

**VARIABLES ASSOCIATED WITH STUDENT  
LEARNING RESOURCE PREFERENCES IN THE LEARNING  
MANAGEMENT SYSTEM AT A FACULTY OF MILITARY  
SCIENCE**

**BY**

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## **DECLARATION**

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## SUMMARY

The study was undertaken to determine variables associated with students' learning resource preferences in the Learning Management System (LMS) of the Faculty of Military Science of Stellenbosch University. It aimed to explain why students either engage, disengage or not engage at all with institutional course content either on or off the existing LMS. The study was undertaken against the background of the challenges that the institution faces in taking informed decisions to improve its LMS to facilitate optimal engagement with its respective online courses.

Few studies to date employed an integrated approach to understanding how lecturers teach online, firstly, and how students learn online, secondly. In order to gain a deeper understanding of why students either engage or not engage with course content both on and off the institutional LMS, the researcher has adopted an integrated approach to analysing data that reported on activities off the LMS as well as data automatically generated by the LMS.

Qualitative data were collected through interviews and open ended questions of the questionnaire. Quantitative data were collected from logs on the LMS, closed questions of the questionnaire, and institutional class lists. Participants in this study were either first year distance education students, or second year residential and distance education students. They were either registered for a particular compulsory first-year module or a particular second-year module. All students were employees, mostly career soldiers of the South African National Defence Force (SANDF).

Data were first analysed per data source. Both thematic content and critical discourse analysis were used in analysis of qualitative and quantitative data respectively. Findings were interpreted according to the conceptual framework for this study.

The study highlighted important aspects in terms of online teaching and learning, key of which is the teaching strategy that the lecturer employed through learning resources which determined the level of engagement intended for students to achieve the expected level of understanding as stated in the learning outcomes. Another important finding highlighted is that students could identify a gap in their knowledge. Limited scaffolding conditions existed for students registered for the compulsory first-year module to achieve the stated learning outcomes. Conversely, adequate

scaffolding conditions were created for students registered for the compulsory second-year module to attain the stated learning outcomes for the module.

The findings revealed a complex combination of interrelated internal, external and contextual factors that should be considered in designing learning resources, because of the impact they have on students' level of engagement with course content both in and off the LMS.

The study revealed that the institution should capitalize on the best opportunities of both face-to-face and online learning to elicit the intended level of engagement with the LMS content in order to achieve the expected learning outcomes. Although the context of the findings is specific to the institution researched, the findings contribute to the general field of learning analytics through the application of an integrated analysis aimed at explaining why students either engage with course content within the Learning Management System, disengage from it, or not even start engaging at all.

## OPSOMMING

Hierdie studie is onderneem om die veranderlikes wat verband hou met student se keuse van spesifieke leerhulpbronne binne die Leerbestuurstelsel (LBS) van die Fakulteit Krygskunde van Stellenbosch Universiteit te bepaal. Die studie had ten doel om vas te stel waarom studente óf aktief deelneem aan institusionele kursusinhoude beide binne en buite die bestaande LBS, óf daaraan onttrek, óf nooit begin deelneem daaraan nie. Hierdie studie is onderneem teen die agtergrond van die uitdagings waarmee die instelling gekonfronteer word in die neem van ingeligte besluite ter verbetering van sy LBS om optimale deelname aan sy onderskeie aanlynkursusse te fasiliteer.

Min studies tot op hede het 'n geïntegreerde benadering gevolg om te probeer vasstel hoe dosente aanlyn onderrig, enersyds, en studente aanlyn leer, andersyds. In 'n poging om 'n dieper begrip te bekom van waarom student óf aktief deelneem aan , óf onttrek, óf van die instelling se LBS, het die navorser 'n geïntegreerde benadering gevolg tot die analisering van data wat aktiwiteite buite die LBS rapporteer, sowel as die analisering van data outomaties deur die digitale LBS gegenereer.

Kwalitatiewe data is versamel deur middel van onderhoude en oop vraelyste. Kwantitatiewe data is onttrek uit puntestate van die institusionele LBS, geslote vraelyste, en institusionele klaslyste. Deelnemers aan hierdie studie was eerstejaarstudente op die afstandsonderrig-program, sowel as tweedejaarstudente op die residensiële en afstandsonderrig-programme onderskeidelik. Hierdie student was dan of 'n spesifieke eerstejaarsmodule, of 'n spesifieke tweedejaarsmodule. Alle student is ook werknemers, meesal beroepsoldate van die Suid-Afrikaanse Nasionale Weermag (SANW).

Data is aanvanklik per databron geanaliseer. Tematiese inhoudsanalise en kritiese diskoersanalise is gebruik om kwalitatiewe en kwantitatiewe data onderskeidelik te analiseer. Bevindinge is ooreenkomstig die konseptualiseringsraamwerk vir hierdie studie geïnterpreteer.

Die studie het belangrike aspekte van aanlyn leer en onderrig uitgelug, veral dan die onderrigstrategieë wat deur dosente benut is in die aanwending van 'n leerhulpmiddel wat die vlak van deelname bepaal wat voorveronderstel word om die gewenste kennisoordrag volgens gestelde

leeruitkoms te verseker. 'n Verdere belangrike bevinding is dat student die gaping in hul kennisvlak kon identifiseer, maar dat slegs beperkte steunomstandighede geskep is om studente die geleentheid te bied om daardie gaping te vul en die gestelde leeruitkomste te bereik. Daarteenoor was daar voldoende steunomstandighede vir studente geregistreer vir die verpligte tweedejaarsmodule om die verlangde kennisvlak en die gestelde leeruitkomste te bereik.

Die bevindinge het 'n komplekse kombinasie van tussenverwante interne, eksterne en kontekstuele faktore openbaar; faktore wat moet oorweeg word in die ontwerp van leerhulpbronne, omdat akkurate voorsiening van leerhulpbronne 'n groot impak het op student se besluit oor deelname aan kursusinhoud beide binne en buite die bestaande LBS.

Die studie het bevind dat dosente die beste eienskappe van beide persoon-tot-persoon en aanlynleer moet uitbuit om die verlangde vlak van aktiewe deelname aan LBS te verseker sodat die verlangde leeruitkomste bereik kan word. Alhoewel die konteks van die bevindinge nou verband hou met die instelling wat in hierdie studie nagevors is, dra die bevindinge by tot die veld van leeraanlytiek deur die aanwending van 'n geïntegreerde analise van waarom student óf aktief deelneem aan kursusinhoud binne of buite die Leerbestuurstelsel, óf daaraan onttrek, of glad nie eers daaraan begin deelneem nie.

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# CHAPTER ONE

## CONTEXTUALISATION AND ORIENTATION OF THE STUDY

### 1.1. INTRODUCTION AND BACKGROUND

Higher education is increasingly digitally supported. Almost all higher education institutions have adopted online teaching and learning platforms called portals, Learning Management Systems (LMS), Course Management Systems (CMS) and Content Management Systems (CMS) to enhance teaching and learning over the past two decades (Coates, James & Baldwin, 2005; Rohleder, Bozalek, Carolissen, Leibowitz & Swartz, 2007; Jaffer, Ng'ambi, & Czerniewicz, 2007; Ssekakubo, Suleman & Marsden, 2011). An adoption of these platforms implies that higher education institutions and lecturers invest in creating a lot of learning resources to enhance teaching and learning (Baebler & Murdoch, 2010).

Seemingly, the impact of their investment can be evaluated through analysis of massive data generated by the platforms as students engage with learning resources. These trails of data have been commonly used to understand attrition, persistence, the actual use of the platforms and evaluation of the usage of the learning resources (Tinto, 2006; Subotzy & Prinsloo, 2011; Ferguson, 2012; Prinsloo, Slade, & Galpin, 2012; Veletsianos & Shepherdson, 2016). Researchers claim that an analysis of trails of data left when students engage with learning resources in these platforms can provide feedback on how lecturers teach and how students learn (Ferguson, 2012; Peregrina, Pradas, González & García, 2014). The trend of analysing data generated by customers' online behaviour (web analytics) has been a common practice in the business sector. Monitoring and tracking of students' online activities with the purpose of understanding how they learn (learning analytics) has fairly recently started receiving attention in higher education sector (HE).

Critics however argue that an understanding of how students learn cannot be based on analysis of trails of data generated by the online teaching and learning platforms (Prinsloo et al., 2012; Ferguson, 2012; Drachsler & Greller 2012; Veletsianos, Reich & Pasquini, 2016). Their criticism is evident in the research on learning analytics that focused on auditing the actual use of the online learning platform, tracking and monitoring student behaviour to understand the use of learning

resources. To contextualize this argument, Baebler and Murdoch's (2010) audit of *Blackboard* at Brigham Young University revealed that the LMS was mostly used for content delivery. In the same year, Rogers, McEwen and Pond (2010) were disappointed to find that the number of learning resources accessed by students and number of visits in the LMS was less than 10%.

The study conducted in 2012 at two open distance learning institutions revealed that learning analytics provides actionable data that informed Open University in UK and Unisa in South Africa about the use of the LMS (Prinsloo et al., 2012). Their findings could not reveal the pedagogy, assessment strategies and necessary support interventions (Prinsloo et al., 2012). In order to make informed decisions about the three aforementioned aspects, Prinsloo and his co-researchers point out that they should implement a framework that incorporates biographic information provided during registration process, submission of assessment activities, financial interactions with the universities and student activities in the LMS. They acknowledge that tracking student behavior and engagement in and between modules does not tell how teaching and learning happens.

Another study on learning analytics was conducted by Roger, Ruipérez-Valiente, Muñoz-Merino, Leony and Kloos (2014), wherein they analysed students' patterns of watching videos and doing assessment activities in the LMS. They found that 29% of students finished watching videos and 60% abandoned doing activities. Roger et al. (2014) could not explain the underlying reasons why only a third of students finished watching videos.

The above mentioned studies on learning analytics could have provided comprehensive feedback if they collected data from other sources as well, since most of the activities happen outside the learning platforms (Ferguson, 2012; Prinsloo et al., 2012; Veletsianos, et al., 2016). These researchers recommend that trails of data should be enriched by activities that happen off the platforms, because online learning platforms do not track all activities that constitute learning. (Prinsloo et al., 2012; Veletsianos, Collier, & Schneider, 2015).

It appears that there is a gradual shift from relying on analysis of online student activities to understand what constitute learning on and off the learning platforms (Ferguson, 2012). The shift can be seen from Ferguson's (2012) study when she traced the development of learning analytics from 70 papers that were submitted in the second International Conference on Learning Analytics

and Knowledge in 2012. She found that cognition, metacognition and pedagogy is under-researched. She recommended that future research should focus on three areas:

- an understanding and optimizing of learning through a good understanding of how learning takes place, how it can be supported and the impact of underlying factors in the learning process;
- an understanding and optimization of learning environments in which learning takes place;
- an understanding of perspectives of students that extends criteria of learning success beyond grades and persistence.

Another review of literature conducted by Veletsianos and Shepherdson (2016) on learning analytics on Massive open online courses (MOOCs) from 2013 to 2015 attempted to address Ferguson's three areas. Their review revealed that learning analytics studies focused more on attrition and persistence. They found that students do not learn by working on the platform itself, but they work within the broader online environment and within the broader context of their life to deal with challenges that they face in online learning environments (Veletsianos et al., 2016). Although MOOCs context is different, the recommendation of Veletsianos et al. (2016) that online learning environments should be designed as "central nodes in a network of learning resources about a topic" to enhance learning experiences is applicable to face to face or online courses.

Studies conducted on learning analytics highlight the need to constantly evaluate the extent to which student learning experiences is enhanced. Czerniewicz and Brown (2009) developed a framework that they used to evaluate the relationship between the use of learning technologies and pedagogy. Their study revealed the common teaching strategies and learning experiences used in South African higher education. Such evaluation ensures that lecturers, students, researchers, higher education institutions and government understand how teaching and learning process takes place in these platforms (Ferguson, 2012; Prinsloo et al., 2012). In this way, lecturers as teachers, designers of learning resources and researchers are able to rethink and plan so that student learning experiences can be enhanced. This then suggests that big data (learning analytics) and other sources of empirical data can help early identification of at risk students and thus provide fitting and timely interventions accordingly (Prinsloo et al., 2012; Czerniewicz, 2016).

Student support services are pertinent in South Africa, particularly that only 25% of students complete their studies in regulation time, while more than 50% who enroll in universities never

graduate even for those students who take more than five years or who return after dropping out, with completion rates among white students on 50% higher than among African students and only 5% of black and coloured students complete their studies (Council for Higher Education, 2013). Learning analytics can inform lecturers to review their pedagogy so that they may contextualise the design of learning resources that enhance student learning experiences with diverse needs (Prinsloo, et al., 2012; Czerniewicz, 2016).

Seemingly, an analysis of trails of data left in online learning environments and other sources of data has not been fully exploited in developing country such as South African. Research conducted so far has focused mainly on trails of data left by students in online platforms in developed countries. There appears to be minimal studies conducted that integrated students' online and offline activities. This then suggests that there is a gap in knowledge in an integrated analysis of logs of data left by students as they engage with learning resources and other sources of data. The gap in knowledge inhibits the ability to determine underlying reasons of students' level of engagement with learning resources in terms of achievement of learning outcomes in developing countries.

## **1.2. CONTEXT OF THE STUDY**

The studies conducted so far have not fully exploited integrated analysis of trails of data left in the online teaching and learning environments and other sources of data to understand why students either engage, do not engage or even disengage. Much of research to date on learning analytics has focused primarily on analysis of trails of data left in the online teaching and learning environment to improve learning experiences in developed countries. Learning can probably be improved when teaching strategies elicit learning experiences that ensure achievement of learning outcomes (Suthers, 2006; Czerniewicz & Brown, 2009; Laurillard, 2013).

To elicit these learning experiences, the Policy on Teaching and Learning stipulates that lecturers should employ a blended learning approach in the design of all courses in the LMS (Stellenbosch University, 2013). However, lecturers are not coerced to use the platform

The idea of not forcing academics to use the LMS is in line with studies done in African universities, which found that academics demand practical reasons to digitalise teaching and learning (Ngugi, 2011; Czerniewicz, 2016). A study on "Attitudes and perceptions of students towards Information and Communication Technologies" undertaken in 2006 at a Faculty of Military



Science of Stellenbosch University found that there are a significant differences between experienced and less experienced students in perceived value of ICT in the work place and their personal lives (Moswetsi, Renken, Neethling, 2006). Govender's (2014) study on "Adoption of SUNLearn in its first year of implementation at Stellenbosch University" found that both students and lecturing staff have very positive attitude towards the university LMS. But there appears to be less correlation on the positive attitude and the optimal usage of the LMS. At the same time, lecturers are encouraged to develop learning resources that promote quality learning experiences (Stellenbosch University, 2007). To ensure quality, learning resources are reviewed routinely. They are evaluated as part of internal quality management processes and as an integral component of annual performance appraisal of lecturers.

Towards the end of each year, lecturers are asked to roll over individual modules. They have to indicate whether they want the existing content to be transferred as is, or whether they prefer a full make over. Lecturers are supposed to respond on individual capacity or at departmental level based on lecturer's and student feedback of individual modules provided at the end of a semester. It appears challenging to make informed decisions without constant review or evaluation of the courses in the LMS. It is not clear whether lecturers should base their decisions to roll over or redesign their modules on quantitative data of students' time spent on learning resources, the number of times resources were viewed and the number of students that accessed the learning resources. Besides access records and student performance, lecturers have no concrete reference to identify the learning resources that helped students learn or what beyond resources actually helped them learn and perform (Laurillard, 2013).

