate “specific design structures that make them ideal for film or equivalent productions” (Adamson & Bryan-Wilson, 2016). The educational studio space has seen its fair share of changes in technology over the years since the Bauhaus and the L'École des Beaux Arts periods, but with the recent rise of digital technology, academic studio design environments are evolving to incorporate new technology-assisted pedagogies (Hitge, 2016).



## 2.2.2 Educational Design Studio Environments

An educational design studio exhibits many of the characteristics of the general studio concept. In addition to the practice aspect, an educational design studio is also a physically shared environment that provides students with ‘learning by doing’ training. It is a space for the generation of knowledge to produce innovative design solutions through reflection-in-action (Schön, 1983).

### 2.2.2.1 Evolution of studio-based learning environments

L’Ecole des Beaux Arts was a French art school, which pioneered the use of a design problem (instead of a traditional lecture) when teaching students in the early 20th century (Anthony, 1991; Broadfoot & Bennett, 2003; Williams et al., 2009; Park, 2011). This approach is very much that of ‘learning by doing’, which is common in all artistic curricular subjects such as graphic design, architecture and industrial design (Schön, 1983). Academic studios in this period became formal learning environments for students, albeit along the lines of the traditional master-apprentice relationship between a student and a master artist or senior designer (Kim, 2016). Of note here is the traditional pedagogy of knowledge transfer, but with an experiential twist and based on continuous practice, trial and direct mentorship. This concept was reinforced by the Bauhaus school in Germany in 1919, where the academic studio environment increasingly took the apprenticeship and workshop format, with students learning under masters and journeymen (Whitford, 1984; Hauffe, 1998). This approach encouraged students to learn the foundation of design elements in an apprenticeship setting, involving participation in discipline-specific workshops before they could become practitioners (Hauffe, 1998). In the academic environment, however, increasing emphasis was placed on balancing practice with theory – with a merger between knowledge and skill determining the training process in the Bauhaus school. Just as at L’Ecole des Beaux Arts, learning by doing was very much the primary mode of learning at the Bauhaus (Hauffe, 1998).

Knowledge of the actual tools used in this theory and practice approach, including the experiential pedagogical context, is important for the purposes of this study. It is necessary to determine whether experiential learning embedded in apprenticeship and practice was confined to a fixed studio (classroom) environment, only subject to visual guidance by the mentor (master), or whether collaborative learning was accommodated, and in which format. This question is posed against the backdrop of the educational quality, quantity and efficiency of facilitating tools, systems and processes in contemporary pedagogical discourse.

## 2.3 Design disciplines and education technology

Networked systems, tools and electronic communication platforms have become a dominant force, and a vehicle for both negative and positive interactive social developments. In a detailed account, Castells (2015) refers to the Networks of Outrage and Hope in order to highlight the multivariate possibilities offered by networked technology. Networked educational technology and systems are prominent among the uses and consequences of information technologies that have re-defined social interaction in networked society (Castells, 2016). Educational technologies have become an enabler of higher education efficiencies in 21st-century higher education programmes.

Rapid technological advancements and the widespread use of the Internet have influenced students’ expectation of education and how it is delivered (Bennett, 2009), with Internet-based digital solutions becoming the standard norm in academia globally (Dutta et al., 2011). In the United States, for example, more than 6.7 million students were taking at least one course via e-Learning platforms in 2011 (Allen & Seaman, 2013). Similarly, the proportion of off-campus students interacting with curricula through mobile (m-learning) and electronic (e-learning) solutions stood at 18% of the total national student population in 2013, which was a 100% increase over the statistics for the early 1990s (Allen & Seaman, 2013). There is clearly a growing demand for e-learning worldwide, a demand driven not only by advances in technology but also by students’ demand for flexibility in learning, as

well as notions of lifelong learning (Salmon, 2013; Rennie & Morrison, 2013). Of interest to this study, however, is that despite the rapid technological change in higher education, the number of online courses in the fields of art, design and architecture are relatively negligible (Norton et al., 2010). Research suggests that this is in part because of technophobia and scepticism among academic staff in the fields of art and design about translating practice-based curricula and content into an e-learning environment (Souleles, 2011). Of greater concern is a lack of understanding about the most relevant ways in which design practice can be virtually taught online. In essence, this study is motivated by the apparent lack of documented scientific insight (evidence) regarding how disciplines like communication design can be taught in an online environment, with the aim of exploring related innovative insights.

The use of virtual teaching and online learning tools has often been associated with a myriad of problems and challenges, especially in fields like graphic design, architecture and other arts fields that are characterised by what Schön (1983) called the learning-by-doing approach. A leading argument against the adoption of technology (especially the use of virtual tools like learning management systems) are that ‘the everyday use of such tools can over-generalise disciplinary characteristics and restrict creativity’ (Bennett et al., 2017). Art and design subjects are usually characterised by professional practice and collaborative interaction between artefacts and design students (or artists) (ibid.). Another vein of scepticism is the view that, although the structure and format of virtual learning environments (VLE) are good enough to deliver some materials in a traditional class, they cannot cater for art and design education because they cannot reflect the specific demands and characteristics of the discipline (Wilson, 2015). Art and design students and lecturers continue to rely on face-to-face communication and collaboration with limited (to non-existent) online interaction (Wilson, 2015), which means that most virtual e-learning tools have not been effectively utilised in disciplines such as graphic design, architecture design and other creative arts disciplines (Pektas & Gurel, 2014; Kim, 2016).

A synopsis of the arts and design curricula and pedagogy could offer useful insights into the relevance and potential of educational technology to facilitate teaching and learning in these disciplines. For example, it is thought-provoking to recognise the potential use of educational technology even in what appears to be technology-focused design disciplines such as website and web-based graphics development. Indeed, one remains inquisitive about the relevance and usefulness of electronic tools to guide learning in the direction of design artefacts such as drawings, storyboard, digital images, photography, typography, programming language and server-sided technology (Kim, 2016). To this effect, literature on the pedagogical practice of educational design studio environments is explored in 2.3.1.

### **2.3.1 The Pedagogical Dose of Educational Design Studio Environments**

The main objective of a design studio in this educational context is to nurture students’ imaginations together with their skills and dexterity in design. It also aims to encourage the production of creative solutions that are aesthetically pleasing in the course of addressing a design challenge (Ibrahim & Utaberta, 2012). Like the general studio phenomenon, the academic environment is also a physical space, with defining features like rules (guidelines), tools, interdependence between a teacher (or mentor) and a learner (apprentice), and skill moulding. A notable difference from a general studio is the knowledge generation motive, with an academic qualification as a sought outcome (Wärnestål, 2016). In this sense, a modern-day design studio across all design curricula is characterised by: (a) the reflective learning component; (b) the personalised design process, which implies creativity; (c) the lecturer’s influence on the product or design solution; and (d) the fact that a student’s actions, personality, and feelings are laid out in the open (Austerlitz et al., 2002). The process tends to link theory and practice, bridging scientific activities with creative ones in order to solve ill-structured, open-ended problems (Hoadley & Cox, 2009). This occurs in an environment that allows students to express their design ideas and creativity through a myriad of communication techniques and methods. Another characteristic is that creative outcomes – drawings, physical models, computer models, photography, video clips and other multimedia tools – are subjected to assessment by the design jury (a lecturer or a tutor) for grading purposes (Tovey, 2015). Lueth (2003) has suggested other characteristics that make the design studio a unique environment

unlike any other educational environment: (a) the influence that students have on each other's work; (b) the influence that students could have on their lecturer (in terms of creating an environment that may or not be conducive to teaching); (c) the influence of the physical environment; and (d) the influence of tools that are used to develop products and services inside the studio. The way in which all these characteristics blend together to form a modern studio has an effect on the education of the participants (student and lecturers) (Lueth, 2003). All the characteristics that have an influence on the studio environment are further discussed below in section 2.2.3, which takes a closer look at how educational design studios work across all design curricula (Lueth, 2008).

In the context of the networked society of the digital age (Castells, 2010), it is common knowledge that technology is an invaluable enabler of educational efficiencies. The challenge facing this research was to explore the difficulty of and resistance to the application of networked educational technologies to support teaching and learning in studio-based, largely practice-focused academic environments. Describing a studio-based academic environment from Shaffer's (2007) systems perspective helps to simplify the challenge. Understood as a coherent system where surface structures and teaching and learning activities interact to create a unique learning community (Shaffer, 2007), the educational purpose of an academic studio design environment becomes clear. The choice of phrases such as "a coherent system" and "surface structures" emphasises the systemic aspect of this conceptualisation. Within coherence stands a consistent, continuous, and a reliably predictable "system". The notion of "a whole made of different parts" that are joined together by the pursuit of a common purpose is embedded in the systems conception (Mlitwa, 2011). The contemporaneous development of skill and dexterity, on the one hand, and the educational objective of the academic process, on the other, substantiate this view. Students present their designs, models or prototypes to the faculty for critique sessions. The sessions aim to encourage reflection during the design and problem-solving journey of learning (Brocato, 2009). In this way, peer learning from each other, from faculty and from professionals in the field becomes possible.

The surface structure embraces easily observable components of the studio: the space, furniture, time blocks, assignments and the tools available for use by teachers and students. Teaching and learning activities include interactions such as iterative cycles of design, hands-on investigations and group discussions of a studio work-in-progress (Shaffer, 2007). Educational technology can offer significant facilitative solutions in this respect.

Whilst educational technology is useful in many educational contexts, the 'hands-on-activities' approach distinguishes this academic field from other disciplines such as philosophy or economics, to the extent that it follows a 'hidden curriculum' component that insists on 'learning by doing' within a community of practice (Schon, 1983; Lave & Wenger, 1991). Educational technology should therefore be employed to add value in a way that accommodates this particularity. The question is not whether technology would be helpful, but what format and type should be implemented, and to what extent. In certain instances, common technology tools can facilitate the acquisition of knowledge and practical skills relevant to the design industry. Learning via content examples stored on and retrieved from cloud databases, as well as through access to electronic prototypes, can help aid the learning process within the specific parameters of the field (Demirbas & Demirkan, 2007).

The studio-based design curriculum should also strike a balance between artistic, technological and humane aspects of the design profession (Demirbas & Demirkan, 2007). The curriculum itself seeks to advance creativity through enhancing critical awareness of criteria for a proposition or design solution (Brocato, 2009). For this purpose, experiences and patterns within design studio educational spaces constitute the 'studio culture', with a focus on 'the reflective learning practice, a dialogue of thinking and doing enabling students to become more skilled as they progress through their design courses (Schön, 1983; 1987).



### 2.3.1.1 Studio activities / teaching and learning process

Most studio activities occurring within the current academic design studio environment consist of teaching and learning activities such as lectures and tutorials that interact to create a unique learning community (Shaffer, 2007). Direct instruction lectures that include demonstrations and practical activities are characteristic of educational studio environments (Obeidat & Al-Share, 2012). All these activities provide opportunities for students to gain technical, practical and theoretical knowledge and skills. In terms of the relative proportion of time spent in the classroom setting, 50% is based on lectures and skill-oriented tasks, whilst the other 50% is on practice through projects (ibid.). The activities that make up the studio curriculum can be grouped into fundamental, technology-based, artistic and theory courses. The fundamental course is mostly theoretical, with development of a design formation as its focus. The technology-based course on the other hand is structured to facilitate knowledge that is correlated with the design field, with the scientific formation of design as a basis (Kim, 2016). In this phase, students are encouraged to develop skills for assessing an ill-defined problem, and generating a series of solution-seeking proposals (Cennamo et al., 2011).

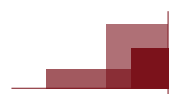
The artistic course is based on practical skills, including technical drawing, model making, design programming, with the aim of expressing and visualising (or executing) ideas. The outcomes of the course are directly related to these applications. Lastly, some of the studio activities include design theory courses, which synthesise the characteristics of the other courses (i.e. fundamental, technology-based and artistic), and this synthesis is crucial in studio-based spaces (Obeidat & Al-Share, 2012). In most studio curricula, for instance, the design process seeks to develop more technically developed products in an aesthetically iterative way, with each iteration superior to the previous one (Cennamo et al., 2011). As these iterations proceed, students gain access to a broader range of resources and content. Central to all studio curricula is the positioning of work as never complete but always on a pathway towards better iterations (Brocanto, 2009). Students are required to showcase their design solutions in diverse representational modes such as sketching on paper or drawing with such digital software as is at their disposal (Cennamo et al., 2011).

## 2.4 State of Educational Technology Research in Design Disciplines

Educational technology, ICT and Education, electronic learning (e-learning), mobile learning (m-learning), as well as other similar computer-assisted learning domains, have matured significantly since the dawn of the new millennium. There is evidence of a growing acceptance of technology as a vehicle adding teaching and learning efficiencies in higher education contexts (Laurillard, 2016; Horvath et al., 2016). Consequently, one might expect to find that considerable attention has been paid to the central research problem addressed by this study: the limited adoption of educational technology in studio-based design disciplines in higher education. But while substantial research exists in the field, it tends to focus on more general issues than the specific aspects explored in this study. For example, whilst explanations are sought regarding the dynamics of technology acceptance in artistic, design-related education studios, most published research engages in a general discourse of technology, with emphasis on conventional disciplines and their respective pedagogical frameworks. Subjects such as technology acceptance, adoption and inclusion, as well as the topics of m-learning, e-learning, emerging technological tools and systems, blended learning, as well as technology and pedagogy, comprise the dominant research areas in the current literature. Far less attention is given to the relevance of educational technology in artistic and design-related, innovative practical disciplines. For contextual framing purposes, research in this field is explored within the context of e-learning in section 2.4.1, below.

### 2.4.1 The South African context of e-Learning

Like many other sub-Saharan African countries, South Africa has been successful in implementing digital technology in its higher education landscape, with positive results over the last few years. The integration of ICT and other digital technology tools has also assisted South Africa to shift towards lifelong learning in higher education (Lwoga, 2012). In recent years, institutions of higher learning in South Africa have been faced with



many challenges in integrating ICT to improve their curricula (Rivers et al., 2015). The use of ICT and other digital tools has also increased student enrolment through open and distant education. However, the use of these systems has not gained momentum as yet in studio-based teaching and learning spaces or other arts-related courses that require a studio for their functioning. Although some research has been conducted which shows the potential of virtual tools in education, the extent of their application inside a design studio remains woefully low. There are still grave doubts among academics as to whether these systems are of any use at all, given the nature of the studio environment (Dougherty, 2012).

According to Waycott et al. (2010), cited in Sidawi (2013), the negative attitudes described above are not influenced merely by the lack of technology or poor infrastructure, but also by the fact that faculty lecturers are sometimes more focused on institutional issues and the adaptation of technology to existing pedagogical practice. As a result, they only choose to integrate e-learning technologies into their teaching activities if and when they see some educational value in doing so. Faculty resistance to curriculum redesign and redevelopment that involves the integration of technology is largely due to long-established conceptions of learning and teaching (Sidawi, 2013). Only an institutional culture that acknowledges, recognises and legitimises innovation can help break the cycle of established teaching conceptions and practices (Nkonki & Ntlabathi, 2016). Even though there is increasing penetration of e-learning within South African universities, usage patterns remain very low and even skewed. South Africa also struggles with the challenge of making e-learning and digital tools available to all students within the higher education landscape. This is partly due to the socio-economic inequalities in the South African economy as a result of a dark history that created an unequal distribution of wealth and educational resources (Bagarukayo & Kalema, 2015). Within this context of limited access, one becomes mindful of the maturity of the field of artistic design-related education and pedagogy, relative to the acceptance thus far of technology in education.

## **2.5 The reinvented studio: Implementation of e-learning and digital technology in studio-based spaces**

A glance at the history of the studio has shown that it has been constantly evolving, though mostly characterised by the concept of creativity and the production of artefacts in various forms (Edmonds et al., 2005). The literature has also shown that with time, the tools commonly used in architecture studios, sculpture studios, music studios and film studios have evolved from traditional hand tools to digital media that allow for mass production (Kafai & Peppler, 2011). The arrival of digital technology and computational tools inside the studio has also opened up new possibilities for creative practice and the studio in general (Edmonds et al., 2005). However, the role of computers in the creative studio space has remained relatively new and unexplored. In computing communities, the subject was only rediscovered in the area of computational creativity and, more recently, in human-computer interaction (HCI) (Edmonds et al., 2005). Since the early 1990s researchers in the field of creative technology have been asking the following questions: how can we understand the nature of human creativity in its many forms, and how can digital technologies be made to fit the needs of creative people? By asking questions of this sort, researchers have been concerned to build solid foundations for the design and construction of better digital tools for creative purposes (Edmonds et al., 2005). Overall, there has been strong agreement among researchers that creativity arises when there is a good combination of factors such as personality traits, social influences, environmental constraints and cultural values, but there is no single recipe for making it happen (Edmonds et al., 2005). The rapid growth of digital technology and computers in creative work has effectively served to promote creativity in studios. Research has also shown that creative people such as artists and designers are seeking to develop new forms and techniques that allow the user to focus on the creative process itself (ibid.). The use of computers in the design or creative process is enhancing the overall creative outcomes as well as the designer's experience. As some scholars have pointed out, however, tools are not only the factors to be considered in assessing the studio experience.

Whether or not creativity can be enhanced in some way may be significantly influenced by the conditions in which the creative process takes place, that is, by environmental and organisational factors, as well as by the

requisite materials and tools. It seems logical to assume that the characteristics of any resources, materials, tools or techniques that form part of the creative work are critical factors influencing the process. This raises the question of the relevance of and need for technology and emerging innovative tools in the educational design studio environment.

### 2.5.1 Technology driven Innovations inside studios

Alongside changes in people's behaviour and new challenges in traditional classroom and studio settings, there has been increasing interest in the use of technology-driven innovations such as Information Communication Technology (ICT) for learning purposes (Bennett, 2009; Park, 2011). There is a body of literature on the potential of ICT use across multiple disciplines. Broadly speaking, educational online technology may be divided into two types: virtual learning environment (VLE) or learning management system (LMS); and Web 2.0 applications (including Social Networking sites). In the nursing and healthcare discipline, for instance, Web CT and Blackboard (part of VLE or LMS) are the most popular learning assistance tools (Moule et al., 2010) commonly embedded to support the teaching and learning process. Moule et al. (2010) go on to suggest that the discussion board is the most common VLE or LMS tool used to support physical classrooms in UK, which is in line with the findings of Moore et al.'s (2011) Colombian study. The high uptake of the discussion board in contemporary universities may be attributable to the belief that it facilitates a "non-threatening environment" where students are free from gender or culture-related biases and non-native speakers are encouraged to speak up (Tham & Werner, 2005).

The introduction of technology in studio-based spaces creates a new relationship between students and lecturers, not only in delivering content but by moving the studio focus from the lecturer to the learner; perhaps turning the student into a digital artisan or craftsman within a more active and engaging climate for teaching and learning (Tham & Werner, 2005). Studio-based teaching and learning spaces aim to foster creativity, reflection, articulation and reasoning, all of which are essential lifelong learning skills and valuable graduate attributes (Oliver, 2000). The purposeful use of e-learning technology and LMSs is central to developing reflective skills, and building reflective skills in students is an essential element in the overall goal of the studio-based approach (Schön, 1995).

### 2.5.2 Common ICT tools and platforms for studio-based spaces

The majority of studies have reviewed the ICT used in design to foster multidisciplinary collaboration and social engagement. The implementation of Web 2.0 applications is receiving increasing attention in design education. The use of Web 2.0 applications inside the studio in arts and design disciplines has benefited both students and lecturers since they tend to be more familiar with these tools (Fleischmann, 2014:48). In line with the finding cited in section 2.3, above, the use of an LMS such as Blackboard is quite common in contemporary design education. Several studies have explored the adoption of a LMS in design courses, for example Pektas (2012), Souleles (2011) and Park (2008). But there nevertheless remains a widespread negative view of using Blackboard to support design courses. According to Cho and Cho's (2014) USA study, the limitations of using Blackboard include:

- the difficulty of uploading images and diagrams, especially on discussion board
- the difficulty of exchanging opinions and offering comments to visual images
- the difficulty of supporting and fostering creative thinking, interaction, and excitement during collaboration
- the unattractive look of the platform and navigation structure.

Some studies have attempted to adapt 3D online applications to design courses, such as Open Simulator and Second Life. Interestingly, there are more examples of using Virtual World (VW) platforms in design education than higher education generally, for VW platforms have a built-in prototyping tool (Koutsabasis & Vosinakis, 2012; Vosinakis & Koutsabasis, 2013). However, this prototyping feature has proved a disincentive to students



because of their unfamiliarity with the tool (Hollander & Thomas, 2009:110) and technical support issues in using VW platforms (Koutsabasis & Vosinakis, 2012; Vosinakis & Koutsabasis, 2013). Overall, the literature indicates that working with VW features alone may not be sufficient to deliver a blended or e-studio program successfully, and that it is essential to understand how individual technologies support the intended learning outcomes. Berente and Lyytinen (2016) agree that the introduction of information and communication technologies (ICT) in arts and design fields such as architecture and graphic design has increased importance of IT-related courses in studio-based teaching and learning spaces. According to Berente and Lyytinen (2009), the rapid development of ICT and its applications in the field of graphic design and architecture has provided an opportunity to transform the traditional mode of teaching and learning in the studio. This has led to alternative models for teaching digital design, including computer-aided design, CAD-plus study, virtual and web design study, resulting, in short, in a blended studio (*ibid.*).

According to Mislove et al. (2007), worldwide web (WWW)-based tools have emerged as critical enablers of teaching and learning processes in studio-based spaces. Web-based systems, for example, are used as a medium to connect students and lecturers in studio-based spaces. The WWW has in this sense become a facilitator for improving distance and residential education in virtual spaces (*ibid.*). In e-learning, the use of the WWW has enabled LMSs to facilitate teaching and learning processes. In 1995, the WWW enabled the development of the first learning management system known as WebCT (which later became Blackboard). The Blackboard tool provides an online learning environment where content can be uploaded and organized. In its earliest form, it only provided a space for online teaching and learning by loading text as PDF files or slides. Over time, LMSs became the principal means by which online learning was offered until lecture-capturing systems arrived around 2008 (Mislove et al., 2007).

## 2.6 Learning Management Systems and Studio-based practices

Kotzer and Elran (2011) describe an LMS as an e-learning tool used for delivering, tracking and managing training for teaching and learning in higher education environments. Mahnegar (2012) also characterises LMSs as systems for managing training and delivering courses over the Internet. Cavus (2013) too agrees that LMSs provide a useful platform for the management, delivery and tracking of learning to all students and lecturers within the higher education environment. Cavus (2013) maintains that LMSs' main goal is to centralise and automatise administration, while delivering learning content rapidly at any given time regardless of geographical location. A study by Lonn (2009) notes that there are various kinds of LMS. They can be categorised into traditional commercial products such as Blackboard and WebCT, open-source products such as Moodle and Sakai, as well as cloud-based LMSs. According to Lonn (2009), all three types of LMS enable lecturers to communicate synchronously and asynchronously with students, and for the students to communicate among themselves.

LMS student users can upload and view photos, search through a list of terms in the glossary database, submit assignments, check assessment marks, as well as chat with colleagues and lecturers online (Jungic et al., 2006). Merino et al. (2006) also claim that LMSs are useful tools for lecturers to manage course and teaching activities: they can be used to publish tasks for students, schedule teaching assignments and manage student assessments. Kumar and Tammelin (2008) add that LMSs enable lecturers to make use of chat and online conferencing tools to communicate and teach, particularly in instances where they are unable physically to meet with students. The advantage for lecturers is that the process of administering the learning process is more organised, efficient and easy to maintain for students inside the studio (Kumar & Tammelin, 2008). According to Cavus (2011), Blackboard forms the core of the Online Learning Environment (OLE), integrating various other components of the OLE such as BB Mobile, Elluminate, Tegrity and Elicitus. Kipcak (2007) discusses Moodle, an open-source LMS that can be applied to many levels of teaching in different settings. Like Cavus (2011), Juvancic et al. (2012) conclude that the above commonly used LMSs are suitable for a cross-section of common e-learning activities and tools for running and managing (blended) courses. However, incorporating these e-learning systems in studio-based practices comes with its own challenges that every institution desiring to use LMSs must take note of (Carbonell et al., 2012). Some of these challenges are highlighted below.



## 2.6.1 Challenges associated with LMSs inside studio-based spaces

### 2.6.1.1 Poor Structure/ Infrastructure

According to Niemiec and Otte (2010), establishing the necessary technological infrastructure is central to the successful integration and use of LMSs in a studio-based space. Some researchers have identified critical administrative decisions – including the decision to invest in necessary technologies and ensure that those technologies are easy to use – as a challenge at institutional level attaching to incorporating LMSs into daily teaching and learning activities. Niemiec and Otte (2010) also suggest that institutions seeking to implement LMSs in the form of blended learning must first provide the fully supportive technological infrastructure required for an efficient course management system to be user-friendly for both faculty and students (Liu & Tourtellott, 2011; Taylor & Newton, 2012). Carbonell et al. (2012) point out that the need for quality servers and sufficient bandwidth to accommodate the increased online activity in a blended teaching and learning space are significant challenges to be met by higher education institutions implementing an LMS.

Niemiec and Otte (2010) also found that scheduling courses via an LMS course is a challenge faced by most institutions of higher learning. Most universities (CPUT included) find it difficult to coordinate and clearly communicate the scheduling of blended courses to all faculty members. According to Liu and Tourtellott (2011), failure to schedule courses before the beginning of a semester makes it hard for students to identify and prepare for courses that match their learning preferences, goals and timetables. In addition, most institutions at faculty level also find it nearly impossible to govern the development of BL courses and the ownership of intellectual property rights in materials created for them (Moskal et al., 2013), including matters of accessibility (Graham et al., 2012). Niemiec and Otte (2010) note that universities need to specify and adapt existing policies to address BL implementation in different courses. The issue of governance and ownership rights is partly caused by the top-down approach most institutions adopt when implementing blended learning through LMSs. Niemiec and Otte (2010) further argue that failure to include the faculty in the governance process creates tension and a lack of interest in using the system among the parties involved.

Niemiec and Otte (2010) regard evaluation as one of the “indispensable essentials” of BL adoption. Systematic, longitudinal data collection is critical for effective evaluation (Dziuban & Moskal, 2011; Toth et al., 2008). Dziuban and Moskal (2011) observe that many institutions struggle to implement even basic assessments, while Taylor and Newton (2012) have sought to account for this problem and propose ways that assessments should be conducted. Marshall (2010) notes that some institutions have not yet developed a “culture of systematic self-improvement” as they respond to the pressure to maintain and deliver services rather than to judge their effectiveness, that is, to implement rather than evaluate. Matzat (2013) points to the absence of continuous professional development as one of the most important reasons why most faculty members struggle to teach using LMSs in a blended format. According to Matzat (2013), faculty members tend to lack appropriate skills for new technologies, which can result in system failure. Most teaching staff lacks the technological skills necessary to design and maintain the online portions of each course (Owens, 2012). When institutions do not provide sufficient opportunities for professional development, lecturers will most likely fail to embrace a blended format fully, and will instead replicate their conventional teaching methods (Al-Sarrani, 2010; Garrison & Vaughan, 2013).

### 2.6.1.2 Lack of technical support

Taylor and Newton (2012) postulate that a lack of technical support after their having completed a professional development course on LMSs and blended learning can result in faculty members forgetting everything they have been trained on and reverting to their traditional ways of delivering course materials, which in turn has a negative effect on students (Wu et al., 2010). Wu et al. (2010) concur with Taylor and Newton (2012) that those who fail to master the necessary technical skills will be disadvantaged in accessing course materials, engaging with course content, and otherwise participating in BL classes. Moskal et al. (2013) point out that support may

be forthcoming in person or by telephone, via instant messaging or email, or on a website containing tutorials and other instructional materials, preferably using multiple methods. Certain recommendations have been made in the literature to help reduce the challenge of LMSs and virtual e-learning tools in arts and design subjects. These recommendations, if applied properly, can help address the poor adoption and integration of LMSs in studio courses like graphic design, architectural design and industrial design.

## **2.7 Considerations and recommendations for e-learning in Studio-based spaces**

Published research suggests a broad range of elements necessary for the integration of blended or e-learning in design education. The trouble is that these recommendations seem to be aimed at more developed nations that are already doing well with the use of LMSs and other e-learning tools. Within the range of recommendations made, this section only includes common considerations and recommendations, or ones that relate to challenges discussed in previous sections.

### **2.7.1 Social interaction and collaboration**

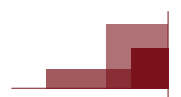
First, consideration should be given to the structure of social interaction in e-learning environments. While social interaction is significant in traditional learning environments, it is also a key element in blended learning and e-learning. Volery and Lord (2000) emphasise the importance of having an adequate level of interaction and engagement between students and the lecturer in an e-learning environment, conducing to the lecturer's being a "learning catalyst". Given this, it is necessary for lecturers to have the skills and knowledge to develop their own learning (Volery & Lord, 2000). For motivating students, Holley (2002) notes the value of providing for sufficient informal discussion, to encourage students to be active in the learning process. There is a strong chance that in e-learning students would receive limited experience of and opportunities to learn from reflection-in-action processes and tacit knowledge, key features of studio-based learning. This is one of Kvan's (2001) main reservations about blended and e-learning environments based on an asynchronous format: "the tacit is easily lost when proximity changes and synchronous communication is replaced with asynchronous". Considering that the major benefit of implementing ICT is to foster flexibility, the use of synchronous communication tools would be difficult and limiting in such learning environments. Online engagement is commonly delivered via a text-based format (even though some ICT has video and audio functions), which makes it difficult to observe others' reactions and expressions (Vosinakis & Koutsabasis, 2013). Global time differences must be taken into consideration when connecting students at a distance from each other (Bennett, 2009). While the literature includes a significant number of studies indicating possible ways to motivate students toward online engagement in design education and higher education more generally, there is no specific recommendation for overcoming the issues raised by synchronous communication methods in the face of time differences.