Currently, lecturers commonly use LMS reports to identify students that register and never participate in assessment activities. They also use the LMS reports to check on cases of suspicion of cheating during tests or examination. An analysis of trails of data left by students as they engage with learning resources in the LMS and other sources of data can inform individual lecturers as designers and teachers, at departmental, programme and faculty level to make informed decisions of how well they have taught and how well students have learnt. They would become the ones informing the LMS administrators about learning resources to transfer, not vice versa.

Studies undertaken so far have integrated data generated by the LMS and data from other sources in developed countries. Very few studies have been undertaken that integrated teaching strategies,

learning experiences, level of involvement and type of learning elicited by learning resources in and off online learning platforms with data generated by the LMS and data from other sources data in developing countries.

### **1.3. AIMS AND OBJECTIVES**

The purpose of this study was to determine variables associated with student learning resource preferences in the Learning Management System (LMS) in order to explain why students either engage or do not engage on and off the LMS. The focus of enquiry is:

- to describe patterns in usage of learning resources in the LMS;
- to identify the types of learning resources that students prefer in the LMS;
- to determine factors that students consider important in engaging with learning resources in the LMS;
- to analyse impact of these factors on student engagement with learning resources in the LMS;
- to identify teaching actions (strategies) represented by learning resources;
- to identify level of involvement elicited by learning resources;
- to predict types of learning and learning experiences elicited by learning resources in and off the LMS.

### **1.4. RESEARCH APPROACH**

The researcher employed mixed methodology in order to answer the main research question (Plowright, 2012:3). Mixed methodology was employed through qualitative and quantitative research methods to gain optimal insights from data generated by the LMS that were integrated with data collected through interviews and surveys (Leedy & Ormrod, 2005).

#### **1.4.1. Research method**

I adopted a case study research design for this study. Case study was relevant for this study, because little is known about student preferences in learning resources in the LMS. Bell (2000:10) defines a case study as “an umbrella term for a family of research methods that have a common purpose of

enquiry around an instance.” There is an on-going debate about why students access and view some learning resources more than others, particularly for this case study in which learning resources are designed for both residential and distance education students.

## **1.4.2. Data collection method**

Qualitative research may use multiple forms of data collection in one study. For this study, the following methods were used:

### **1.4.2.1. Interviews**

Semi-structured interviews were used in order to get lecturing staff to freely talk yet focused about student preferences in learning resources in the LMS. Students were interviewed to get a sense of the reasons for their preferences in learning resources in the LMS. In addition, student interviews gave a sense of the reasons they preferred specific types of learning resources (Bell, 2000:138). Open ended questions were administered in order to encourage participants to talk about what was central and significant to them rather than to the researcher (Bell, 2000:138).

Interview questions were designed to ensure that all areas important in this study were covered, by using probes and prompts to steer participants in the right direction (Gillham, 2003:14). Interview questions were based on the analysis of data accessed LMS reports. Probes and prompts were used because participants could have been tempted to talk about what should have happened, rather than talking about variables associated with their learning resource preferences in the LMS (Leedy & Ormrod, 2005:146). One lecturer, seven students for Compulsory Module 144 and a focus group that comprised of 12 students of Compulsory Module 214 were interviewed in order collect in-depth insights from a small number of participants (Descombe, 1998:110). Interviews were transcribed.

### **1.4.2.2. Official records and documents or artefacts**

In terms of the current study, official records and documents were data generated by the university LMS, learning resources in the LMS, students’ profile in terms of mode of study, age, rank and number of students who qualified to write examinations. The researcher has organisational and institutional permission to use data from LMS reports, resources and activities added on LMS. The researcher has ethical clearance.

### 1.4.2.3. Questionnaires

The researcher developed questionnaire items that covered closed questions to yield quantitative data and very few open questions to yield qualitative data (Bell, 1998:36). The questionnaires were developed by the researcher based on analysis of LMS reports. The researcher created pseudo identities for participants and modules so that the information cannot be traced back to participants by others.

## 1.5. DATA ANALYSIS TECHNIQUES

White (2003:82) refers to data analysis process as an “inductive process of organising data into categories and identifying relationships among the categories”. For this study, I applied a combination of thematic content and critical discourse analysis.

Thematic content analysis was applied because data automatically generated by the LMS and data collected through closed questions of the questionnaire surveys were pre-coded. Data collected from the LMS were classified and clustered according to trends in order to identify student preferences in learning resources in the LMS (Gillham, 2003:59). In other words, in terms of the current study, what students did with the resources and activities added in the LMS was tracked and monitored. Closed coding schedule measured student engagement on the system. A framework (Table 3.1) was used to analyse level of engagement elicited by teaching strategies employed in learning resources to predict type of learning and learning experience on and off the LMS.

Critical discourse analysis was applied, because narrative data collected through interviews and open ended questions in the questionnaire surveys were coded after data have been collected.

Since this study attempted to explore variables associated with student learning resource preferences in the LMS, educational data mining as a data analysis technique was applied, because this study has no preconceived hypothesis. Variables associated with student learning resource preferences in the LMS were uncovered by sifting through data (Larose, 2005:2). In sifting through LMS data, patterns lying within data were described. In addition to description, variables associated with student learning resource preferences through estimation, prediction, classification, clustering and association were uncovered (Larose, 2005:11). In this way, usage of learning resources in the LMS was examined (Romero and Ventura, 2007:136). Moreover, these data analysis techniques

assisted in discovering of meaningful new correlations, patterns and trends on the use of resources on the LMS (Larose, 2005:2).

## **1.6. DEFINITION OF TERMS**

The five terms that are relevant to this study are defined next. The meaning of the five terms will be explored in the literature review, so that their meaning is understood in the context of this study.

### **1.6.1. Variables**

The complexity of explicitly classifying variables as external, internal (personal) or contextual can be noted from a study on student success and retention (Prinsloo et al., 2012). This study shows that student success and retention is a “multidimensional phenomenon where a number of interrelated and often interdependent variables meet in complex relationship”. In similar vein, the analysis Veletsianos et al. (2016) of the 2013 to 2015 empirical literature on MOOCs shows that a complex combination of contextual and individual factors affect student success. In this study, variables are described as factors that influenced student engagement with learning resources on an off the LMS.

### **1.6.2. Learning resources**

These are the course materials that are uploaded in the LMS and assessment activities that are created to assess level of understanding. The lecturer as a designer and teacher should take into account that there is an alignment of learning outcomes, teaching and learning activities (what a student does), assessment and the affordances (opportunities offered and those that are perceived) of learning technologies used (Bower, 2008).

Stellenbosch University’s Policy on Teaching and Learning Materials outlines principles that should guide lecturers in the development of learning resources:

- Learner-centredness
- Student needs
- Learning outcomes
- Good academic practice
- Module frameworks
- Intellectual property

- Logistical matters
- Reasonable expectations

The policy further stipulates that guidelines on evaluation of learning resources:

- be evaluated as part of the routine revision of modules form year to year,
- be evaluated in various existing internal quality management processes
- be evaluated as an integral component of annual performance appraisal of lecturers.

### **1.6.3. Preferences**

Preference is defined as “a greater interest in or desire for something than something else” (The Oxford Advanced Learner’s Dictionary of Current English, 1995:909). For this study, preferences refers to students’ interest in accessing resources and participating in assessment activities. In this study I will use “engagement” throughout my study to denote student access to specific resources and participation in assessment activities. Their access and participation in learning resources is measured through resources and activities that they visited, number of times they visited and time spent on resources. In other words student preferences answers the question why students engage or do not engage on and off the LMS.

### **1.6.4. Engagement**

Engagement is defined as the “degree of interest, attention or passion that students show when they are learning” (The Oxford Advanced Learner’s Dictionary of Current English, 1995:92). University of Stellenbosch shares similar understanding of student engagement in its Vision Statement 2030 which stipulates that the university aims to support its graduates to become enquiring, engaged, dynamic and well-rounded citizens (Stellenbosch University, 2013). The reasons for visiting learning resources were determined through interviews and questionnaire survey.

Student engagement emphasises active participation in the learning process, which ranges from listening that helps students absorb what they hear to application of knowledge in other situations (Faust & Paulson, 1998).

### **1.6.5. Learning Management System**

Learning Management Systems have been adopted in public and private sector. Coates, James and Baldwin (2010) describe Learning Management System as a system that can be linked with other systems to provide tools that can be used for course administration, documentation, teaching and learning, tracking online activities, and creating of reports that can be used. The common platforms used in universities are Moodle, Blackboard, Sakai, WebCT. They can be used for content development and delivery in real time (synchronous) or asynchronous. They provide tools that can be used to develop assessment activities that can be done online or offline as well as class and user management tools.

### **1.7. POSITIONING OF THE STUDY**

This study is located within the pragmatic mixed approach as described above. The focus of this study is on variables associated with student learning resource preferences in order to determine reasons why students engage on and off the LMS. This study is positioned within the field of learning analytics in higher education in the military. Findings on why students engage or do not engage on and off the LMS would provide institution case studied with comprehensive feedback to take informed decisions on optimal use of the LMS. The optimal use of the LMS broadens access to personnel whilst they remain active in the South African National Defence Force (SANDF), by blending time, people, location, communication, learning activities, assessment activities, learning and teaching styles (Bath & Bourke, 2010; Czerniewicz, 2016). Officers would be provided with an opportunity to obtain their undergraduate degrees prior to taking up a first appointment in the relevant Service or Division (Van der Walt, 2011). The study would contribute to the body of knowledge on factors that should be considered when designing learning resources in the LMS.

Equally important, this study contributes to quality assurance through provision of more objective feedback on how teaching and learning takes place on and off the LMS. Moreover, the framework that is used in the analysis of learning resources, has been developed from Curriculum Studies perspective.

My professional context provides the lens through I approached this study. My role as a blended learning coordinator for four years, in which I support lecturers and students in integrating technologies for teaching and learning, being a former primary and high school teacher for sixteen

years where I have taught Mathematics and Natural Science, played a vital role in my interest, enthusiasm and perspective in undertaking this research. As a result, the choice of my topic has been directly influenced by my professional context. Hence of all the possible topics, I have chosen “variables associated with student learning resources preferences in the Learning Management System”.

Equally important, my professional and personal context has enabled me to be aware of potential biases I could have had about my topic. I have ensured that I was objective and critical through engagement with literature, collection and aggregation of data from the LMS, interviews and questionnaire survey, focusing on variables with student learning resource preferences in the LMS. In this way I have ensured that my interpretation of the findings is not influenced by my professional and personal context (Plowright, 2012).

## **1.8. ORGANISATION OF THE STUDY**

The study has been organised in the following way:

Chapter 1: This first chapter outlines the research problem and research questions. It outlines why the problem is merited to an in-depth investigation. This chapter outlines how I identified the gap in knowledge and clearly stated why I believe the gap existed. It has stated how the title of my study fits in the wider world of scholarship.

Chapter 2: Chapter 2 provides review of relevant literature to the problem under discussion. This chapter has acquainted me with methodological approaches and experiences of other researchers. In this chapter I have outlined how I interrogated literature to discover what other researchers have written on and around reasons why students engage or do not engage on and off the LMS. In this way, I was able to build a conceptual framework from different frameworks and theories that provided my theoretical overview of my study. This chapter has ensured me that my topic is researchable.

Chapter 3: This is the detailed description of the research design and methodology. The chapter explains how I planned my research and undertook it. The chapter identifies data collection methods and data analysis techniques.

Chapter 4: Chapter 4 provides detailed report on the findings of the study.

Chapter 5: The final chapter provides the discussion and interpretation of the findings. It relates the findings to the research problem, literature, theories and research studies. It closes with recommendations for future research and limitations of the study.



## **CHAPTER TWO**

# **EXPLORATION OF USAGE OF ONLINE TEACHING AND LEARNING RESOURCES**

### **2.1. INTRODUCTION**

The purpose of this chapter is to review literature on factors that influence student to engage or not engage with learning resources in on and off the LMS. This chapter is divided into five main sections. The first section firstly explores literature on the purpose of learning analytics in universities in general. The second part explores literature on impact of design of online teaching and learning on learning. The third section moves on to describe digital learning experiences in higher education. The fourth section describes role of online teaching and learning in three operating modes in higher education. The fifth section reviews literature on online teaching and learning in military education. A review of literature in the five sections clarifies the nature, scope and manifestation of the focus area in question: Which variables are associated with student learning resource preferences in the LMS?

At the end of each section, I will provide a summary of research discussed. This chapter will be concluded by discussing the current debate on learning analytics in order to explore variables associated with student learning resource preferences in the LMS, internationally, South African higher education institutions, particularly in South African military higher education institutions. Such a discussion creates a lens through which the empirical work of this study will be interrogated. This lens is established by the discussion of key issues that set the contextual background of the study. In other words, this chapter will enable me to identify key areas that I will research, which will help me to build conceptual framework, which will be provided after summarising the whole chapter (Plowright, 2012).

### **2.2. MEANING OF LEARNING ANALYTICS**

In this section, I will review learning analytics in broad sense in higher education. I will however focus on how researchers use data retrieved in the LMS to track and monitor students' online behaviour in order to determine factors that students consider important when they engage with learning resources. Mining of data to track and monitor online behaviour has been a common practice in businesses, called web analytics. Learning analytics has recently received considerable

attention in online teaching and learning. Learning analytics is generally understood to mean “measurement, collection, analysis and compilation of report of data about students and their contextual factors, for purposes of understanding and optimizing learning and the environments in which it occurs” (Ferguson, 2012:307; Peregrina, Pradas, González & García 2014:543).

As it stands, it can be seen that the definition of learning analytics is regarded as a data collection method as well as a data analysis technique (Rogers, McEwen & Pond, 2010). The two terms “contextual factors” and “learning environments” indicates that trails of data left in the platform are analysed with other sources of data that are collected from the activities that students participate in as they learn. Contextualising analysis of data is evident in that learning analytics is seen as relating the value that is extracted from the data generated by online learning platforms with activities that happen outside the platforms in order to predict and advise on learning (Ferguson, 2012).

The idea of contextualising data is relevant in this study because participants in this study teach and learn in face-to-face and distance education mode (Draffan & Rainger, 2006). Although the definition has been adopted by the Society for Learning Analytics Research (SoLAR) in the first International Conference in 2011 on Learning Analytics, different opinions still exist as to whether the number of learning resources accessed on the LMS and time spent on resources can be considered as predictors and indicators of student learning in an online teaching and learning environment.

Researchers have challenged the extent to which number of clicks and time spent on resources constitute student learning (Brown, 2012; Dalton, 2015; Veletsianos, 2015). Brown (2012) and Dalton (2015) question why trails of data generated by LMS can be used as predictors and indicators of online learning. Brown (2012) and Dalton’s (2015) question points out the view that an analysis of data generated by the LMS do not tell all that researchers need to know about online teaching and learning (Veletsianos, et al., 2016:2). This would mean that for researchers to understand online teaching and learning, they should not rely on student data generated by the LMS only, but they their analysis should incorporate data collected from other sources.

Larose (2005) complements the definition of Peregina et al. (2014) and defines learning analytics as a data mining technique for clustering, classifying, associating, predicting and estimating collected data. These five data mining techniques can be used for the “discovery of useful, valid, unexpected and understandable knowledge from data” (Torgo, 2011:1). This would mean that learning analytics can be used to reveal and explain how a pattern of usage of learning resources in online learning environments can provide feedback on how learning can be improved (Romero & Ventura, 2007:232). Researchers are of the opinion that learning might not improve as expected, because trails of data collected from the online platforms commonly miss unrecorded learning activities that occur off the platforms (Ferguson, 2012, Prinsloo et al., 2012; Veletsianos, 2015; Czerniewicz, 2015; Veletsianos et al., 2016).

In a similar vein, the current study explores variables associated with student learning resource preferences in the LMS, through collecting and analysing data retrieved from the LMS and qualitative methods. Learning resources can be defined as course materials and assessment activities added on the LMS in the current study. Moreover, this is a discovery driven study, in that it has no hypothesis, but the patterns and tendencies will be discovered in students’ usage of learning resources on and off the LMS (Romero & Ventura, et al., 2007).

The discovery of patterns and tendencies in the use of learning resources proposes that learning analytics is one way of explaining how and why students engage on and offline. This would mean that learning analytics provides lecturers with invaluable information on how learning can be improved (Ferguson, 2012:307). A likely explanation for the improvement of learning, could be that learning resources created in the LMS are assumed to guide students’ attention on relevant information, which in turn determine their decisions to either engage or not engage.

Learning can however be ineffective even when students’ attention is guided, due to internal and external factors, such as student profile, like skills and abilities, student issues such as time management, ICT skills, educational experience, student preferences such as metacognitive styles, study strategies and learning styles and approach issues, such as attitude towards learning and self-advocacy skills (Laurillard, 2002, Prinsloo et al., 2012; Czerniewicz, 2015). Laurillard (2002) and her colleagues noted that these factors influence student preferences (which will be referred to as engagement in this study) with learning resources. In other words, their engagement can be measured through their participation in the learning process. Active participation cannot be easily

measured, since learning is believed to be personal and not easily quantified. One of the quickest way of quantifying learning is through rewards.

Critics however argue that rewards commonly promotes memorisation and reproduction of content without understanding (Biggs, 1999; Oliver, Falconer, Littlejohn & Harvey, 2007). This would mean that learning analytics can therefore be effective when it is regarded as a data collection and analysis technique to understand the relationship between student use of learning resources and reasons for using such resources, instead of improving learning (Baepler & Murdoch, 2010:3).

In terms of the current study, learning analytics is the application of data mining techniques to interpret visible and invisible student activities on and off the LMS in order to provide more objective feedback for online teaching and learning. Hence student data stemming from engagement with or usage of learning resources and activities in the LMS, will be analysed in terms of their relationship with data collected through qualitative methods such as questionnaire surveys, interviews, official records and documents. In this way, analysis of data retrieved from the LMS provides information on patterns and tendencies of use of resources as well as reasons why they prefer such learning resources in the LMS.

This section began by defining learning analytics as a data collection and analysis technique about student data applied to understand online teaching and learning in context. The definition of learning analytics was contextualized by using exemplary studies conducted on learning analytics. Much research on learning analytics so far has used number of page views and time spent on resources and activities as predictors and indicators of the learning process. As explained above, researchers argue that page views and time spent on resources and activities cannot be regarded as sole predictors and indicators of learning processes.

It is worth noting that researchers in this section have not exploited educational data mining techniques, probably because their studies were hypothesis driven. Data mining techniques will be outlined in order to explain the value they add in teaching and learning higher the next section. This is exemplified by the study of Baepler and Murdoch (2010:2) on the use of LMS audits as a learning analytics technique at Brigham Young University and University of Michigan who found that there is a gap in knowledge on studies that manipulate data analysis techniques. Seemingly, researchers can identify variables associated with student learning resource preferences when they

sift through data and wait for patterns to emerge rather than sifting through data with pre-conceived hypotheses.

### **2.2.1. Purpose of learning analytics in higher education**

As pointed out in the previous section, learning analytics has recently become a research interest in higher education. It has been explained that learning analytics is associated with a number of data analysis techniques. According to Baebler and Murdoch (2010:2), learning analytics can either be hypothesis-driven, which they call “academic analytics” or without preconceived hypothesis, which they call “educational data mining.” Educational data mining (EDM) is regarded as a data analysis technique without a preconceived hypothesis because it is used for describing patterns and trends lying within data which can be revealed through estimation, prediction, classification, clustering and association (Larose, 2005:11).

It should be noted that the five data analysis techniques are commonly applied in almost all data mining types. The three concepts “description of patterns, trends lying within data and revelation” in the definition of Larose (2005) explains that educational data mining incorporates qualitative data collection methods to understand patterns and trends revealed in student data generated by the LMS. Larose’s description of EDM is exemplified in the work undertaken by Scheuer and McLaren (2012). Scheuer and McLaren (2012) illustrated that student data can be collected from learning activities and institutional records. Such data collection methods can be a probable explanation why educational data mining is assumed to be concerned with exploration of unique types of data in educational setting to better understand students and the setting in which they learn (Romero & Ventura, 2010).

Furthermore, educational data mining is viewed as an examination of the usage of teaching and learning materials on the LMS (Romero & Ventura, 2007:136). It is worth noting that these materials are specifically designed to help students learn. As such, an examination of their use will certainly reveal cognitive processes required from students as they engage with these materials. There is a strong possibility that this examination will provide underlying reasons for use of such materials. This implies that educational data mining is one way of evaluating design of learning resources in the LMS (Romero & Ventura, 2007:136).

Such an evaluation suggests that educational data mining can help lecturing staff to establish pedagogical decisions when designing learning resources or modifying their teaching approach (Romero and Ventura, 2007:136). Their suggestion appears to be the case because educational data mining is concerned with the “development, research and application of computerised methods to detect patterns in large collections of educational data”. (Scheuer & McLaren, 2012:1). In the current study, educational data mining refers to collection and analysis of student data generated by the LMS and data from other sources to understand underlying aspects in the usage of learning resources and activities on the LMS.

Baepler and Murdoch (2010:6) further point out that learning analytics can be regarded as an LMS audit. LMS audits can be used to analyse the actual use of the LMS and learning resources since universities invest in creating a lot of resources on the LMS. Similarly, lecturing staff invest a lot of resources in designing learning resources on the LMS and thus want to evaluate the usage thereof. An audit of *Blackboard* at Brigham Young University revealed that 90% usage of the LMS is concentrated on content delivery tools (Baepler & Murdoch, 2010). Baepler and Murdoch (2010) further found that 95% of LMS usage at University of Michigan concentrated on use of tools for delivery of content rather than on interactive tools such as Wikis, chats and discussion forums. The findings from the study of Baepler and Murdoch (2010) therefore suggest that online teaching and learning is regarded as a product to be packaged and delivered (Veletsianos, 2015).

Critics question the notion of packaging learning, arguing that such learning environments can be ineffective in helping students develop mental framework (Modell, Michael & Wonderoth, 2006). This would mean that the LMS is used as an e-delivery tool for students to receive content, memorise it and reproduce it to meet examination requirements. One possible implication of packaging online teaching and learning could be that students can acquire knowledge, but still need help in forming mental models that leads to effective learning as explained in paragraph 2.4.1. Packaging of learning is criticised, since most learning occurs off the platform.

Czerniewicz (2015) confirm that lecturers should not only focus on how students learn in the formal teaching and learning setting, but they should also focus on how students learn in semi-formal and non-formal setting. Her opinion is endorsed by Veletsianos et al. (2016) who found that most of the activities happen outside the MOOC platform as they deal with challenges within the platform.

Although the contexts differ, the LMS does not capture all student learning activities that happen outside the system.

Furthermore, the description of learning analytics as educational data mining, academic analytics and LMS audit offered me an option of available strands that could be used to clarify the scope of the focus area in question: Which variables are associated with student learning resource preferences in the LMS at a Faculty of Military Science? In other words if this study can reveal factors that students consider important in using resources and doing activities on the LMS, then findings of this study can contribute to the growing body of knowledge specifically in the field of learning analytics in higher education, particularly in South African higher education in the military.

For example, Larose (2005:11) points out that learning analytics should be used as a discovery process that helps to uncover patterns of behaviour. The discovery process can be one way of identifying at-risk students (Van Barneveld, Arnold & Campbell, 2012). Ferguson (2012:7) shares a similar view in that learning analytics helps lecturing staff to identify students who need extra help, as well as the kind of help required. She argues however that researchers should not only uncover patterns of behaviour, but should use other evaluative methods to identify causes of such patterns. In this way, the lecturer can apply intervention measures and thus manage student success more accurately, more effectively.

Although early detection of at-risk-students is not the focus of this study, if analysis of LMS reports can inform the Faculty of Military Science about vulnerable students, then such information would be helpful in managing student success for both residential and distance education students in South African universities. The vulnerability of students can be seen from the graduation rates of students below:

- 25% of students that graduate in regulation time;
- 35% of the total intake graduate within five years;
- 48% of the residential students in five years;
- white completion rate on average of 50% more than African rates;
- under 5% of black and coloured succeed in any form of higher education;

- 55% of students never graduate

(Council for Higher Education, 2013)

In Stellenbosch University, first year students are assessed within the first six weeks. Those who consistently perform below the module average mark in all modules they have registered for, are identified as at risk students (Stellenbosch University, 2013). Van Merriënboer and Sweller (2005:166) argue that measuring performance by number of correct answers, may not provide a true reflection of students' performance. In other words, such data should be interpreted with caution, in that their interpretation can result in faulty diagnosis (Prinsloo et al., 2012, Veletsianos et al., 2016). So called at-risk students can possibly not be vulnerable per se, but may manifest as vulnerable if measured simplistically. Assessment by itself appears to cause high cognitive load, and is assumed to affect performance. Cognitive load is the "load imposed on working memory by information being presented" (Bradford, 2011:217).

Bradford (2011) recommends that assessment should be used to measure mental effort, instead of measuring performance by grade. According to the current study, mental effort is "the cognitive processes needed to learn new information" (Chen & Wu, 2014:109). In other words, mental effort involves amount of cognitive energy that a student commits to recall encoded information. As such, data from the LMS should be interpreted in terms of their relationships with other contextual factors.

Learning analytics is exemplified in a case study conducted by Romero, Gonzalez, Ventura, del Jesus and Herrera (2009) to obtain rules which describe relationships between the student's usage of the different activities on Moodle and the final score obtained in courses at University of Cordoba in Spain. Romero et al. (2009) used association, a data mining technique to analyse data automatically generated in five sampled face-to-face courses to determine the relationship between use of learning resources and student performance in respective courses. They found that students who completed high number of assignments and sent more messages to the forum obtained good marks in quizzes and in their final marks. One limitation with their findings is that they sampled five modules with highest use of activities and resources on the Moodle. Their findings are based on number of assignments completed, assignments passed, assignments failed, quizzes completed, quizzes passed, quizzes failed, messages sent to the chat, messages sent to the teacher, messages sent the forum and forum messages read in face to face courses. Their study could potentially



develop opportunity for deeper understanding if they included students' demographic information. This proposes that learning analytics can give a full picture of how students interact with learning resources on the LMS when quantitative data are integrated with qualitative data (Ferguson, 2012, Prinsloo et al., 2012; Czerniewicz, 2016; Veletsianos et al., 2016). Their study however highlight the impact of level of engagement on learning. ,

A further example on LMS audit, was a case study conducted by Rogers, McEwen and Pond (2010) on Algebra course in distance education study mode at Brigham Young University. They were surprised to find that only 2% of all students logged in on the LMS at the end of a semester. Their revealed that from the 2% that logged in on the LMS, only 30% spent less than one minute on assessment activities. These findings seem to reveal why lecturing staff should consider the amount of content and structure of content that can be covered in one lesson. Rogers et al. (2010) call students' online behaviour that is tracked and monitored on regular basis "Key Performance Indicators" (KPI). They identified student engagement and provision of signals that guide students' attention on important information as the KPI. They used page views and time spent on pages as observable data as matrices that they used to measure and analyse learning processes in the LMS (See Table 2.1). One weakness with Rogers, et al. (2010) is that learning process relies heavily on number of views and time spent on resources. They acknowledge that their study could have provided invaluable information about student learning if the collected data were integrated with other information such as students' biographic information. Their findings however revealed that on average, students attempt to finish one online lesson in one visit. Although Rogers and his colleagues, could not explain how learning and cognitive processes takes place in an online learning environment, their study did highlight the impact of amount of content, structure of content in a lesson, and mode of study on use of learning resources in the LMS.

Furthermore, a comparative study conducted by Prinsloo et al., (2012) at the Open University in UK and Unisa in South Africa revealed that student engagement with learning resources took place on and between modules in the LMS, but could not tell how and why they engaged. They identified a weakness in their findings because they could not explain the pedagogy, assessment strategies and necessary support interventions. Their findings could be justified if they incorporated biographic information provided during registration process, submission of assessment activities, financial interactions with the universities and student activities in the LMS. They acknowledge the impact of epistemological and ontological perspectives on student engagement in the academic discourse,

which they call the “Thirdspace”. They are of the opinion that they should incorporate all sources of data in their framework that could be used to understand student engagement on and off the LMS.

Tracking the development of framework that can be used to measure student engagement on and off the LMS emphasises the conceptual conclusion that can be drawn from visible and invisible aspects of teaching and learning process. In other words, the framework answers the purpose of learning analytics that attempts to understand how we teach and how students learn (Ferguson, 2012; Prinsloo et al., 2012; Laurillard, 2013).

Another case study in Universidad Carlos III de Madrid, Ruipérez-Valiente, Merino, Leony and Kloos (2014) found that data generated by the LMS is commonly used to analyse and interpret learning processes. They analysed student engagement with resources and assessment activities in the LMS in Physics, Chemistry and Mathematics. They thus identified six categories of interpreting learning processes using data retrieved from the LMS, namely: total use of the LMS, progress on the system, time distribution of the use of the system, exercise solving habits, gamification habits and affective state.

Compared to Rogers et al (2010) who used number of page views as indicators of student learning, Ruipérez-Valiente et al. (2014) further mapped out indicators for each category to analyse learning processes of individual students in comparison with the whole class. A list of indicators in each category is a possible explanation why they provided a detailed analysis of results. Their detailed analysis can be seen in the use of the LMS wherein they were able to show the percentage of students who accessed resources and assessment activities, as well as students’ level of progress in a particular resource, the extent to which they could do activities correctly, their efficiency in resources utilisation and efficiency performing activities. They found that all students started to watch all videos uploaded in the LMS, but only 29% finished watching them all. In addition, it was found that all students started doing assessment activities based on the videos, but abandoned 60% of them. One drawback in their study however is that they could not substantiate the cause of such patterns of watching and completing activities on the LMS, because they did not have access to any other data. It can only be assumed that these patterns are influenced by design of learning resources, which in turn determines the nature of information processing. It should be noted that these students’ patterns are influenced by other variables specific to this online teaching and learning context.

However, the study by Ruipérez-Valiente et al. (2014) could potentially develop a deeper understanding if they collected qualitative data to determine the underlying causes for the extent and frequency of the use of learning resources. In this way, an interpretation of their findings would have been valuable if they investigated the relationship between indicators both within a category and across categories, as well as the relationship of indicators with other variables. In this view, the findings Ruipérez-Valiente et al. (2014) should be interpreted with caution, since almost all students who participated in this study were young, ranging between 17 and 19 years and the sampled courses were offered on face-to-face basis. Their findings, cannot be generalised because their analysis and interpretation of indicators depend on other variables specific to Universidad Carlos III de Madrid context, but could serve as a lens through which the empirical work of current study can be analysed.

Their findings have brought paradigm shift in understanding my theoretical perspectives in drawing conceptual frameworks. In this way I was able to authorize the position I hold towards my research. For this study, the visible aspects will be online behaviour that is tracked and monitored on regular basis called “Key Performance Indicators” (KPI) (Rogers et al., 2010). They identified student engagement and provision of signals that guide students’ attention on important information as the KPI. They used page views and time spent on pages as observable data that was extracted to predict and indicate students learning in the LMS as outlined in Table 2.1:

Table 2.1: Tracking online behaviour to understand visible aspects of learning process (Adopted from. Rogers, McEwen & Pond, 2010: 238)

<b>KER</b>	<b>KPI</b>	<b>Visible data extracted from the LMS to measure learning</b>
Design of teaching and learning activities	Student engagement with teaching and learning activities	<ul style="list-style-type: none"> <li>•number of views on resource added,</li> <li>•time spent on each resource,</li> <li>•time of the day spent on viewing resources,</li> <li>•day of the week viewing resources.</li> <li>•number of tasks done and not done,</li> <li>•time spent doing tasks,</li> <li>•time of the day doing tasks,</li> <li>•time of the week doing tasks.</li> </ul>
	Provision of signals that guide students' attention on important information.	<ul style="list-style-type: none"> <li>•Number of views on resource added,</li> <li>•time spent on each resource,</li> <li>•time of the day spent on viewing resources,</li> <li>•day of the week viewing resources</li> </ul>

Equally important, Table 2.1 will assist me in extracting visible data from the LMS reports and these will be used to explore variables associated with student learning resources preferences in the LMS. For example, number of resources accessed and activities done from the LMS will be analysed to explain student engagement.