All the considerations detailed above are necessary to create an environment conducive to fostering creativity and collaboration among students and lecturers in arts and design courses (Bennett, 2017). The findings of the literature have highlighted some major gaps that still exist in the implementation and integration of e-learning technologies in arts and design teaching and learning spaces. The uniqueness of the discipline needs to be taken into consideration when developing teaching and learning materials and appropriate technological tools to be used.

## **2.8 Conclusion**

This chapter commenced with an overview of the studio phenomenon. This was followed by an outline of an academic design studio environment, with a view to understanding the context and education needs of this environment and, ultimately, the relevance and appropriateness for it of electronic teaching and learning solutions. The literature discussed above investigated exactly what it is that sets this environment apart from the traditional classroom environment, and what adds complexity to the adoption and use of educational technology solutions. An analysis of the status of research in this subject area was then conducted. The researcher

investigated research developments globally and in South Africa, and concluded by pointing to the limitations in existing research in the field. The conclusion highlights the urgent need for empirical investigation in one of the leading higher education institutions in South Africa offering Design Education, the Cape Peninsula University of Technology. Lastly, a review of LMS usage and their integration into studio-based spaces was presented, together with challenges associated with this. The next chapter (Chapter 3) presents the theoretical framework in terms of which the subject of this research was viewed.

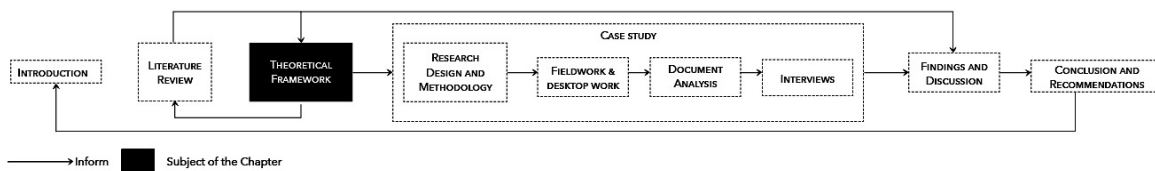


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M Tech  
Graphic  
Design

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# CHAPTER THREE THEORETICAL FRAMEWORK





**Figure 3. 1:** Outline of Chapter 3

### 3.1 Introduction

A theory consists of an organised set of principles that help explain real-world events. Consequently, a theoretical framework provides a practical and conceptual model for implementing the research approach and methodology. This chapter outlines the activity theory concept that is used as a framework for the analysis of the data collected from the field. The chapter is outlined in the graphical illustration in Figure 3.1, above.

### 3.2 Theoretical / analytical framework

A theory is a set of interconnected constructs and propositions that present a systematic view of the phenomena under investigation (Wacker, 1998). The main purpose of a theory is to predict and thus guide the researcher to ask appropriate questions in his or her research study. On the other hand, a framework is used to describe a set of ideas that form research decisions and judgements within which the relationships between variables are explained. A theoretical framework can also be described as an analytical tool that researchers use to analyse the data they have collected. It can be used to develop and validate data for further processing (Anfara & Mertz, 2014).

#### 3.2.1 Activity Theory

The current study is guided by activity theory as a shaping concept for both data collection and analysis. It focuses on an activity-based phenomenon grounded in the purpose and context in which it is situated (Leont'ev, 1978). The application of activity theory assumes that teaching and learning of traditional arts and design subjects in an on-line e-learning environment is a collective work activity. This work activity is a system composed of key stakeholders such as students, lecturers and the university's management (Engeström, 1987). A work activity system is considered a form of social activity, based on rules, deliberate and collaborative work by various people (subjects), in the pursuit of a common purpose (object). In this study, the subjects are students and lecturers using e-learning and other web-based tools to accomplish the educational goal of online studio-based learning (Korpela et al., 2004). In this activity system, an "object" refers to the purpose for which a social activity is carried out (Engeström, 1987). Learning Management Systems (LMSs) are the main e-learning tools used to facilitate the online teaching and learning of arts and design subjects in studio-based practices. The term "subject" refers to the various stakeholders involved in the use of these tools such as students and lecturers, system administrators and e-learning coordinators. Korpela et al. (2004) note that stakeholders are not only individuals, but also various groups and entities, such as institutions and departments.

Engeström (1987) developed an extension of the activity theory model that added the component of a community sharing the same object. In his expanded model of activity theory, Engeström (1987) added rules that mediate the learning community and the subject to create a division of labour between the community and the object. Activity theory deals with the processes that lead to social transformations by analysing the cultural and technical aspects of human action. According to Engeström (1987:29), the focus of the study of mediation should be on its relationship with other components in an activity system. As part of the developmental process, activity systems transform one condition to another and thus are instruments of reorganisation (Engeström, 1987).

Researchers often use activity theory when analysing human-computer interactions (Schön, 1983). In the current study, human-computer interactions were used to analyse the structure, development and context of learning activities mediated by computers and other digital technology tools for the teaching and learning of arts and design courses at CPUT (Sharples et al., 2010). They were also used as a source of data for analysing the factors that influence user participation in online discussions mediated by computers or other digital technology devices. An activity system is made up of six main components that are interrelated with one another: the rules, community, object, subject, mediating artefacts (i.e tools) and division of labour. These components are explained in a greater detail below:

- Object orientedness is the first component of the activity system. An object forms the basis for an action and is thus the goal of that action (Engeström, 1987). The objective of the activity system is collaboration and cooperation among the actors involved in the activity. In the case of the current study, such collaboration could occur in online teaching and learning.
- Another important component of the activity system is the subject(s). No actual or meaningful activity can happen without subjects, that is, the individual actor or actors engaging in activities from whose perspective an object is to be viewed (Daniels, 2004; Daniels, 2016). In the current study, students and lecturers are contextual subjects engaged in collaborative learning activity inside a studio.
- The environment or place where the actors are engaged in their activities is also known as the community. In this study, the studio environment serves as the community through which all the actors are involved in the activity system. Students and lecturers are engaged in the social activity of teaching and learning through the constructing and sharing of knowledge (Daniels, 2016).
- In the development of an activity, the actors use various tools or create their own artefacts within the studio community of practice (Engeström, 1987; Engeström, 2014). Tools include the technological level of activity theory. In an activity system, actors use tools to help mediate effective communication by transmitting social knowledge. Tools also include the artefacts used by actors in the system; they influence actor-structure interactions and are influenced by culture (Engeström, 1987). No meaningful activity can take place without a division of labour. Division of labour amongst the actors in an activity system can be hierarchical or simply differential. The activities in an activity system cannot take place in the absence of meaningful rules. Within an activity system (such as that of studio-based practices) there are functioning rules, regulations and guidelines govern the activities (Engeström, 1987).

These six components correspond to six processes summarised in Figure 3.2, below.

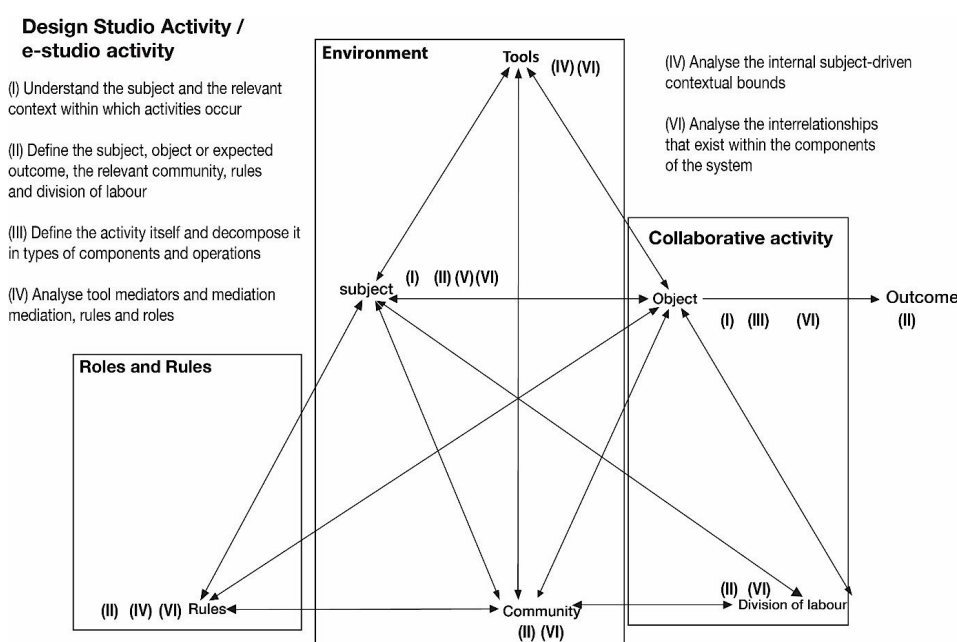


Figure 3.2 : Summary of the six-step process of activity theory

From Figure 3.2, above, it can be seen that the key focus of activity theory is the interaction between human activities, objects or goals and mediators within a given community; in the current study, this focus rests on studio-based practices (Vygotsky, 1987). Studio activities link actions to the context and comprise the primary unit of analysis in activity theory (Engeström, 1987; Engeström, 2014). The current study leans heavily on activity theory to fully understand student and lecturer interaction through mediated tools and artefacts (e-learning tools) within the studio-based practices of subjects like graphic design and architecture (Hashim, 2007; Mursu et al., 2007). According to Engeström (1987), subjects develop their own systems and use tools (artefacts, instruments) in the process of carrying out actions towards achieving a goal (outcome). The main outcome for using e-learning tools in this study is a fully transformed studio environment where students and lecturers can interact and collaborate online without the need to access the physical space of the traditional studio.

### 3.3 The use of activity theory in this research

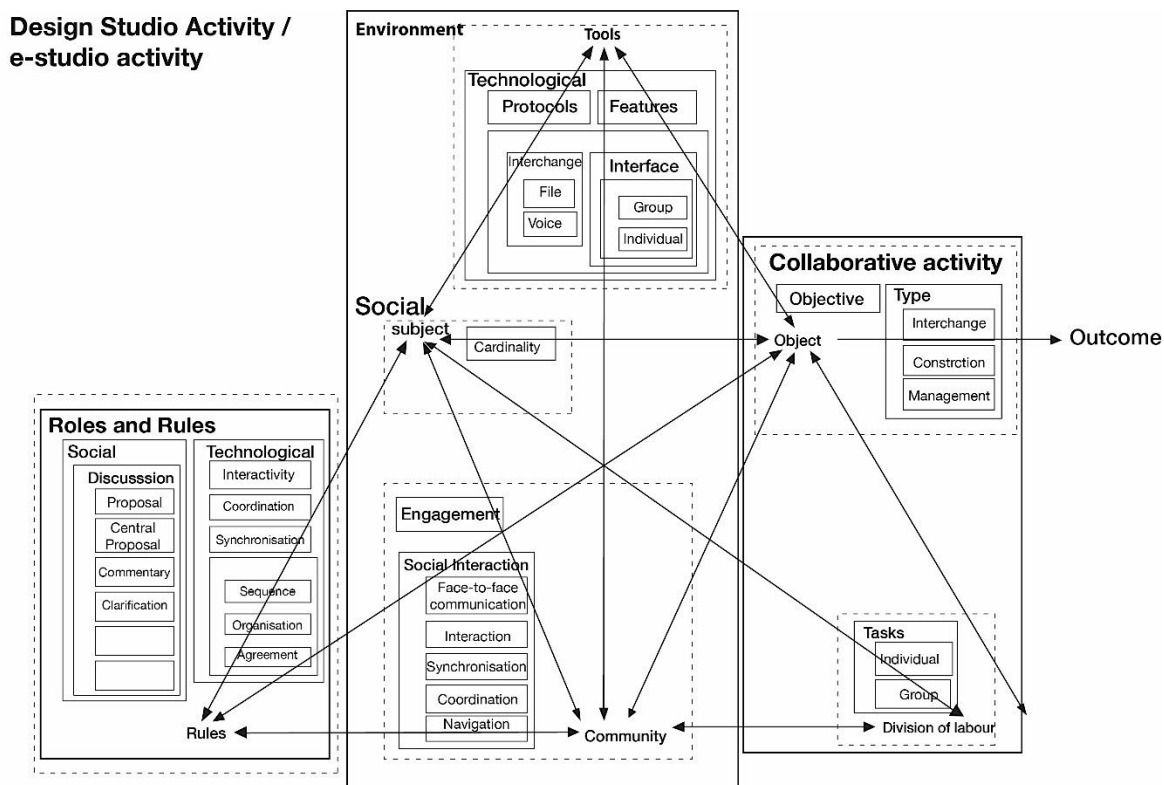
In this study, activity theory is used to observe and analyse students and lecturers pursuing their activities and objectives within studio-based practices, by examining their tools and the mediation of the rules and history of the communities in which they are operating (Burwell, 2012). Activity theory was used to gain a clearer sense of how students and lecturers as well as other stakeholder interact in studio-based practices with the assistance of e-learning tools such as LMSs and other multi-media digital tools (Hakkinen & Korpela, 2006; Hasan, 1998; Korpela et al., 2002; Scanlon & Issroff, 2005). A key attribute of activity theory in the context of this study is its focus on argumentative (dialectic) analysis of the interaction between students and lecturers (humans) and their mediated tools or artefacts (technical elements) which have been shaped by human activity (purpose) (Svensson & Goldberg, 2015). Since the aim of the study was to understand students and lecturers' attitudes towards the use of e-learning technologies for the teaching and learning of arts and design courses, activity theory helped enable an understanding of how lecturers and students learn in the complex environment of a design studio, and of the relationships between them as mediated by sophisticated tools such as learning management systems (Svensson & Goldberg, 2015).

Activity theory was also used in this study to examine the experiences and perceptions of students and lecturers regarding the transformation of their current studio environment into an on-line environment through the use of e-learning tools such as LMSs (Mbuva, 2015). In addition, activity theory served as a framework for the building of knowledge, perspectives and artefacts to guide the design of computer-supported collaborative learning activities in the graphic design and architecture departments at CPUT. Activity theory helped to explain the nature of the collaborative activities that take place inside the studio, and to indicate how students and lecturers can participate socially while interacting with the technology (ibid.).

In sum, the present study used activity theory (AT) to evaluate how studio-based or practice-based environments can use e-learning tools to achieve their objectives by exploring the factors that influence students' participation in online communities. The ease of use of the technology and its usefulness are key factors influencing students' attitudes toward the adoption of e-learning tools in studio environments. In this context, a study by Lu and Churchill (2014) argues that the teacher still plays a major role in guiding students in online lectures. The social interaction that helps students construct and share knowledge can only be achieved through the instructor: it has been found that a decrease in the frequency of interactive messages in online communities is triggered when the online tutor or instructor is not present with the group in the online community.

AT's fitness for this research is also based on the fact that it provides a conceptual and practical lens to understand the interrelations between activities, operations, tools and the motives of actors, as well as factors involved in the social, organisational and social contexts within which the work activities are framed (Lu & Churchill, 2014). AT therefore suggests that factors that influence the use of e-learning tools in studio-based practices cannot be adequately understood outside the social, technical and institutional environment in which the practices of e-learning are rooted. In this sense, AT is used to understand and analyse the factors affecting the adoption of e-learning from an activity-based and multi-stakeholder perspective. The AT concepts

of work activity are used to present the usefulness of LMSs in studio-based practices as a system of activities. These concepts include actors, motives/goals, mediators, activities/actions, transformations and outcomes. From the point of view of the work activity system, an actor is an individual or a group of people (Engeström, 1987). The motives/goals refer to the objectives that must be achieved by the various actors within the activity system (ibid.). Mediators are factors and tools that can allow or inhibit the successful achievement of a goal (Vygotsky, 1978). Activities/actions are tasks that must be carried out by the various actors within the work system (ibid.). The transformation process combines enabling factors, tools and activities to achieve a positive result known as the outcome (Uden & Damiani, 2007). These AT work activity concepts are used to present studio-based teaching and learning as an activity system in Figure 3.3,



**Figure 3.3 :** e-studio Activity Theory analytical framework

### 3.3.2 Teaching and Learning online through LMSs as an activity objective

Being able to translate the traditional studio into a successful online studio through e-learning tools such as LMSs is considered a key objective and unit of analysis within the activity system. The interaction between lecturers, students, tools, mediators and real learning processes are the main activities in the context of teaching and learning in arts and design courses in studio-based environments. According to Mlitwa (2010), a goal is a practical attempt (usually at individual lecturer level) to achieve the overall goal of the institution. The objective of the individual lecturer must therefore be in line with the main institutional objective and mission, hence the question of guidelines (rather than prescriptions), norms and procedures (Mlitwa, 2010). Starting with teaching via LMSs as an activity objective in the studio-based system, lecturers and tutors must believe in the tool's usefulness as a work-activity enhancer, while finding it conveniently usable. In addition to the performance and usefulness of the tool, studies by Mlitwa (2005), America (2006), Czerniewicz et al. (2007) and Ncubekezi (2009) suggest that the nature of the task relative to the uses of the tool, and the social rules and context further determine the use or non-use of the system. This aspect of activity theory is integrated into the data collection tool to investigate the purpose and value that lecturers and students attach to the use of LMSs in studio-based practices for teaching and learning purposes.



### 3.3.3 Rules and social contexts as mediators of an e-learning activity

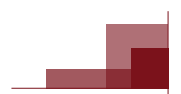
To fully understand the effectiveness of activity theory in this study, there must be inclusion of the social context, rules, tools, empowerment or disempowerment problems as well as technical skills act as mediators of LMSs being fully adopted in the design studio (Mlitwa, 2010). ICT infrastructure and institutional support systems should be adequate and well understood; failure to properly maintain the IT infrastructure and technical support may cause despondency among lecturers. Even when lecturers believe in the usefulness of an LMS, they may stop using it when the institutional support system and the IT infrastructure are inadequate (ibid). The IT network and institutional support systems must be efficient, with the capacity to handle different versions of data, as well as easily navigable (Mlitwa, 2010). Activity theory's notions of mediation are used to analyse the degree to which licensing policies, guidelines, and the social environment encourage the effective use of the LMS in the studio, ultimately translating it into a fully networked on-line studio.

### 3.3.4 Institution, lecturers and students as actors

The institution, lecturers, tutors and students are all regarded as actors in the activity system, sharing a common purpose that is served by different individuals or groups through an information tool (Mursu et al., 2007:6). In addition, alignment of a collective actor with a system presupposes a formalised system of related activities and linkage to a common goal (Mlitwa, 2010). In a studio-based e-learning environment, a group of students interact through a discussion forum on an LMS platform while working to achieve a common learning goal. A lecturer wanting to use an LMS must act as a part of a department, institution, or member of a specific community of practice within the system (Lave and Wenger, 1998). This collective actor draws on the lessons that emerge from the communities of practice and is interested in the impact of instruction on students' learning experiences (Wenger, 2006). As a member of a collective team, a lecturer can offer part of or one or more of the courses, with other teaching staff contributing towards the student's qualification. Teaching in this sense is a collective process conducted by individual lecturers using the appropriate tools. When learning is considered a common goal, students are also an important part of the collective activity (Miettinen, 1997). Other teachers, the learning environment, the students, and the tools involved have an equally great or even greater influence on the learning process. The roles of a department and of an institution as a whole are therefore important factors in the use of LMSs. In the current study, this point is embedded in the data collection tool aimed at establishing whether the institution provides a favourable environment in terms of necessary infrastructure, user motivation, and technical support and literacy to enable individual and collective e-learning activities

### 3.3.5 Conflicts, technical limitations, mediator tension

When dealing with conflicts, disempowerments, technical limits, and tensions between mediators, Mlitwa (2010) suggests that resistance to change, lack of training, incompetent network divisions and uncooperativeness would inhibit the collective success of e-learning activities. He maintains that a lack of co-operation between the computer network, academic planning, faculties and departments, individual lecturers and students may further render the subjects (actors) unable to carry out their activities and achieve their common goal (Mlitwa, 2010). The transformation of the current studio environment is the main objective of the activity system (Czerniewicz et al., 2007; Laurillard, 2009; Mlitwa, 2010). The quality of learning on an online platform is closely interwoven with the impact that an LMS has on students' learning experience. Understanding this impact is important, but the adoption of LMSs in studio-based practices has not reached an appropriate maturity to reflect the desired academic impact (WEF, 2008; White, 2008). Rather, the emphasis here is on the real problem of whether LMSs are being used by lecturers, and for what purpose? In particular; is the LMS being used to improve the production and quality of learning (Eom et al., 2006) in terms of student satisfaction and positive learning outcomes? (Arbaugh et al., 2009)



### 3.4 Conclusion of the theoretical framework

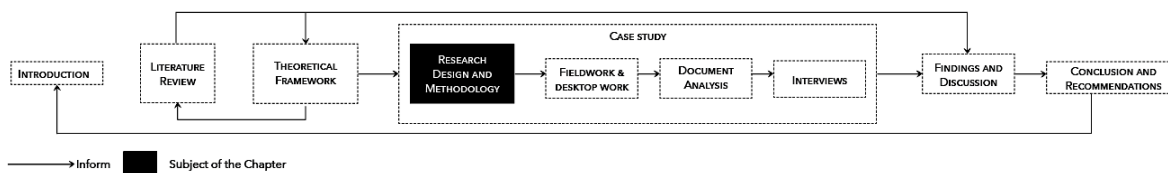
Activity theory in this study considers studio-based teaching and learning practices as a system of activities in which collective work is carried out by individual and group actors in pursuit of a common goal. In other words, teaching and learning activities are not a series of isolated individual exercises, but parts of a common and collective effort. It has also been pointed out that elements in the system of activities – the context, the rules, the tools and the environment – are all mediators, potentially promoting smooth interaction among activities. Success in adopting and using LMSs to facilitate online studio-based teaching and learning is in this light context- and mediator-dependant. The research methodology employed to conduct this research is presented in the next chapter (Chapter 4).

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M Tech  
Graphic  
Design

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# CHAPTER FOUR RESEARCH APPROACH & METHODOLOGY





**Figure 4. 1:** Outline of Chapter 4

## 4.1 Introduction

While there is general agreement that e-learning tools improve efficiencies in higher education, they have scarcely been introduced into studio-based practices. The aim of this study is to understand the seemingly paradoxical inconsistency in the (non-) application of e-learning solutions such as learning management systems (LMSs) in studio-based teaching and learning. Whether current LMSs are adding value to studio-based practices or not, and what type of value might be at issue, remain unclear. As a result, further steps in LMS implementation could be poorly informed, with a likelihood of following the wrong path (Mlitwa, 2010).

The current study is based on activity theory, as represented in Figure 3.2, above. Within that framework, this chapter focuses on the research approach and methodology chosen to address the problem of the poor uptake of LMSs in studio-based teaching and learning spaces. Section 4.2 describes the research paradigms customarily used by researchers and provides a rationale and justification for the specific paradigm(s) chosen for this study. This section is followed by an account of the research approach (section 4.3), which elaborates on why the researcher adopted a qualitative approach. The following section, section 4.4, provides a detailed account of the research strategy adopted, while sections 4.5 and 4.6 describe the sampling techniques and data collection tools utilised. The chapter concludes with a description of the data analysis techniques used and the ethical principles adhered to in the conduct of the research. The structure of this chapter is presented in Figure 4.1, above.

## 4.2 Research Paradigm

A research paradigm relates to how research knowledge is developed, and the nature of the knowledge developed. The research paradigm one adopts contains an (often implicit) set of rules governing how the world is viewed. A clear and a well-defined paradigm or set of philosophical assumptions has the potential to strengthen the strategy and methods of a piece of research (Saunders et al., 2009). Research paradigms in the social sciences are also referred to as world-views or research traditions. They are perhaps best described as an underlying theory or hypothesis upon which one's perspective on the world and world-views are built. In following a specific paradigm, researchers adopt a particular manner of studying phenomena relevant to their field (Bezuidenhout et al., 2014). It is essential for researchers to recognise their philosophical standpoint and the type of research they are conducting in order understand how their research relates to the real world. A well-defined research paradigm comprises aspects of ontology, epistemology and methodology, domains explored from Section 4.2.1, below, ranging from ontological realism to social constructivism to relativism; and from positivist to critical to interpretivist epistemology.

### 4.2.1 Ontology

Ontology can best be described as philosophical enquiry concerned with questions such as “what is reality, and how do we recognise what is real?” Ontology has its roots in the Greek language, *ontos* meaning “being, or that, which is”, and *logos* meaning “the study of”. Ontology thus denotes the study of being, reality or existence. This results in questions about the assumptions that researchers have concerning the way in which the world operates (Bezuidenhout et al., 2014:23). According to Bezuidenhout et al. (2014), the dominant contemporary

trend in ontology is the notion that humans create their own reality by defining or naming constructs. This is known as the social construction of reality, in terms of which reality is created inter-subjectively as it happens in human consciousness (Mchunu, 2013). A social constructivism perspective aligns logically with the interpretivist epistemological paradigm of knowing about reality. This study leans on social constructivism, which is a social theory that deals with the construction of reality (Jackson & Sorensen, 2006). It focuses on human awareness or perception and its position in world affairs (Chandler, 2011). The current study seeks to understand student and lecturer perceptions of the use of LMSs in studio-based practices, a form of social behaviour, which means that it is essential to take into account cultural perspectives and context in the construction of this knowledge (Kim, 2001). According to Sohel (2010), social constructivists believe that reality is constructed through human activity. In other words, the social world of individuals along with everything that is involved is created by those individuals (*ibid.*). For the social constructivist, reality is not something that can be discovered: it does not exist until it has been invented in society (Kim, 2001). The current study's main goal of understanding the factors hindering the use of LMSs in studio-based teaching and learning practice means discovering the teachers' and students' constructions of reality and how these relate to broader contexts.

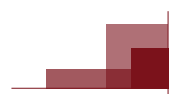
### 4.2.2 Epistemology

Epistemology is concerned with questions such as “what counts as knowledge and how do we know what we know?” The term is derived from the Greek words *episteme* meaning “knowledge”, and *logia* or *logos* meaning “the study, science or theory of”. Epistemology then denotes the study of knowledge or the science of knowing, and beyond that, the nature of knowledge (Bezuidenhout et al., 2014). Three main trends in epistemology as it relates to research have been identified: positivism, realism and interpretivism. Each profoundly influences the way a researcher thinks about research processes; not only in terms of assumptions and concepts but also regarding which research problems seem important. This study follows an interpretivist approach to justify the lacking of e-learning adoption in studio-based spaces within the higher education system of South Africa.

The interpretivist research paradigm can also be described as relativism, idealism, constructionism and even constructivism. It is mainly founded on the philosophical doctrines of humanism and idealism, which assume that an individual's perception of the world is created in their mind. The interpretivist paradigm views knowledge as based on observable events, personal beliefs, values, reasons and understanding (Ojong & Muthuki, 2010). Interpretivist researchers seek to understand phenomena by reviewing meanings that participants give to them. They need to critically reflect on the social and historical background of the study and their role in the study to ensure a good interpretation of participants' views. By ensuring this, a researcher can check on biases and distortions and use the resultant data to show how the findings match or contradict previous research and relate to the relevant theory (Walsham, 2006:326). This study followed the interpretivist paradigm by studying reality as perceived from the subjective viewpoints of the participants, that is, finding out their perceptions regarding e-learning and the low level of adoption LMSs by students and lecturers in studio-based disciplines. Details of the research methodology and data collection tools commonly used in the interpretative research paradigm appear below, together with an outline of the study's research strategy.

### 4.3 Research approach: qualitative research

The process of discovering what is known about a particular field of study, and the manner of discovery of this information, is known as a research approach or research methodology (Babbie, 2013). The research approaches that resort within the interpretivist paradigm include participatory action research, quantitative research and qualitative research. Qualitative, quantitative and a combination of the two, mixed method research, are the approaches or methodologies most commonly used by researchers in the social sciences (Creswell, 2009). There are several major differences between qualitative and quantitative research. Not only do the data have distinct features, but different methods are needed for data analysis. Traditionally, natural science focused on hard or quantitative (i.e. positivist) analysis; the social sciences followed this route until its limitations became obvious as researchers noticed that subjective human feelings were difficult to quantify. This led to the



evolution of qualitative (anti-positivist) analytical methods, which took more account of “soft”, personal data (Walliman, 2005:270-271). Quantitative methodology mostly makes use of statistical analysis and scholars work with figures (Mchunu, 2013:24). Qualitative research, on the other hand, deals with the qualities of subjective experience and the meanings people attach to these (Bezuidenhout et al., 2014). A qualitative approach is one in which the researcher studies (a sample of) people in a particular setting comprehensively with the purpose of providing an account of the (in part, historically and socially constructed) meaning they make, with the intention of developing a theory or recognising a pattern. In other words, research is termed qualitative if the primary aim is to understand or describe the ‘what’, ‘how’ and ‘why’ of a condition or phenomenon (Fouché & Delpont, 2011:64). The present study followed a qualitative research approach as it recorded the perceptions of participants so as to understand, explain and possibly generalise from the findings. The use of a qualitative research strategy and qualitative data collection techniques made it possible for the researcher to observe and respond to the complexities of low LMS use in studio-based practices. This was achieved by focusing on students’ and lecturers’ perceptions of and attitudes towards the use of LMSs and online teaching and learning generally, in arts and design courses normally taught inside a design studio. The approach thus made it possible for the researcher to study and analyse participants in their natural environment.