It can be seen that studies on learning analytics focused much on LMS audit and use of learning resources. The four case studies affirm Ferguson's (2012) notion that cognition, metacognition and pedagogy is under-researched. In her review of learning analytics, she recommended that future research should

address an understanding and optimizing of learning through a good understanding of how learning takes place, how it can be supported and the impact of underlying factors in the

learning process, an understanding and optimization of learning environments in which learning takes place and an understanding of perspectives of students that extends criteria of learning success beyond grades and persistence.

The underlying reasons that could provide an enrichment of data have been partially explained by Christensen, Steinmetz, Alcorn, Bennet, Woods and Emmanuel (2013) who conducted a survey in one of University of Pennsylvania MOOC platform. The survey was conducted on students who enrolled in one of the 32 courses and have watched one lecture. The purpose of their study was to describe students who took MOOC and reasons they took these courses. Their study revealed profile of MOOC students to be:

- predominantly young, highly educated and employed;
- mostly from developed countries;
- more males than females;
- enrolled in the Social Sciences and business courses to advance their jobs and for curiosity;
- those from developing countries have tertiary degree.

Their findings should be interpreted with caution, because Christensen et al. (2013) acknowledged that students without higher education from developing countries were underrepresented. Their study could have provided a deeper understanding if their study incorporated reasons for watching one lecture of the course they registered for. Although MOOC context is different from university face-to-face or online courses, their findings on profile of students registered for MOOC provides a lens through which profile of students from developing countries can be interpreted.

Another study of Veletsianos et al. (2016) on how students deal with challenges they face in MOOCs, furthers the findings of Christensen et al. (2013). The findings of Veletsianos et al. (2016) highlight some of the reasons why students engage or do not engage on and offline. They found that learning activities occur at the “work station, ecology of learning and the life world” (Veletsianos, 2016:7). Common activities in the work station were: taking of notes, printing, consulting books and interacting with people. In the ecology of learning environment, they work off the learning platform by forming study groups and consulting online resources. Lastly, in the life world, learning depends on students’ ability and support structures to reconcile competing and conflicting life responsibilities (work, family, studies) as a person. The limitations they identified in their study point out that their findings should be interpreted in context, since MOOC is different and all participants were from developed countries.

Although their studies have been conducted in a context different from this study, their studies have provided an appropriate lens through which the empirical work of this study can be analysed. Their findings mirror how students engage with learning resources on and off the LMS. I will thus adapt their KERs and KPIs to suit the context of this study.

A revelation of student learning resource preferences in the LMS challenges lecturing staff when adding resources and activities in the LMS. It suggests that lecturing staff should consider a number of factors such as the amount of content to cover in a lesson, level of difficulty of learning resources, level of involvement and styles of learning when adding resources and activities in the LMS (Mayer & Moreno, 2003; Dyke, Conole, Ravenscroft & de Freitas, 2007). For this study, learning analytics is defined as the analysis and contextualization of data that are automatically generated by LMS to understand student interaction with resources and activities added on and off the LMS. I will thus extract visible data that are automatically generated and use other qualitative methods to explore variables associated with student learning resources preferences in the LMS.

Literature acknowledges that it is easy to become overwhelmed by the amount of data that are automatically generated by LMS, which often causes researchers to lose track of what they want to discover (Rogers et al., 2010; Phillips, Maor, Preston & Cumming-Potvin, 2012). For me as a researcher of learning analytics to have a deeper understanding of the patterns in the use of learning resources, I will apply educational data mining techniques. There is a strong possibility that such an understanding of patterns provides an explanation about student learning resource preferences in the LMS (Romero, Ventura & Garcia, 2007:369). I will thus describe patterns and trends that lie within LMS reports. Secondly, I will estimate student preferences with learning resources. In addition, I will sift through LMS reports through prediction, classification and clustering techniques in order to explore variables associated with student learning resource preferences in the LMS. These variables will be revealed by discovering meaningful links, patterns and trends of student use of learning resources in the LMS (Larose, 2005:2).

These variables suggest that learning resources are not just added on the LMS, thinking that students will engage with them in similar manner, but they are presented and structured in order to guide students to make meaning. Knight (2005) calls presentation and structuring of resources and activities on the LMS “learning design”. This will be discussed in the next section.

The former section has reviewed the use of learning analytics to understand online teaching and learning. All literature reviewed in this section provided a lens through which learning activities which students participate in, can help students learn. The studies build on what Galusha (1999) found earlier about barriers of learning in distance education. These studies could not explain the extent to which teaching actions (online and offline resources that represent the lecturer) elicit learning experiences in order to ensure that both students, particularly those from the developing countries and lecturers share the same conceptualisation in a traditional university course. A possible explanation could be that most of the studies were undertaken in developed countries. Another possible reason is that most studies were undertaken in MOOC's in developed countries, of which the context is different from university online course. Studies from the formal university setting relied heavily on quantitative data. Another possible explanation could be that studies undertaken in traditional universities were hypotheses driven. Their studies however revealed the impact of design on student engagement with learning resources.

## **2.3. IMPACT OF DESIGN ON USE OF LEARNING RESOURCES**

This section will review literature on how design of online learning resources impact how students engage on and off the LMS. In other words, this section reviews the impact of teaching strategies elicited by design of learning resources on the way students learn on and off the LMS. As mentioned in the previous section, I will first define the meaning of “design” in order to clarify the impact of characteristics of resources and assessment activities on processing of information. In other words, processing of information from resources and activities determines the extent to which students learnt. It is believed that students learn effectively when requirements of cognitive processes in the teaching and learning activities do not overload the limited capacity of working memory. This would mean that when the requirements of the cognitive activities make heavy demands on the working memory (WM), learning can be ineffective (Beetham, 2007). Hence Clark and Mayer (2011) points out that designers of resources and activities are more likely to help students learn when they in fact know how students learn.

### **2.3.1. Definition of design**

One way of helping students learn effectively, would be to choose teaching and learning activities that enhance students' needs (Bennet, 1997:131). Bennet's (1997) definition fails to explain the context of creating such teaching and learning activities. It can only be assumed that the created teaching and learning activities are suitable because they integrated into student support services

(Knight, 2005; Conole, 2012). Knight (2005) complements the definition of Bennet (1999) and views “design” as being the “order in which the content is presented, how it is integrated in learning support services, how it is sequenced, and the amount of content that students should cover in a lesson”. Knight’s reference to the amount of content that students cover in a lesson, informs lecturing staff that learning resources in the LMS should use less of a student’s WM, in order to maximize encoding of information in the long term memory. WM is the “short term memory in which conscious processing of information occurs” (Kirschner, 2005:77).

A key weakness in Knight’s definition, however, is that design involves packaging of content. Knight definition has been criticised by many scholars as explained in paragraph 2.2.1. Conole (2012), for example, views design as an effective use of learning technologies to develop more pedagogically innovative learning resources. The incorporation of “effective of learning technologies” and “development of pedagogically innovative resources” in Conole’s (2012) definition points out that design is more than sequencing packaged content. Effective use of learning technologies implies that the use of learning technologies is informed the pedagogy employed in the development of learning resources. She describes the development of innovative learning resources in four levels:

- Digital assets: A single file such as a video clip;
- Information objects: Digital assets designed to present information;
- Learning activities: Tasks that involve interactions with information designed to achieve a specific learning outcome
- Learning design: Structured sequence of information and activities to promote learning (Conole, 2012).

It can be deduced from Conole’s (2012) description of learning resources that firstly, content is not just added on the LMS, but it is presented and structured in order to guide students to make meaning. Secondly, content is not presented in isolation, but students are provided with opportunities to engage with the content by completing some tasks in order to achieve specific learning outcomes according to Bloom’s taxonomy. Thirdly, content is presented in a specific sequence such as taking into consideration level of difficulty. Fourthly, development of learning resources should take into consideration opportunities and constraints afforded by learning technologies. Conole’s (2012) description here suggest that design of resources and activities on the LMS has an impact on learning.



The impact of design on learning is exemplified by Sweller (1994:304), who points out that content should be sequenced according to level of difficulty. Information that requires students to use low mental effort, means that such information can be learned independently. This type of information is said to have low element interactivity. Conversely, information that needs to be learned by simultaneously, by relating it to other information is said to have high element interactivity (Pollock, Chandler & Sweller, 2002). An element is any material that needs to be learned (Chen & Wu, 2014:118). This would mean that interactivity of complex information can possibly be reduced by ensuring that design eliminates interactivity between elements (Gauvain, 2008). In other words, resources and activities that comprise of complex information should require students, especially novices to first process information as individual elements, then process information simultaneously. Taken together, Gauvain and her colleagues' studies reported here appear to challenge the manner in which content is presented on the LMS. The impact of design on learning as explained above is likely to have an effect on student preferences to learning resources on the LMS.

Furthermore, presentation of content incorporates cognitive processes required to engage with learning resources. This would mean that the LMS can potentially be used as a platform to specify activities that students should do to engage with content. In addition, presentation of content specifies level of guidance that lecturing staff provide for students to make meaning (Biggs, 1999:66).

Presentation of content implies then that the use of learning resources can guide students' attention to relevant information. When students' attention is directed towards relevant information, students can organise selected information into mental presentations and integrate it with existing knowledge (Clark & Mayer, 2011:37). Clark and Mayer's opinion suggests that presentation of content can potentially accomplish specified learning outcomes.

Learning outcomes are assumed to specify what students should be able to do at the end of a lesson (Kennedy, Hyland & Ryan, 2012). For this study, I have adopted Bernholt and Neuman and Nentwig's (2012:21) definition, which state that learning outcomes are "statements of what a learner is expected to know, understand and or be able to demonstrate at the end of a learning activity." Kennedy et al. (2012) are of the opinion that learning outcomes should be written in terms of verbs that describe the level of understanding that students are expected to achieve as mapped out on Table 2.2.

Table 2.2: Verbs that describe level of understanding specified in the learning outcomes (Anderson & Krathwohl, 2001; Krathwohl, 2002; 2009; Laurillard, 2013)

<b>Learning experience elicited (Bloom's Taxonomy)</b>	<b>Types of learning (Laurillard, 2013)</b>
<b>Evaluation</b> Appraise, Ascertain, Argue, Assess, Compare, Contrast, Convince, Criticise, Defend, Explain, Evaluate, Judge, Justify, Predict, Recommend	<b>Collaboration</b> Small Group Project, Discussing Others' Output, Wikis, Chat Rooms
<b>Synthesis</b> Argue, Arrange, Assemble, Categorise, Construct, Design, Establish, Generalise, Integrate, Modify, Organise, Propose	<b>Discussion</b> Tutorials, Seminars, Forums, Emails, Discussion Groups, Web-Conferencing
<b>Analysing</b> Analyse, Appraise, Classify, Categorise, Compare, Contrast, Differentiate, Document, Examine, Explain, Group, Identify, Infer, Inspect, Observe, Order, Outline, Question, Review	<b>Production</b> Producing Articulations Using Essays, Reports, Photos, Videos, Blogs, E-Portfolios
<b>Applying</b> Choose, Construct Determine, Develop, Draw, Illustrate, Modify, Organise, Predict, Present, Produce, Select, Sketch, Solve, Apply, Assess, Demonstrate	<b>Practice</b> Using Models, Simulations, Virtual Labs, Field Trips, Role Play, Practice Based Projects
<b>Understanding</b> Compare, Conclude, Contrast, Define, Demonstrate, Describe, Estimate, Explain, Identify, Interpret, Predict, Rewrite, Summarise, Associate, Change, Defend, Clarify	<b>Inquiry</b> Analysis Of Ideas And Information. Collection of Data And Analysis, Comparison, Searching and Evaluating Information and Ideas
<b>Knowledge</b> Arrange, Define, Describe, Identify, Label, List, Locate, Match, Memorise, Name, Outline, Recall, Select, Show	<b>Acquisition</b> Lecture Note, Reading Multimedia, Website, Digital Documents Ad Resources, Listening to Podcasts, Webcasts, Videos

It can be seen that the level of understanding range from lower to higher order thinking skills. It can clearly be noted that the types of learning advocated by Laurillard (2013) have incorporated Bloom's Taxonomy. In this way, design can be regarded as being exploratory, developmental, reflective and contextual process, not a package (Bannan-Ritland, 2003).

According to this study, learning design process involves:

- a. specifying activities that lecturing staff do to guide students' attention in selecting relevant information, so that students can organise selected information and integrate it into existing knowledge,
- b. specifying activities that students do;
- c. specifying assessment activities to evaluate level of understanding on resources and activities added on the LMS;
- d. matching opportunities and constraints afforded by the LMS with resources and activities that lecturing staff add on the LMS.

### 2.3.2. Design framework

It has been mentioned that Bannan-Ritland views design as an exploratory, developmental, reflective and contextual process. Bannan-Ritland (2003:21) summarised design of resources and activities into four stages:

- a. Exploration: This is the phase of needs analysis of identifying and satisfying the needs of the intended users in supporting learning outcomes.
- b. Enactment: This is the initial intervention design and changes effected based on continuous feedback.
- c. Evaluation: In this stage, lecturing staff evaluate the impact of intervention. The evaluation process can cause changes in the initial intervention (Enactment phase). Evaluation phase also concerns the dissemination of information in the form of publication and adoption or adaptation of interventions.
- d. Reflection: This step involves review of the whole instructional design process.

Bannan-Ritland's (2003) four stages clearly provide detailed information of designing online teaching and learning environment. It can be seen that design involves more than structuring and sequencing of content. Implementation of these stages can possibly reveal underlying reasons of student use of designed learning resources. It is almost certain that information gathered through the application of these steps in design of online teaching and learning can help interpretation of quantitative data.

Similarly, Britain (2004) affirms the Integrative Learning Design Framework of Bannan-Ritland (2003). Britain (2004:7) views design process as being more prescriptive in that it involves definition of learning objectives, development of narrative description of learning and teaching scenario, creating learning activity workflow from narrative description, assigning resources tools and people to activities, running (real-time), learner support and on-the-fly adaptation and reflecting (including sharing outputs for peer reflection). Britain's (2004) design process begin by defining learning objectives even before knowing students' needs and exploring ways of satisfying them. It can be clearly seen that Britain's (2004) design process involves completion of one step before proceeding to the next, which differs from Bannan-Ritland's (2003) framework.

Bannan-Ritland's (2003) steps clearly demonstrates that design is a recursive process, whereas Britain (2004) views design as linear process. It is worth noting that Bannan-Ritland's (2003)

design processes provides the designer with exploration, continuous feedback, self and peer evaluation, as well as reflective opportunities. The provision of these opportunities probably explains an assumption that resources uploaded on LMS can guide students' attention to select relevant information by avoiding unnecessary information that can cause heavy demands on WM (Chen & Wu, 2014:108).

Cognitive overload can occur “when degree of mental effort exceeds processing capabilities” (Bradford, 2011:217), which he claims as one factor that plays an important role in usage of learning resources in the online learning environment. In other words, design of teaching and learning activities involves identification of complex content and breaking it down into manageable lessons, which can easily be understood by almost all students (Biggs, 2003).