There are various research strategies within the domain of qualitative research. These include ethnography, grounded theory and case studies, among others. The current study adopted a case study research strategy. The reasons for conducting a case study are explained below, in section 4.4.

### 4.3.1 Background, research question and aim

Given the growing demand among students for online learning and the growing use of learning technology and immersive virtual environments, it is important to understand why there is a low usage of LMSs in studio-based instruction. The study aims to identify what factors may be hindering the use of LMSs in studio-based teaching and learning practice. For the purposes of this study, insights were obtained from the analysis of existing LMSs and the way they are currently used to teach and learn in studio-based practices. Table 4.1, below, presents a summary of the main research question and sub-questions driving this research.

**Table 4. 1:** Research questions and objectives

<b>Research Problem</b>	Low adoption and usage of LMSs in studio-based spaces	
<b>Main Research Question</b>	What is the extent of e-Learning systems adoption and use in Studio-based Design courses (graphic Design and Architecture) at CPUT?	
<b>Objectives</b>	<b>Research Sub-questions</b>	<b>Research Methods</b>
Identify the status of LMSs and related web-technology/ies usage by students and lecturers in studio-based subjects such as graphic design and architecture at CPUT.	What is the extent of e-learning systems adoption and use in studio-based design courses (Graphic Design and Architecture) at CPUT?	Literature review, document analysis, in-depth interviews and web analysis
Identify specific tools, LMSs or web technologies that students and lecturers are currently using in studio-based spaces	What specific tools, (LMSs) or Web technologies do lecturers and students use in studio-based teaching and learning practices?	Literature review, document analysis, in-depth interviews and web analysis
Arrive at explanations for the usage (or non-usage) of these tools in studio-based teaching and learning spaces;	How can the current usage (Non-usage) patterns of e-Learning system in graphic design and architecture be explained?	Literature review, in-depth interviews and web analysis

Identify key design features to enable a potentially successful studio-based LMS platform;	What are key design features required to enable a potentially successful studio-based LMS platform?	Literature review, document analysis and in-depth interviews
Understand how an LMS should be designed for successful interactivity inside studio-based practices;	How should LMSs be designed for successful interactivity inside studio-based practices?	In-depth interviews

## 4.4 Research strategy

There are various types of research strategies, often grouped as experiment, survey, historical, archival and case study. Each involves a different way of collecting and analysing data and has its own advantages and disadvantages. This study followed the case study approach.

### 4.4.1 Case study

A case study is an inquiry that investigates a phenomenon in its real-world context (Yin, 2003; Creswell, 2007). It differs from other traditional research strategies because of its focus on a bounded system (the case) that is studied in depth (Creswell, 2007). A case study approach can also be characterised as an investigation that “looks at a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly defined” (Yazan, 2015). Yin (2017) suggests that a case study approach is particularly appropriate when ‘how’ or ‘why’ research questions are posed, and when the researcher has little control over the events. The current study adopted a case study research approach so as to understand better how students and lecturers make use of e-learning tools such as LMSs for practice-based courses like graphic design and architecture. A case study strategy was used for intensive research into the adoption and usage (or non-usage) of e-learning tools such as LMSs in studio-based courses (Yin, 2017). Within a case study strategy, units of analysis are normally divided into single or even multiple individual units, such as teams or communities (Neuendorf, 2016). The community in this instance comprised staff and students in CPUT’s graphic design and architecture departments.

In the current study, the studio-based teaching and learning process is viewed as a collective work activity for both students and lecturers, carried out by multiple stakeholders also known as actors, using tools, rules and procedures to negotiate the translation of the current traditional studio environment to a fully networked online environment. The actors who participate in this teaching and learning activity are categorised as: the entity (institution); the group(s) (departments and their communities of practice); and individual actors (lecturers, students and network administrators). Case study sampling methods as well as data collection methods – such as in-depth interviews and document analysis – were utilised (Yin, 2017). These methods are further discussed in sections below.

### 4.4.2 Research setting for the study

The graphic design and architecture design departments are the two sources of empirical data in this study. These two studio-based courses are part of the Faculty of Informatics and Design at the Cape Peninsula University of Technology. This university came into existence after a merger of two technikons took place in 2005. The merger saw the unification of the Cape Technikon and the Peninsula Technikon as part of South Africa’s government efforts to redress and transform the higher education landscape, marred by inequalities as a result of the previous government’s policies (Morkel, 2011). The university today has six faculties and

campuses spread across the Cape Peninsula region of the Western Cape province of South Africa. All the campuses operate within a single institutional structure and confer both initial and postgraduate degrees.

The Faculty of Informatics and Design (FID) is located on the District Six campus in Cape Town. It is made up of several departments that operate at various levels through the courses and programmes they offer. The Department of Applied Design and the Built Environment consists of architecture and graphic design. The architecture department is the top-ranked studio-based course in the FID, and it has made a significant effort to transform its traditional studio to a fully networked on-line environment through the use of e-learning tools such as LMSs. The Department of Graphic Design (also known as Applied Design) is similarly recognised as strong but is a somewhat smaller department. It has for some time been trying to use LMSs in its courses, but historically it is strongly grounded in the traditional studio approach.

The departments in the case study were selected for various reasons, one being that although some departments have made efforts to transform the traditional studio into an online environment by implementing e-learning tools such as LMSs, the gap between those using LMSs for studio spaces and those in other disciplines such as commerce and business science is still evident (Denscombe, 2014). Another reason was relative paucity of literature on LMS usage in studio-based spaces internationally, but especially in sub-Saharan Africa. A third reason was that the researcher had done similar studies at an undergraduate level and was, therefore, familiar with the conditions that exist and able easily to access the relevant teaching and learning spaces. Of the nine departments in the FID, architecture and graphic design were most likely to provide insightful information on the usage habits and usefulness of LMSs as they have the most students and the most studio-based spaces. The criteria for the selection of participants for the research sample are presented in Table 4.2, overleaf.

## 4.5 Techniques and Procedures

The last layer of the research onion as it is represented in Figure 3.1 comprises techniques and procedures, which include sampling, data collection and data analysis. The decisions taken on previous layers of the research onion influence the techniques and procedures discussed below.

### 4.5.1 Units of analysis and observation

In case study research, a unit of analysis refers to the population, people or items with the characteristics one wishes to study (Bhattacharjee, 2012:65). A unit of analysis also refers to the “what” of the investigation, the “object, phenomenon, entity, process, or event” under investigation. A unit of analysis such as a population is the whole set of individuals in whom a researcher is interested. But typically, the whole population does not participate in the study; rather, the results obtained are generalised from a sample to the entire population (Gravetter & Forzano, 2009:128). A population can consist of individuals, groups, companies, movements, artefacts, institutions or countries (Neuman, 2011:58). In this study, the main unit of analysis comprises students and lecturers in graphic design and architecture identified as using LMSs as part of their studio-based teaching and learning activity. An activity is a collective process determined by an objective that is carried out by individuals or groups (known as actors), all operating according to a set of rules, guidelines, conditions, tools and procedures to achieve a common outcome.

#### 4.5.1.1 Case study procedures: selecting units of observation from the unit of analysis

Reflections on the nature of a design studio for teaching and learning within a higher education environment helped to clarify the reasons for choosing specific disciplines for sampling in this research. Teaching and learning activities found in art and design courses taught in a design studio are generally different from teaching and learning activities characteristic of other disciplines. The difference between these learning spaces lies in the teaching and learning activities involved in each discipline and the interaction between students and lecturers (see section 2.1, above). It is this distinction that led to the choice of disciplines for the case study.



In any given research, constraints of time and cost usually make it impossible to include the entire population studied (Denscombe, 2014). In this particular project, the time available was insufficient to include all the students and lecturers, especially as there were on-going strikes that affected their availability on campus. It was also costly to travel from one interview location to another as a result of the strikes that were happening at the university. Most lecturers were hardly available on campus, and the researcher had to travel to a safe location to meet with the lecturers, away from strikes and protests that were going on.

## **4.5.2 Sampling**

In the current study, sampling involved selecting a workable number of participants from the research population under investigation (Denscombe, 2014). In sampling and selecting the participants for this study, the researcher made sure that participants were representative of the population to be studied (i.e. students and lecturers from studio-based courses). There are two basic modes of sampling, probability and non-probability sampling, and these are described below (Kothari, 2004).

### **4.5.2.1 Probability sampling**

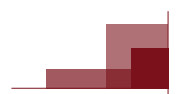
Probability sampling refers to a method of selecting an eligible number of participants from a population when the researcher knows the exact number and location of the population elements (Bhattacharjee, 2012:65). According to Ritchie et al., 2013, probability sampling primarily aims to select population characteristics that portray the actual parameters that exist within the total population being represented. Probability sampling also uses a random selection process to draw the research participants from a wider population. With this kind of sampling, each member of a population has the same chance of being selected to form part of the sample (Ritchie et al., 2013). With probability sampling, emphasis is placed on statistical accuracy. Since this study is less concerned with statistics than with gaining a deep understanding of the reason why there is poor adoption and use of LMSs by students and lecturers in studio-based teaching and learning, probability sampling was not appropriate. Non-probability sampling was used instead, as discussed in more detail in section 4.5.2.2, below

### **4.5.2.2 Non-probability sampling**

Non-probability sampling refers to a method for selecting participants from a population group, in a context in which the number and location of the population elements is not entirely known to the researcher (Ritchie et al., 2013). Contrary to probability/random sampling, members of the population do not have an equal likelihood of being selected for the sample (Bhattacharjee, 2012:69). Depending on the type of population and the particular details of an investigation, the researcher may choose any of the four types of non-probability sampling techniques. These are convenience, quota, snowball and purposive sampling. Purposive sampling was more appropriate for the selection of participants in this investigation, as is discussed in the section below.

#### **4.5.2.2.1 Purposive sampling**

Selecting a small sub-set of a population based on their characteristics and suitability for the purposes of a study is known as purposive sampling. Purposive sampling is a non-probability sampling technique that researchers use to obtain a specific target population that best serves the purposes of the study, bearing in mind the research question that the study is seeking to answer (Yin, 2011:88). This study sought to contribute towards resolving problematic issues pertaining to the adoption and usage of e-learning tools such as LMSs in studio-based practices. To achieve this objective, the researcher looked for individuals who could assist with relevant information. A purposive sampling technique was thus used because the researcher had clearly defined characteristics of the population in mind (Bhattacharjee, 2012:69). These characteristics and features of the overall population were then used to target a small sub-set representing the overall population (Yin, 2011:89). Purposive sampling was also used to select participants to shed light on the low rate of adoption



and use of e-learning tools in studio-based practices. The current study made use of population elements such as the e-learning coordinators from the Fundani department of CPUT, as well as students and lecturers as representatives of the general population, all selected because of characteristics relevant to the aims and objectives of the study (Denscombe, 2014). By means of a purposive sampling technique, the researcher focused only on the members of the population who were more willing and likely to provide the information required (Bhattacharjee, 2012:69). As the sampling technique was based on the interpretive point of view, emphasis was placed on the usefulness and quality of the participants, rather than on any statistical or numerical factors (Yin, 2011:89)

**Table 4. 2 :** Criteria for selection of participation sample



**Main Question:** What is the extent of e-Learning systems adoption and use in Studio-based Design courses (graphic Design and Architecture) at CPUT?

Issue/ Point of Investigation	Data Source	Tool/s	Unit of Analysis	Unit of Observation	No. of Participants
Background, Methodology & theories	Literature	Read, Analyse, Write	Journals, Internet, books	Published Journals, Trusted Websites, accredited textbooks	
Types of Web technologies being used inside studio-based spaces	Web analysis of Blackboard, Piazza and Cousera Students Course coordinators Lecturers	Interviews Document analysis Web analysis of Blackboard	Graphic design Architecture LMSs websites	Graphic design lectures (4), Architecture lecturers (3) Commonly used LMSs (3) e-learning coordinators (1)	Graphic design lecturers = 5 Architecture lecturers = 4 Course coordinators = 1 e-learning coordinators = 1 Design students = 6 LMSs Websites = 3
Status & usage patterns of LMSs in the studio	Lecturers Students Course coordinators	Interviews Document analysis Web analysis	Graphic design Architecture	Graphic design lectures (4), Architecture lecturers (3) Commonly used LMSs (3) e-learning coordinators (1) Design student (6)	
Structure of LMSs (insight on the tool)	Web analysis Instructional Designer IT desk Lecturers	Interviews Web analysis	Graphic design studio vis-a-vis online TL Architecture vis-a-vis online TL LMSs (Blackboard, Module)	Graphic design lectures (4), Architecture lecturers (3) Commonly used LMSs (3) e-learning coordinators (1)	
Institutional factors (decisions about LMS & promotion of LMSs)	CPUT e-learning management Instructional Designer Lecturers	Interviews Document analysis	Graphic design Architecture	E-learning coordinators (2) Graphic design lecturers (3) Architecture lecturers (4)	
Challenges: (problems & issues to do with current structure of LMS)	Lecturers Students Instructional Designer IT help desk	Interviews Document analysis Web analysis of Open-source LMSs	Graphic design vis-a-vis online TL Architecture vis-a-vis online TL	Graphic design lectures (3), Architecture lecturers (4) Commonly used LMSs (3) E-learning coordinators (2) Design students (6)	
<b>Total Participants:</b>					

## 4.6 Data collection instruments

Data collection is the process of gathering information for relevant variables in a recognised systematic approach; it may be in the form of primary or secondary data, and it may contain words, numbers or pictures aiding the researcher in answering the research question (Yin, 2011:130). Various data collection methods can be employed during the data gathering process (Wahyuni, 2012:73), each depending on the field of study plus the chosen methodology (Fox & Bayat, 2007:71). When conducting a qualitative research study, researchers typically use one or more of the following data collection instruments: direct observations, participant observations, document analysis and web analysis, basic interviews, in-depth interviews, and focus group interviews (Yin, 2011:130). The current study collected relevant data through document analysis and in-depth interviews with lecturers, e-learning coordinators and students.

### 4.6.1 Basic and in-depth interviews

While basic interviews effectively scrape the surface of a phenomenon, in-depth interviews penetrate to a much deeper level of investigation to find out underlying factors (Bhattacharjee, 2012:78). To obtain a thorough understanding of the dynamics and limited use of e-learning tools in studio-based teaching and learning practices, extensive in-depth interviews were conducted with fifteen participants in two studio-based courses at CPUT. Among this sample was a total of ten lecturers, six from the graphic design department and four from the architecture department. These lecturers were interviewed between April and November 2016.

By ensuring diversity in the sample selected, the researcher was able to draw a comparison between the graphic design course and the architecture course. The aim was to compare what the architectural courses achieved with their e-learning tools compared to the graphic design courses, since both use the studio for their daily operations. The following table, Table 4.3, features the participants and their departments. Initials and pseudonyms are used for ethical reasons to protect the identity of those who took part in the data collection process.

**Table 4.3 :** Selection of lecturer participant samples

Institution*	Department**	Participant***	Interviews	
			Date: Aug- 2016- Jan -2017	Time
CPUT	FID-GD	(a) AM; (b) LD; (c) SW; (d) BL (e) EP	(a) 30 Aug; (b) 12 Sept; (c) 18 Sept; (d) 19 Sept	(a) 10-11am; (b) 12-1pm; (c) 11-11:45am; (d) 10-10:45am
	FID-ARCH	(a) JM; (b) DG; (c) AM; (d) CH	(a) 30 Sept; (b) 12 Oct; (c) 13 Oct; (d) 22 Oct	(a) 10-11am; (b) 12-1pm; (c) 11-11:45am; (d) 10-10:45am
	IT HELP DESK	(a) JN; (b) AV;	(a) 25 Oct; (b) 28 Sept	(a) 10-11am; (b) 12-1pm;

\*Cape Peninsula University of Technology (CPUT)

\*\* Faculty of Informatics and Design (FID), Graphic Design (GD), Architecture (ARCH)  
Industrial design (ID).

\*\*\*Acronyms of participant names. Full names withheld for confidentiality (ethical reasons).

#### 4.6.1.1 Basic description of Interviewees

The interviews took place at CPUT's Bellville and Cape Town campuses. During the interviews, the researcher explained the protocol to the participants and tried to create an atmosphere conducive to truthful deliberation. The character profiles of the interviewees in both departments are as follows:

**GD-1, AMO:** Interviewee 1 is a female lecturer who taught the ECP class in Graphic Design at the Bellville campus but has since been transferred to the Cape Town campus along with the whole department. She seems to enjoy her work judging from the way she carries herself and how she interacts with her students. Considering her appearance and knowledge of the subject, she seems to have been at the university for more than ten years.

**GD-2, LGD:** Interviewee 2 is also a female lecturer who teaches the second-year class in Graphic Design from the Bellville campus. She seems to be techno-savvy judging from her social skills on digital platforms and how she interacts with her students through different e-learning platforms. Considering her appearance and knowledge of the digital environment, she seems to be comfortable in any kind of an e-learning platform at the university or even outside the university. She seems to understand a lot about e-learning and how it all started at the university, which suggests that she has been at the institution longer than fifteen years. She is very calm, almost timid and quiet. She has an occupation similar to that of GD1.

**GD-3, EDP:** Interviewee three is a male lecturer who teaches third- and fourth-year graphic design. He enjoys working with students and providing digital training in programs like Illustrator and Photoshop. He is very young and jovial and a former student of the department at CPUT. He only graduated with his B-tech degree in 2009 and has been lecturing since 2010. He seems skilled in using ICTs (he helped the researcher to connect his laptop to the local WLAN).

**GD-4, JS:** Is a male lecturer who teaches second- and third-year graphic design. He also enjoys working with students and providing digital training for programs like Illustrator, Indesign and Photoshop. He himself is very young and jovial and he was once also a student in the same department of graphic design. He graduated with his B-tech degree in 2004 and has vast industry experience. He has only been lecturing at the university since 2015 but doesn't seem to be skilled at using ICT (he struggled to connect his laptop to the WLAN of the university and he also failed to connect to Blackboard). After a little discussion about how the interview would be conducted (he did not want to be identified), he was assured that the study would maintain his anonymity.

**GD-5, BT:** The interviewee teaches history and theory of design to second- and third-year students and is a senior member of staff. By his appearance he seems to be well organised and strict towards his students. From the way he talks, he seems to be serious and to the point, and surprisingly most students are afraid of him and would do anything to avoid direct contact with him. This seems strange, too, given the fact that he has been at the university for more than ten years. He also seems to have a detailed knowledge of e-learning and the various tools it uses. This is based on how he demonstrated the use of Blackboard to the researcher while in his office. He must also be skilled at using ICTs (he didn't struggle to connect his laptop to the wireless network of the university), a task most lecturers find difficult to do. After a little discussion about how the interview would be conducted (he did not want to be identified), he was assured that the study would maintain his anonymity.

**ARC-1, MRK:** This interviewee teaches second- and fourth-year students from the applied architecture department. She has been at the university for fourteen years and is now a senior member of staff. She has been mostly responsible for spearheading and facilitating e-learning initiatives in the department of architecture. From the conversation she had with the researcher before the interview started, it appeared that she was very insightful and knowledgeable about e-learning issues; she even highlighted some interesting topics in e-learning that the researcher was not aware of. Her maturity, energy and very friendly personality also made the researcher feel comfortable during the interview process. Given the nature of her discipline, one would expect her to be more serious and focused but that was not the case. She was very knowledgeable about

e-learning and was busy with her doctoral degree at the same university where she teaches.

**ARC-2, JHS:** This interviewee was a very senior member of staff who has been with the university for more than twenty-five years. Like ARC-1, MRK, he teaches third-year and fourth-year students. The time he spent at the university, shows that he knows every bit of history about the university from the time it was Cape Technical College to the time it became Cape Technikon, right up to the time it finally became known as Cape Peninsula University of Technology. He has very strong views and he appears to dislike e-learning and ICTs altogether. A closer look at why he dislikes e-learning tools, particularly Blackboard, revealed that he comes from a time where they did everything manually and that he has never obtained any formal training in the use of digital tools such as e-learning platforms. He sounded very negative when he was asked about his views on current e-learning trends and his lack of IT skills. He appeared not to be bothered by his lack of IT skills, as he was to retire in less than a year from the time the interview took place.

**ARC-3, SW:** This interviewee is a highly ranked lecturer in the architecture department. He is an architect by training. He is a young male lecturer (probably middle 40s) well aware of e-learning issues but a bit on the defensive side.

**ARC, STUD\_1:** This interviewee was a fourth and final year student studying graphic design within the department of applied design. He has been in the university for about five years as he had to take the foundation program before he started his first-year studies. His knowledge of digital technologies and LMSs is very impressive. He is very open about his views and enthusiasm for LMSs. He even claimed that students are willing to use LMSs inside the studio, only to be disappointed by their lecturers who seem uninterested in using the system. He puts the blame on lecturers for not leading the way in encouraging them to use LMSs inside the studio.

**GD, STUD\_2:** This interviewee was a young coloured woman, confident and neatly dressed. She was also studying her final year in architecture technology at the university. From her appearance, she seemed to be doing well in her studies. Her views on LMSs appeared to be fair in the sense that she had no problem with the system. She agreed to the interview protocol and the interview took place in one of the studios she always worked from.

**GD, STUD\_3:** This interviewee was a female student within the applied design department in her third year of study. She seemed very unhappy with the way LMSs were being used by some of her lecturers inside the studio. She complained about the lack of guidance from her lecturers and how they never encouraged them to use LMSs. The level of frustration she was experiencing clearly indicated that to her LMSs were not useful.

#### 4.6.1.2 Interview protocol and process

The in-depth interview protocol involved first selecting the interviewees and participants through purposive sampling. After the interviewees had agreed to take part in the study, they were asked to sign consent forms as per ethical requirements, where after interview dates and times were arranged. A follow-up email confirming the date and time of the interview was then sent out to all who had agreed to take part. On the day of the interview, the interviewer made sure all his recording equipment was in good order to avoid any inconvenience during the process. The researcher also came to the interview site with a notebook and a set of questions that the interviewees then needed to answer. At the end of the interview, the recorded conversation was put away for safekeeping.

#### 4.6.2 Document analysis

Document analysis also formed part of the data collection instruments used by the researcher to collect data on the use of e-learning tools inside studio-based courses. These documents were based on a review of relevant literature. Reading and analysing documents and websites helped to gather background information and

methodologies (Merriam & Tisdell, 2015). An analysis of training materials and e-learning policy documents also formed part of the document analysis process.

Document analysis was carried out in accordance with activity theory (see Figure 3.2, above) and continued until the final draft of the thesis was presented. Documents used in the study were selected using purposive sampling within a population of relevant e-learning stakeholders: policies, guidelines, training materials, reports, web pages, electronic emails and scientific publications. The sampling criteria first examined the elements relevant to the tools/LMSs used in studio-based teaching and learning practices. After this phase, the researcher established a link between the relevant documents selected according to the coding scheme used for analysis based on activity theory. The results of the document analysis were combined with interview data in the presentation and discussion of the findings (see Chapter 5, below).

## 4.7 Data analysis procedures

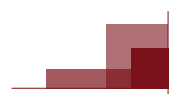
Data analysis is the process in which the researcher evaluates all the data collected, including interviews and field notes, for meaning making. There is no single correct method of analysis, and the process can be personalised and reviewed for each study (Cresswell, 2017). A qualitative research approach tends to choose among analytical procedures such as discourse analysis (Silverman, 2015), narrative analysis (Neuendorf, 2016), conversational analysis (Silverman, 2000) and content analysis (Robson, 2002). Given the nature of the data in this study, content analysis was the most appropriate because it moves through the stages of data management by reading, describing and interpreting data through visualisation and representation.

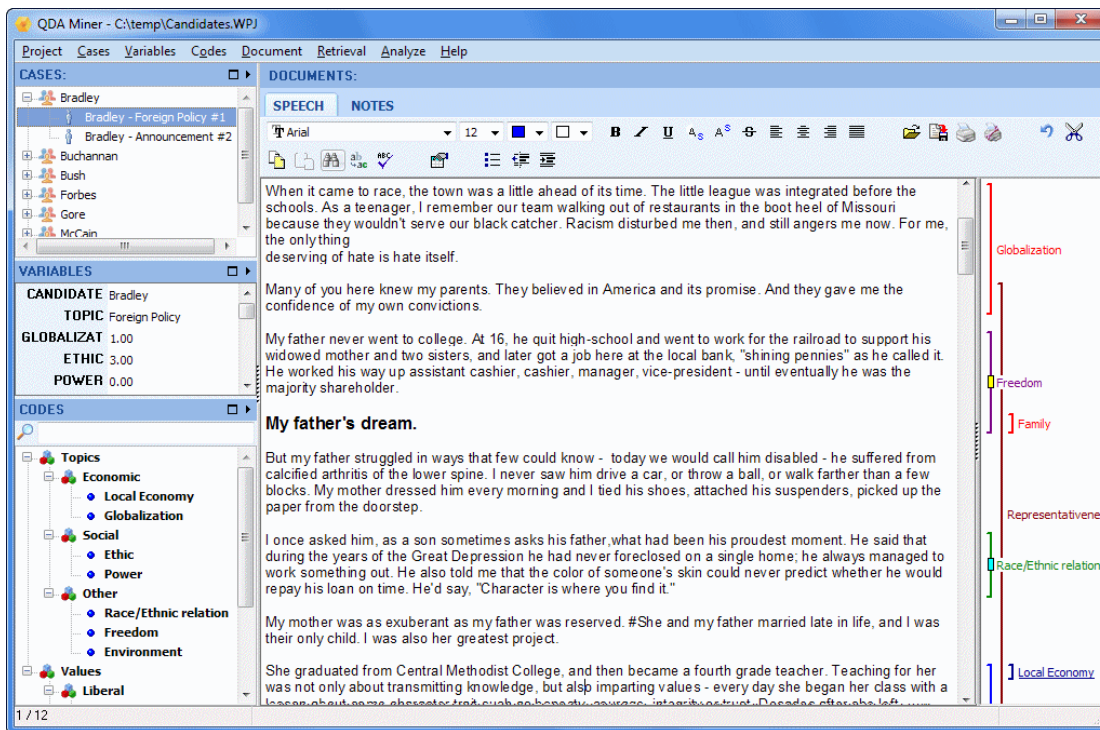
### 4.7.1 Utility of computer-aided research and procedures followed using Atlas.tiTM

This investigation relied on various new computer-aided designs and techniques for the thematic content analysis of qualitative data. Atlas.tiTM, a program that has been used by many theorists in various fields, including information systems, was adopted for this research (Sheridan & Storch, 2009:2; Zhang & Wildemuth, 2009:1-6; Vosloo, 2014; Woods et al., 2016). The use of Atlas.tiTM was essential to the analysis of qualitative content, such as cataloguing primary documents and organising codes and code descriptions (Zhang and Wildemuth, 2009:6; Vosloo, 2014; Woods et al., 2016).

Atlas.tiTM was a valuable help in organising and cataloguing all the data in a complete and efficient way. The software also tracked connections (relations) between codes, themes and sub-themes, as well as networking. The networks then created the opportunity to highlight different relationships, similarities and differences (Lu & Shulman, 2008:105-107). Bazely (2009) underlined the importance of Atlas.tiTM in asserting that it effectively manages search data by organising codes alphabetically, presenting code strength and graphically representing data. Atlas.tiTM was also useful for generating macro-themes or sub-themes, which led to the topics for final analysis – a process that would have required much more time if it were to have been done manually (Vosloo, 2014). Keeping in mind that not all fragments of code formation will be correct, computer-assisted content analysis saves countless unsuccessful work hours by providing data manipulation with a mouse click. Atlas.tiTM allowed the codes to be dynamically linked to quotes and documents to facilitate the quick and easy navigation of complex data sets.

Processes inherent to Atlas.tiTM mean that it fits well into qualitative content analysis since it was able to run earlier manual procedures more quickly and established a definable audit trail (Vosloo, 2014). A section of text was selected with the mouse and then either associated with existing code(s), or used to define new ones (Vosloo, 2014). Although the interpretation phase involved many hours of reflection and interpretation, Atlas.tiTM facilitated this process by tracking data not in isolation, but with reference to the general context (Vosloo, 2014). The use of computer-assisted analysis greatly facilitated the control and re-verification of hypotheses and conclusions.





**Figure 4. 2 :** Qualitative data content analyser (QCA) (Atlas.ti)

### 4.7.2 Content analysis approach

Content analysis was used to analyse data from the in-depth interviews in order to identify keywords, similarities and differences that helped the researcher to understand its significance (Neuendorf, 2016). Through the use of content analysis, the researcher was able to identify the key themes and sub-themes emerging from the data (Ritchie et al., 2013). The content analysis process involved a number of critical steps.

The first step was to identify the main themes from the detailed responses provided by the respondents to each of the interview questions (Zhang & Wildemuth, 2016). These were mostly derived from activity theory. The second step was to assign codes to the main themes through the number of times an issue occurred in the interview until the researcher had reached a saturation point. The third step classified responses under the main themes through computer-aided qualitative data analysis software (such as Atlas.tiTM, NVivo or CAQDAS) (Leech & Onwuegbuzie, 2011). The last and final step was to integrate the themes and responses into a discussion of the findings. The procedure for deriving arguments from the study depended on how the researcher intended to communicate the results to readers (Neuendorf, 2016). The computer-aided qualitative data analysis helped clarify the findings on the usefulness of LMS in studio-based teaching and learning practices, rendering the data easy to understand. It provided complete and comprehensive information in a succinct and efficient way for readers (Leech & Onwuegbuzie, 2011). During the first phase of the content analysis process, the interviews were divided into three separate groups: lecturers, students and IT e-learning specialists from Fundani. In this process, complete transcripts of the interviews were treated as the units of analysis. Then the researcher returned to the transcripts to select appropriate text extracts (see section 4.2.1, above). These portions of data were read and assigned meaning (manifest or latent) as first-order constructs linked to the main constructs of activity theory; meanings were then assigned to a complete fragment or sentence or group of sentences in a block of text. Each construct of the first order was related to a particular category or code from the Atlas.tiTM drop-down menu. The categories were then populated with first-class constructions and were further developed and structured as main themes and sub-themes (Graneheim & Lundman, 2004:106-109). The main categories were identified in Chapter 3, while the sub-categories emerged from the analysis of interview data.



### 4.7.3 Coding the data

The procedure through which collected data is viewed, analysed, conceptualised and then reassembled in new ways is called data coding. This process is essential in any research study as it helps the researcher to make meaning from the information gathered so as to draw accurate and meaningful conclusions. To store, retrieve and analyse the collected data, the researcher made use of a computer system (Atlas.tiTM), as explained above. Atlas.tiTM assisted the researcher to critically examine and analyse the data, by sorting it, and thereby allowing meaningful associations to emerge (Creswell, 2007: 165). This computer program was also used to encode in-depth interviews and document analysis data to produce main themes and sub-topics.

## 4.8 Research quality management

### 4.8.1 Limitations of the research and how they were handled

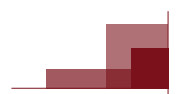
Although this research addressed the low rate of adoption and use of LMSs in studio-based practices, there were limitations associated with the research method, case-based research, which restricted the researcher's ability to generalise the results. Another limitation of the case-based approach was the influence of the researcher's subjectivity on the results. The use of multiple sources of data and various analytical methods has provided evidence of addressing the question of subjectivity (Neuendorf, 2016). Nevertheless, the coding of data, the results and the conclusion of the research are generated from a single perspective, that of the researcher.

### 4.8.2 Ethical considerations: ethics and consent

Ethical considerations are of paramount importance in any kind of investigation or research. The current study complied with the university's codes of ethics and obtained an ethics authorisation certificate from the Faculty of Informatics and Design's research committee. In addition to the institutional authorisation, letters were sent to participants outlining the purpose of the research, explaining its value and how the data would be handled, and the kind of participation expected of them. These letters also requested the formal consent of the addressees to participate in the study. The letters also guaranteed to protect the participants' confidence and anonymity where this was necessary (Bhattacharjee, 2012:138). The research participants did not have to participate in the study without full knowledge and consent at the time of data collection. The subject of the investigation did not include discussion of sensitive topics, nor required invasive, intrusive, or potentially damaging data-gathering procedures. In addition, participants were contacted to confirm their desire to participate in the research. As outlined above, the research aims and objectives of the study were thoroughly explained to ensure that the interviewees met the criteria for sample selection (Saunders et al., 2009:328). After all requirements had been satisfied, the interviews were scheduled. The dates and times selected for the interviews took into account the demanding schedules of students and lecturers. On the day of the interviews, the aims and objectives of the study were again explained to ensure that research participants could make informed decisions. Participation in this study was voluntary and students and other key informants could leave at any time. Written consent was specifically obtained for all forms of data collection (see Appendix G).

### 4.8.3 Confidentiality

Anonymity and confidentiality are aspects of ethical research practice of paramount importance in social studies (Bhattacharjee, 2012:138). To keep the discussion neutral, interviewees are denoted by referents such as GD, C2-S3, and quotes refer to particular passages or transcript annotations rather than individuals. The interviewed participants were assured that the information they provided as well as their personal details would remain confidential, and that the research was purely for academic purposes.



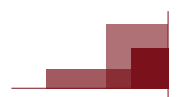
## 4.9 Conclusion

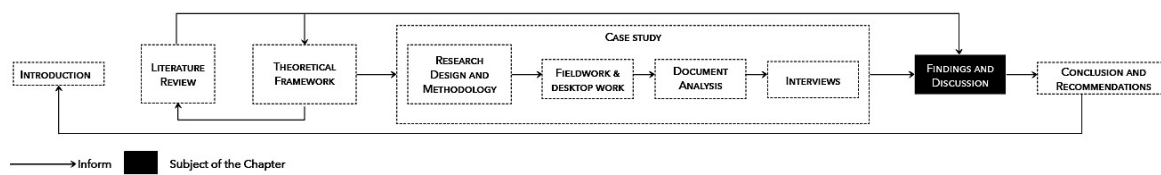
Every research project requires the correct identification of a problem and research instruments appropriate for collecting data to address that problem. This chapter has covered the research approach adopted for the study, data collection methods and techniques, as well as the data analysis process. There is a direct correspondence between the theoretical approach described in Chapter 3 and the research methodology adopted for the study. The theoretical framework in Chapter 3 assisted in conceptualising and understanding the research problem at hand, at the same time suggesting appropriate research methods and techniques to carry out the investigative process correctly. The main research question and objective provided a basis and guideline for choosing the research methods. The fieldwork and data collection period was a challenging, slow and painful part of this research, but also a period of learning new research concepts. Data was collected and analysed despite the hindrance of time and other constraints. Data was collected from literature and relevant documents, and from interviews with key students and lecturers and e-learning specialists at CPUT's Fundani department. The process of data collection helped the researcher to acquire certain skills and competencies in undertaking research. The researcher learned how to find a topic, approach a subject to research, choose research methods, adjust to interviewees and participants, perform the data collection, transcribe and analyse the data, draw conclusions and write up the entire process. The next chapter (Chapter 5) discusses the findings of this research through the lens of activity theory.

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M Tech  
Graphic  
Design

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# CHAPTER FIVE FINDINGS & DISCUSSION





**Figure 5.1 :** Outline of Chapter 5

## 5.1 Introduction

The purpose of this research was to understand an apparent contradiction between the usefulness in principle and the actual usage patterns of LMSs among students and lecturers in studio-based courses such as graphic design and architecture. The aim was to obtain insights into the factors affecting the uptake and usage of online LMS tools in these courses. The ultimate objective was to contribute towards mechanisms to help students and lecturers adopt and implement new e-learning tools in studio-based courses to supplement the traditional approaches. For this reason, a combination of lecturers and students from the Graphic Design department of the Cape Peninsula University of Technology (CPUT) was selected for an inferential case study. The research question posed was: “What is the extent of e-learning systems adoption and use in studio-based design courses (Graphic Design and Architecture) at CPUT?” This question was divided into the following sub-questions:

**5.1.1** What specific tools (LMSs) or web technologies do lecturers and students use in studio-based teaching and learning practices?

**5.1.1.1** How can the current usage (or non-usage) patterns of e-learning in graphic design and architecture be explained (participants’ perceptions)?

**5.1.1.2** How does the current structure of LMSs and the environment – for instance, design features, institutional policies and lecturers – promote or hinder their usage in studio-based spaces?

**5.1.1.3** What are the key design features required to enable a potentially successful studio-based LMS platform?

**5.1.1.4** How should LMSs be designed for successful interactivity in studio-based practices?

Given the nature of the problem at hand and of the questions to be addressed, the researcher looked for individuals who could assist with relevant information. Selected thus through purposive sampling, fifteen participants from the Graphic Design and Architecture departments in the FID at CPUT’s District Six and Bellville campus were interviewed. Drawing on activity theory as portrayed in Figure 3.2 (Chapter 3, above), the stakeholders were broken down into 4 actor roles: architecture and graphic design lecturers, students, e-learning coordinators and HoDs in the departments concerned. The logic of activity theory was then embedded into the analysis and interpretation of the data as presented in this chapter. In this process, the researcher focused on relationships between the data and elements of activity theory as a type of qualitative content analysis (Ritchie et al., 2013). The required initial step in the process of analysis was inquiry into existing research data sets (Neuendorf, 2016). Information gained from this was used to understand questions that arose in the primary data sets and analysis (ibid.). From this point onwards, the first step was to identify the main themes through the detailed responses provided by respondents to each of the interview questions (Zhang & Wildemuth, 2016). The second step was to assign codes to the main themes emerging from the interviews until the researcher had reached a saturation point. The themes were identified with reference to the research questions and the theoretical framework. Responses classified in terms of these themes were then analysed with the help of qualitative data analysis software, Atlas.ti™ (Leech & Onwuegbuzie, 2011).

Specific responses in each transcript were colour coded according to the theme. Thereafter answers that fell within the same theme (in other words, answers that shared the same colour) were grouped together.

### 5.1.6 Thematic presentation of findings

This section presents the research findings according to theme: (i) e-learning tools or specific LMSs and web technologies used by students and lecturers; (ii) usage/non-usage patterns; (iii) e-learning structure and the environment; (iv) and (v) attitudes and perceptions (students and lecturers); (vi) integrating e-learning tools in studio-based spaces; (vii) staff readiness.

The above themes all link to activity theory constructs and corresponding categories, with the categories representing the aggregation and concatenation of codes with specific shared characteristics during the analysis phase. The categories and themes presented here mostly emerged from analysis of the interview data, interview questions, activity theory constructs and a theoretical understanding of the phenomenon being studied.

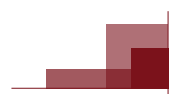
The findings are discussed under two headings because the study is an embedded multiple-case study in which data was gathered independently from students and staff members at CPUT to obtain clear insights and achieve the objectives of the study. Findings are drawn from the in-depth interviews held with the participants (outlined in Appendix G). In the next section (5.2), the e-learning tools or specific LMSs and web technologies used by students and lecturers is discussed.

## 5.2 E-learning tools: LMSs and web technologies currently in use in studio-based teaching and learning practices

This theme embraces the tools and technologies that students and lecturers were using inside the studio. These tools indicate the scope of the activities taking place inside the studio. The theme is divided into two categories:

- I. Proprietary tools; and
- II. Open-source tools

Open-source tools do not require any licensing and are free to use; examples include Facebook, WhatsApp, Coursera and Piazza, just to mention a few. Open-source tools such as Coursera, Piazza and Moodle were in popular demand and use among both students and lecturers. Reasons for their popularity will be elaborated upon in due course. Proprietary tools, on the other hand, are not free; they require a license and purchased usage rights before one can use them. Proprietary tools like Blackboard and Open Architecture were the type favoured by the university. CPUT endorses Blackboard and Open Architecture for all staff members and students to use because of their security. However, there seems to be disagreement and friction arising from the choice of tools among lecturers and students. An overview of LMSs/ web technologies or tools currently in use is presented in Table 5.1, overleaf.



**Table 5.1 :** Overview of LMSs and Web technologies in use

Department	System Code Initiative*				System objective
	Open source (OSS*)	Pty/ licensed**	Social/ Web 2.0 based***	Managing unit	
Graphic design	Cousera* Moodle*	Blackboard**	WhatsApp*** Piazza*** Behance ***	Centre for e-learning: Personal management	Support use of LMS for teaching and learning Maximise use of studio communication for effective teaching and learning
Architecture design	Cousera* Moodle*	Blackboard** Open architecture**	WhatsApp*** Piazza*** Facebook ***	Centre for e-learning Personal management	Support use of LMS for teaching and learning Outsourced Web-enabled tool to facilitate teaching and learning to 2 <sup>nd</sup> year internship students

**Explanatory Note:** \* OSS = Open source based, inhouse initiative; **Pty** = Proprietor owned (licence fee) \*\*

Refs = Graphic Design: Cronje (2010); Morris (2011); Architecture: Morkel (2011)

Table 5.1, above, presents the mostly commonly used tools found inside studio-based spaces and the reasons for their use. As highlighted earlier on, this table categorises these tools into open-source and proprietary tools (including Web 2.0 tools) that students and lecturers are currently using for their studio activities. From the in-depth interviews that were carried out by the researcher, it was very clear that most students and lecturers were in favour of Web 2.0 tools or open source tools, particularly when they ran into trouble with the university's favoured proprietary system, Blackboard. From Table 5.1 it can be seen that open source tools as well as Web 2.0 tools are in popular demand among students and lecturers. This table also highlights some of the key usage or non-usage patterns of specific tools within studio-based practices. A general studio-based work activity with e-learning tools, as described in section 3.2 of Chapter 3, is made up of institutional goals (objectives and motives) for the use of LMSs, including the rules (policies, strategies and procedures) and people (participants) or human actors (subject instructors, section designers, e-learning and network administrators, as well as students) and finally, the means of usage (tools, procedures and activities).

The first set of goals for having e-learning tools within the studio-based work activity system is framed by CPU's goals, objectives and motives. The university is responsible for creating an appropriate learning environment; in this case, for granting access rights to the e-learning environment. Both students and lecturers must fully be identifiable within the university system through a valid staff number or student number for them to gain access to the e-learning environment and tools. Upon successful system verification through a valid staff or student number, the university then allocates usage rights and access to these tools and learning spaces to the students and lecturers. The university's main objective is to provide a successful and quality learning environment that supports an 'anytime', 'anywhere' type of teaching and learning for both students and lecturers.

The institution's authorities responsible for e-learning have the task of making sure that all relevant departments and units operating within the university have access to e-learning and its various tools. Their mandate is to ensure that there is frequent use of e-learning tools and viable wifi or internet connectivity to encourage

collaborative learning among students and lecturers. At CPUT, the Fundani department on the District Six campus and the e-learning centre on the Bellville campus are responsible for all queries relating to e-learning at the university. The CTS help desk is primarily responsible for issuing usage rights by activating the username and password of a student or lecturer into the system. The Fundani department then provides free training for those who have been granted access by the CTS help desk.

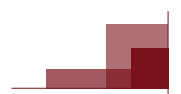
At the time of data collection, all the students and lecturers in the Graphic Design and Architecture departments were using the university's recommended proprietary system, Blackboard, which will be further explained. The architecture department was also using a system of their own called Open Architecture that is similar to Blackboard but different in terms of navigation and the tools available on it. Findings relating to these and other e-learning tools and web technologies currently used by students and lecturers in these departments are presented in section 5.2.1, below. This section begins by interrogating Blackboard as a proprietary tool being used in graphic design. It then explains how this tool functions and how users interact with it. Their perception and concerns regarding the system are also presented in this section.

### **5.2.1 Proprietary tools**

During the data collection stage of this research, it was discovered that proprietary tools were in use in the Graphic Design and Architecture departments although they were not very popular among students and lecturers. Through the in-depth interviews it came to light that two types of proprietary systems were in use. The Graphic Design department had no choice but to use the Blackboard system, which they were not in favour of using, while the Architecture department was found to be using a system called Open Architecture, which will be discussed in section 5.2.1.2, below. One of the major findings about the tools in use was the fact that the Architecture department had the privilege of being able to call upon two systems, depending on what was needed. The following section presents the findings in respect of Blackboard.

#### **5.2.1.1 Blackboard as a tool for teaching and learning in the Graphic Design department**

By referring to Table 5.1 above, it can be noted that CPUT has been using this tool since 2005, when the merger took place. Blackboard is a proprietary system that does not allow anyone without access rights to use it. To access it one needs to have a username and password, which can only be generated by the CTS help desk. This means it is advanced in terms of its security and functionality. Blackboard was adopted to provide much-needed e-learning support for students at CPUT. Aside from its main purpose, graphic design lecturers somehow use it as an administration tool. Students also get to use this tool but only when their lecturers are using it, so that the frequency of use of this tool on the part of students mainly depends on their lecturer. As mentioned earlier, this tool is run and controlled by the e-learning department made up of the Fundani unit and the CTS help desk unit. Both units are responsible for the licensing of this tool to the university, and they are the departments tasked with making sure that it runs smoothly and providing training whenever it is needed. The two departments work hand-in hand to make sure that the university's overall teaching and learning objectives with respect to technology are being met (Mlitwa, 2010). The e-learning Centre and its two units are regarded as the driver for e-learning, with lecturers only following the lead of the Centre (rather than taking the initiative) in this format of e-learning practice. Figure 5.2, Figure 5.3 and Figure 5.4 serve to outline the structure of Blackboard as used in the Graphic Design department at CPUT.



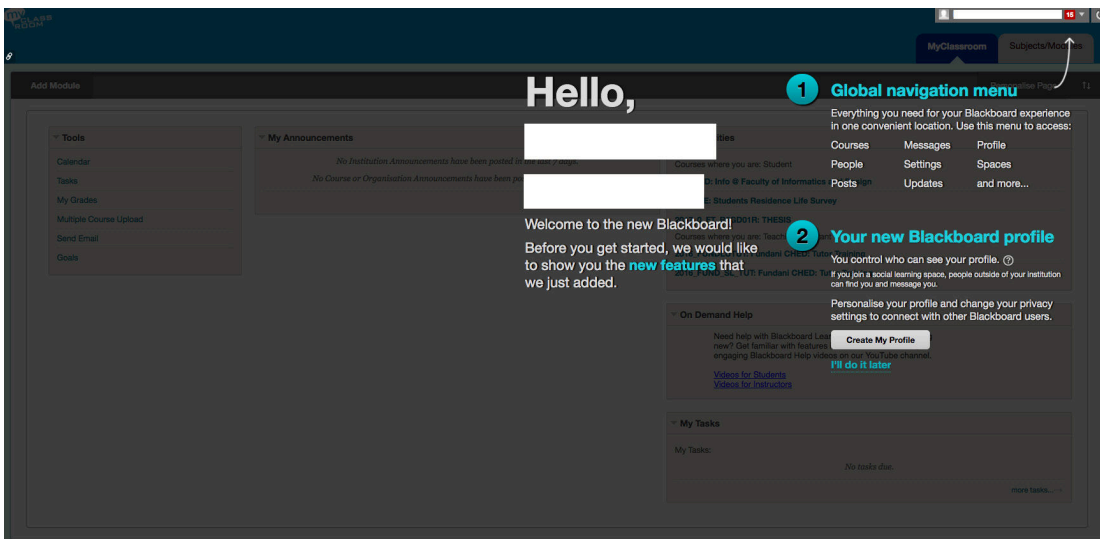


Figure 5. 2: Blackboard login page  
 Source: <https://myclassroom.cput.ac.za/>

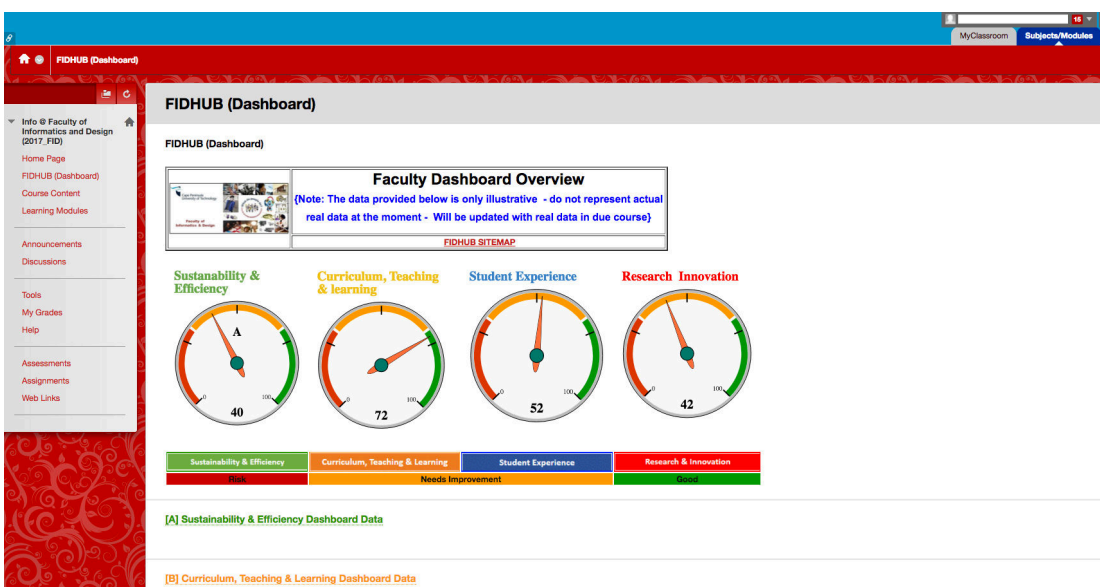
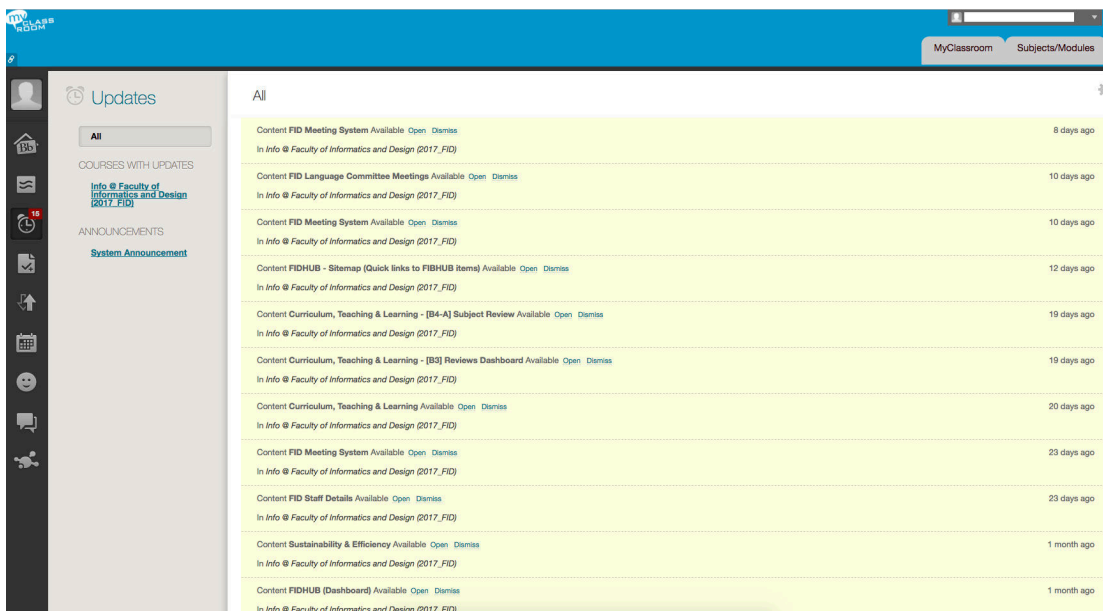


Figure 5. 3 : Blackboard course / e-classroom page  
 Source: <https://myclassroom.cput.ac.za/>





**Figure 5. 4:** Blackboard subject page

Source: <https://myclassroom.cput.ac.za/>

Figures 5.2, 5.3 and 5.4, above, demonstrate the appearance and structure of Blackboard as the lecturers and students from Graphic Design experience it. During the in-depth interviews, it emerged that at the beginning of every new semester, students and lecturers need to enrol on the Blackboard system to gain full access to the system. To do this, they must visit the e-learning centre on either of the two campuses where this study was conducted. Once full access to the system has been granted by the e-learning department through its units, lecturers then need to enrol each of their students on the system, depending on the course and modules they are taking in that particular semester. Their role is to login into the system once access has been granted. They can if they wish customise or re-design the platform to suit their own preferences, depending on their overall teaching and learning objectives.

In addition, after enrolment has been completed, all the courses a lecturer is taking in that semester or year are linked to their Blackboard profile, but are not automatically activated for immediate access and use by students. So lecturers are required to register every student taking their course on Blackboard after the academic registration period has been completed. The impact of this administrative task on the workload of lecturers is elaborated and criticised in the discussion of the findings later in this chapter. To access the Blackboard system, users click on the classroom link on the university's main website, which takes them to the entry page shown in Figure 5.2 above. Upon a successful login, a lecturer proceeds to the e-Classroom (or user interface). As shown in Figure 5.3, a lecturer or a student can see and select any of the courses for which they have access rights in the e-Classroom space. Asked about their overall experience of the platform and how they felt about its design and user interface, most students expressed a lack of interest and some even said that they did not see themselves using it in their studies. A question of its relevance to the nature and purpose of their course of study emerged as the main concern in this interview. When asked whether or not they should be more active on this system, for example, some students pointed out that it was not meant for graphic designers. Asked to elaborate, one student alleged that the system was poorly designed in terms of its interface, which was confusing and difficult to navigate. The student even went on to say the following:

*Honestly, I don't get it why these lecturers force us to use it. It really doesn't make sense for me to use a tool that does not even help me to do my work. How's it expected that I learn with such a tool like that. Me I do not know how to use it and honestly at this point in my studies, I don't really care, so long as I pass. (STUD-1, GD)*

From this explanation, it is obvious that the student has been frustrated by the system and does not enjoy using it. This was not the only student to express such a negative perception of this tool. Another third-year student who was also interviewed about the tool had this to say:

*Eish! You're asking the wrong person about this thing. Me I only use it when my lecturer say there is an assignment on Blackboard, that thing even confuse me. I don't like the way they designed its interface. We are graphic designers and to use the layout and navigation is very important. We are visuals man, we can't be expected to read things all the time (STUD-1, GD).*

Like most of his colleagues, the student's sentiments about this tool are decidedly negative. From his point of view, the tool's interface and navigation are not helping him to enjoy his learning experience as a graphic design student. He is very frustrated by the way it looks and how badly it is designed. Given this attitude, it is clear that this student will only make use of Blackboard if his lecturer insists on it. The extracts from the interviews with these two students clearly reveal that the system is not being fully utilised by the students, who are frustrated and disappointed by what this tool can offer them.

As it appears that lecturers are imposing the tool on learners, regardless of its relevance to their learning needs, one was curious to discover lecturers' perceptions of the usefulness of tool. Strangely, many lecturers echoed the students' negative sentiments, expressing general disappointment with Blackboard and its lack user-friendliness. Key things to note in the lecturers' reservations were the username and password issues that keep recurring and never got fixed once and for all. One may understand their level of frustration and disappointment with Blackboard, as it takes a lot of time simply to login, let alone to find a course for their students. The fact that Blackboard's user name and password do not work efficiently forces them to adopt other tools readily available at their disposal. Some lecturers also expressed their annoyance and unhappiness with the communication tools available on Blackboard

*That thing they call Blackboard is really a nightmare, clearly how do you expect me to use that thing when half the time I am trying to figure out where my students are. That is why I use WhatsApp as a way to by-pass all the hassles associated with getting a username and password from the IT help desk .... (ARC-2, JHS).*

The difficulty with this assessment, however, is that it seems at face value to register the technical weaknesses of the system. On closer examination, however, one may not be too certain about the infrastructure needed to support response efficiency, especially with heavy graphical content associated with graphic design work. So, as much as there are negative perceptions of its usability, it is inconclusive whether the system itself is alone to blame. Nevertheless, the value and use of a learning management tool such as Blackboard seem to be reduced to those of a communication medium, for which WhatsApp or Facebook could be substituted. No additional pedagogical value is recognised.

From the perspective of activity theory, then, the negative effect of two critical constructs, object and mediators, could be recognised. In the object sense, the purpose and value seems misplaced – at least from the perceptions of the users. This has a direct causal correlation with the user median effect. For example, the object negatively distorts perceptions with a negating mediator effect on usage. The environment also seems to be unsupportive, and therefore disabling. For example, the inability of the user to login, and the lack of effective communication solutions, clearly frustrate users.

### **5.2.1.2 Open Architecture as a tool used for teaching and learning in the Architecture department**

The Open Architecture tool is like Blackboard in being a proprietary system. This tool is used by architecture students and lecturers for the part-time blended architecture programme in the architecture department at CPUT to supplement their contact session time. The tool is a proprietary brand like Blackboard as one must

be licensed to acquire the right to use the system. It is owned and controlled by the South African Institute of Architects (SAIA) and was developed to help address the continued shortage of architects in South Africa. As shown in Table 5, above, the department started using this tool to supplement the narrow range of functionalities available on Blackboard. Open Architecture was introduced at CPUT in 2014 as part of a two-year part-time B-tech programme (in partnership with SAIA), in the form of an office/studio-based online programme with intensive face-to-face tutoring (Morkel, 2011). This programme runs concurrently with the mainstream full-time B-tech programme at CPUT; its modules have the same title as the full-time B-tech subjects, but course delivery is adapted to suit full online part-time studies, bound to any geographic location.