Conole (2012) affirms Bannan-Ritland's (2003) design as she maps out seven C's of designing resources and activities, namely:

- a. **Conceptualise:** This is a specification of the vision of the course, where the lecturer specifies why, who and what to design. This would mean consideration of key principles and pedagogical approaches and nature of students.
- b. **Capture:** This would mean that lecturing staff should check course materials already created for example in Open Educational Resources. If course materials are not available, lecturing staff can create multimedia such as interactive materials, podcasts and videos, but also provide students with opportunities to create their own content. Wellburn and Eib (2010:51) propose that students should be guided to “create content in and for the world that is both download and uploaded”.
- c. **Communicate:** Lecturing staff can design activities that foster communication such as considering affordances of LMS tools that promote communication.
- d. **Collaborate:** In this step, lecturing staff can design activities that foster collaborations. Wellburn and Eib (2010) are of the opinion that lecturing staff can engage students to use wikis, blogs, chat rooms and forums to create notes collaboratively, wherein students can share their interpretations, questions, comments, can critique information and generate further conversations.

- e. Consider: Lecturing staff can design activities such as blog to foster reflection. The author is of the view that reflection can be fostered when there is an alignment between learning outcomes, learning activities and assessment.
- f. Combine: In this step, lecturing staff can combine learning activities into course view, which provides a holistic overview of the nature of the course.
- g. Consolidate: This is the final step in which a complete design is put into practice. The design is evaluated and refined based on the evaluative findings and findings are shared.

### **2.3.3. Implications of design framework on learning**

It is evident that the design framework of Conole (2012) shares similar aspects with Bannan-Ritland (2003). It is worth noting that both Bannan-Ritland (2003) and Conole (2012) argue that design of resources and activities should be based on learning theory. They are both of the opinion that design should be evaluated at any stage. Thus design is seen as a recursive process. Literature however shows that sequential and linear design appears to have greater influence in teaching and learning practice than recursive and non-linear design (Britain, 2004; Koper, 2005; Bien & Xu, 2012).

A probable explanation for such a claim might be that learning can easily be measured within a linear learning environment, because it is prescriptive. The question however, is whether a prescriptive list of design process can be adapted to various online teaching and learning contexts. Recursive learning design can possibly be adapted because constructivist designers provide students with rich learning environments, wherein meaning can be negotiated and ways of understanding can emerge and evolve (Tam, 2004:4). The adaptability of learning design is a likely explanation why constructivist designers are believed to “avoid breaking down contexts into component parts as traditional instructional designers do” (Tam, 2004:4).

One possible implication in constructive learning design is that not all students are capable of learning effectively. Almost all students require a level of guidance and support to learn. It can be clearly seen that design involves level of guidance provided in online teaching and learning environments. According to Clark and Mayer’s Cognitive Learning Theory (2011:142), students can be guided by helping them to engage by first selecting important information as words or pictures. Selection of important information can be guided by directing students’ eyes, such as using

headings, italics, bullets, boldface, font size, arrows, icons, underlining, white spaces, margin notes, captions or repetition. Important information can further be selected by using instructional objectives, providing summaries and eliminating irrelevant information.

Secondly, students organise selected information into verbal or visual models and lastly integrate it with existing knowledge. Clark and Mayer (2011:142) point out that new information can be organised by comparison, contrasting, classification, enumeration, generalisation or cause-and-effect. In addition, selected information can be organised by using outlines, headings, pointer words and graphic representations. Organised information is integrated with existing knowledge by using advance organisers, illustrations with captions, animation with narrations, worked examples and elaborative questions (Clark & Mayer, 2011:142). Organised information can further be integrated by presenting verbal and visual information together.

Furthermore, information that is processed in the WM is presented as text. Text can be presented as words or pictures, visual or auditory, static or moving. At the same time, the mode of presentation of information influences the way in which students prefer to process information for learning (Clark & Mayer, 2011:65). Mousavi, Low and Sweller (1995), in their article titled “Reducing Cognitive Load by Mixing Auditory and Visual Presentation Modes” and Riding and Sandler-Smith (1997:206), categorised students according to their preferred mode of processing information:

- a. Holistic Verbalisers: Students in this category may benefit from verbal presentation of information. They benefit when overall view of new information is presented.
- b. Holistic Imagers: These students may benefit from overall view of new information. They benefit from diagrammatic or pictorial presentation of information.
- c. Analytic Verbalisers: These students analyse information into component parts. They may benefit from verbal presentation of information.
- d. Analytic Imagers: These students analyse information into component parts. They benefit from diagrammatic or pictorial presentation of information.

The four categories or modes of processing information clearly explain that there are a number of variables associated with student learning resource preferences in the LMS. According to Mousavi, et al. (1995:320), Riding and Sandler-Smith (1997:206), design of teaching and learning activities

should be suitable to students and situation. Mousavi et al. (1995:319) and Riding and Sandler-Smith (1997:206) emphasise that resources and activities added on the LMS should accommodate students' preferred channel of information processing.

Riding and Sandler-Smith (1997:206) recommend that if resources and activities are not suitable for students' information processing styles, lecturing staff should guide students to make efficient use of strategies of strengths and limitations of their processing styles. They thus propose that students' processing styles can be accommodated by presenting information firstly either in textual or pictorial mode, which they call "adaptation approach."

Secondly, students' processing styles can be accommodated by presenting information in words and pictorial mode, which they call "balanced approach." Thirdly students' processing styles can be accommodated by facilitating and accelerating strategies that help students to deal with information that does not suit their processing style, which they call "strategy approach" Strategy approach can be facilitated and accelerated by helping students to be aware of the information that matches or does not match their preferred way of learning. In strategy approach, lecturing staff can identify types of activities that are necessary for successful completion of learning.

Furthermore, Sweller, van Merriënboer, and Paas (1998:267); Paas, Renkl, and Sweller (2003:3); and Van Merriënboer and Sweller (2005:151) recommend the following six strategies that can be useful in designing online teaching and learning activities:

- a. The goal-free effect: Lecturing staff can replace conventional problems with goal free problems by providing students with a specific goal. In other words students use known examples and resolved examples. This would mean that students can focus on provided information and use it where possible.
- b. The worked examples effect: Lecturing staff can replace conventional problems with worked examples. This would mean that students are provided with completed problems and steps to solve them.
- c. The completion effect: This strategy requires lecturing staff to replace conventional problems with completion problems. In other words, students are provided with a partial solution. This

strategy means that lecturing staff provide students with partially completed problems and steps to solve them.

- d. The split-attention effect: This strategy means that lecturing staff can replace multiple sources of information (frequently pictures and accompanying text) with a single, integrated source of information.
- e. The modality effect: This means replacing a written explanatory text and another source of visual information such as a diagram (unimodal) with a spoken explanatory text and a visual source of information (multimodal).
- f. The redundancy effect: This strategy means that lecturing staff can replace multiple sources of information with one source of information.

The above mentioned six strategies work well for novice students, but as students become more knowledgeable, lecturing staff should vary the format of teaching and learning activities (Van Merriënboer & Sweller (2005:152). Van Merriënboer and Sweller (2005:166) assert that lecturing staff should assess students' mental effort in order to vary format of teaching and learning activities according to mental effort needed to process information.

Similarly, Chen and Wu (2014:109) are of opinion that split attention, modality and redundancy effect influence sustained attention, emotion, cognitive load, and learning performance.

In conclusion, it appears a challenge to design teaching and learning activities that accommodate processing styles, because processing styles cannot be easily measured. It is a challenge particularly for lecturers who teach both residential and distance education students. These lecturers are assumed to have to adapt their traditional way of teaching to provide both students with the same opportunities to learn. There is a host of contextual factors that lecturing staff should consider in order to guide students in facilitating and accelerating strategies that help them deal with information that does not suit their processing style. The studies explained above show that if design of resources and activities does not cater students' processing styles, learning can be



compromised. In other words, students cannot make meaning of the newly acquired information if they cannot link new information to what they already know.

## **2.4. STUDENT ENGAGEMENT**

This section will review literature on learning processes related to higher education. In other words this section reviews how lecturing staff deliberately design ways to help residential and distance education students learn (Peters, 2004:2). The section begins by explaining three approaches of learning that students adopt. It will then go on to look at learning, describing it based on underlying theories. This means that I will examine what students do when they engage in an activity that leads to learning (Biggs, 1999:63; Suthers, 2006). Literature shows that three views of learning have emerged over years.

### **2.4.1. Views on learning**

It has been seen from the previous section that design of resources and activities has impact on learning. Students engage in the learning process by adopting surface, deep and strategic approaches (Marton Säljö, 1976; Biggs, 1999:60; Entwistle & Ramsden, 2015). Firstly, students who adopt surface learning put in sufficient effort by memorising subject matter even if they do not understand it. They therefore reproduce it to meet the requirements that enable them to pass. It should be noted that memorising of subject matter is a mental process (Bodner, 1986). Surface learning can be viewed from the objectivist's perspective, which states that learning is the "acquisition and accumulation of a finite set of skills and facts" (Jonassen, 1991:6). Objectivists assume that students should be told about the world and be expected to replicate its content and structure (Jonassen, 1991:6). Biggs (1999:60) is a critic of the objectivists' view, arguing that "acquisition of information does not bring change, but change is brought by the way students structure information and think with it"

Students who adopt deep learning go beyond memorising subject matter. They instead interpret the meaning of subject matter that enables them to understand it. Clearly, interpretation of meaning is a mental process. A good illustration of deep learning can probably be seen in the transformation of teaching and learning practice in higher education, wherein the importance of Graduate Attributes (GAs) is recognised internationally (Barrie, 2006; Treleaven & Voola, 2008; Green, Hammer & Star; 2009; Hughes & Barrie, 2010; Barrie, 2012; Jones, 2012; Oliver, 2013). In the recent years,

universities are increasingly concerned with the development of attributes that prepare students beyond disciplinary content knowledge (Barrie, 2007). The development of attributes can be achieved by creating conditions for students to become effective participants in the participatory society and add value in the world they live in (Wellburn & Eib, 2010). Take the case where students in *YouTube* video “A vision of students today” expect learning to be relevant to life so that they can help to solve complex societal problems (Wesch, 2008). For them to solve complex problems, they should be able to construct meaning from the old and new information which is outside their range of experiences (Boud, 1993; Biggs, 1999).

Thirdly, students who adopt strategic learning apply “well-organised study methods and effective time management” in order to achieve the highest possible marks for an assessment (Entwistle 1997:19).

Clark and Mayer (2011) have summarised three approaches in their Cognitive Learning Theory, which they call “selecting-organising-integrating” (SOI). The SOI theory seems to be one of the learning theories that incorporates mental processes that happen in student approach to learning as explained above. These are mental behaviours that are involved when students interact with learning resources online (Rogers et al., 2010:244). This will be explained in detail in the next section. Such mental behaviours are likely to determine student learning resource preferences. This would mean that student approach to learning depends on the nature of assessment (Biggs, 199:60). It is worth noting that the embedding of GA in higher education aims to prepare students beyond assessment of content knowledge.

#### **2.4.1.1. Learning as response strengthening**

As mentioned in the previous paragraph, students’ approach to learning depends on the nature of assessment. Surface learning appears to be one approach that promotes learning as response strengthening, as students spend most of their time memorising learning materials and reproducing it so that they can earn marks (Biggs, 1999; in Conole, Oliver, Falconer & Littlejohn & Harvey, 2007), irrespective of whether they understand the work or not. Learning as response strengthening is advocated by behaviourists (Anderson, 2010:144) whose focus is on observable and measurable behaviours. It suggests that students learn through basic stimulus response conditioning (Beetham, 2005 in Oliver, Roberts, Beetham, Ingraham, Dyke & Levy, 2007), wherein desired behaviour is

reinforced through rewards. It is suggested that online teaching and learning is commonly dominated by direct instruction that promotes transmission of information (Cuban, 2001; Peters, 2004; Kirscher, 2004; Yu-mei, 2011). Transmitted information is placed in the short term memory, but not integrated with prior knowledge (Clark & Mayer, 2011; Whelan & Teigland, 2013).

A possible reason for non-integration may be the gap that is assumed to exist between opportunities offered by learning technologies to enhance learning and the actual use of learning technologies (Dyke, et al., 2007). Dyke et al. (2007: 86) further claim that there are less opportunities created for students to learn by doing and by collaboration because it appears as a challenge to “create pedagogically innovative learning activities that promote a range of theoretical perspectives”. It can thus be proposed that transmission of information is promoted by standardised testing (Wellburn & Eib, 2010), where the teacher’s role is to administer rewards and punishments in terms of learning (Clark & Mayer, 2011:34).

Transmission of information implies that students are told about the world and are expected to replicate its content and structure (Jonassen, 1991:6). In other words, the online learning platform is used to mark quantitatively, wherein marks are allocated for correct answers and no marks are allocated for incorrect answers (Rumble, 2001:35; Clark & Mayer, 2011:33). It should be noted this type of assessment might not tell the lecturer the level of understanding that students have achieved and how well they achieved such level (Biggs, 1999). This type of assessment commonly assesses outcomes of the lower level of Bloom’s taxonomy (1956), such as knowledge, in which students are expected to give one correct answer.

Learning as response strengthening has been critiqued by Woolfolk and Hoy (2002) who argue that even if information can be imposed, understanding comes from within. He further states that learning is an active mental work, wherein students’ minds engage with learning resources through selecting relevant information as words or pictures for processing. It is not surprising that Von Glaserfeld (1984:18) considers students as “active constructors of understanding, who do not simply mirror and reflect what they are told or what they read”. It should be noted that students prefer learning resources that provide them with opportunities to apply higher order thinking skills even if they are not provided with full information (Von Glaserfeld, 1984:19).

At the same time, Czerniewicz and Brown (2009) challenge the widely held view arguing that transmission of information does not imply that students are passive recipients. They propose that

students become active participants when new information is shown, demonstrated, described and explained as online lecture notes, streaming videos of lectures and multimedia, because they listen, attend and apprehend. The availability of online lecture notes, streaming of videos of lectures and multimedia resources would mean that students' learning styles are accommodated, which makes it easier to process information. Czerniewicz (2016) thus advocates scholarship of teaching and learning and emphasises why academics should be driven by pedagogies of care. Laurillard (2013) shares similar view that learning takes place through "acquisition, enquiry, practice, production, discussion and collaboration". It can be seen that the first step in learning is that the teacher's action should motivate students to modulate their own concepts.

From the literature reviewed in this section, it is evident that the use of learning technologies to tell students whether their answers are right or wrong is strongly contested by a number of scholars. They argue that such use of learning technologies exemplifies drill and practice, wherein students are provided with little or no opportunities to make meaning from acquired information. This would mean that learning becomes less meaningful, since students become passive recipients of rewards for correct answers (Mayer, 2011:146). For learning to be meaningful, students should be provided with opportunities to engage with learning resources by selecting, organising and integrating acquired knowledge (Clark & Mayer, 2011). Learning as response strengthening is incomplete in that students acquire information, practice it, but do not get opportunities to integrate the acquired knowledge with prior knowledge (Czerniewicz & Brown, 2009).

#### **2.4.1.2 Learning as knowledge acquisition**

It was mentioned in paragraph 2.4.1 that the three approaches to learning provide students with opportunities to acquire knowledge. It has been argued that acquisition of knowledge only is not enough, unless students can integrate acquired knowledge with what they already know. This would mean that learning as knowledge acquisition occurs when new information is placed in long term memory. Kirschner Weller and Mayer (2006) argue that before new information is placed in long term memory, it is placed in the short term memory called "working memory" (WM), which has limited capacity. This would mean that new information should be rehearsed, because if it not rehearsed, it is assumed that it can be lost (Kirscher et al., 2006). At the same time, when new information is rehearsed and integrated with prior knowledge, it is stored in the long term memory, which suggests that there is an acquisition of knowledge.