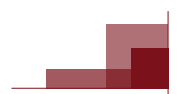
To use the Open Architecture tool, lecturers are enrolled by the e-learning division organised by a professional body of architects outside of CPUT into their respective courses. As is the case with Blackboard, these lecturers are granted full rights and access to the system upon successful registration. The system allows them to customise it to suit their personal preferences for easy navigation when they perform various tasks such as uploading or assessing assignments. Unlike Blackboard, it is clear that parties with access to Open Architecture extend beyond students and lecturers. The Architecture department only started using the Open Architecture system as a way to support working-class part-time students who ran the risk of falling behind their mainstream full-time counterparts. Its main objective was to offer general support to teaching and learning in ways that supplement rather than replace existing educational processes at CPUT (ARC-1, MRK; ARC-2, JHS). The Open Architecture tool also provides a blend of formal and informal learning engagements between students and lecturers in the form of office/ studio-based mentoring, through an online learning portal OR an interactive, web-based platform, as well as face-to-face block release programmes. According to one of the lecturers interviewed, who also happens to be the coordinator for the B-tech programme:

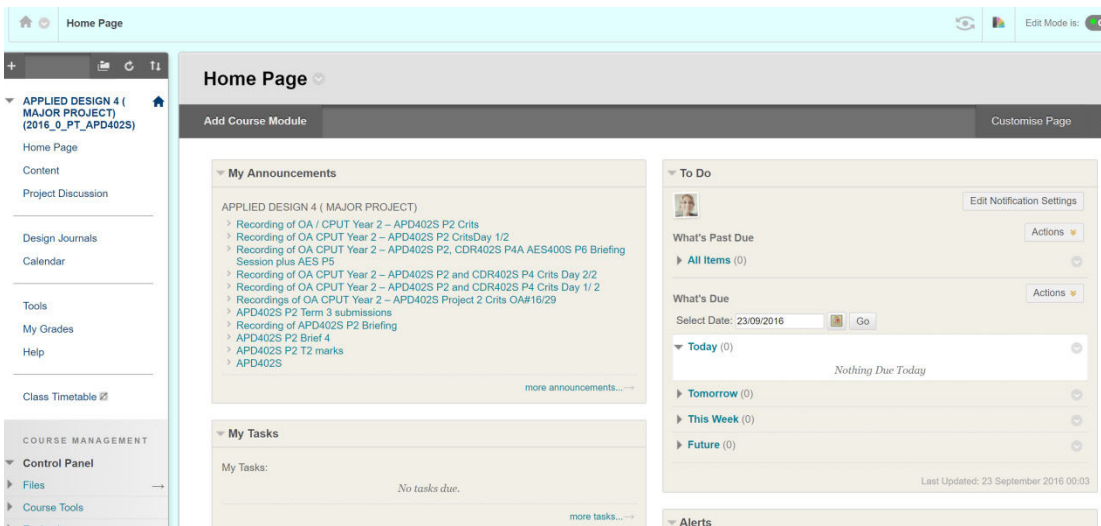
*The Open architecture platform allows the architecture programme to offer lectures in real time, as well as via recordings; giving remote students access to the studio experience (ARC-1, MRK).*

The lecturer seems to be implying that both students and lecturers can access this platform for various learning and communication purposes beyond its initial purpose (ARC-1, MRK). According to another lecturer who was interviewed (ARC-2, JHS), within the Architecture department, students who are registered for the part-time B-Tech architectural technology programme are supposed to spend an equivalent of 50% of the time that full-time students spend on their studies during the academic year. The same lecturer also indicated that after full access has been granted, computer literacy is one of the main requirements in order for the students to use this tool effectively. This lecturer also went on to say the following:

*... all students who enrol for this module, we need them to have good knowledge of the computer, otherwise how are we going to show them how to use this tool? Students must have some good background knowledge of these programmes (MS Word, Power Point, graphics, CAD, 3D modelling) and must have a good access to Open Architecture (a computer and internet connection). This kind of course requires a good internet connection and one must make sure they have access to this as it is very important. ... (ARC-2, JHS).*

In order to access the Open Architecture system, just as with Blackboard, users must click on the login button on the platform's website outside of the university's main website, which takes them to the entry page shown in Figure 5.4, below. Upon a successful log-in, a lecturer proceeds to the e-Classroom (or user interface). As shown in Figure 5.5, a lecturer or a student is able to see or select any of the courses for which they have access rights in the e-Classroom space.





**Figure 5.5 :** Open Architecture login page  
Source: <http://openarchitecture.learn.cput.ac.za>

### 5.2.2 Web 2.0 and Open-source tools

This section speaks about the Web 2.0 and open source tools that students and lecturers from the Graphic Design and Architecture departments were found to be using. During the in-depth interviews, it emerged that several Web 2.0 and open source tools such as Facebook, Whatsapp and Cousera were in use. The following section presents the findings regarding these tools: how they function and how they are perceived by students and lecturers.

#### 5.2.2.1 WhatsApp, Facebook, Cousera and Piazza as open-source tools used for teaching and learning in studio-based spaces

Although the university's policy states that lectures and students must use Blackboard for their everyday teaching and learning, findings from the in-depth interviews as shown in Table 5.1 above reveal that lecturers in the Graphic Design department were using various other e-learning tools or web technologies to support studio-based teaching and learning in ways that supplement rather than replace the recommended e-learning tools at CPUT. To emphasise the significance of the communication feature in electronic learning tools for these design subjects, lecturers from Graphic Design and Architecture have come up with their own strategy that involves using additional tools like, Facebook, WhatsApp, Cousera, Piazza and Behance, to mention but a few. The uniqueness of these tools is found in the way students can interact with one another and their lecturers too. The level of interaction on these platforms surpasses what is to be found on Blackboard. Students were also found to favor these tools because of the way they were designed, in terms of their interface and functionality, which was far superior to the proprietary Blackboard system.

##### 5.2.2.1.1 WhatsApp

WhatsApp is one of the tools used by lecturers to communicate with their students. It was found out that most lecturers were using this communication tool to bridge the information gap that has the potential to divide them and their students on Blackboard. Lecturers in the Graphic Design and Architecture departments use this tool to harness and share educational resources through mediated instant messaging interactions. Their main purpose is generally to support their teaching and learning activities rather than replace the existing Blackboard platform acquired by the university (GD-1, AMO).

Most lecturers depend on WhatsApp for its reliability and ease of use, which are very different from Blackboard.

It was also found that a majority of lecturers and students had created their own chat groups, where they discussed project due dates and other assignment requirements. It was revealed that although Blackboard offers an instant messaging facility, students in Graphic Design and Architecture perceived WhatsApp as a far better tool for accessing peer-generated resources by promoting an 'anytime', 'anywhere' teaching and learning experience. According to GD-1, AMO, who is a lecturer from the Graphic Design department, WhatsApp offers a reliable form of communication that makes relaying information easy for both students and lecturers. GD-1, AMO went on to say this about WhatsApp:

*Most lecturers use this tool as a digital noticeboard to communicate information about briefs, submission dates and other useful information to their students. Students will need to join the WhatsApp group that I created. Sometimes we always chat online in this group and I can see who is online, who is taking part and those that are silent or not contributing the discussions we do as a group ... (GD-1, AMO).*

The majority of lecturers in Graphic Design apparently supported using WhatsApp as a tool for the daily communication for project briefs and assignments. This lecturer even said:

*The strategy we developed of using WhatsApp for communication purposes has helped students, even those who cannot access Blackboard due to username and password issues, to communicate with us easily (GD-2, LGD).*

Another lecturer from the Department of Architecture was enthusiastic about using WhatsApp as a way of communicating important information to students. Asked to elaborate on what she meant by that statement, she said:

*We normally communicate with our students via WhatsApp as a way to by-pass all the hassles associated with getting a username and password from the IT help desk at the e-learning centre of CPUT. We have been using it for the transmission of text-based messages between conversing interactants and to support collaborative problem solving within our studio-based practices. (ARC-3, SW).*

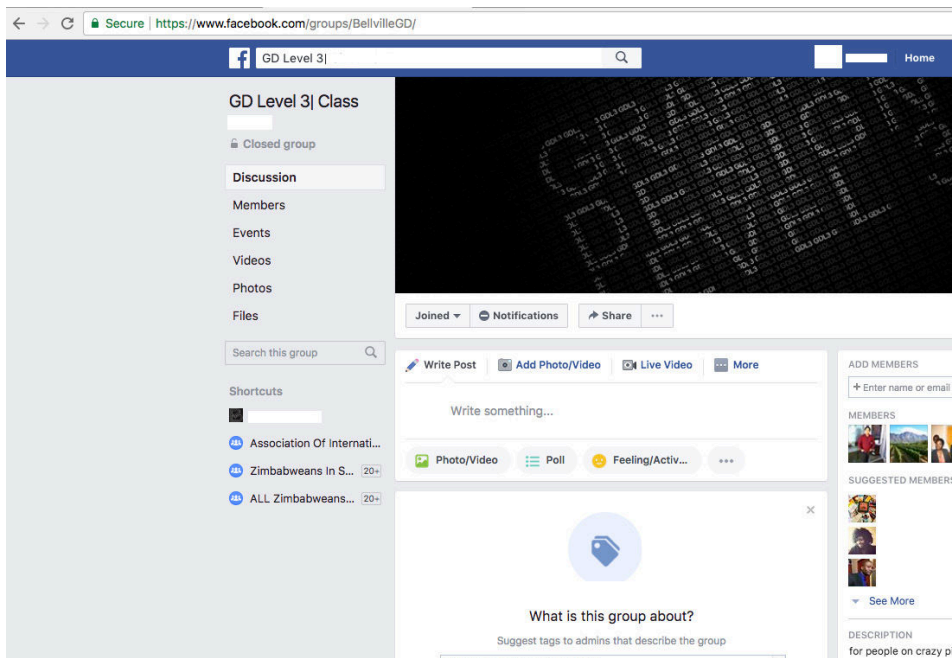
During the data collection period, both lecturers and students indicated their preference for WhatsApp and Facebook over other communication tools readily available. Facebook received the most coverage, though some lecturers were concerned about the security issue when using web tools like WhatsApp and Facebook.

### **5.2.2.1.2 Facebook**

Like WhatsApp, Facebook is a popular communication platform that students and lecturers are using for studio-based communication purposes. Facebook is used to harness and share educational resources through instant messaging mediated interactions. However, most lecturers do not rely much on this tool because of its lack of seriousness and how it is perceived as un-academic. Some lecturers do make use of Facebook as a way of bridging access to peer-generated resources within studio-based practices. Facebook does offer a form of reliable communication among students and lecturers. Most lecturers use it to post assignment briefs and useful general information for students. In a way, Facebook is regarded as a way to by-pass all the challenges associated with Blackboard at CPUT such as poor interface and login problems. To indicate their level of satisfaction with Facebook and how they prefer to use it over Blackboard, one of the lecturers remarked:

*We use Facebook for studio-based communication and learning activities, we are also using it to socialise and share great design ideas and inspiration. Socialisation is also part of studio-based teaching and learning spaces hence why it fits seamlessly in our practices. It is actually the students who have encouraged us to create Facebook groups for their courses so that everyone gets to know if there is any important communication passed by us as lecturers (GD-3, EDP).*

This level of interaction with Facebook compared to Blackboard clearly shows that both students and lecturers have benefitted from easy communication with each other, gaining knowledge in the process (Kirschner & Karpinski, 2010). The social aspect of Facebook has made it very popular and an effective tool to encourage collaboration in the studio.



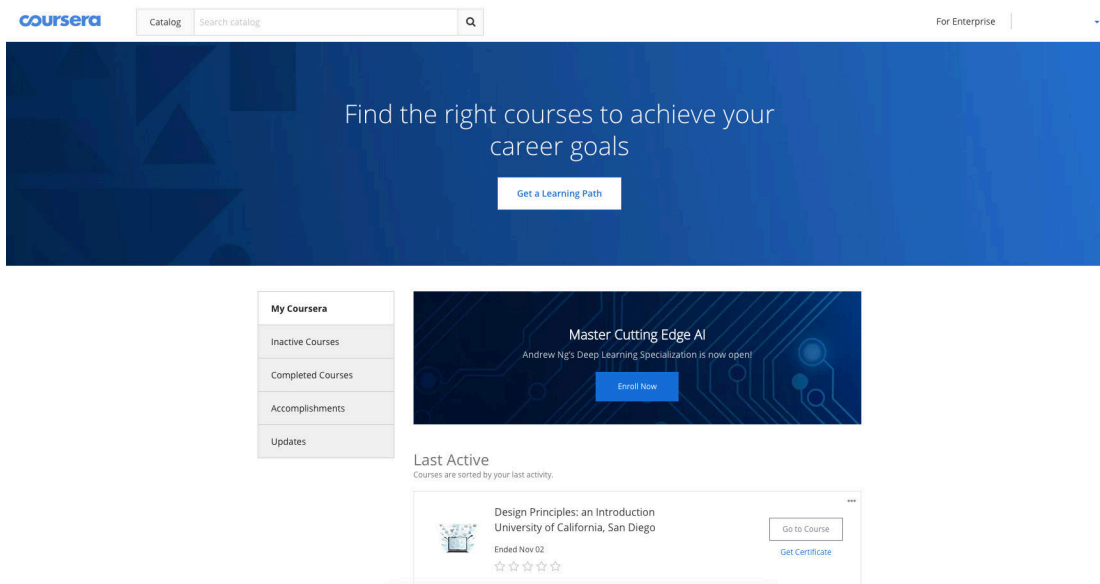
**Figure 5. 6:** GD Facebook page

Source: <https://www.facebook.com/groups/BellvilleGD>

### 5.2.2.1.3 Cousera and Piazza

The interviews with students and lecturers also revealed that Cousera and Piazza, like other open source educational tools (also known as massive open online courses or MOOCs), are currently being used for teaching and learning in studio-type contexts. Cousera and Piazza are web-based educational tools used to harness and share educational resources with other top-league universities and institutions around the globe. Some lecturers within the Graphic Design department have been using these web-based tools since 2013 and believe they have helped to bridge the gap of accessing peer to peer-generated resources within studio-based practices (GD-1, AMO). One of the lecturers had this to say about Cousera and Piazza „

*Since the day I discovered Cousera and Piazza, I have been using these tools with my students because they provide a two-way communication; most of my students use this tool for their assignments even when I am not available to answer their questions in the office. It helps me to keep track of their discussion and that is how I usually interact with them. The interaction and collaboration is great I tell you. (GD-3, EDP)*



**Figure 5. 7:** Coursera login page

Source: <https://www.coursera.org/>

On the home page (as illustrated in Figure 5.7, above), the lecturer can see all the courses under his/her responsibility. Upon selecting and accessing a specific course, a lecturer may perform a number of administrative or teaching functions using any of the available tools on Coursera. For a selected course, the course content in the form of notes and reading materials is presented for access by the students. Unlike the Blackboard system, as soon as students have signed up or created their free profile, they are automatically registered for their courses on the LMS platform. There is no need for a lecturer to enrol individual students into individual courses on Coursera (GD-1, AMO), which means less of an administrative burden for lecturers.

### 5.2.4 Summary of findings on e-learning tools: LMSs and Web technologies currently in use for studio-based teaching and learning

In summary, most students and lecturers were in favour of using open source e-learning tools rather than the proprietary tools available at CPUT. Within this theme, the concept of communication and collaboration seems to appear in both Graphic Design and Architecture departments. From this it can be deduced that studio-based practices are essentially interactive spaces where students and lecturers share their design ideas in one way or the other. Another key concept that emerged from this theme is that of support and guidance, with most interviewees insisting that support is essential if ever they were to use some of the e-learning tools available at the university. Technical support plays a vital role in assisting students and lecturers to use the proprietary tools sponsored by the university. It emerged that poor technical support was a major cause of frustration and a principal reason for the reluctance to use Blackboard. As indicated above, most lecturers and students go for alternative, readily available open-source tools to supplement the role of Blackboard in supporting studio-based teaching and learning. These points are interrogated further in the lecturers' interview inputs in section 5.3, below. The next theme, students' perceptions of and attitudes towards e-learning tools currently in use inside studio-based courses is presented below. According to the aim and objectives of this study, this theme is presented to show why students alone cannot be blamed for not using e-learning tools such as Blackboard or other open-source tools for continued collaboration and interactivity in studio-based practices.

### 5.3 Students' perceptions, usage and non-usage patterns of the e-learning tools and web technologies currently in use for studio-based practices

The use of e-learning tools in the form of either proprietary or open source systems in studio-based practices maybe best be described as a goal-determined collective activity with actors and stakeholders. All these actors

and stakeholders take part in the system of work activity with the aim of achieving a common goal (Figure 3.2). As the intended recipients of e-learning activity offered by the institution, students are the most important actors in that system (Figure 3.2).

This following section of the findings draws upon students' experiences and preferences as a background to the interrogation of lecturers' circumstances in later sections of the chapter. Insight from activity theory is also used in this section to explain students' experience of e-learning tools, which also depends on whether and how lecturers use these tools for teaching and learning. The mediating factors identified in the exposition of activity theory in Chapter 3 are used to present students' experiences in this section, because those experiences are in fact dependent on these factors or independent variables – social, technical and environmental.

### **5.3.1 Current infrastructure and LMS usage by students in studio-based practices**

Data in this section was obtained from open-ended interviews with students from the Graphic Design department and Architecture departments during the period September 2016 to January 2017. Data from students' interview transcripts was analysed using the following sub-themes drawn from activity theory: environmental mediators, technical mediators and social mediators. To better understand the role of these mediators, students were asked perceptual and motivational questions on how they used e-learning tools such as LMSs in studio-based practices.

These questions sought to extract information from the students on how they felt about the e-learning tools available to them, and if they had any suggestions regarding what needs to be improved for them to be truly helpful and used frequently. These questions also served to provide information on students' level of understanding of e-learning and its purpose at the university. They were also asked to make relevant recommendations based on their experience of e-learning tools. The task was to indicate whether these e-learning tools were fit for the purpose they had described.

Students were also asked to indicate whether they were using an LMS for studio-based teaching and learning purposes, whether it was easy to use, and if it was not easy, to describe why not. Students were asked whether they had received any training on how to use these tools. They were also asked whether they got timely responses when reporting technical failures, whether their lecturers were using LMSs in their courses; and were encouraged to comment on usage omissions, usage limitations or poor techniques. The students were eventually asked to describe their ideal type of e-learning tool that could enhance their overall learning experience inside the studio-based curriculum.

### **5.3.2 Students' understanding of LMSs in studio-based spaces: perceptual factors**

Findings from this sub-theme on students' understanding of e-learning tools inside the studio begin with their perceptions of learning management systems. Students described e-learning and its tools interchangeably, as if they meant the same thing. When they were asked to elaborate on this aspect, it was found that, most of them tend to refer to e-learning either as a process (a way of doing educational things that include accessing structured content, getting their assignments, checking their marks, getting important notices about the course, and design briefs), or as a resource or tool used to do educational things electronically. In describing e-learning and how they understood it, some students characterised it as a system while others referred to an LMS by its name, such as Blackboard or Open Architecture. Asked to describe e-learning, for example, one student simply expanded the abbreviation, saying: I think e-learning is somehow a way of learning electronically (GD, STUD\_1). In this perspective it is seen as a process of learning in or through an electronic environment, but essentially the same as the traditional way of doing things in the studio. Whilst learning seems central to this process, other students saw e-learning as involving extending the resources of a physical studio into an electronic studio (e-studio) environment. Another student felt that e-learning is like when: they [lecturers] take what is given in lectures and they make it available electronically (ARC, STUD\_2). Yet another described e-learning as a way



of getting design briefs and lecture notes (GD, STUD\_3). Regarding the usage of an LMS, one student stated:

*We just use it more like a data base; we can download all our design briefs and other important documents that our lecturer provides us. (GD, STUD\_4)*

In the above statement, an LMS is being presented as a storage platform where one can access one's briefs and other important notes in one's own time, pace and space. Another student described e-learning as a way of communication between the lecturers and the students (GD, STUD\_1) over an LMS. Some students, however, do not have a clear understanding of an LMS because they have never had any experience of it in their courses or heard of its usage (GD, STUD\_2). In an attempt to describe the e-learning tool called Blackboard, another student referred to it as:

*It's what we used before Open Architecture came out, where you would log on with your student details and you would find links to your different courses... it's not similar to Blackboard, and it's very efficient. (ARC, STUD\_1)*

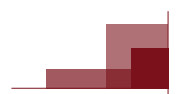
From these findings, it emerged that the Architecture department had used a different system before their current Open Architecture LMS, and the current group of part-time students have had experience of both. Open Architecture is described as a lot more efficient than Blackboard. Students viewed Open Architecture as more user-friendly, with simple and easy navigation protocols, as opposed to Blackboard's too many nested tabs that are sometimes difficult to keep track of. Navigation on Blackboard was described as chaotic and very difficult to understand. Students viewed LMSs not only as simple learning tools, but also as a means to facilitate other necessary functions such as accessing assignments and design briefs. The first description of an LMS by students, for example, points more towards an electronic resource than a platform for actual learning. In the second description, students viewed LMSs as a way of facilitating communication.

Students also perceived LMSs as tools that help lecturers carry out or manage various teaching tasks, electronically (or over an LMS): an LMS is an electronic system that should help the lecturer with whatever course they will be teaching or lecturing (GD, STUD\_3). Whilst some e-learning tools are considered useful, students seemed to believe that the role and objectives of a lecturer determine whether and how an LMS is used, and whether they can benefit from its capabilities (ARC, STUD\_3). For example, students said that a resource like a chat-room can help them do more listening as there is less note-taking than in lectures. Confidence in how an LMS can simplify learning and access to learning processes suggests a belief in its usefulness among students; that is, if it is technically sound and effectively implemented. The technical adequacy or inadequacy of LMSs, therefore, informs the level of its usefulness for students. Students' perceptions on the design interface of LMSs are presented in section 5.3.3, below.

### **5.3.3 Student perceptions on the design interface of LMSs: access reliability and functional consistency**

Regarding the proprietary e-learning tools that were in use inside the studio, students expressed mixed opinions about the design interface and technical adequacy of these tools in terms of consistent functionality, reliable accessibility on and off campus, as well as the availability of technical support. The findings from students' experiences clearly revealed that a majority of them were highly dissatisfied with the aesthetics of the Blackboard system. They claimed that the system was very unreliable in terms of its technical functionality and usage. Some students also expressed great concern over the way some lecturers failed to use this system. They also said it was very embarrassing to see some of their lecturers struggle to use the system, which ended up rendering this platform entirely inaccessible and unreliable. Asked to elaborate one student said:

*This thing called Blackboard is very difficult to use, our lecturers even struggle to use it. If they can't use it how do you expect us to even use it? I don't even know how to use that thing it's difficult to access it. It*



*is not easy to use, my login details they never work and sometimes I end up just ignoring it. (GD, STUD\_3)*

Students perceived Open Architecture's design interface as fair, and overall, the system's functionality was viewed as reasonable and consistent (ARC, STUD\_2). But it emerged that Open Architecture requires a good internet connection all the time and that the system is consequently not easily accessible off-campus. This places a financial burden on students. A student who was affected by this issue of off-campus connectivity had this to say:

*I have too many challenges with wifi when I try to connect to the system off-campus at home. I cannot even log onto this system because of poor internet connection. Sometimes my data bundles quickly finish before I even get access to my own dashboard. (ARC, STUD\_2)*

Students attributed the poor network when off-campus to poor service by help-desk personnel at the university. The findings also reveal that students were not happy with the design inconsistencies that were found on these systems. A key issue highlighted was that of a poor design interface that was difficult to navigate, which renders even the most otherwise useful LMS inadequate for studio-based teaching and learning purpose (GD, STUD\_3). Out of sheer frustration, students have turned to other open source tools, which were better-designed and easier to use. Students recommended the use of tools such as Coursera and Piazza, which are more user-friendly with design interfaces that are simple and easy to navigate.

External factors, such as network infrastructure and inadequate facilities for individual students, were cited as reasons for access problems off campus. When experiencing log-in difficulties or password problems, most students stated that they had to leave their work station (computer lab) and physically walk to the admin buildings with their identification details to seek help. All the students were concerned about this poor service facility and suggested phone-in facilities to help them if they experienced technical difficulties outside of the normal work hours, especially during the weekends (GD, STUD\_2; GD, STUD\_1). The general feeling was that it is great to have an LMS with impressive facilities, but not useful if the system is technically not easy to use. In their e-learning endeavours, lecturers always need to think of supporting, and not technically or financially burdening, the student.

### **5.3.4 Usability (ease of use) of e-learning tools and LMSs**

Most students who were interviewed during data collection considered some e-learning tools great and easy to use. The majority of students applauded the ease of use of tools such as Open Architecture, Piazza and Moodle. Open Architecture was considered as a great LMS tool by some of the architecture students, who all preferred Open Architecture to Blackboard for studio-based teaching and learning. Many of the students liked the fact that Open Architecture had its own dashboard that allowed a student to customise the course to suite their own schedule and learning preferences, a functionality not found on Blackboard. This functionality also allowed them instantly to receive any updates from their lecturers.

On the other hand, most students complained about the dashboard on Blackboard, claiming that it was discouragingly difficult to use due to its poor design aesthetics and functionality. Some students even stated that they had never used Blackboard during their time at the university (ARC, STUD\_2). When it comes to registration on Blackboard and class enrollment, students complained that the process is often very lengthy, complex and confusing, as they are not familiar with the system. Students also raised major concerns about how Blackboard is unsuited to studio-based practices though some claimed that good implementation practices by the university (lecturers, HoDs and e-learning coordinators) could make the system usable in studio-based practices (GD, STUD\_1). The students tended to share similar perceptions on what the appropriate uses of LMSs are and should be, believing that the usability of LMSs depends on the objectives of the lecturer and the relevance of the system to studio-based practices. On this aspect, most students felt that LMSs are used more for the convenience of the lecturers (GD, STUD\_1; ARC, STUD\_2), who nevertheless seemed reluctant to

use them. Lack of training and poor orientation on the use of the system rendered it difficult to use, as most students attested.

Poorly designed interfaces and course structures on some LMSs like Blackboard have discouraged many lecturers from using LMSs for studio-based practices. Poor usage patterns by lecturers further handicap usage of the system by students (GD, STUD\_1). In many cases, however, the appropriateness of LMS usage is dependent on the technical ability and skill of the course administrator. The majority of the students doing studio-based courses believe that their lecturers should be at the forefront in spearheading the usage of LMSs like Blackboard instead of trying to avoid them. As a result of these frustrations, coupled with system failure and poor support structures on the part of the university's management, most students recommended that more robust action be taken in order to alleviate some the problems of ease of use they were encountering. The following section (5.3.6) sets out students' recommendations and suggestions for improving the usage and adoption of LMSs in studio-based practices.

### **5.3.5 Students' recommendations for potentially successful LMSs for use in studio-based practices**

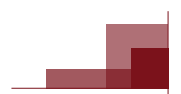
The uploading of academic content such as notes, design briefs and academic notices is the most important function of e-learning tools in the Graphic Design and Architecture departments. Students described e-learning tools as efficient and effective when they were able to get their learning materials on time, and lecturer's slides, notes, and everything else dealt with and spoken about in the studio has been uploaded (ARC, STUD\_2). Students also liked the interactive dashboard component found in Open Architecture. They noted that when lecturers become consistent and active on e-learning platforms, they would be ready to follow suit. Their estimation and use of LMSs would improve, eventually resulting in a high adoption and usage rate (GD, STUD\_2).

Some students suggested that LMSs should be used as forums for discussion on specific topics (ARC, STUD\_2; GD, STUD\_2), and that these forums should be interactive like Facebook and other web technology they have been in contact with (GD, STUD\_3; ARC, STUD\_2). Students wanted LMSs to be lively and highly interactive, especially in the case of studio-based, practices since they learned by doing. Most students mentioned how easy and interactive Piazza was compared to Blackboard. As stated earlier in section 5.2, Piazza is an open source tool that allows its users to ask any question by posting it to the dash-board. By posting such questions, users can get an immediate answer. This instant messaging allows for a high degree of collaboration among students and lecturers, making the learning experience easier and more fun.

Students recommended that the university develop or outsource other virtual types of e-learning proprietary tools that could address the challenges of the physical space of studio-based practices. The students went on to recommend that before the university finally adopted any virtual learning tools, lecturers must be make an attempt to use LMSs in their current studio-based practice (GD, STUD\_1; GD, STUD\_3; ARC, STUD\_2). Students also pleaded that the Blackboard LMS be redesigned or at least tailored to better fit their needs in studio-based practices, thus reducing frustration and neglect (GD, STUD\_2). Students insisted that lecturers who try to or really want to use the LMS should make an effort to learn to use it properly, so as to help rather than further confuse them as students (ARC, STUD\_1).

### **5.4 Lecturers' perceptions, usage and non-usage patterns: key design features to enable a potentially successful studio-based LMS experience**

Presented in this section of the findings is the theme of lecturer' perceptions, usage and non-usage patterns as well as key design features that enables a potentially successful studio-based teaching and learning experience with e-learning tools. This theme also highlights some of the key findings on lecturers' notion of the ideal e-learning environment, one that might enable a pleasant teaching experience inside the studio. Treatment of their perceptions and usage patterns is based on activity theory as set out in Chapter 3 (Figure 3.2, above).



Sub-themes presented in these main themes are derived from activity theory's main constructs: technical, social and environmental factors. Environmental factors are to do with institutional issues such as technical and skills support, functionality as well as ease of use of the tools and any other challenges that may encourage e-learning usage by students and lecturers. Technical factors include issues such as the physical infrastructure including IT networks and any other relevant computer hardware and software e-learning tools. Social factors have to do with the significance attached to e-learning tools in terms of their fitness for studio-based teaching and learning purposes. Social factors also include user skills and willingness to use the tools. Table 5.2, below, presents these findings in detail.

#### **5.4.1 Current infrastructure and lecturers' usage patterns of LMSs and other web-based tools in studio-based practices**

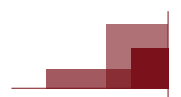
Table 5.2, above, is a snapshot view of the current infrastructure of e-learning systems inside the Graphic Design and Architecture departments at CPUT. The Table also displays some of the findings that were identified with regard to lecturers' patterns of usage of LMSs and other web-based tools in studio-based practices. Table 5.2 also provides a concise view of interviewees' understanding of e-Learning, its fitness for the purposes and technical requirements of a potentially suitable LMS, and their patterns of usage. All these sub-themes were derived from activity theory and were used to gain a deeper understanding of the phenomenon at hand. To enable a detailed understanding of the current situation inside the studio, some lecturers were also asked to provide an account of their everyday studio activities and how they were using these tools to achieve their goals. They were also asked to provide clarity on their motivations or frustrations (enabling/inhibiting mediators).

Lecturers were asked whether the system was easy to use, to suggest reasons for the difficulties they encountered, and to recommend ways of improving usage. Findings from the data collected indicated that most lecturers who were interviewed did not agree on the degree of usefulness of current e-learning tools like Blackboard in studio-based practices. There appeared to be considerable confusion as to whether current tools and the way they are configured were useful or not in the studio-based practices. To some of the lecturers, current e-learning tools like Blackboard are just a means of replacing the old manual way of doing things inside the studio with an electronic substitute. For instance, instead of printing learning materials, lecturers indicated that they simply put them on-line for students to access in their own space and time. This practice does not seem to affect teaching practices that do not involve Blackboard.