An acquisition of knowledge appears less useful if it cannot be applied to a specific context according to Laurillard (2002). She points out that acquisition of knowledge helps students to modulate their own concepts (Laurillard, 2013). In her opinion, learning takes place through “acquisition”, “enquiry”, “practice”, “production”, “discussion” and “collaboration” (See Table 2.2). It can be seen that the first step in learning is that the lecturer’s action should motivate students to modulate their own concepts. Seemingly, novice students need more than one practice opportunity to be assured that they have achieved level of understanding stated in the learning outcomes (Laurillard, 2013). In other words, prior knowledge needs to be activated by contextual cues so that it can be related to the existing knowledge (Schimdt, 1993:425).

Activated information is organised in a specific way called “cognitive structure”, which determines the extent to which it will be accessible for use (Schimdt, 1993:424). Biggs (1999:60) complements Schimdt’s (1993) opinion in stating that the acquisition of information does not mean that students have learned, unless they can use the acquired knowledge in a practical setting. The process of transforming information into knowledge is pioneered by Jarvis (2004) in Dyke et al. (2007:82) who state that human learning is the combination of processes through which whole persons construct experiences of a situation and transform them into knowledge, skills, attitudes, values, emotions and the senses and integrate the outcomes into their own biographies

Seemingly, some online learning environments are dominated by transmission of information as well as provision of opportunities that enable students to acquire knowledge from transmitted information (Veletsianos, 2010, Bath & Bourke, 2010). For example, such opportunities can be provided in the LMS by creating a space for negotiation and dialogue in a forum, online chat, wiki or blog (Veletsianos, 2010). These LMS tools allow knowledge to be constructed, deconstructed and reconstructed (Perry & Edwards, 2010). Tools such as a blog provide students with reflective opportunities in that they receive feedback from peers and lecturers. These tools work better for students with high collaborative skills. Else if students do not have collaborative skills, they feel excluded (Czerniewicz, 2016).

Rogers et al. (2010), however acknowledge that it is a challenge to discover how learning and cognitive processes and behaviours of students are manifested online. A possible explanation for such a challenge can be attributed to the fact that learning involves three aspects: change that cannot be directly seen, change that takes place within student’s information processing system, and

change due to students' experiences (Clark & Mayer, 2011:33). Clark and Mayer (2011:34) point out that the design of online teaching and learning environments should create experiences that foster desired change (Clark & Mayer, 2011:34). They are of the opinion that learning analytics can inform lecturing staff of how students interact with resources and activities and learn online.

It has been explained in this section that students acquire information by placing it in a WM. It is assumed that such acquired information is lost if not rehearsed. However, if students are provided with rehearsal opportunities, the acquired information is placed in the long term memory. Biggs (1999) has questioned the usefulness of such information, arguing that students should be able to make meaning of the acquired information by relating it to prior knowledge.

### **2.4.1.3 Learning as knowledge construction**

In this view, learning occurs when students actively construct knowledge (Clark & Mayer, 2011:37). Almost all learners of all ages probably know how to construct knowledge, provided they are given enough guidance (Kirschner et al., 2006:77). Learning is described as a constructive process through which information is turned into knowledge by means of interpretation, by actively relating it to existing bodies of knowledge, by the generative creation of representations, and by processes of purposeful elaboration (Resnick, 1989:15). Such a constructive process can possibly occur when students are provided with specific guidance that enable them increase the efficiency to cognitively manipulate the new information in order to achieve specified learning outcomes and store the result in the long term memory (Kirschner, 2006:77).

Such manipulation of information means that students become actively engaged with resources and assessment activities. Laurillard (2002:14) challenges this view, arguing that student engagement does not imply that they are indeed learning, because they should make use of the opportunities provided in the online teaching and learning environments to learn effectively. Suthers (2006:323) illustrates Laurillard's (2002) argument, pointing out that, "learning only happens through student's efforts at meaning making" by integrating acquired information with prior knowledge. This would mean that the design of teaching and learning activities should help students to know how to learn and what to learn (Riding & Sandler-Smith, 1997:205; Peters, 2004:156).

In this study, I consulted literature to track down exactly what is it that lecturing staff can do to help students learn effectively (Diaz & Bourke, 2010:5). It appears that the first component of learning is

the selection of relevant information (Clark & Mayer, 2011:149). In other words, resources and activities added on the LMS should guide students to focus on important information.

Seemingly, students can be guided to focus on relevant information when there is constructive alignment of learning outcomes, teaching and learning activities and assessment (Biggs, 2003). According to Biggs (2003:269), when there is constructive alignment, “students cannot easily escape without learning”. In other words students learn when they undertake frequent and regular activities (Simonson, Smaldino, Albright & Zvacek, 2008:10). Undertaking regular activities however does not per se imply that students learn effectively. It is assumed that students learn effectively when they “search, criticize, and identify positions of their own” (Bath & Bourke, 2010:9), instead of being lead to “mere fact learning and reproduction of accepted truths” According to Michael and Modell (2003), students engage in these activities by linking new information to what they already know. Besides linking new information to old information, old knowledge needs to be activated by prompts in the context of information (Schimdt, 1993).

From the discussion above, it can clearly be seen that design of resources on LMS can compromise construction of meaning if students cannot link new information to what they already know, to form “mental models” or “schemas” (Michael, 2006; van Merriënboer & Sweller, 2005; Gauvain, 2008). It is believed that if students cannot link the existing knowledge to what they already know, that would mean that the student’s mental models are “faulty or incomplete” and are called “misconceptions” (Michael, 2006).

It is believed that students learn when existing misconceptions are challenged (Entwistle, 2005:20). Misconceptions can be challenged by designing learning environments that create discomfort for students, while providing enough support for them to process new information without overloading their working memory (Vermunt & Verloop, 1999:270). It is commonly assumed that it is difficult to fix faulty models (Biggs, 1999). The level of difficulty of repairing faulty models suggests the necessity to clarify exactly how the faulty models can be repaired. Hence, learning is defined as a “process of conceptual change in which the faulty models are repaired (Modell, Michael & Wenderoth, 2005).

Faulty models can possibly be repaired by designing teaching and learning resources that challenge students’ thoughts, so that they can identify gap in what they already know (Wellburn & Eib, 2010). Rogers (2010) further illustrates that faulty models can be repaired when students can draw their



own conclusions. This would mean that students can draw conclusions by constructing and negotiating their understanding as they relate it to their community (Biggs, 1999). Such understanding results in the achievement of learning outcomes (Biggs, 1999; Draffan & Rainger, 2006 citing Shuell).

There are different opinions about definition of learning, but there seems to be an agreement on defining learning in the current study as construction of meaning from old and new information (Boud, 1993; Biggs, 1999). This view is further shared by Makoe (2006:361) who states that students learn by constructing their own knowledge and meaning according to what they already know within the social, historical and linguistic contexts of their own learning. Learning as construction of meaning is affirmed by Newby (1996:24) who defines learning as a “change in meaning constructed from experience.” For this study, the researcher has adopted the definition of Clark and Mayer (2011) which states that learning is change in students’ knowledge due to experience.

It became evident to me that learning can only happen through the learner’s efforts at meaning making (Suthers, 2006:322). Lecturers can thus “arrange for the students to have challenging experiences in order to accelerate the change process” (Suthers, 2006:316). This would mean that online teaching and learning should enable students to integrate new information with prior knowledge or increase the efficiency of retrieving stored relevant information (Clark & Mayer, 2011:17).

Suthers (2006:320), however, argues that literature provides theories of learning but not a definition that enables us to recognize that students are involved in digital learning. In his view, it is a challenge to determine how students learn in digital learning environments. He further argues that design of resources and activities “provides conditions and support for learning by making salient that students elaborate on and relate to new information or ideas.” Bower (2008) however argues that provision of conditions and support for learning does not guarantee learning. To guarantee learning lecturers can match learning outcomes, teaching and learning activities, assessment with the potential affordances of learning technologies, (Bath & Bourke, 2010; Conole, 2012). In addition to alignment, Clark and Mayer (2012) maintain that lecturing staff should know how information is processed.



In this study, learning as response strengthening and knowledge acquisition is incorporated in learning as knowledge construction, since information is stored as verbal or visual models, according to how the information will be used. Take for example, residential students in institution case studied attend face-to-face classes, buy prescribed textbooks, have access to course materials on a dedicated drive on the institutional network or intranet. Off campus students attend one week face-to-face contact session at the start of each semester, attend course introductory classes, use prescribed texts and receive additional course materials either during contact sessions, or via emails once they had left, or on LMS through the semester. This implies that students in this study have access to much of information. The question that needs to be asked is how much of this information can students absorb and integrate with prior knowledge? Since this study attempts to explore why students engage or not engage of and on the LMS, it would be important to understand how information is processed.

## **2.4.2. Processing of information**

The following sub-section will explain the importance of understanding how much information the brain effectively absorbs and encodes. The discussion attempts to inform lecturers of the amount of information that should be covered in learning resources. According to Kalyuga, Chandler and Sweller, (1999), Van Merriënboer and Sweller (2005), Clark and Mayer (2011:41), Chen & Wu (2014:109) it appears important to consider the amount of information that can be absorbed, because working memory capacity is assumed to be limited, particularly when students interact with novel information.

According to students' working memory (WM) is limited to about seven new items or elements of information at one time when information has to be merely remembered, whereas Long term Memory is unlimited (Van Merriënboer & Sweller, 2005). WM is the cognitive process required from students to engage with teaching and learning activities, while Long term Memory (LTM) refers to the storage of learned information, which enable students to draw from this storage when processing novel information (Gauvain, 2008:205). In addition, when new information has to be used to organise, contrast and compare, only two or three items of the information can be processed simultaneously (Van Merriënboer & Sweller, 2005:148). In other words, working memory is limited in capacity and can thus processes small amount of information at a time. If not processed, it is lost after about twenty seconds. Van Merriënboer and Sweller (2005) further contend that when students learn new information, the information is processed in the WM and stored into categories

called “schemas” in LTM. To them, these schemas are stored according to how they will be used as well as for understanding and remembering the information. In their opinion, learning occurs when new schemas are formed or existing schemas are altered. It is notable that Clark and Mayer (2012), Chen and Wu (2014:109) found that most online environments deliver content, but ignore human cognitive processes. Seemingly, this neglect is experienced more often in distance education where the student body comprises mostly of older students.

Factors such as age seem to have a significant impact on formation of new schemas. Older students for example are assumed to experience reduction of WM capacity, because there is a general slowing of cognitive processing and a decline in the ability to repress irrelevant information (Van Merriënboer & Sweller, 2005:173). Moreover, online teaching and learning environments are commonly dominated by self-study learning resources, which cause an increase in information processing. It should be noted that an increase in processing is not directly related to acquisition of new schemas, because processing takes away part of the WM capacity (Kalyuga, Chandler & Sweller, 1999). Thus, Van Merriënboer and Sweller (2005:162) recommend that lecturers can design resources and activities that optimize limited working memory. The impact design of learning resources on working memory is illustrated in Fig 2.1 below

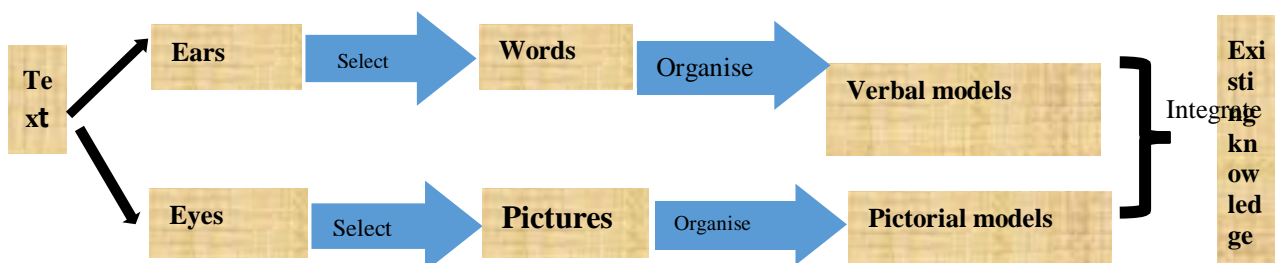


Figure 2.1: Learning process according to: Cognitive Learning Theory: from Clark & Mayer (2012)

According to Riding and Sandler-Smith (1997), Rumble (2001), Clark and Mayer (2012), learning involves selecting relevant information. Secondly, learning involves mentally organising the information into coherent mental representation. Clark and Mayer (2012) further points out that lecturing staff can foster organising of information from text by using outlines, signaling headings, pointer words and graphic representations. Lecturing staff can also structure text so that students can organise text in common structures, such as comparing or contrasting, classification, enumeration, generalisation and cause and effect. Thirdly, information is learnt by integrating it with existing knowledge.

In similar vein, guidance of students' attention facilitates the selection of relevant information and limits processing of information not required for knowledge construction (Chen & Wu 2014:108). This would mean that guidance of students' attention minimises overloading of limited working memory. Moreover, selection of relevant information determines the extent to which the information is mentally organised into coherent mental representation and integrated with existing knowledge. Riding and Suddler-Smith (1997:205), Rumble (2001:35), Clark and Mayer (2012) explain that selection of relevant information is the first component of processing information.

Furthermore, when students interact with resources and activities, they make sense of whether activities are simple or complicated (Riding & Suddler-Smith, 1997; Clark and Mayer, 2011). Students perceive resources and activities to be difficult when required to use complex cognitive processes that are not stored in their long term memory. Such resources and activities are described as having high elements of interactivity (Riding & Suddler-Smith, 1997; Chen & Wu, 2014).

Seemingly, students' perceptions depend on design of activities and social context of learning (Chen & Wu, 2014). Novice students prefer teaching and learning activities with low element interactivity, while as they become more experienced, they prefer activities with high element interactivity (Sweller, 1995; Kalyuga et al., 1999; Gauvain, 2008). At the same time, it should be noted that students place more value on challenging topics or activities (Bradford, 2011:223). It appears that students can process information if they are aided to select relevant information from materials (Bradford, 2011:225).

To help students focus on relevant information, lecturing staff can develop strategies that help students to process presented information. Firstly, Sweller (1995), Kalyuga et al. (1999) and Gauvain (2008) hold a view that lecturers can help students to focus on relevant information by translation. Translation means facilitation and acceleration of processing of information presented into a mode that makes it easier to process and understand (Gauvain, 2008). In addition, lecturing staff should identify types of activities that are necessary for successful completion of learning.

For example, when resources are presented as text, an imager can translate it into diagrams, a verbaliser describes a diagram into words, an analytic may map out elements of a topic to obtain an overview, a holistic may go through a chapter and list headings to give indication of its structure.

Secondly, students need help in adapting their information processing styles to the mode of presentation (van Merriënboer & Sweller, 2005:172). Thirdly, lecturing staff can reduce the processing load by presenting information in a mode that is suitable for students' processing styles. If information is presented in a preferred mode, then information processing load is less. If information is not presented in a preferred mode, information may exceed processing capacity, which results in information not being learned at all (Riding and Saddler, 1997:204).

Clark and Mayer (2011:3) propose seven principles of mitigating cognitive overload:

- a. Multimedia: Lecturers may use words and graphics rather than words alone.
- b. Contiguity: Lecturers may align words to corresponding graphics.
- c. Modality: Lecturers may present words as audio narration rather than on screen text
- d. Redundancy: Lecturers may explain diagrams with words in audio or text not both.
- e. Coherence: Lecturers may cut out extra information that is not necessary for learning.
- f. Personalisation: Lecturers may use conversational style and virtual coaches.
- g. Segmenting and pre-training: Lecturers may break down a lesson, particularly lessons with lot of information into small chunks.