The following excerpts also suggest no functional changes in the methods and tasks of teaching and learning. One of the lecturers had this to say: It would make it easy for students to access course content (GD-3, EDP). The implication is that, thanks to the system, students can have access to their materials any time, anywhere. This lecturer also stated that if students were to lose any of their printed material, they could easily go and access them from Blackboard again in soft copy. Two similar excerpts from other lecturers' views regarding the function of an LMS: I ensure that students receive the learning material and information that they need; and Students will download notes and slides from Blackboard (ARC-2, JHS; GD-1, AMO). It is evident that lecturers simply see Blackboard and other LMSs as tools that enable access to learning materials, possibly curtailing office visits by students requiring learning materials.

Lecturers confirmed students' assertions LMSs were merely being used to supply material and to convey information to students. One of the lecturers for example, commented: They will also be able to read any announcements I place on Blackboard for their attention (GD-1, AMO). In the same light, another lecturer commented: They will also see the due dates for formative and summative assessment of their portfolio (ARC-1, MRK). One lecturer even had this to say: before Open architecture, I used my Google drive account and the general hard drive only to put materials for the students (GD-2, LGD). Other comments included: I've been using e-learning tools like Blackboard for a while, yes... as a place for students to access information on the site (GD-1, AMO); and putting all the materials onto Blackboard is the main use... and then, reminders of tests, and sometimes discussions on Blackboard on the materials they work on in tutorials (ARC-3, SW).

The excerpts above clearly indicate that the majority of lecturers regard e-learning tools such as Blackboard as a means to do what they have already been doing. They do not accord any significant value to Blackboard, and their usage patterns seem to support this. Whilst lecturers and students seem to agree on the uses of an LMS, students prefer the communication aspect to be more interactive. They wanted lecturers to be more available on these platforms to guide their learning and exchange chat. On this point, students emphasised the importance of using LMS features regularly, as they were intended by design to minimise confusion and inconsistency on the part of lecturers. But some lecturers believe that usage should be driven by the goals of the lecturer, and that they can and should only use what they find appropriate and relevant to their goals at any given time.



Mediators	LMSs Status in studio-based practices (Departmental similarities and differences)			
	Departmental similarities	Departmental differences	Explanation	Implication on usage
<b>Meaning of E-learning</b>	LMSs are considered as a tools that facilitate learning and better communication (they do not agree on the degree of facilitation and usefulness for studio-based practices)	There was a majority voice in graphic design, arguing an LMS cannot be used for studio-based teaching and learning, but as mere logistical and administrative tools.	Explanations to the common understanding are that students are no longer passive recipients of knowledge. They engage, interact, and explore to learn. Direct instruction is passive, ineffective, and using an LMS in this way should be rejected.	There is likelihood on the first account, that an LMS will be used as an interactive learning platform. On the second account, lecturers will not link LMSs with studio-based teaching. Usage will be minimal, limited only to logistical uses.
<b>Perceived Usefulness</b>	Both graphic design and architecture department consider LMSs as difficult to use and challenging for delivering on-line content to students.	A lecturer in architecture department, complained that because of LMSs students no longer value the traditional way of assembly drawing, and they no longer know how to search for information at common knowledge bases	An LMS promotes a sense of entitlement to spoon-feeding. A lecturer is expected to provide, which takes away a responsibility to find own information.	Despite the interactive claims earlier on, the common view on usefulness is that it helps with content delivery, communication, which simplifies the lives of students. Clearly, this is the pattern an LMS will be put to use.
<b>Willingness of lecturers</b>	The growth of Open Architecture usage among lecturers suggests willingness to use LMSs. Several lecturers say they are willing to use LMSs but inhibited by facility failures.	A lecturer in architecture department is not willing, and is not using Open architecture. Reactions were also mixed in graphic design department.	Willingness is motivated mostly by logistical benefits offered by Open architecture.	If an LMS usage takes too much time to manage then reluctance is likely. Due to pressure they will use it half-heartedly, resulting to dissatisfied students.
<b>Usability</b>	Lecturers described LMSs as difficult and not easy to use for a general person.	Lecturers are extremely frustrated with system failures at CPUT. Blackboard is considered very unreliable, and needs to improve.	Success is attributed to careful planning, effective development of networks and infrastructure, and dedication of the support structures.	Usability encourages usage. Similarly, system failures frustrate users and hinder system usage.
<b>Environment (Social &amp; Technical)</b>	Although CPUT's CET holds regular workshops and training seminar to promote literacy on LMS usage. There has been very low to minimal attendance of these training sessions.	Most graphic design lecturers and students complain of limited helpdesk support.	Positive experiences are linked to management commitment in architecture. Limited help desk support is linked to structural merger complexities. A senior official at CPUT argues that problem is elsewhere, on the operational units, which are not fully consolidated.	Sound infrastructure and efficiency of the support structures contribute to sound network operations. This promotes system usability, and ultimately, usage. Management is key to this factor. The opposite, unfortunately implies continued hindrances to LMS usage.

**Table 5. 2:** Overview of LMS tools/ web technologies in use in studio-based practices (Departmentals similarities and differences)

### 5.4.2 LMSs' relevance to teaching and learning activities in studio-based practices: fitness for purpose

It was difficult to understand whether LMSs were deemed relevant to the everyday teaching and learning that takes place inside the studio. This confusion was caused by inconsistencies in interviewees' perceptions of the degree of usefulness of LMSs for studio-based practices. The majority of lecturers were in support of a content repository approach, arguing that LMSs cannot replace the Bauhaus/ Badaux studio-based teaching and learning approach and therefore should not be regarded as teaching tools. One lecturer, even said he only used an LMS like Blackboard to present information . . . not to teach (GD-2, LGD), adding that it was not a teaching instrument, but a teaching administration tool (GD-2, LGD). Another lecturer also voiced her doubts about the role of Blackboard in teaching, saying that in terms of teaching, I have mixed views on it; in terms of administration, it can definitely be a time saver (GD-4, JS). Yet another stated that he did not use LMSs for anything else except just to upload notes for students... It does not affect how I teach (ARC-2, JHS). The argument common to these lecturers is that studio-based teaching and learning requires something more than what current LMSs are offering. Studio-based teaching requires learning by doing: it takes engagement with students. It takes presence; the lecturer added that his use of LMSs is limited, and is purely logistical (ARC-2, JHS). The sentiment is that an LMS does help to make some processes easier (ARC-3, SLB), but it cannot be claimed that teaching improves just because some materials are now on Blackboard or Open architecture (ARC-3, SLB): The teaching rests with the lecturer or the master (ARC-2, JHS). There seems to be reference here to the Bauhaus phenomena of mediation, facilitation, and guided learning from a master, as well as discovery and collaborative learning. LMSs are considered OK as a medium to remind people of things they already know, but not as tools for learning new things (GD-5, BT), because LMSs are human-made, non-cognitive artifacts that can only offer artificial and pre-programmed solutions (GD-5, BT).

### 5.4.3 Usefulness of LMSs in studio-based practices

Contrary to the view that LMSs and multimedia are not ideal for teaching in studio-based subjects, some of the literature has defended the ability of LMSs to makes things easier for studio-based practice. As an instruction delivery medium, LMSs help universities to deliver their offerings to larger numbers of students and thereby increase their student intake. Reducing LMSs to mere logistical tools that have no role in studio-based teaching and learning therefore seems ill-informed and misleading. Lecturers in studio-based practices should think beyond purely logistical ends and use LMSs as tools that facilitate online collaboration among students in their studio activities. In this respect, perhaps they should be more available on-line, or perhaps build their own in-house LMS that has the potential to meet the requirements of a virtual well-connected studio or e-studio environment. A very informative argument on whether LMSs can play a role in the learning process in studio-based subjects is offered by one lecturer, who stated that LMSs only assist in improving logistical efficiencies and in saving time and costs, rather than improving teaching or learning (ARC-1, MRK). Yet she also believes that LMSs do help to mediate learning in various forms and ways. In her own words, Students can actually go back to their lecture notes and review them. If there is anything that they might have forgotten, they may go back to the material online and see, hear or listen to what was said in class and remember things, etc. (ARC-1, MRK). She believes that students may be inspired to relate an LMS encounter with various contextual experiences, with the option of referring back to the lecturer or classmates for further discussion and clarity (ARC-1, MRK).

#### 5.4.3.1 Usage and usefulness of Blackboard and Open Architecture in studio-based spaces

With regard to perceptions of LMSs usage and usefulness in studio-based practices, several lecturers do believe that they are unable fully to exploit their alleged usefulness, due to extreme technical failures and the faulty structure of the system. One lecturer, for example, remarked: if it works it is fantastic!' (GD-3, EDP). Whilst Blackboard makes it easy to present learning materials to students in a fairly structured way (GD-1, AMO), the

problem is that it never works, or at least not consistently (GD-1, AMO). As a result, its usefulness is inhibited. It is technically slow, and is not adequately developed or designed (GD-2, LGD). The difficulty according to the lecturers is that the current Blackboard system does not cater to the intricacies of studio-based practices, such as different file formats like audio files and other multi-media types of files associated with studio-based practices – it can be quite rigid (GD-1, AMO):

*Sometimes you want to do three things, but you can't do all three things at the same time. You cannot load three files all at once. You have to go back, and you cannot just go back by, say one page back, but three pages back and then load something again. (GD-1, AMO)*

Although there was disgruntlement and dissatisfaction with Blackboard on the part of most students and lecturers, Open Architecture, on the other hand, received positive reviews from role players in the Architecture department. Its uptake and usage had been on the rise since its inception in 2014. Lecturers from the department have positive perceptions on the usefulness of Open Architecture; for most lecturers, it is very helpful to be able to put readings, design briefs, notes and references, onto Open architecture (ARC-1, MRK), and it makes it very easy to communicate with students and for them to communicate with you (ARC-1,MRK). Another lecturer said they can communicate with me very, very easily, adding that he was receiving more communication and comments from students now than in the years preceding the use of Open Architecture (ARC-4,SLB).

Another interesting finding to emerge regarding Open Architecture as opposed to Blackboard was a correlation between age and the understanding of LMSs. While the majority of lecturers below the age of 40 demonstrated a better understanding of Open Architecture, older lecturers seemed to be in favour of Blackboard. One younger lecturer also had this to say about the older generation of lecturers who seem to like Blackboard despite its badly designed interface:

*You know what, there is nothing aesthetically pleasing about that Blackboard tool, most us never use it or even engage with it. But some of the senior lecturers in our department like it very much. Those guys we call them BC; they were born Before Computer age and they can't use a computer like the way me and you do. So they think Blackboard is the best tool they have ever had to use in their entire lifetime.*

From this lecturer's point of view, older lecturers do not have the digital skills to enable them to use most digital tools available nowadays. He seemed to be mocking their inability to recognise what a good e-learning tool should look like in terms of design features and functionality (ARC-3, JS). His attitude towards senior staff seemed to suggest that these elderly lecturers have limited knowledge and understanding of the latest computer and software trends, or did not even know how to use the latest educational software for teaching and learning. This explanation accounts for why most of the lecturers above the age of 45 were seldom clear about the usefulness of the Open Architecture system compared to Blackboard, which has not been updated to suit the current generation of students who are technologically advanced and demand a system that is more user-friendly and aesthetically pleasing. Blackboard does not provide any of the above-mentioned design features to make it potentially appropriate for studio-based practices.

Convenience and flexibility of access to materials seemed to be the only real benefits cited by most lecturers regarding the current e-learning tools such as Open Architecture and Blackboard (ARC-1, MRK; GD-1, AMO). Most lecturers agreed that LMSs help simplify logistical processes for lecturers, and that students can view their design briefs... as soon as you upload them and make them available for students to view at any time (ARC-1, MRK). The general thinking is that LMSs make it easier, and maybe easier than it should be, for students to search and access learning materials (ARC-3, SW). Lecturers seemed to fear that LMSs threatened to render the lecturer and traditional studio-based practice redundant. Whilst LMSs were considered useful logistically, there was a worry that LMSs might end up supplanting their roles as educators in the near future – hence their unwillingness to adapt or use them frequently in their teaching. As a result, they were perceived not to be useful for their daily studio teaching and learning activities.



## 5.5 Conclusion on the descriptive presentation of the findings

All key themes and sub-themes that were presented in the previous sections of this chapter show an almost unqualified belief in the usefulness of LMSs in facilitating teaching and learning processes in studio-based practices. Certain key factors emerged as encouraging LMS usage among students in studio-based spaces. Positive perceptions of the usefulness and the ease of use of the system should be supported practical usability, constant availability, accessibility, relevance and clarity of purpose on the part of the lecturers.

In addition, the findings indicate that a supportive teaching and learning environment in the form of good administration and technical support encourages LMS adoption and usage. The findings also reveal that most lecturers rarely spend their time on LMS platforms, but simply upload all the materials online and hope the students will find and use them. It emerged that Open Architecture is better managed than Blackboard; technically speaking, the platform has full-time external personnel who see to its maintenance and assist lecturers when they have operational difficulties. Limitations in respect of these factors, on the other hand, play a negative role in LMS usage. The association of lower motivation with patterns of limited LMS usage among lecturers supports this point of view. A critical discussion of the findings follows in section 5.6, below.

## 5.6 Discussion of findings

The aim of this discussion is to reflect on teaching and learning activities involving e-learning tools in studio-based practices as a collective objective within the e-learning activity system (as per the theoretical framework in Figure 3.2, above). For the purposes of the discussion, it is important to view e-learning and the use of LMSs in studio-based practices as outcomes of different mediators within a collective system of studio activities. To this effect, positive mediators enhance the usage of LMSs, while poor usage is an outcome of negative interplay between the actors, activities and mediating factors (as identified by activity theory, see Chapter three above).

The findings described above have also drawn our attention to a specific trend in the patterns of LMS adoption and usage by students and lecturers of studio-based subjects in the two academic departments. The presence of positive mediators of usage in the Architecture department is supported by positive patterns of LMSs usage in that department. Similarly, there are limitations in these factors in Graphic Design, with concomitantly poor LMSs patterns. Despite this, there are a few lecturers in Graphic Design who continue to use LMSs.

Furthermore, lecturers' perceptions of the usefulness of LMSs are standard across the two departments; that is, there is a mixture of positive and negative views across the two departments (see also Table 5.2, above). Section 5.6.1, below, offers a detailed discussion of the e-learning tools and web technologies currently in use in studio-based practices.

### 5.6.1 LMSs and Web technologies currently in use for studio-based teaching and learning in the Graphic Design and Architecture departments

From the findings on the e-learning tools and web technologies currently available, several problematic issues were observed concerning the adoption and usage of LMSs like Blackboard in studio-based practices. These issues had to do with the actual utilisation of e-learning systems by the Department of Applied Design in the Faculty of Informatics and Design at CPUT (see also Selwyn, 2007; Juvanic et al., 2012). One of the issues identified was the poorly designed infrastructure and technical support on the part of the university's management. A study by Alenezi (2012) found that whenever an institution of higher learning decides to implement LMSs or e-learning tools, robust infrastructure implementation and advanced technical support must be provided to the faculty and students before any system is usable. Such measures (according to Mizban & Roberts (2008); Ruschel et al., 2009) promote the actual adoption and usage of the system by the end users it was intended for. They help to reduce the need to use other platforms that may not be fully secured to engage in university activities. The situation at CPUT's Architecture and Graphic Design departments clearly shows that lecturers and

students are using other web technologies that may not be fully secured and are easily prone to cyber-attacks. The scenario in which lecturers are advocating the use of other web-based technologies for studio-based practices is also an indication that there is lack of clear strategy and limited policy implementation concerning the use of LMSs at the university (see also Selwyn, 2007). According to Selwyn (2007), a clear strategy and a sound policy must be developed so that the implementation of LMSs in studio-based practices encourages continual usage of the systems. Many of the faculty members have not used the LMSs yet, and have novice skills and little knowledge regarding the use of online educational software and resources such as Blackboard (see also Al-Sarani, 2010). Lecturers should therefore be trained not only on how to use various e-learning tools for theoretical courses, only but also how to use the university-sponsored LMS tools in a traditional design studio set-up. Previous research has pointed out the benefits accruing from the university teaching staff's adopting a positive attitude towards the use of e-learning systems (Panda & Mishra, 2007; Alajmi, 2010; Alenezi, 2012; Sidawi, 2012).

Some lecturers were concerned about the ability of an e-learning system to meet the requirements of a studio-based environment (Al-Nuaimi & Aboukhatwa, 2012). The findings reveal that the faculty was against teaching design and studio-based courses using the current e-learning tools, whereas some of them were happy to teach theoretical courses using such tools. Some lecturers pointed out that they did not see any real educational value in teaching studio-based practical courses using the current e-learning tools; or could not see the need to teach a practice-based course in a fully online environment. They held the view that the online delivery of practice-based courses would not be of the same quality as face-to-face (f2f) courses. They therefore recommended a more robust, blended course approach, that would provide students with more help and support. Other researchers were also concerned about the cost, efficiency and usefulness of implementing sound and efficient e-learning systems at a public university, suggesting a blended approach that is cheaper and easy to administer (Abouchedid & Eid, 2004; Al-Nuaimi & Aboukhatwa, 2012; Sidawi, 2012).

From studies conducted by Foley and Ojeda (2008) and Sidawi (2012), it should be noted that a faculty's approach to teaching affects their utilisation of e-learning system. It is therefore crucial to examine how best to incorporate their teaching approach in the online educational process. Researchers have highlighted the usefulness of blended courses to enhance teaching and learning inside studio-based practices (Sidawi, 2012). Some studies also suggest that an experimental or pilot survey should be conducted before implementing the blended tools to test their usefulness and fitness for purpose. In this selection and implementation process, some studies suggest that the selection process must include key stakeholders and representatives from across the institution (Al-Nuaimi & Aboukhatwa, 2012). An institution's primary focus plays an integral role in the decision making to select the right e-learning tools, which means that if an institution's primary function is to teach and to facilitate learning, then faculty and students – the primary LMS users – should be included on the committee (Sidawi, 2012). A good LMS must meet the diverse educational needs of the community it serves.

In addition, when an institution has decided to adopt and implement virtual learning and other e-learning tools inside the studio, all potential technical problems and system failures as well as compatibility issues with the software should be checked, identified and sorted out beforehand. These measures will increase the chances of the tools making a significant impact on its intended beneficiaries (Ruschel et al., 2009). Also, there are often problems in integrating architectural software such as 3D modelling, virtual environment, and simulation systems with online learning systems. Thus, when developing the technologies and tools to cater for future studio-based teaching and learning practices, potential technical problems should be identified and sorted out in advance whenever possible (Pinho et al., 2008).

Some members of both teaching and non-academic staff were also against the idea of developing full on-line studio-based teaching and learning courses, citing reasons and challenges to do with shortages of up-to-date infrastructure and weak technical knowledge of the faculty, particularly on how to plan and run virtual design courses online. Previous research by Reffat (2005), Alraouf (2006) and Bender and Vredevoogd, (2006), also found that a virtual design studio would offer real benefits to students and lecturers in studio-based practices as it crossed the traditional design studio boundaries based on the Bauhaus and the L'Ecole des Beaux Arts

(Anthony, 1991; Bennett, 2009; Broadfoot & Bennett, 2003; Green & Bonollo, 2003; Hill, 2007; Park, 2011; Williams et al., 2009). Previous research has also found that virtual design studios could blend with traditional design studio teaching, improving overall educational delivery (Reffat, 2005; Alraouf, 2006; Bender & Vredevoogd, 2006). The benefits of virtual design tools and the virtual studio concept should therefore be demonstrated to the faculty, with discussion on how these might be integrated into traditional studio-based teaching and learning settings and the curriculum (Mizban & Roberts, 2008).

### **5.6.2 Students' perspectives on current e-learning tools and web technologies and their influence on studio-based practices**

Presented in this part of the discussion are students' perceptions of current e-learning tools and web technologies and their influence inside the studio. A summary of the key findings presented above clearly suggests that most architecture students are keen to use e-learning technology, to the point that they believe their lecturers should be made use the tools available (ARC, MRK). But the situation with graphic design students is quite different from that of their architecture design counterparts. This is attributed to a lack of enthusiasm and initiative to use the tools on the part of most students. The majority of them seem to have become despondent and complacent about the use of e-learning tools. The pressure that students can exert on a lecturer is among the mediators referred to in activity theory in Figure 3.2 above, a social mediator (Engeström, 1987). Like other factors such as rules (policies and strategies), tools, skills, etc., a social mediator works in conjunction with other factors, in favour or against a collective goal (Mlitwa, 2010). Technical infrastructure, sound management, efficient skills and technical support systems together exert a stronger mediating influence in the process of transforming the activity system. The situation in the Graphic Design department is that the force of negative mediators seems to be stronger, serving to override any pressure that may be emanating from students (Mlitwa, 2010). These include a lack of interest and resistance to change among some lecturers (GD-1, AMO). Limited information technology skills and knowledge, limitations on teaching time and issues of resistance to change are among the factors preventing students from benefitting from e-learning (GD-1, AMO). Student pressure alone cannot drive LMS usage, regardless of the circumstances or environment. Therefore, it is advisable to create initiatives to advance the adoption and usage of LMSs in studio-based settings that acknowledge all the possible mediators of system usage. In particular, careful attention should be paid to managerial limitations, system choices, and to strengthening the infrastructure and user-support facilities.

### **5.6.3 Lecturers' perspective on LMSs (key LMS design features to enable a potentially successful studio-based LMS experience)**

Lecturers in both the Graphic Design and Architecture Design departments tend to agree on the usefulness of some design features available on current LMSs, but disagree on the degree of usefulness and on the relevance of the system to teaching and learning. All 10 interviewees agreed that an LMS is important, with one side of the spectrum supporting the usefulness of the system for teaching and learning, the others seeing it as an important logistical tool. Lecturers viewed LMSs, either as a place where students can get hold of your lectures, your slide shows, their tests, they can post stuff for you, and you can post back... (GD-2, LGD); or a good interface between an academic and a student... to present stuff that they need to know in a fairly structured way. (ARC-2, JHS). LMSs like Blackboard are also seen as a means to give students access to design briefs and study materials that one would otherwise send them to the library (GD-2, LGD). In light of the different instructional approaches from the graphic design and architecture lecturers, LMS usage patterns could be expected to follow different instructional stances. It is therefore contradictory that LMSs usage patterns by lecturers are predominantly similar. That is, all 10 lecturers are using Blackboard, Coursera, Piazza and Open Architecture (ARC) to present notes to and communicate with their students.

By referring to the notion of "object-transformation" from activity theory (Figure 3.2, above), it can be seen that the resultant e-learning activities would fail to transform the goal of the process into an outcome. If e-learning tools are to transform the studio teaching and learning environment, then key design features

such as chat tools and discussion forums as well as interface design and navigation should be able to lead to e-learning activities realising the desired outcome (teaching and learning of studio-based activities on-line). The argument in the summary of findings pertaining to the fourth factor (perceptions of the appropriateness of LMSs in teaching), is that most lecturers said LMSs are important in the studio, but disagreed about their relevance to teaching. There are those who see an LMS as a useful teaching and learning instrument, and those who dispute its relevance to teaching (and learning), and see it as a mere logistical tool. Where the academic value of an LMS is questioned, motivation for usage is likely to be very low, and in cases of limited usage, educational considerations would be rare. Success depends on a deliberate undertaking by lecturers and instructional designers to develop and implement a virtual studio. Arguments in this section expose lecturers as biased, possibly even cynical about the relevance of LMSs in teaching. Without their appreciating the value of an LMS in teaching, it is questionable whether compulsory usage would yield an educationally sound e-learning experience. Training in educational technology should be vigorously encouraged.

An important but often ignored consideration is that an e-learning system should be easy to integrate and interoperate with other existing systems in an organisation (e-learnSpace.org, 2010). Weighing of such factors often informs a final decision on whether to use a proprietary or an open-source software-based system (Mlitwa, 2010). The nature of the factors affecting this decision vary according to the context, but cost, relevance and system support considerations are the most important because they inform the sustainability of the system that is finally adopted (Mlitwa, 2010). Important considerations shared by the departments at CPUT were relevance, ease of use and availability of support (Smit, 2010). Open Architecture originated as a by-product of an externally funded educational project for architects in South Africa that, due to its promising success, was continued into the current system after the project term had lapsed (Morkel, 2011). Following operational frustrations with the Blackboard proprietary system before 2014, the switch to Open Architecture resulted from a collaborative effort by CPUT's Architecture department and the Association of South African Architects to assist part-time students who were struggling to find employment to fund their studies. The hope for a system after its selection is that it should meet the operational expectations of its adopters. In this respect the question can be asked as to whether there is a difference in terms of functional efficiencies (as a return on investment) between the proprietary and an open source-based system. On this issue, the findings in the case of CPUT's Architecture and Graphic Design departments point to organisational limitations as the problem, and not the structure of the system. Therefore, ensuring a healthy IT infrastructure (that is frequently serviced and upgraded) as well as ensuring the sound management of e-learning units and efficient user support systems, remain the logical solution.

### **5.6.3.1 Resistance to change and limited skills on e-learning tools between departments**

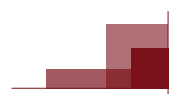
The findings also revealed that skills limitations and resistance to change among lecturers are a common problem in the two departments under investigation in CPUT's Faculty of Informatics and Design. A lack of interest and/or willingness among lecturers (GD-2, LGD), and their not having a broad computer background (ARC-4, SLB), with some fearing that the system might be too difficult even to try (GD-1, AMO), are cited in responses from the Graphic Design department. Similar limitations were cited in the case of the Architecture department, but in this instance, resistant lecturers were at least making alternative arrangements to ensure system usage in their courses.

## **5.7 Conclusion**

The purpose of this research was to understand an apparent contradiction between the usefulness and usage patterns of LMSs among students and lecturers in studio-based courses such as graphic design and architecture. An understanding of the factors that might be influencing LMS usage in studio-based teaching and learning was sought, with an emphasis on explanations for the low adoption rate and inconsistent usage of LMSs among students and lecturers in studio-based courses such as graphic design and architecture. The aim was to expand insight into the factors affecting the uptake and usage of online LMS tools in studio-based courses.

The overall objective was to contribute towards mechanisms to help students and lecturers actively adopt and implement new technology such as e-learning tools in studio-based courses, to supplement the traditional studio-based learning approaches. E-learning and LMS usage, however, involves both lecturers and students. So, learning about LMS usage by lecturers requires some background insight from the intended beneficiaries of the e-learning process, the students. Using qualitative research methods within the interpretivist paradigm, interviews were held with students and lecturers at CPUT's Architecture and Graphic Design departments. In addition, activity theory was used to develop sub-themes in the analysis of the use of e-learning systems in studio-based teaching and learning spaces. According to the key tenets of the activity theory of Engelstrom (1987) and Mursu et al., (2007), the work-activity system consists of the actors (who may be individuals, groups, or entities), activities, goals, rules, tools and the environment, which are joined together by the pursuit of a common purpose. The theory helped interpret the various elements and processes of e-learning. It is assumed in activity theory that the interplay between enabling and inhibiting mediators in the activity system determine (mediate) the quality of activities, and the final outcome. The mediating factors, therefore, are independent variables. The independent variables in this context were then used as themes for discussion. This structure was also used in the collection and analysis of data, as well as in describing (section 5.3) and discussing (section 5.6) findings. In this respect, mediating factors were presented as issues, and observations were made as to how a respondent reacted to, or was affected by, the issue. Tensions were then interrogated further for explanations.

Clearly, although the object and mediators have a negative effective on perceptions and use of the university-approved LMS, the converse is true in the case of interactive communication tools of choice such as WhatsApp and Facebook. In the object sense, the purpose and value seems to inhere purely in effective interactive communication – which attracts users to these tools. Obviously, a direct causal correlation with the user mediation effect is evident in both scenarios. For example, the object negatively distorts perceptions with a negative mediator effect on usage of the Blackboard LMS. The relevance, fitness for purpose and quick responsive nature of the open source tools, on the other hand, translates into positive perceptions and high usage patterns for alternative solutions. A lesson that emerges in these findings, therefore, is that the relevance of a technology solution to the needs of the user, together with its fitness for purpose and usability, are paramount. The following chapter concludes the study and makes recommendations for future action and research. It highlights the key problem that was under investigation as well as some of the notable challenges that were observed during the research. It then provides a set of recommendations so as to contribute towards mechanisms for students and lecturers to actively adopt and implement technological innovations such as e-learning tools in studio-based teaching and learning courses to supplement the traditional studio-based learning approaches.

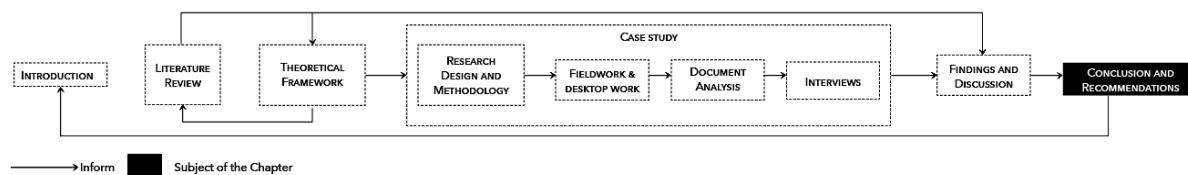


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M Tech  
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# CHAPTER SIX CONCLUSION & RECOMMENDATIONS





**Figure 6. 1 :** Outline of Chapter 6

## 6.1 Introduction

The current study has pointed out that digital and other forms of technology are becoming the backbone of teaching and learning in institutions of higher learning. There is little doubt that today effective teaching and learning on a large scale cannot be carried out without the appropriate technology in place (Nwokefor, 2015; Selwyn, 2016). Internet-based systems, in particular, have influenced the ways students approach learning, with more students opting for e-learning courses and mobile technology than ever before (Ng’ambi et al., 2016; Gachago et al., 2013). The growing demand for e-learning worldwide is driven not only by advances in technology but also by student demands for more flexible learning opportunities and notions of lifelong learning. The information and data gathered in researching this study reveals that students are becoming creators of their own content online via the internet, making their use of digital technology via ever-increasing digital literacy skills a potentially unique experience (Brown et al., 2016; Ng’ambi et al., 2015). For that reason, sound technological tools and good internet connectivity remain the key issues for every institution wishing to utilise technology.