In addition to seven principles of multimedia, Clark and Mayer (2012) further propose strategies that can be used to help students select relevant information. Firstly, lecturing staff can highlight important information by using heading, bullets, italics, boldface, font size, underlining, arrows, icons, margin notes, white spaces, repetition and captions. This would mean lecturing staff provide signals on learning resources to guide students' attention on relevant information. Secondly, lecturing staff can integrate adjunct questions with resources and activities added on LMS in order to help students integrate new information with the existing knowledge. Thirdly, lecturing staff can provide summaries at the end of each lesson or involve students to make summaries of a chat or a discussion forum on the LMS in order to guide students' attention on important information.

Fourthly, lecturing staff should eliminate irrelevant information when adding resources and activities on the LMS. Irrelevant information should be eliminated because students' working memory is limited (Sweller, 1994; Kalyuga et al, 1999; Gauvain, 2008; Clark & Mayer, 2011; Clark

& Mayer, 2012; Chen & Wu, 2014). According to Chen and Wu (2014:109), if information exceeds working memory capacity, which Clark and Mayer (2011) call “cognitive overload”, information may not be learned at all. Cognitive overload arises when more information is presented than students can process and when a lot of information is presented but only part of it is relevant (Whelan & Teigland, 2013:178). In other words, if information exceeds working memory, learning as response strengthening and as knowledge acquisition occurs, instead of learning as knowledge construction.

Mayer and Moreno (2003), Chen and Wu (2014) identified three types of cognitive load processes:

- a. Intrinsic load processing: Intrinsic load processing refers to the cognitive processes inherent in the nature of course materials, known as “mental load” (Chen & Wu, 2014: 220). It should be noted that the complexity of teaching and learning activities cannot be reduced, but it has implications on design of such materials (Bradford, 2011:220). It is thus recommended that information should be presented from simple to more complex materials.
- b. Germane load processing: Chen and Wu (2014:108) define germane load as “mental effort exerted by learners to process new information and then integrate it into existing knowledge structures”. These are cognitive processes that are required for learning new materials. In other words germane load processing deals with how students use their visual (seeing) or auditory (hearing) channels to process words and pictures, by selecting, organising and integrating those words or pictures for effective learning to take place. According to Mayer (2005), germane processing means that only necessary information is presented. In Mayer’s (2005) view, if students consider teaching and learning materials unnecessary, then cognitive processing will be extraneous.
- c. Extraneous load processing: This is cognitive processing that is not required for learning presented course materials, but are primed by design of resources and activities added on LMS. According to Gauvain (2008) extraneous cognitive is a result of poorly designed teaching and learning activities. Similarly, Chen and Wu (2014:109) argue that extraneous cognitive load interferes with learning, while germane cognitive load facilitates it.

A description of the three types of cognitive load processing highlights the impact of design of teaching and learning activities on processing of information.

According to Clark and Mayer (2012), students use visual or verbal processing channels separately to process few pieces of information at a time. Else, if teaching text comprises of great density of information, the system becomes overloaded, which they call “cognitive overload” (Clark & Mayer, 2012). Mayer and Moreno (2010) in their study for a 12 year program at the University of California, identified five types of cognitive overload and recommended offloading strategies thereof:

Table 2.3: Types of cognitive load and strategies of offloading the load, adapted from Mayer and Moreno (2010:38)

Type of cognitive overload	Description	Solution to offload
One channel is overloaded with essential processing demands.	Student visual attention is split between viewing and reading.	Move some essential processing from visual channel to auditory channel. Present words as narration rather than as on-screen text.
Both channels are overloaded by essential processing demands.	Processing of information occurs as words in the verbal channel and as images in the visual channel..	<ol style="list-style-type: none"> <li>1. Segmenting: Allow students to digest intellectually one chunk of information before moving on to the next.</li> <li>2. Pre-training: Let students receive prior instruction concerning the components to-be-learned</li> </ol>
One or both channels are overloaded by the combination of essential and incidental processing demands.	Adding interesting but extraneous material to a narrated animation	Signalling: Provide cues to the learner about how to select and organize the material.
One or both channels are overloaded by the combination of essential and incidental processing demands.	Extraneous material is included and presented in a confusing way.	<ol style="list-style-type: none"> <li>1. Align words and pictures.</li> <li>2. Eliminate redundancy: Students understand a multimedia presentation better when words are presented as narration rather than as narration and on-screen text. When no animation is presented, students learn better from a presentation of concurrent narration and on-screen text than from a narration-only presentation</li> </ol>
One or both channels are overloaded by the combination of essential processing and representational holding.	When the student must hold the verbal representation in working memory while the corresponding animation is being presented.	Synchronizing: synchronize the presentation of corresponding visual and auditory material.

Seemingly, psychological engagement can be achieved when small chunks of visual or verbal information is presented in a conversational style (Peters, 2004). It is believed that conversational style appeals to students' emotions and creates sense of immediacy, because content is presented as if presented to real people. Peters (2004) further points out that conversational style has a personal tone that draws students' attention to important information and encourages them to formulate possible questions. At the same time, Peters (2004) criticises conversational style, arguing that it is partially suitable to present scientific content in the disciplinary context. A likely explanation for this criticism is that students might not adequately develop scientific thinking and academic language.

In this section I have explained that students learn by processing information as words or pictures. It has been explained that the capacity of the WM is limited to process small chunks of information at a time. If information is presented in an unsuitable processing style, then the system becomes overloaded. This would mean students may not learn effectively.

In terms of the current study, I adopted the view of Clark and Mayer (2012) of learning as knowledge construction as explained above. In other words lecturing staff in single mode, dual mode and mixed institutions can manipulate learners' experiences to foster learning, where the goal of manipulation is to cause a change in what the student knows, by attending to relevant information, mentally reorganising it, connecting it to what you already know (Clark & Mayer, 2012).

## **2.5. OPERATING MODES IN HIGHER EDUCATION**

In this section, I will explain operating modes of universities, focusing on design of teaching and learning activities at these institutions. Since this study is undertaken at a dual mode institution, three operating modes in higher education will be explained. However, dual mode universities will be explained in depth, because this study is undertaken in an institution that has been functioning as a campus based institution from 1953, but has added distance education from 2003. Universities provide teaching and learning in single, dual and mixed modes (Calvert, 2001; Peters, 2004; Power, 2008, Salmon, Jones & Armellini, 2008):

## **2.5.1. Single mode institutions**

Single mode universities provide education exclusively to either on campus students or off campus students. Traditionally, most universities have been operating as single mode institutions, wherein teaching and learning has been taking place in closed and close proximity. The use of LMS broadens access to teaching and learning to both on campus and off campus students. I conduct this study at an institution that has been established as campus and class based teaching institution for fifty three years.

### **2.5.1.1. Traditional face-to-face institutions**

According to Rumble (2001:34), in single mode universities, students attend face-to-face classes. On-campus students have a choice of attending classes on face-to-face basis, attend classes virtually or access teaching and learning materials online. Lecture classes are commonly seen as efficient ways of transferring information from lecturing staff to students. According to Dale's Cone of learning (Fig 2.2), students tend to remember 4% to 6% of information from lectures after six weeks when the level of involvement is commonly listening (Jacobs, Hurley & Unite, 2008:8). It can be seen in Figure 2.2 that the more students become actively involved in learning, the better they learn.



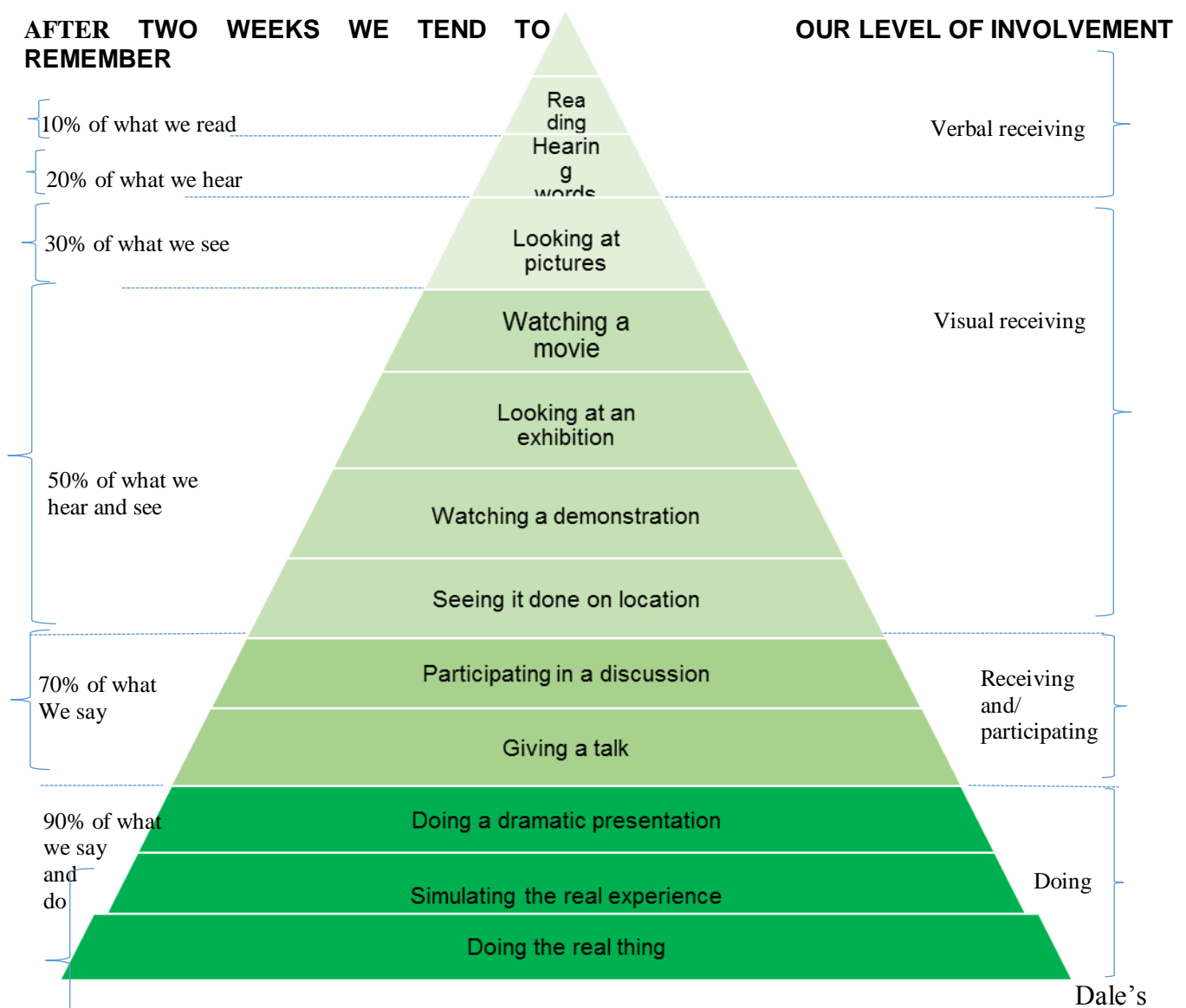


Figure 2.2: Dale's Cone of learning: Experience and learning, Adapted from Krivickas, 2005; Jacobs, Hurley & Unite, 2008

It is a widely held view that in face-to-face single mode universities, students commonly engage listen to lectures. Few opportunities are created for students to construct knowledge. At the same time, Vandergrift (2004:6) in his article entitled "Listening to learn or learning to listen," argues that listening promotes active information processing when lecturers use gestures and voice to emphasize relevant information. The optimal use of learning technologies provide opportunities for face-to-face single mode universities to decide on the level of involvement that students could engage in.

### **2.5.1.2. Traditional distance education institutions**

Literature indicates that single mode universities that provide distance education only, regard teaching and learning at a distance not the equal of face-to-face (Peters, 2004:61). To these single mode universities, distance is regarded as a deficit that has to be bridged, reduced or eliminated. To bridge, reduce or eliminate distance, distance single mode universities attempt to make distance equivalent to closed and close proximity by using learning technologies to deliver teaching and learning activities.

Researchers claim that the use of learning technologies at distance single mode institutions, learning is shaped by prescriptive learning that replicates traditional teaching practices, instead of non-prescriptive e-learning (Peters, 2004; Kirscher, 2004; Yu-mei, 2011; N’gambi, Gachago, Ivala, Bozalek & Watters, 2012). The lack of e-policy, institutional champions, and students as drivers and individual staff innovators in some of the universities appear to be contributing factors for replication of traditional practices (Czeniewicz & Brown, 2009).

Peter (2004) further points out that in single mode distance universities, “written teaching” dominates “spoken teaching” and “reading learning” dominates “listening learning.” According Dale’s Cone of Learning, students tend to remember 6% to 10% of what they read after six weeks (Jacobs, Hurley & Unite, 2008:8).

Distance education will be explained in depth, because the distinction between traditional face-to-face single mode university and distance education universities is becoming blurred.

Distance education can be traced back to almost two centuries ago. It is important to track how learning technologies have been used in providing distance education through all generations. For the current study that is undertaken in an institution that provides both face-to-face and distance education, it would be beneficial to review the history of distance education in South Africa. This review will probably provide invaluable information to understand the context of the provision of online teaching and learning in the institution case studied, since participants in this study design learning resources for both residential and distance education students. According to Simonson, Smaldino, Albright and Zvacek (2008:10) in their article entitled “Teaching and Learning at a Distance”, historian Frederick Jackson Turner was the first person to run the correspondence program of the University of Wisconsin in the late 1800s. In South Africa, the University of South Africa (UNISA) was formally declared in 1946 as one of the world’s earliest correspondence

universities. In South Africa other traditional universities could offer distance education from July 2014 (Republic of South Africa, 2014).

Distance education can thus be considered a major component of provision of higher education in South Africa. In South Africa, distance education is provided by almost all public universities that predominantly offer face-to-face programmes (Badat, 2003:185).

Thus, for this study it would be beneficial to track the evolution of thoughts and approaches on distance education through generations. Such tracking emphasizes what it means to teach and learn at a distance. Seemingly, distance education practice has gone through three generations (Peters, 2004) and five generations (Moore & Kearsley, 2011). The first generation is characterised by a correspondence model mainly through written text and distributed through mail (Peters, 2004; Moore & Kearsley, 2011). In the case of the second generation, teleconferencing was commonly used (Peters, 2004), in the form of broadcast radio and television (Moore & Kearsley, 2011). According to Moore and Kearsley (2011), the third generation is not characterised by any specific technology, but by open universities, which implies that this generation is characterised by integration of opportunities afforded by learning technologies (Peters, 2004). There appears to be a slight difference between the second and the fourth generation, because the two generations both used teleconferencing. The fourth generation is characterised by audio and video teleconferencing delivered by telephone, satellite or computer networks and the current generation is characterised by online teaching by means of Internet (Moore & Kearsley, 2011). Studies show that teaching and learning in almost all universities is digitally supported.

It appears that there is little change in teaching and learning practice via mail to teaching and learning using learning technologies. A possible explanation could be that for thousands of years teaching and learning has been taking place at a closed and close proximity (Peters, 2004:18). Advancements in learning technologies appear to challenge lecturing staff to rethink their teaching practice (Veletsianos, 2010:51; Yu-mei, 2011:1039) which means that lecturing staff should add resources and activities on LMS that guide students' attention on relevant information, to such an extent that students can organise selected information into visual or verbal models and thus integrate it into existing knowledge (Clark & Mayer, 2011:37). Kirschner, Sweller and Mayer (2006:80) found that if students' attention is unguided, working memory becomes overloaded and learning becomes ineffective for both novice and experienced students.

Distance education has various definitions. It is a challenge to define distance education, since the distinction between contact and distance education is blurred (Badat, 2006). Peters' (1971:206) defines distance education as:

a method of imparting knowledge, skills and attitudes which is rationalised by the application of division of labour and organisational principles as well as by the extensive use of technical media, especially for the purpose of reproducing high quality teaching material which makes it possible to instruct great numbers of students at the same time wherever they live. It is an industrialised form of teaching and learning.