All the stakeholders who will be affected by technological innovation must be involved in the implementation process. The implementation of digital technology cannot take place in an environment that is technically and socially unstable. E-learning cannot be utilised to its maximum capacity where its users take it for granted or treat it with scepticism. All stakeholders, especially those responsible for making the decisions to adopt or change the technology, should take this change seriously (Ng’ambi et al., 2015). Those tasked with the job custodians of technology at any institution of higher learning must adapt rapidly to any technological changes taking place at any given time. Failure to do so is a recipe for disaster: it will either result in technological innovations that do not serve the needs of the community, or the new technology will not bestow its full benefits on the intended beneficiaries (Brown et al., 2016). When students and lecturers use technology in studio-based practices, they should not engage with it as an electronic way of doing things they would otherwise do manually. The tools of e-learning and digital technology must be used appropriately in sound and effective ways that actually improve teaching and learning in studio-based practices (Mlitwa, 2010).

The research problem addressed by this study was the overwhelming confusion among students and lecturers over the relevance and usefulness of computer-assisted technology in studio-based design subjects (McGill et al., 2011; Pektas & Demirkan, 2012), and at CPUT in particular (Ng’ambi et al., 2016; Gachago et al., 2013). Scepticism and inconsistency in the adoption and usage of LMSs among students and lecturers in practice-based courses such as Graphic Design and Architecture at CPUT was a case in point. While networked and mobile technological innovations have transformed education from a space-constrained, rigid environment, into an “anytime, anywhere” environment, students continue to be limited to a fixed, traditional studio experience.

The study therefore sought to understand what factors might be influencing LMSs usage in studio-based teaching and learning practices, with a focus on the low adoption rates and inconsistency in the usage of LMSs among students and lecturers. The aim was to gain insight into the factors affecting the uptake and usage of online LMS tools in studio-based courses. The overall objective was to contribute towards mechanisms to enable students and lecturers to implement technological innovations such as e-learning tools in studio-based courses, to supplement traditional studio-based learning approaches.

The understanding gained does not resolve the problem immediately, but it does contribute to its resolution

by highlighting issues that need to be addressed by the teaching staff and management of the institution. Semi-structured interviews and a literature review were the sources of data collection. Participants from the e-learning department and from the Graphic Design and Architecture departments, including e-learning coordinators, students and lecturers, were purposively selected as representatives of the general population (Bhattacharjee, 2012:69).

This chapter concludes the study by presenting answers to the main research question and sub-questions asset out at the beginning of the study (section 1.6). Recommendations to assist the adoption of e-learning technologies in studio-based practices are presented based on the knowledge gained from the study. The chapter concludes by describing the research’s contribution to knowledge and its limitations, as well as making recommendations for further research topics on teaching and learning with LMSs in studio-based teaching and learning practices. A diagrammatic representation of Chapter 6 appears as Figure 6.1, below.

## **6.2 Reflections on the research problem and the study’s aim and objectives**

The research problem was informed by the literature on e-learning and the findings in background studies. The study sought to understand what factors might influence LMS usage in studio-based teaching and learning practices, with an emphasis on accounting for the low adoption rate and inconsistent usage of LMSs among students and lecturers. The aim was to expand existing awareness of the factors affecting the uptake and usage of online LMS tools in studio-based courses.

Insights gained from the study revealed confusion and disagreement in respect of the usefulness and usage of e-learning and other web-based tools in studio-based practices. The study found that while most lecturers seemed to agree that certain e-learning platforms could be of use to staff and students, they disagreed about its practical value to the sort of teaching and learning that occurred in the studio. There was lack of clarity over how e-learning tools might be used effectively to transform the studio environment into a fully networked online environment meets the needs of student and lecturers. Even those lecturers who claimed to use e-learning tools were not consistent in terms of their frequency and spread of use. It was also very challenging to explain the nature and purpose of LMSs, especially to lecturers known as “BC”. Until the whole issue is clearly understood, efforts to improve the role of e-learning in studio-based teaching and learning spaces are likely to follow an undefined route, with risky outcomes for management and for the intended service recipients (students).

It also emerged from this study that if e-learning tools such as LMSs are to be implemented successfully, they must be seamlessly designed to accommodate the needs of studio-based practices. Programme features and system functions must be designed appropriately to enable open and flexible access to learning materials (minimalist approach). They should also facilitate the storage and exchange of different formats of data, easily, speedily, safely and reliably across time and space. At the very least, LMSs should be adaptable to change and be inter-operable with the new multi-media technologies. For LMSs to meet these criteria, system usability is crucial. Drawing on technology usability studies, minimalist design (i.e. practical simplicity) of an LMS prioritises relevance to user needs, efficiency and ease of use (Davies, 1989). A shortcoming in any of these aspects was a major source of frustration for users, and a strong inhibitor of LMS usage in studio-based subjects such as Graphic Design and Architecture.

### **6.2.1 Revisiting the theoretical framework and its use in the thesis**

To gain a better understanding of teaching and learning with e-learning tools such as LMSs inside studio-based practices, the socio-technical perspectives of activity theory were invoked. Activity theory is derived from Engeström’s (1987) Developmental Work Research (DWR) model. This model seeks proposes a theoretically sound, work-oriented and activity-based analytical approach to socio-technical projects. From activity theory’s point of reference, collective activities are widely accepted (by a large community), rule-based (rather than haphazard), deliberate and systematic. According to Engeström (1987), socio-activities are a collective effort



by people (subjects) in pursuit of a common purpose (object) – in this case, converting the traditional studio to an online environment using e-learning technologies (Engeström, 1987).

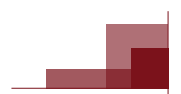
Activity theory's precepts aligned it with the current investigation, and the objective of the current thesis. The theory also clarified factors and tensions relating to LMS adoption and use in studio-based teaching and learning spaces. These factors cannot be adequately understood outside the social, technical and institutional environment in which e-learning practices are embedded. The theory offered a systemic approach to understanding the factors affecting LMS adoption from a context-based, activity-based and multi-stakeholder (actor) perspective. It also highlighted the tensions between the contrasting circumstances that mediate the transformation of goals, activities and actions, into outcomes (Mlitwa, 2010). Understanding the tension between these factors in a work activity system is important in making sense of the reasons why the outcome is unlikely to achieve the status of full success or failure. In the case of the current findings, for example, even in the case of extreme dissatisfaction with the status and quality of LMS facilities at CPUT, there are positive mediators that are strong enough to enable some level of LMS usage in adversely affected departments like Graphic Design and Architecture Design.

### **6.3 Summary of the findings**

The following sections present the key findings of the study. These findings effectively answer all the research questions posed at the commencement of the research process. Section 6.3.1 below presents a summary of findings on students' perspectives on the usefulness of e-learning tools inside studio-based courses.

#### **6.3.1 Student perspectives**

Structured interviews with students from the Graphic Design and Architecture Design departments were used to gather information on students' perceptions of the usefulness of e-learning tools such as LMSs in studio-based practices at CPUT's Faculty of Informatics and Design. At the time of data collection, students were asked to reflect on the usefulness of such tools, whether LMSs were being used in their registered modules, how they were being used, whether they were satisfied with the status of e-learning infrastructure and the available user support. Students were also asked whether they were satisfied with current LMS usage patterns, and to explain their reasons. Some students were eager to have LMSs used extensively in their courses but had to defer to their lecturer's preferences (Nkonki & Ntlabathi, 2016). Levels of satisfaction with the quality of the infrastructure, the functionality of LMSs and the patterns of usage by lecturers differed significantly between the two departments. In the Architecture department, students were happy with the e-learning tools they were using as their lecturers made an effort to help them along their way. But in the Graphic Design department, most students expressed concern and frustration over the way some of their lecturers had been engaging with e-learning tools. Students from Graphic Design complained bitterly about the lack of support from their lecturers and the fact that they were left to figure out things on their own most of the time. Students from Graphic Design perceived e-learning tools to be useful only if their lecturers were to start using them consistently and frequently. Since the lecturers were not doing this, the students themselves were discouraged from using the tools (Mlitwa, 2010). Activity theory portrays this situation in terms of an imbalance between the factors that enable LMS usage (positive mediators) by students, and the factors that inhibit e-learning (negative mediators). Despite the presence of positive mediators such as the availability of basic support, infrastructure like computers and the internet, and the actual LMSs, as well as skill, confidence and self-belief, there are also negative mediators such as the poor quality of the system, reluctance on the part of lecturers to use it, limited support from the institution and infrastructure failures. These negative mediators jointly inhibit the success of LMSs in studio-based practices.



### 6.3.2 Dynamics of LMS usage by lecturers

Once data collection on students' perceptions of e-learning tools in studio-based practices was completed, it became the foundation for enquiry into the dynamics of LMS usage by lecturers. The lecturers who took part in the study were asked to indicate their level of understanding of LMSs, and to share their perceptions of the usefulness of these systems in studio-based practices. The objective of these questions was to find out whether lecturers were using e-learning tools, and how these tools were being used. During the collection of data, most of the lecturers referred to e-learning tools especially LMSs as both a process and a thing. When they referred to LMSs as a process, they meant that they regarded these tools as a way of using other web-enabled technology to support studio-based teaching, learning, course management and communication (Mlitwa, 2010). But by referring to LMSs as a thing, they apparently considered them legitimate teaching and learning instruments or platforms currently available to them. Thus one group of lecturers viewed LMS tools like Blackboard and Open Architecture as teaching and learning instruments, whilst others failed to see the relevance of these tools to teaching and learning in studio-based practices. Their consensus was that LMSs might offer teaching and learning support to studio-based practices, but they remained mere logistical tools that could not replace the traditional way of doing things inside the studio. The only difference would be that everything is done electronically (Nkonki & Ntlabathi, 2016).

Lecturers also expressed concern about the IT infrastructure, helpdesk support, and ultimately, the patterns of LMS usage at the university. In line with the findings from students, Graphic Design and Architecture Design lecturers were equally frustrated with the poor quality of IT infrastructure, system performance, and the inefficiency of IT helpdesk services at the university. LMS usage patterns were very low and there were inconsistencies in use of the system. This problem of poor IT infrastructure and help desk service was linked to recurrent managerial challenges associated with the politics of institutional mergers (from two Technikons into a University of Technology in 2005) (Mlitwa, 2010). It came to light that the merged operating units, such as the IT networks unit and e-learning, have not fully consolidated yet, and are still shifting responsibilities and obligations between themselves. Most lecturers were also found to be not entirely computer literate, with limited technological skills, which caused much resistance to change across both departments.

The findings on lecturers usage patterns and engagement with e-learning tools also indicate that the brand of the system, sound infrastructure management, effective management of implementing units, and the efficiency of user-support structures together have a stronger influence on usage than other factors (Mlitwa, 2010). In line with these findings, any institution of higher learning wishing to adopt e-learning technologies must always revisit their e-learning implementation structures to consolidate relationships between interdependent units whenever implementation challenges arise. This study submits that careful attention needs to be paid to the regular servicing and consistent maintenance of existing infrastructure at the university. The study also found out that there is a division between lecturers who see LMSs as useful teaching and learning tools and those who do not, while there is still no agreement on the practical details of this usefulness (Nkonki & Ntlabathi, 2016).

### 6.4 Recommendations

To improve the rate of adoption and accelerate the usage of e-learning tools in studio-based practices, this study makes several recommendations. These recommendations focus on raising awareness among various stakeholders such as senior university management staff, e-learning coordinators, lecturers and students, on the need to adopt good practices to implement e-learning tools in studio-based practices. The recommendations emphasise the necessity of providing a technologically functional environment: one in which there is reliable Internet connectivity and a well-trained service desk that is always available to provide technical support. The recommendations also propose key strategies to improve the status of e-learning tools in studio-based practices. These strategies are informed by the relevant findings, which point to the factors that cause confusion or a lack of clarity in perceptions of the usefulness of LMSs in studio-based practices. The recommendations of this study are also informed by activity theory (see Chapter 3), which presented teaching and learning

inside studio-based spaces as a collective (multi-stakeholder) work activity system (Mlitwa, 2010). The major recommendations proposed are as follows:

#### **6.4.1 Effective system management**

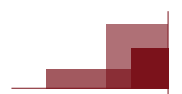
One of the key challenges to the use of LMSs and e-learning tools inside the studio is that of poor system management. This factor was found to be a major hindrance to effective engagement with the system, and the main reason why some abandon it completely. The effective management of the enabling processes of e-learning is central to the transformation of goals and activities into outcomes (Mlitwa, 2010). The problem of the limited use of LMSs in studio-based practices was also linked to managerial issues in the e-learning department, which is made up of two separate units called Fundani and the CTS help desk. It was found that the main reason for poor system management was the limited interaction between the main parties and a lack of collaboration in solving the problems that arise on a daily or weekly basis (Alenezi, 2012). This study therefore recommends that the university revisit its e-learning implementation policy and strategies to foster closer cooperation among the stakeholders involved in e-learning. Relationships between inter-dependent units such as e-learning and IT network structures should also be consolidated. On the basis of this study, it is also recommended that those wishing to develop and implement e-learning technologies for studio-based practices should bear in mind the structure of social interactions that characterise studio-based practices (Carbonell et al., 2013).

While social interaction is significant in traditional studio-based teaching and learning spaces, it is also a key element in blended and online learning. There must be an adequate level of interaction and engagement between students and the lecturer in an e-learning environment. The lecturer in this context acts as a teaching and learning catalyst, and must be equipped with appropriate managerial skills and the technical knowledge to develop his or her own teaching and learning activities. Formal discussions are also an essential ingredient in on-line learning, so lecturers are urged to encourage their students to be active in the learning process (Cennamo et al., 2011). There is a high chance that students might get only limited experience of and opportunities to learn from reflection-in-action processes and tacit knowledge, key features of studio-based learning. This is a central concern in blended and e-learning environments based on an asynchronous format: “the tacit is easily lost when proximity changes and synchronous communication is replaced with asynchronous”. Bearing in mind that the major benefit of implementing LMSs is an increase in flexibility, the use of synchronous communication tools is difficult in such learning environments if the systems are not properly managed (Cennamo & Brandt, 2012; Vosinakis & Koutsabasis, 2013).

#### **6.4.2 Effective infrastructure management: environmental and technical factors**

Infrastructural failures, system malfunctions and poor technical support are major causes of the slow adoption of e-learning tools and other web-based technologies in studio-based teaching and learning at CPUT. This study submits that the regular servicing and constant maintenance of existing infrastructure are activities that must be prioritised (Dizdar, 2014). Whilst the institutional adoption of systems is important, using faulty networks and inaccessible or poorly maintained computer facilities creates a negative impression. University authorities, technology infrastructure and network administrators, as well as academic developers and e-learning units, all need to collaborate in the planning and implementation of effective e-learning systems.

Units responsible for introducing e-learning should engage with lecturers regarding the relationship between LMS usage and the facilitation of studio-based teaching and learning (Schön, 1987), in order to realise the educational value of e-learning (or computer assisted learning) in the studio. In relation to the processes of developing and re-structuring courses to deliver blended and e-learning platforms, the literature suggests the necessity of involving LMSs as early as possible (Snyder & Gardner, 2012). Several studies have argued that the choice of LMS should be made carefully, and suggested the following points to guide the choice of appropriate technologies:



- Student characteristics and needs (Karber, 2001; Smart & Cappel, 2006)
- Student Internet and technology literacy (Sagun et al., 2001; Sagun, 2009)
- The content of the course and the learning context (Smart & Cappel, 2006)
- The object of the course (Cowie & Sakui, 2013)
- The characteristics of the discipline (Hunt et al., 2011)
- Features governing the use of ICT, such as Internet speed and the general acceptance of computer-based technology (Abdelaziz et al., 2011; Crawford & McKenzie, 2011). Especially in studio-based teaching and learning spaces, a significant consideration is that learning material and submission files are mostly visual-oriented, which means that the files are larger than text-oriented documents. Regulating the number of files and the specifics of file delivery also requires consideration in studio-based spaces (Koutsabasis & Vosinakis, 2012)
- Lastly, the provision of a forum or online space where online lecturers can share and support each other

Without due consideration and implementation of the above points, the technologies or platforms may not support course content, students, and lecturers in an effective manner, which could lead to low student satisfaction with the quality of the content and the learning environment (Dziuban & Moskal, 2011).

### 6.4.3 Good system design: courseware and interface design

Poor system design and a user interface that is difficult to navigate are some of the factors leading to a low rate of adoption of e-learning tools and other web-based technologies inside studio-based practices. Most participants in the study complained about how difficult it was for them to use the current e-learning system due to its poor interface design, with too many nested tabs not easy to navigate. Emphasis should always be placed on ease of use (EOU) (Davies, 1989). This study therefore recommends a good system design with a minimalist approach (Cho et al., 2009). A minimalist approach will ensure that the system is easily navigable: system features and usage procedures must always be easy to understand and use (Cho et al., 2009). The relevance of features to the tasks to be performed, the use of non-sophisticated terms, and minimising the number of steps required to complete a single task, all play a significant role in this respect.

Simple navigation opens up participation opportunities to a broad range of people. Understanding student perceptions of online platforms is important in the process of their design (Dutta et al., 2011). As contemporary studio-based teaching and learning spaces are evolving towards fully networked and knowledge-based spaces, the views on learning, on what needs to be learned and on how to learn need to evolve as well to meet the requirements for transforming studio-based teaching and learning practices into a fully online-networked environment. Emphasis should be placed on ease of use (EOU) so that system features and usage processes are always simple to understand for users (Davies, 1989). The minimalist approach to designing course content does not only promote flexible on-line learning environments, it also helps to deliver quality of content, learning resources and discussion (Mlitwa, 2010).

All stakeholders responsible for the development of e-learning at the university must have clear agreement on its aims and objectives and on how they want the system to be implemented and managed. To facilitate effective online collaboration, a detailed plan for appropriate time scheduling is another consideration (Bennett, 2009). Well-structured course content could overcome the disadvantages of using LMSs in studio-based spaces and enhance quality of student learning.

### 6.4.4 System administration

Most lecturers were frustrated by the amount of time they had to spend on the administrative task of enrolling students in their courses at the beginning of each year or academic semester. It is therefore recommended that an

automated system of enrolling students into courses be devised and introduced. In both departments, lecturers were encouraged to seek administrative support (dedicated specifically to the operation and management of LMSs). Even though literacy in technology is essential for both students and lecturers, the majority of studies (in both higher education and design education) have identified low levels of technical skill and knowledge in blended and e-learning environments as problematic (Abdelaziz et al., 2011; Crawford & McKenzie, 2011). It is thus recommended that university management provide the right support to students and lecturers to enhance their technical skills with e-learning in the form of regular training sessions and follow-through updates throughout the year. This will facilitate the effective use of technology and maximise the advantages of its integration in studio-based practices (Moule et al., 2010; Souleles, 2011; Vosinakis & Koutsabasis, 2013).

In addition, infrastructural failures, poor studio spaces and system malfunctions had a negative impact on the adoption of e-learning and LMSs. The current studio space needs to be designed to enable the creation of dynamic individual learning spaces or hubs that stimulate a student's creative ability. Such spaces should not just be any empty space or open space (Charalambous & Phocas, 2012). There must rather be provision of technologies and facilities to accommodate specific learning activities and basic students' needs. Studio-based teaching and learning spaces and spaces adjacent to them should be functionally designed in synergy with generic spaces currently available (Sidawi, 2012).

#### **6.4.5 Good system technical support and technical skills**

Poor helpdesk support and lack of adequate on-line instruction were among the factors contributing to the low adoption and usage of e-learning tools inside studio-based practices in both departments. If challenges to usage are to be minimised, e-learning administrators should not define the adequacy of e-learning tools in terms of the features alone, but in conjunction with the adequacy of a formal supportive and constantly accessible helpdesk framework (Bollinger, 2009). The change in learning environments also has an effect on the role a lecturer plays. Lecturers may teach in blended and e-learning courses, but not necessarily with success. The literature identifies several key skills required by online instructors. They must for a start have sufficient technology literacy collaboratively to support students and be readily available whenever a need arises (Cho & Cheng, 2014).

To improve the impact and usefulness of LMSs in studio-based spaces, the e-learning department and on-line course instructors should respond timely to student and lecturer inquiries (Alle et al., 2012). Attempts should be made by e-learning trainers and academic development experts to create a positive attitude towards the use of LMSs, to help motivate students. As in the case of all systems, therefore, proper management of the enabling processes of e-learning is essential to the successful translation of goals and activities into outcomes (Mlitwa, 2010). A multi-disciplinary team that includes technologists, curriculum specialists, students and education developers should be constituted to enable education that is informed by curriculum principles of active, engaging, collaborative, meaningful and transformational learning.

In addition, sufficient didactic expertise (Paechter et al., 2010) and the ability to guide students in their search for reliable information on the Internet is also required. Specifically, a list of recommendations for a design would be desirable, in order to facilitate successful online collaboration (Cho & Cho, 2014). First, an understanding of the advantages and disadvantages of online and physical modes of collaboration is important. Online collaboration suits a stage when students organise and exchange resources or manage time schedules, while physical collaboration works better at the stage of generating ideas. Secondly, it is essential to construct various online collaboration opportunities for students' future career (Cowie & Sakui, 2013). Thirdly, the provision of roles with clear expectations would be helpful to motivate online collaboration. Lastly, the evaluation of online collaboration should be based on both quantity and quality of participation. Given the students' (often disappointed) expectations of being able to access tutors 24/7 on an online platform (Nagel et al., 2011), it is necessary to clarify lecturers' availability. Also recommended is the provision of clear guidelines to lecturers about their duties, schedules for the preparation of learning resources, participation in the construction of

learning environments and settings, and active engagement with students (Vosinakis & Koutsabasis, 2013; Lahti & Hakkarainen, 2014).

#### **6.4.6 Frequent use of the system**

Limited, inconsistent and speculative patterns of LMSs usage were outlined as a major concern in the research problem addressed by this study. It is submitted that lecturers should use the e-learning systems more frequently to encourage students to make regular contact with the system(s) (Al-Sarrani, 2010). They should do so by finding and/or developing the best ways of using LMSs to achieve their intended objective (to facilitate on-line teaching and learning inside the studio). The lack of interest and resistance to change, mostly attributable to limited computer skills, might be addressed by a vibrant discourse on LMSs and training in inter-departmental seminars (see section 6.4.5, above). In closing, exploring supportive linkages between technology and studio-based spaces would accelerate the adoption of LMSs.

### **6.5 Research contributions**

In the sub-sections below, the theoretical and practical contributions of this research are presented and discussed.

#### **6.5.1 Theoretical contribution**

The study's theoretical contribution is confined to the field of e-learning with a specific focus on studio-based teaching and learning practices. Literature in the field of e-learning and its adoption and usage in studio-based practices is scanty and apparently not expanding. The literature referred to in this study was largely borrowed from other fields, like commerce and information and technology, which are more established in terms of research literature.

Such literature as is available is marked by gaps and inadequate information, so does not paint a true picture of the situation in studio-based practices. Not much is known about graphic design and other studio-based subjects from an African or South African perspective and most literature on e-learning and its use in studio-based practices is Eurocentric in orientation. It is hoped therefore that some of the findings of this study might help in the development of a teaching and learning framework or model, based on activity theory, to focus on studio-based practices from a specifically African perspective. The model might serve as a guideline to assist in understanding the technological needs and requirements of a modernised on-line studio environment in an African context – one no longer based on the Eurocentric Bauhaus or L'Ecole des Beaux Arts approach.

### **6.6 Limitations of the study and suggestions for future research**

This study was limited to two departments from the Faculty of Informatics and Design at Cape Peninsula University of Technology (CPUT), Graphic Design and Architecture Design. In total, 17 students and lecturers as well as various university management officials participated in the study. A larger sample would probably have produced a wider range of reasons for the slow adoption of e-learning and its tools in studio-based practices. Importantly, attention was not paid directly to possible demographic variables such as age and gender in the questions posed to participants. The study also did not touch on the social makeup of the students and lecturers that teach and learn in studio-based practices. The majority of the students come from previously disadvantaged communities and had limited access to resources before they came to university. The study could not touch on this aspect because it is so sensitive and to have done so may have resulted in ethical complications.



### 6.6.1 Suggestions for further research

Bearing in mind the limitations of this study as pointed out above, future research could widen and complete the picture it presents as follows:

- Future research should include a larger sample size from all the other universities across South Africa's ten provinces, to produce a more broadly based account of the low adoption of e-learning in studio-based practices, and determine faculty members' preparedness to teach studio-based courses in a fully automated on-line environment. Further research needs to be conducted to ascertain the usefulness of converting the traditional studio into a fully networked, online environment that still retains some of the characteristics of a physical studio.
- Research that links e-learning usage and adoption patterns to demographic variables such as age, gender and social background is also suggested, to address issues of transformation and equality which were not tackled in the current study.

A variety of case studies providing detailed accounts of the adoption of e-learning in studio-based practices, in order to provide insight into some of the practical implications of specific instances.

## 6.7 Conclusion

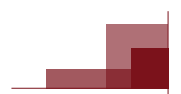
In order to understand the apparent contradiction between the usefulness and actual usage patterns of LMSs among students and lecturers in the studio-based teaching and learning practices of subjects like Graphic Design and Architecture, the study sought to identify the factors responsible, with an emphasis on accounting for the low adoption of and inconsistent usage of LMSs. The overall objective was to contribute to mechanisms to help students and lecturers actively to adopt and implement technological innovations such as e-learning tools in studio-based teaching and learning practices to supplement the traditional ones.

As a practical contribution, this thesis also offers valuable insight into the attitudes of e-learning administrators and facility managers, on what could encourage LMS usage in studio-based teaching and learning practices. The study encourages an open dialogue on technology, teaching and learning among lecturers of studio-based subjects so that a purpose-driven solution can be reached. Poor network infrastructure and technical support also inhibit LMSs usage by lecturers in many departments in the Faculty of Informatics and Design at CPUT. While the institutional adoption of systems is important, malfunctioning networks and inaccessible or poorly maintained computer facilities create a challenge. Institutional officials, technology infrastructure and network administrators, academic planners, and e-learning units are encouraged to work together as a team when planning and implementing e-learning systems at the university. In this process, priority needs to be given to the coordination of LMSs with administrative systems and academic (knowledge) data-bases, active mediation of online learning by lecturers, and cooperation between e-learning and IT network departments.

The following final section provides a snapshot of the researcher's journey by highlighting some of the important lessons the researcher learned in the course of the study. This process of recalling events and how they happened is essential in any study as it should help to improve the quality of research in future studies. The process highlights some of the research's key strengths and weaknesses and how these were dealt with along the way.

## 6.8 Recalling the researcher's journey

In qualitative research, the researcher is the main instrument for the collection of data, which means that the research should include some information about the researcher, his or her capabilities, training, values and worries, as each may have affected the output or quality of the end result. Additionally, a true account of the research journey needs to be given, bringing to mind the topic development, limitations and background



(Altheide & Johnson, 2011). With my background in graphic design and other professional experience, carrying out this research was still challenging in terms of linking the ICT and information systems theory to the field of design within the allocated time frame of the research. Especially because it involved a qualitative approach, every detail of the research process (including data collection from relevant documents, literature, semi-structured interviews and content analysis) needed to be presented in a way that conforms to the requirements of a full Master's degree thesis. The concept for this study was developed from the perception of how Learning Management Systems and other web-based tools (subsets of e-learning) might be utilised inside studio-based practices, given that their actual usage was very low compared to other, non-studio disciplines. The study was also inspired by Mlitwa (2010), whose focus was on e-learning and its utilisation in institutions of higher learning in the Western Cape region. The focus of the present study was narrower, however, concentrating on the studio aspect of e-learning and how it might be fully utilised and adopted to suit such a space in the light of students' and lecturers' needs.

In this study, not all the participants who were purposively identified were available to be interviewed for the study as some would categorically say "no" whilst others would promise to give their consent but never did (over 22 participants were approached from Graphic Design and Architecture Design). The fieldwork was a challenging experience in the sense that there were on-going strikes and it was difficult to get hold of participants at their place of work. Several interviews were delayed, postponed to another date or venue, or cancelled outright at the last minute. This was a frustrating experience, and it required patience and diligence to continue with the study. This was ultimately inspiring, as it taught the researcher how to handle difficult situations without being distracted from achieving his overall goals. Figure 6.2, overleaf, is a flowchart summarising the study process. The shapes in the flowchart indicate the beginning and end of the project, the rectangle shapes indicate the process, and the diamond shapes indicate decision points.





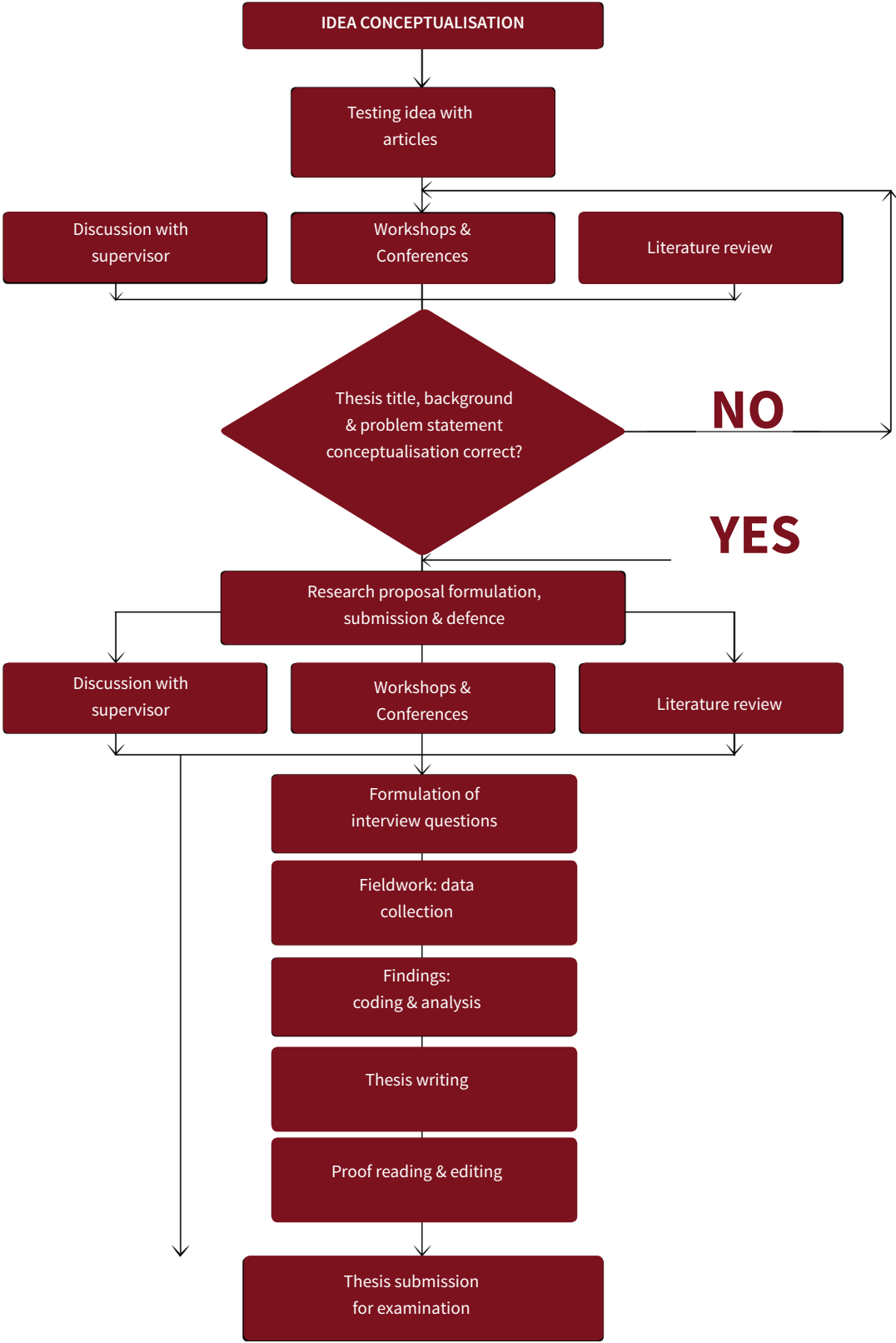


Figure 6. 2: Flowchart summarising the study process  
Source: Author



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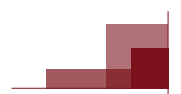
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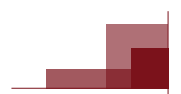
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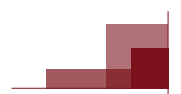
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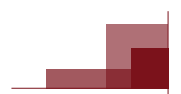
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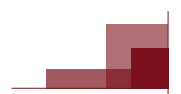


## **LECTURER INTERVIEWS**

*Opinions expressed in this thesis and the conclusions arrived at, are those of the author, and due to nature of this research because of ethical reasons and confidentiality purposes, student and lecturers' names have been withheld.*

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## STUDENT INTERVIEWS

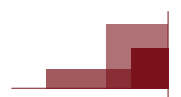
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## **APPENDICES**

- A: Interview Questions for Lecturers
- B: Interview Questions for Students
- C: Participant interview invitation letter
- D: Approved letter to collect data (CPUT ethics department)
- E: Ethical Clearance certificate (CPUT ethics department)
- F: Research Participants' Consent Form
- G: LMSs feature comparison



## APPENDIX A: INTERVIEW QUESTIONS FOR LECTURERS

### SEMI-STRUCTURED INTERVIEW QUESTION SHEET

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#### PROJECT TITLE:

**Students' and lecturers' perceptions of the usefulness of LMSs in studio-based teaching and learning spaces at a University of Technology**

#### RESEARCHER:

**Blessed A. Mhungu**

**Faculty of Informatics and Design, Cape Peninsula University of Technology**

#### Questions

The focus of this research is to investigate and seek clarity why the uptake and integration of LMSs in studio-based spaces remains adequately low. The focus of this data collection (from students and lecturers) is to get a full insight into the pattern of usage habits on the integration and usage of LMSs in studio-based teaching and learning environments.

The questions are framed into, technical, social and organisational related factors (the human environment and the system interface design) that could explain the low usage or integration of Learning management systems in studio-based teaching and learning spaces. In this research, it is important to understand how meanings and perceptions contribute to usage or non-usage patterns of LMSs' in studio-based teaching and learning spaces.

**Question 1** Seeks to investigate the main causes of low use of LMSs in studio-based teaching and learning spaces among students and lecturers at CPU, find insight on the students' understanding of a (a) Learning management system, views, perceptions, tools and its interface (b) Emphasis will be placed on the interface design and explanations why lecturers view LMSs the way they do in a studio-based space:

- 1.1 To get lecturers' understanding of Learning management systems (and the use of LMS tools) in the studio. An example of an LMS is required. Lecturers should at least cite Blackboard as an example. [it will be useful for the researcher to learn what they think an LMS is, its purpose, whether it is useful or not in a studio-based environment.
- 1.2 To find out when they first arrived in the institution and whether they have been using LMSs or not throughout the years. How did they learn to use the LMS and how was their experience [here the researcher is trying to identify the perceived ease of use of the LMS]? (Interface design).
- 1.3 Do other lecturers think it is important to use LMSs in studio-based spaces? [perceived usefulness, under what circumstances, and why?]

**Question 2-** What specific LMSs or web technologies are being used for teaching and learning in a studio-based environment? **How LMSs are being used in the studio (How useful are they for teaching and learning in studio-based spaces)** (How do lecturers and students interact with these systems?).

- 2.1 What is Blackboard used for in the studio, and is this the way you expected it to be used?
- 2.2 How often do you teach using Blackboard and do you think it is the right tool for studio-based space?
- 2.3 How does Blackboard help you to upload or receive assignments from your students?
- 2.4 As a lecturer, is it easy to find what you are looking for on Blackboard? What do you do when you can't find what you are

looking for?

2.5 Are all lecturers using LMSs? If yes why and if no, why are they using them (probe for reason for usage and non-usage).

2.6 What sort of files can you upload or download on Blackboard?

2.7 Would you support a decision to use or not to use an LMS in the studio? Why would you do so?

**Question 3- What specific challenges or problems do lecturers face with the current interface design features (How useful are they for teaching and learning in studio-based spaces)**

3.1 What sort of challenges do you face with Blackboard? Did you expect to encounter any challenges or problems with Blackboard?

3.2 How often do you encounter such problems or challenges with Blackboard?

3.3 What do you do when you cannot find the material you are looking for? When you get stuck what do you do?

3.5 As a design lecturer, what do you think about the current interface on Blackboard? How can it be simplified?

3.3 What role does the IT desk; faculty or university play in facilitating solutions to the problems or challenges you mentioned?

3.4 Is this the way you expected to get help from the IT desk, faculty or the university?

3.5 How often do you get trained to use Blackboard and is this training helpful to you as a lecturer?

3.6 Does the process of uploading or downloading teaching material for your students cause you to change your mind about using Blackboard?

**Question 4- Task: Comparison between LMSs and the traditional studio-based environment**

4.1 Should all lecturers be using Blackboard inside the studio, and what would be your motivation?

4.2 Should lecturers be free to choose between using the traditional studio-based approach to teaching and learning and Blackboard?

4.3 If lecturers decide not to use Blackboard for studio-based teaching and learning, what other LMSs can they use?

4.4 How does the use of Blackboard help prepare you for further studies? (to probe further if it does at all).

**Question 5- Institutional factors, decisions about LMSs and promotion of LMSs**

5.1 From your point of view as a lecturer, who do you think is responsible for the decision to use certain LMSs over others. Who decides that LMSs be used for teaching and learning in the university, who decides how it should be used?

5.2 What do you do if there are technical problems with the LMSs' network at the University? What are the procedures – do you call or send an email to the persons responsible for fixing the problem?

5.3 Is the role of LMSs enhancing teaching and learning process inside the studio by the university?

5.5 Are there any times when you have unsuccessfully requested your colleagues to use LMSs inside the studio?

5.6 Why are you and your colleagues in your department not using LMSs and why the current tool?

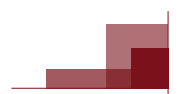
**Question 6- How technical support, access and interface design affect the use of LMSs by students**

6.1 While on campus, does the department offer technical assistance if a student's password is not working?

6.2 How easy is it for you to access the LMSs from your computer at the time you need it for teaching and learning?

6.3 What common challenges do you often experience with Blackboard in this department?

6.4 Do you experience any network failures, slow internet to the computers that you use?



## APPENDIX B: INTERVIEW QUESTIONS FOR STUDENTS

### SEMI-STRUCTURED INTERVIEW QUESTION SHEET

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#### PROJECT TITLE:

### **Students' and lecturers' perceptions of the usefulness of LMSs in studio-based teaching and learning spaces at a University of Technology**

#### RESEARCHER:

**Blessed A. Mhungu**

**Faculty of Informatics and Design, Cape Peninsula University of Technology**

#### **Questions**

The focus of this research is to investigate and seek clarity why the uptake and integration of LMSs in studio-based spaces remains adequately low. The focus of this data collection (from students and lecturers) is to get a full insight into the pattern of usage habits on the integration and usage of LMSs in studio-based teaching and learning environments.

The questions are framed into, technical, social and organisational related factors (the human environment and the system interface design) that could explain the low usage or integration of Learning management systems in studio-based teaching and learning spaces. In this research, it is important to understand how meanings and perceptions contribute to usage or non-usage patterns of LMSs' in studio-based teaching and learning spaces.

**Question 1** Seeks to investigate the main causes of low use of LMSs in studio-based teaching and learning spaces among students at CPUT, find insight on the lecturers' understanding of a (a) Learning management system, views, perceptions, tools and its interface (b) Emphasis will be placed on the interface design and explanations why lecturers view LMSs the way they do in a studio-based space:

- 1.4 To get students' understanding of Learning management systems (and the use of LMS tools) in the studio. An example of an LMS is required. lecturers should at least cite Blackboard as an example. [it will be useful for the researcher to learn what they think an LMS is, its purpose, whether it is useful or not in a studio-based environment.
- 1.5 To find out when they first arrived in the institution and whether they have been using LMSs or not throughout the years. How did they learn to use the LMS and how was their experience [here the researcher is trying to identify the perceived ease of use of the LMS]? (Interface design).
- 1.6 Do other students think it is important to use LMSs in studio-based spaces? [perceived usefulness, under what circumstances, and why?]

**Question 2-** What specific LMSs or web technologies are being used for teaching and learning in a studio-based environment?

**How LMSs are being used in the studio (How useful are they for teaching and learning in studio-based spaces)** (How do students interact with these systems?).

- 2.1 Do you ever use Blackboard in the studio? If yes why and if no why? (probe for reason for usage and non-usage).
- 2.2 How often do you log onto Blackboard in a week or month? Is it easy for you to gain access to the system as a student?
- 2.3 How do you download assignments from BB? Which LMS do you use?
- 2.4 How long does it take to upload a photoshop file? Does it depend on file size or format?
- 2.5 When you login to the system, is it easy to find what you are looking for? What do you do when you can't find what you are looking for?
- 2.6 Would you support a decision to use or not to use an LMS in the studio? Why would you do so?

2.7 Besides uploading or downloading assignments what else do you use BB for?

**Question 3- What specific challenges or problems do students face with the current LMSs (probe interface design features) (How useful are they for teaching and learning in studio-based spaces)**

3.1 What challenges do you face when uploading or downloading assignments on Blackboard as a student?

3.2 How often do you encounter such problems or challenges with Blackboard?

3.3 What do you do when you cannot find the material you are looking for? When you get stuck what do you do?

3.4 As a design student, what do you think about the current interface on Blackboard? How can it be simplified?

3.5 When you cannot login to the system what do you do?

3.5 What role does the IT desk; faculty or university play in facilitating solutions to the problems or challenges you mentioned?

3.7 How often do you get trained to use Blackboard by your lecturer? Is this training helpful to you as a student?

3.8 Does it become easier for you to use BB after training?

**Question 4- Task: Comparison between LMSs and the traditional studio-based environment**

4.1 Should all students be using Blackboard inside the studio, and what would be your motivation?

4.2 Should students be free to choose which LMS they want instead of Blackboard?

4.3 What do you think about doing your assignments on BB?

4.4 Would you like to continue using it? (probe for reason for usage and non-usage).

**Question 5- Institutional factors, decisions about LMSs and promotion of LMSs**

5.1 Who decides which LMSs can be used for teaching and learning in the studio, who decides how it should be used?

5.2 What do you do if you can't login to BB? What are the procedures – do you call, send an email or go to the persons responsible for fixing the problem?

5.3 Do you like using BB inside the studio?

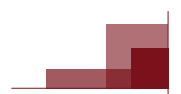
**Question 6- How technical support, access and interface design affect the use of LMSs by students**

6.1 While on campus, does the department offer technical assistance if a student's password is not working?

6.2 How easy is it for you to access the LMSs from your computer at the time you need it for uploading or downloading materials?

6.4 Do you experience any network failures, slow internet to the computers that you use?

6.5 Can you login the system if you don't have a password or username?



## APPENDIX C: PARTICIPANT INTERVIEW INVITATION LETTER

### INFORMATIONS SHEETS FOR COLLECTION OF PARTICIPANT ARTEFACTS



#### Project Information sheet: Consent letter

##### PROJECT TITLE:

**Students' and lecturers' perceptions of the usefulness of LMSs in studio-based teaching and learning spaces at a University of Technology**

##### RESEARCHER:

**Blessed A. Mhungu**

**Faculty of Informatics and Design, Cape Peninsula University of Technology**

Dear Sir/Madam

You are kindly being asked to participate in the Integration of learning management systems for studio-based teaching and learning spaces research project conducted by Blessed A Mhungu from the Faculty of Informatics and Design at Cape Peninsula University of Technology. The main aim of this research is to investigate and seek clarity why the uptake and integration of LMSs in studio-based teaching and learning spaces remains adequately low. In this regard, an understanding of the factors or challenges that may hinder or influence LMSs usage in studio-based teaching and learning spaces is sought.

If you consent to participate, your reflective results will be used to help improve quality of teaching and learning with LMSs in studio-based spaces at a modern university of technology. Any information or material that might be drawn upon will be utilised in a confidential manner and any identifying material will be edited or amended to protect your identity. The following measures will be adopted to protect the identities of the participants in the study:

Data collected will be stored securely in a locked filing cabinet in the research supervisor's office in the Faculty of Informatics and design and will only be accessed by the researcher only. Your participation in this research is voluntary. You are free to refuse to participate and may withdraw from the research at any time by advising Blessed Mhungu. Your refusal to participate or withdrawal of consent will in no way harm your relationship with the Faculty of Informatics and design at CPUT or the researcher.

If I have any enquiries about the research, I can contact the researcher by phone on 078 586 4039 or by email at blengomhungu@gmail.com .

By signing below, I indicate my consent to participate in Integration of Learning Management Systems for studio-based teaching and learning spaces project conducted by Blessed A, Mhungu as it has been described to me in the information sheet. I understand that the data collected from my participation will be used for academic publications and I consent for it to be used in that manner outlined above.

**Signed**

**Date**

.....

...../...../.....

Name (*please print*)





**APPENDIX D: APPROVED LETTER TO COLLECT DATA (CPUT ETHICS DEPARTMENT)**



Office of the Deputy Vice Chancellor:  
Research, Technology Innovation & Partnerships  
**Belville Campus**  
P O Box 1906  
Belville 7535  
Tel: 021-9596242  
Email: [NhlapoC@cpu.ac.za](mailto:NhlapoC@cpu.ac.za)

15 April 2016

**Mr Blessed Mhungu**  
Cape Peninsula University of Technology  
Faculty of Informatics and Design  
Cape Town  
Email: [Blengomhungu@gmail.com](mailto:Blengomhungu@gmail.com)

Dear Dr Mhungu,

**RE: PERMISSION TO CONDUCT RESEARCH AT CPUT**

The Faculty Research Ethics Committee received your application entitled "Usefulness of Learning Management Systems for studio-based learning environments in Design education", together with the dossier of supporting documents.

Permission is herewith granted for you to do research at the Cape Peninsula University of Technology.

Wishing you the best in your study.

Sincerely



**Dr C Nhlapo**  
Chair: Senate Ethics Committee



**APPENDIX E: ETHICAL CLEARANCE CERTIFICATE (CPUT ETHICS DEPARTMENT)**



P.O. Box 652 • Cape Town 8000 South Africa • Tel: +27 21 469 1012 • Fax +27 21 469 1002  
80 Roeland Street, Vredehoek, Cape Town 8001

Office of the Research Ethics Committee	Faculty of Informatics and Design
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At a meeting of the Faculty Research Ethics Committee, ethics approval was granted to MR BLESSED MHUNGU student number 210226935 for research activities related to the MTech: Graphic Design degree at the Faculty of Informatics and Design, Cape Peninsula University of Technology.

Title of dissertation/thesis:	Usefulness of Learning Management Systems for studio-based learning environments in Design education
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**Comments**

Research activities are restricted to those detailed in the research proposal. Ethics approval is granted on condition that a consent letter from CPUT Management is submitted to the Faculty Research Ethics Committee, allowing the candidate to collect data from CPUT students.

 Signed: Faculty Research Ethics Committee	17/2/2016 Date
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## APPENDIX F: RESEARCH PARTICIPANTS' CONSENT FORM

### INFORMATIONS SHEETS FOR COLLECTION OF PARTICIPANT ARTEFACTS



Project Information sheet: Consent letter

PROJECT TITLE:

**Students' and lecturers' perceptions of the usefulness of LMSs in studio-based teaching and learning spaces at a University of Technology**

**Blessed A. Mhungu**

**Faculty of Informatics and Design, Cape Peninsula University of Technology**

Dear Sir/Madam

You are kindly being asked to participate in the *Integration of learning management systems for studio-based teaching and learning spaces* research project conducted by Blessed, A Mhungu from the Faculty of Informatics and Design at Cape Peninsula University of Technology. The main aim of this research is to investigate and seek clarity why the uptake and integration of LMSs in studio-based teaching and learning spaces remains adequately low. In this regard, an understanding of the factors or challenges that may hinder or influence LMSs usage in studio-based teaching and learning spaces is sought.

If you consent to participate, your reflective results will be used to help improve quality of teaching and learning with LMSs in studio-based spaces at a modern university of technology. Any information or material that might be drawn upon will be utilised in a confidential manner and any identifying material will be edited or amended to protect your identity. The following measures will be adopted to protect the identities of the participants in the study:

Data collected will be stored securely in a locked filing cabinet in the research supervisor's office in the Faculty of Informatics and design and will only be accessed by the researcher only. Your participation in this research is voluntary. You are free to refuse to participate and may withdraw from the research at any time by advising Blessed Mhungu. Your refusal to participate or withdrawal of consent will in no way harm your relationship with the Faculty of Informatics and design at CPUT or the researcher.

If I have any enquiries about the research , I can contact the researcher by phone on 078 586 4039 or by email at [blenqomhungu@gmail.com](mailto:blenqomhungu@gmail.com) .

By signing below, I indicate my consent to participate in *Integration of Learning Management Systems for studio-based teaching and learning spaces* project conducted by Blessed A, Mhungu as it has been described to me in the information sheet. I understand that the data collected from my participation will be used for academic publications and I consent for it to be used in that manner outlined above.

Signed

Date

.....

27.09.16

Name (please print)

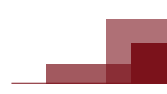
A handwritten signature in black ink, appearing to read "Blessed A. Mhungu", written over a dotted line. Below the signature, the name "Blessed A. Mhungu" is printed in a smaller font.

## APPENDIX G: LMSs FEATURE COMPARISON

	Blackboard Learn	Sakai	edX Studio	Google Classroom
Posting Documents	Upload files one-by-one through the Web interface OR Upload multiple documents at a time through the content collection function.	Upload files one-by-one OR multiple documents at a time through the Web interface.	Files can be uploaded using the Files/Upload option.	Upload files or entire folders directly into a Google Drive folder linked to the course.
	Hide/unhide posted items.	Hide/unhide posted items.	Hide/unhide posted items (private by default).	Hide/unhide posted items (move them out of course folder to hide)
	Set date/time for posted content to be released.	Set date/time for posted content to be released.	Set date/time for posted content to be released.	N/A
	Add descriptive text to be viewed beneath links to posted items.	Add descriptive text to be viewed clicking on an "i" button, next to posted items.	Add descriptive text to be viewed beneath links to posted items.	Add descriptive text to be viewed above links to posted items.
	Drag and drop multiple folders/files at once from desktop to content collection.	Drag and drop multiple folders/files at once within the web interface from desktop to the main content area of the site.	Drag and drop multiple folders/files at once from desktop to Files/Uploads.	Drag and drop multiple folders/files at once from desktop to course's associated Google Drive folder
	Move or copy folders/files from one site to another.	Move or copy folders/files from one site to another.	N/A	Move or copy folders/files from one course site to another.
	Option to send an email notification to all site participants upon posting new files to the site (a link to the file is included in the email).	Option to send an email notification to all site participants upon posting new files to the site (a link to the file is included in the email).	N/A	Option to send an email notification to all site participants upon creating a new assignment.
Creating folders	Create folders one-by-one.	Create folders one-by-one.	Create subsections and units.	Create folders one-by-one.
	Control the ordering of posted folders/files through the Web interface.	Control the ordering of posted folders/files through the Web interface.	Control the ordering of posted folders/files through the Web interface.	Control the ordering of posted folders/files through the Web interface.
	Create learning modules to organize materials.	Create lessons and subpages to organize materials.	Create units and subsections to organize materials.	N/A
Posting Announcements	Post announcements on the site with a WYSIWYG editor (choose from several formatting features).	Post announcements on the site with a WYSIWYG editor (choose from several formatting features).	Post Announcements on the site in an <b>HTML format (no WYSIWYG option)</b> .	Post announcements on the site with a WYSIWYG editor (choose from several formatting features).
	Recent announcements are viewable on the site's opening page.	Recent announcements are viewable on the site's opening page. Delayed announcements are posted on the date indicated in settings.	Recent announcements are viewable on the site's opening page.	Recent announcements are viewable on the site's opening page.
	Include file attachments with posted announcements.	Include file attachments with posted announcements. Include links to items from any other area of the course site (assignments, test & quizzes, etc).	Link to files and uploads using HTML.	Include file attachments with posted announcements.
	Option to send an email notification to all site participants upon posting a new announcement (announcement message and attached files are included in the email).	Option to send an email notification to all site participants upon posting a new announcement (announcement message, links and attached files are included in the email).	N/A	Option to send an email notification to all site participants upon creating a new announcement
	Announcements can also be created directly from other tools such as Assignments and Test & Quizzes upon creation of these assessment items.	Announcements can also be created directly from other tools such as Assignments and Test & Quizzes upon creation of these assessment items.	N/A	N/A
	Drag and drop to reorder items.	Option to sort announcements by date, subject or author. Drag and drop to reorder items.	N/A	N/A
Course Navigator	Content can be navigated to using the Course Menu found on the <b>left hand</b> side of the screen.	Content can be navigated through using the Course Menu found on the <b>left hand</b> side of the screen.	Content can be navigated to using the navigation at the <b>top and left</b> of the screen.	Content can be navigated to using the navigation at the top of the screen.
	Hide/unhide site buttons and can manage order.	Hide/unhide site buttons and manage order.	Hide/unhide site buttons and can manage order.	N/A
	Change name/title of the tool.	Change name/title of the tool.	Change name/title of the tool.	N/A
	Create subsections to organize materials.	Create lessons to organize materials.	Create subsections to organize materials.	N/A
Assessments	Use the Assignments tool to post assignments and allow students to download documents.	Use the Assignments tool to post assignments and allow students to download documents.	N/A	Use the Assignments tool to post assignments and allow students to download documents.
	Collect student assignments electronically and results are shown in the Grade Center for faculty.	Collect student assignments electronically. Results are shown in the Gradebook for faculty and students to view	N/A	Collect student assignments electronically
	Download all submitted files at once via a zip file.	Download all submitted files at once via a zip file.	N/A	Download all submitted files at once via a zip file.
	Rubrics available for grading.	Rubrics available for grading.	Rubrics available for grading peer and self assessments	N/A

Posting Assignment	Can set due dates that populate to the course calendar.	Can set due dates that populate to the course calendar.	Can set due dates.	Can set due dates.
	Inline grading allows for faculty to comment, grade and return assignments to respective students within the same interface.	Comment, grade and return assignments to respective students within the same interface. Assignment comments are also sent to gradebook along with grades.	Grading can be done through artificial intelligence for some assignment types, or peer grading.	Inline grading allows for faculty to comment, grade and return assignments to respective students within familiar Google Docs interface.
	Attach a rubric for quick and transparent grading.	Attach a rubric for quick and transparent grading.	N/A	N/A
	Self and peer assessment available.	Self and peer assessment available.	Self and peer assessment (participation comes from students).	N/A
	Option to set up assignment submission by Group.	Option to set up assignment submission by Group.	N/A	N/A
	TurnItIn option integrated in the assignment set up	TurnItIn option integrated in the assignment set up	N/A	N/A
Dropbox	N/A	Electronically exchange files between the instructor and individual students or groups.(if using for the collection of assignments files, see the Assignments tool)	N/A	Electronically exchange files through Google Drive
Creating Groups	Groups can be created within sites giving the instructor the ability to target select sub-groups for communication and content.	Groups can be created within sites giving the instructor the ability to target selected sub-groups for communication and content.	N/A	N/A
	Instructors can create groups for student teams giving them their own separate site, including (but not limited to) group email, file exchange area, discussion board, chat area, Wiki, calendar, and announcements.	Instructors can create groups for student teams giving them their own separate site, including (but not limited to) group email, file exchange area, discussion board, chat area, Wiki, calendar, and announcements.	Instructors can create groups within the discussion forum, giving students a separate discussion area	N/A
	Instructors have the option to manage group settings in bulk.	Instructors have the option to manage group settings in bulk.	N/A	N/A
Tests, Surveys and Quizzes	Create tests, quizzes and surveys (10-15 different question types available).	Create tests, quizzes and surveys with more than 10 different question types including audio recording and calculated questions.	Can create problems and questions within a unit.	Can use Google Forms, but no integration with course grading.
	Randomize questions within quiz.	Randomize questions within quiz.	N/A	N/A
	Randomize answers for each multiple choice question.	Randomize answers for each question.	Randomize answers for multiple choice questions.	N/A
	Export/Import quizzes using .csv or .txt files.	Export/Import quizzes in QTI format.	N/A	N/A
	Can create pools of questions for reuse.	Can create pools of questions for reuse.	Instructors create problem sets for students.	N/A
Course Links	Links can be created within a course to link to materials.	Links can be created within a course to link to materials.	Links can be created within a course to link to materials.	Links can be created within a course to link to materials.
	External links can be created using the Weblinks option or to use HTML	External links can be created.	External links can be created using HTML	External links can be created using a Link button.
	Add a link on the course menu that will display an external Web site or in the course.	Add a link on the course menu that will display an external Web site within the course or in a new window.	Can create links through HTML code.	N/A
Incorporating video	Videos can be uploaded to a course under the Build Content option.	Videos can be uploaded to a course, however, is recommended to embed the video instead of uploading it.	N/A	Videos can be uploaded to Google Drive or directly to course.
	Faculty can embed YouTube videos within a course by created HTML code.	Faculty can embed videos (YouTube, Vimeo, etc) within a course by created HTML code.	Faculty can embed YouTube videos with edX's Video component tool, which allows you to simply paste the YouTube link.	Faculty can embed YouTube videos within a course
	Instructors can also create mash-ups of YouTube videos (no HTML required).	N/A	N/A	Button to create YouTube videos (no HTML required)
	Faculty can link to and non-YouTube videos using HTML code.	Faculty can link to and non-YouTube videos using HTML code.	Faculty can link to non-YouTube videos using edX's Video component tool, which allows you to simply paste the video link.	Faculty can link to non-YouTube videos with link button.
Banners and site graphics	Instructors can upload banners to display on their home pages.	Instructors can upload banners to display on their home pages.	Instructors can upload banners, which they can then display in their course using HTML code.	N/A
	Post an image, video, Prezi, widget or display an external/internal html page.	Post an image, video, Prezi, widget or display an external/internal html page.	Post an image, video, Prezi, widget or display an external/Internal html page.	Post an image, video or link to Prezi's and other pages.
	Post numeric and letter grades for students; student sees his/her own grade only.	Post numeric and letter grades for students; student sees his/her own grade only.	N/A	Post numeric grades for students; student sees his/her own grade only.

Source: [http:// sites.bu.edu/lms-investigation/home/lms-feature-comparison-chart/](http://sites.bu.edu/lms-investigation/home/lms-feature-comparison-chart/)





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