Peters' title alone "Theoretical aspects of correspondence instruction: The changing world of correspondence study", proposes a shift from viewing distance education as correspondence study. Peters' definition however points out that distance education is a method of imparting knowledge, skills and attitudes, but does not explain how students are helped to make the knowledge theirs personally. It appears that processing of imparted knowledge takes place when students are provided with cues to select relevant information (Clark & Mayer, 2012). Peters' (1971) definition clearly state that the purpose is to reproduce quality teaching, of which quality teaching depends on quality of online learning environments (Peters, 2004; Chen & Wu, 2014:110). If online learning environments do not produce quality teaching, Clark (1983) regards them as

mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in nutrition . . . only the content of the vehicle can influence achievement (Clark, 1983:3 as cited in Wankel & Law, 2011:248).

Peters' definition was redefined by Moore (1973) by pointing out that online learning environments do not only deliver but facilitate teaching and learning at a distance. Moore (1973) defines distance education as

the family of instructional methods in which the teaching behaviours are executed apart from the learning behaviours, including those that in a contiguous situation would be performed in the learner's presence, so that communication between the teacher and the learner must be facilitated by print, electronic, mechanical or other devices (Moore, 1973:664).

Furthermore, Commonwealth of Learning (2004) appears to view distance education as a delivery of content, but also a measure of how well students have learned the content. It defines distance education as:

the delivery of learning or training to those who are separated mostly by time and space from those who are teaching or training. The teaching is done with a variety of 'mediating processes' used to transmit content, to provide tuition and to conduct assessment or measure outcomes

(Commonwealth of Learning, 2004).

Clark and Mayer (2012) complement the Commonwealth's definition by pointing out LMS do not transmit content but they should be used to tailor the content and instructional methods to students' learning needs. Tailoring content to students' needs is maintained by Mowes (2005) who is of opinion that distance education is a complete paradigm shift in that online learning environments facilitate teaching and learning as well as provide student support services.

In terms of the present study, the defining elements of distance education include:

- a. The use of learning technologies to provide learning opportunities for residential and non-residential students who work routinely in military units, or operate on internal or external deployment;
- b. The development and design of learning activities and assessment tasks so that students can achieve learning outcomes in the cognitive and emotional domain. According to Bloom (1956) an achievement of learning outcomes in the cognitive domain includes knowledge, comprehension, application, analysis and synthesis, while learning outcomes in the emotional domain include receiving, responding, valuing, organisation and characterisation;
- c. The interaction of lecturing staff and students who are separated by distance, but participate in a one week contact session at the start of every semester at the Faculty of Military Science of Stellenbosch University;

d. The extent to which lecturers take advantage of the opportunities afforded by LMS tools to create learning environments for students to engage in learning activities to achieve stated learning outcomes and support graduate attributes.

Tracking the definitions of distance education, could not point out how according to Suthers (2006:327) educators can design the learning environment that prompt actions that require students to negotiate their level of understanding in the learning process. In spite of the advancement in technologies, online learning environments appear to be still dominated by traditional mode of teaching, wherein emphasis is laid more on learning as strengthening of responses and knowledge acquisition than learning as knowledge construction. Defining distance education points out that single mode universities function as dual mode universities.

## **2.5.2. Dual mode universities**

Dual mode universities are “universities that have added distance education to their established class and campus based teaching” (Peters, 2004). Power (2008), Salmon, Jones and Armellini (2008) define dual mode universities as universities that provide teaching and learning to both on campus and off campus students. However, for this study, I have adopted Peters’ definition, because my study is conducted at an institution that has been operating as a campus and class based institution for fifty three years and has implemented distance education as pilot project in 2003, after which it was adopted as an alternative to campus-based mode.

Studies confirm that the progression of the institution relevant to this study from single mode to dual mode is typical of most current dual mode universities. They have generally functioned as traditional face-to-face institutions and only later added distance education (Peters, 2004:4). Lecturing staff in dual mode institutions reside in varied domains, in that they teach both on-campus students and off-campus students. This implies that dual mode universities in fact operate as mixed mode universities, which is explained in the paragraph below. It poses a challenge for lecturing staff to adapt their traditional way of teaching in order to guide both on-campus and off-campus students with equivalent, although not similar opportunities to learn.

### **2.5.3. Mixed mode universities**

Mixed mode universities refer to universities that provide face-to-face classes, but make provision for the lessons to be streamed live. These lessons are then made accessible anytime and anywhere (Peters, 2004). For example, single mode universities that teach on-campus students only, provide students with teaching and learning opportunities to mix mode of learning, wherein they can attend face-to face lectures, virtual lectures or both. Simonson et al. (2008:52) define mixed mode universities as universities that provide a mix of different learning experiences, which is called “blended learning.” Although Simonson et al. (2008) did not use the concept blended learning, the concept ‘mix’ equates “blend”. Young (2003), Graham and Robinson (2006) in their study on blended learning view blended learning as a mixture of learning environments that afford various learning experiences such as lectures, workshops, self-paced study, online collaboration, communication exercises, simulations and interactive multimedia. Seemingly, a blend of learning experiences creates conditions for effective teaching and learning (Bath & Bourke, 2010).

The definition of Graham and Robinson (2006) of blended learning is relevant for this study, since the institution case studied operates as dual mode institution since 2003, but also operates as mixed mode institution. Lecturing staff commonly add the same resources and formative assessment activities on the LMS for both on-campus and off-campus students.

#### **2.5.3.1. Defining blended learning**

Blended learning involves use of different modes of delivery, models of teaching and styles of learning for teaching and learning (Draffan & Rainger, 2006:55). Their definition has been broadened by Krause (2007) who views blended learning as more than use of different modes of delivery, models of teaching and styles of learning. She points out that pedagogy and best features of face-to-face and online teaching and learning should underlie modes of delivery, models of teaching and styles of learning (Krause, 2007, citing Bath and Bourke, 2010:9). Krause’s (2007) definition raises an interesting question in the context of this study, namely how lecturing staff use affordances of LMS to incorporate best features of face-to-face and online interaction in the design of resources and activities. According to Bath and Bourke (2010:12), some of these features include blending time, people, location, communication, learning activities, assessment activities, learning styles and teaching styles. According to Diaz and Brown (2010:12), blended learning environments

enable students to exploit learning opportunities by actively engaging with learning resources and collaborating with other students.

Chen and Wu (2014:109) argue that blending teaching and learning activities commonly result in overloading students' WM. For example the use of blended learning resources such as audio, video, and written materials without consideration of principles of multimedia can interfere with students' ability to process information (Mayer & Moreno, 2003:45). Draffan and Rainger (2006:57) affirm that motor, visual, auditory, language, learning and e- skills are affected by student's resilience and coping skills in a blended learning environment. The authors thus proposed an analysis of design of teaching and learning activities from a cognitive load perspective, because of their implications on design. Peters (2004) acknowledges the complexity of blending learning environments, because lectures have been the common approach for teaching and learning in universities.

Seemingly, teaching different students at different locations who learn at different times, require a different mix of learning experiences (Simonson, et al., 2008:52). Such a mix of learning experiences provides students with opportunities to learn, through blending time, people, location, resources and collaboration (Bath & Bourke, 2010).

### **2.5.3.2. The role of LMS in mixed mode universities**

In this section I will explain types of Learning Management Systems commonly used in mixed mode universities and what they are used for.

LMS are "enterprise-wide and internet-based systems that integrate a wide range of pedagogical and course administration tools" (Coates, James, & Baldwin, 2005). These systems have tools that provide a means of designing, building and delivering online learning environments.

Literature indicates that most universities use LMS such as Blackboard, Moodle, Sakai and Open Education Resources (OER) for teaching and learning (Krause, 2004; Kinuthia & Dagada 2006). Research indicates that LMS are commonly used for delivery of course content such as slides, with or without voice over and assessment activities such as quizzes and communication such as emails and calendar (Baepler & Murdoch, 2010:10). According to Clark and Mayer (2011), these study materials are delivered as page turners. In their opinion, turning pages forward and backward omits interactivity by presenting screen after screen, but do not provide students with overt opportunities to process the content through practice exercise and simulation. It appears that the design of many



courses in the LMS has minimal impact on teaching and learning practice (Peters, 2004; Conole, 2012).

Universities appear to promote learning as knowledge construction. Yet, literature shows that LMS are commonly used for e-delivery, rather than e-learning. It appears that LMS tools are used for information transmission where educators select the body of knowledge, organise it and expect students to absorb it as passive recipients and feed it back, rather than participating in and contributing to knowledge construction (Day & Llyod, 2007:5). Hence, according to Day and Llyod (2007:5), educators should find best ways to incorporate affordances of LMS into the design of effective instruction for learning.

At the same time, Rodgers et al. (2006), maintain that it is a challenge for higher education to place more emphasis on development of application of knowledge than on memorisation of content. The difference in construction of knowledge and the object of knowing is acknowledged by Knapper (2001:94) who states that university teaching and learning is characterised by:

[...] instruction that is too didactic, a lack of personal contact between teachers and students and among students, assessment methods that are inadequate to measure sophisticated learning goals and too little opportunity for students to integrate knowledge from different fields and apply what they learn to the solution of real-world problems.

Surprising that the use of LMS appears to have little impact on teaching and learning in South African universities, since well-designed digital learning environments can likely serve the fundamental social and economic interests of South Africa (Czerniewicz, 2015). Literature highlights the following possible reasons: LMS such as Moodle requires a special server infrastructure such as PHP and has hidden costs for administration and technical and pedagogical expertise for online design and delivery. Similarly, Blackboard is a propriety system that needs vendor support for modification and the licencing fees are very expensive. In addition, some lecturers view the use of LMS as an add-on that increases their workload, possibly because they are expected to attend training in spite being experienced lecturers. It is assumed that education is resistant to change.

Research undertaken in African universities shows that academics prefer to use learning technologies that solve existing problems, otherwise do not have the luxury to invest time and resources into something simply because it is good to do (Ngugi, 2011; Czerniewicz, 2016). Hence the possibility of transforming teaching and learning is both enthusiastically welcomed and enthusiastically opposed. Thirdly, LMS are institutionally structured learning environments that are commonly used for content delivery, announcements and assessment such as quizzes rather than for content construction. Lastly, studies show that students prefer to be full participants in activities such as using social media tools that create connectivity, customization, personalization. Their participatory inclination therefore creates rich opportunities for networking and collaboration (Lee & McLoughlin, 2010; Conole, 2013). At the same time, a study conducted on “Adoption of SUNLearn in its first year of implementation at Stellenbosch University” found that both students and lecturing staff have very positive attitude towards the LMS, but there appears to be less correlation with findings and on optimal usage of the system (Govender, 2014).

South African universities are expected to lead schools in using learning technologies for teaching and learning. This expectation is affirmed by the South Africa Department of Education. By 2013 the SA government expected that:

every South African manager, teacher and learner in the general and further education and training bands will be ICT capable (that is, use ICTs confidently and creatively to help develop the skills and knowledge they need as lifelong learners to achieve personal goals and to be full participants in the global community (Department of Education South Africa, 2004:17).

South Africa as a developing country, views the use of the potential affordances of technologies as an opportunity to offer flexible and inexpensive delivery that has potential to respond to skills’ shortages by increasing access to education and serving as an equaliser in economic development and transformation (DOE & DOC, 2001). Thus, higher education is identified as a critical role player in offering flexible, custom based education available to anybody, anytime and anywhere (Tiffin & Rajasingham, cited by Czerniewicz, & Ngugi, 2007). South African universities appear to be underprepared to provide student support services although they have been granted permission to offer distance education since July 2014 (Czerniewicz, 2016). Peters (2004) argues that flexible, custom based education can be offered when lecturers know opportunities and constraints afforded by learning technologies.

In conclusion, an explanation of operating modes of universities indicates that universities commonly function as blended modes institutions. Universities use technologies such as LMS to provide off-campus and on-campus students with equal opportunities to learn. However, studies show that design of learning resources, particularly multimedia resources commonly fail to consider limits of working memory (Clark, 1999; Bradford, 2011; Chen & Wu, 2014). It can then be assumed that a blend of teaching and learning activities can interfere with the learning process, when multimedia principles are not considered. To minimise interference of the learning process, literature recommends cognitive offloading strategies. Interference of learning process can possibly be minimised by alignment of learning outcomes, learning resources and affordances of learning technologies.

### **2.5.3.3. Affordances of learning technologies in terms of information processing**

In this section I will review literature on the meaning of affordances of LMS tools at universities. Although LMS have various tools, this section will review affordances of LMS tools commonly used for adding resources and activities at the institution case studied, i.e. a Faculty of Military Science of Stellenbosch University.

In tracking the origin of the concept “affordance”, in order to understand its evolvement over time, it was revealed that “affordances” comes from the word “afford”, which means to give or support (Collins Dictionary and Thesaurus, 2005:5). Thus, resources and activities in the LMS are offered to support students. It is assumed that lecturing staff create resources and activities on the basis of cultural context, experience or perceptions (Geertz, 1973:36).

Gaver’s (1991:80) findings in the article entitled “Affordances of technology” affirm that lecturers’ use of LMS tools depend on their culture, experiences, intentions and social setting and thus defines affordances as “definition of properties of the world, with respect to people’s interaction with it.” Clearly, lecturing staff prior experience with similar tools should be able to design learning resources using LMS tools (Carter, Westbrook & Thompkins, 1999; Wijekumar, Meyer, Wagoner and Ferguson, 2006).

Gibson (1979) claims that he coined the concept “affordances” three decades ago. According to Gibson (1979:127), “affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill”. Gibson did not use the concept culture, but his definition is ecologically contextualised, which explains that the use of affordances of LMS tools is culturally based. Of relevance to this study is that the inherent properties of resources such as a book, file, folder, label and activities such as assignment, quizzes that are available on the LMS afford lecturers the possibilities of designing teaching and learning activities that help students learn.

In addition, lecturing staff use LMS tools to design learning resources according to the inherent properties of the tools and their perception (Gibson, 1979:137). Gibson’s (1979) reference to affordances as being directly perceived, suggests that lecturers upload resources and activities according what they think the LMS tools can be used for:

Animals perceive objects around them directly in terms of affordance. For a lizard, at the fundamental level, a rock means shelter. The idea of an action invited becomes clearest where for instance, the particular bend of a door handle affords either pushing or pulling (Gibson, 1986).

Repeat studies by Graves (2007:336), confirms Gibson’s opinion that affordances are invitations. Graves in his article entitled “The Affordances of Blogging: A Case Study of Culture and Technological Effects” found that the design of LMS tools suggest that actions shift as people become used to the application of a particular tool.

At the same time, Norman (1988:8) asserts that the inherent properties of objects determine just how the objects could possibly be used. The term affordances refers to “the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the object could possibly be used” (Norman, 1988:8). Bower (2008:6) in citing Norman emphasizes that the use of learning technologies depends on what one thinks can use them for. In other words, the use of the LMS tools depends on what lecturers use them for and how they want to use them. An analysis of data retrieved from LMS will reveal the extent to which perception as a contextual factor can influence design and use of learning resources in the LMS (Ferguson, 2012: 307; Peregrina, Pradas, González & García, 2014).

Norman (1998) revised his definition by distinguishing between inherent and perceived affordances. To him people perceive affordances because of the design of the object that makes the affordances available for perception. He however, argues that the perception may suggest affordances that do not actually exist; while those that exist may not be perceivable. A repeat study by Rappert (2003:569) asserts that perceived affordances only suggest, but do not determine how tools can be used. Hutchby (2001) pioneered Gibson's (1979) view arguing that affordances are not perceived, but are clearly defined. According to Hutchby (2001), LMS tools are used on the basis of interpretations of possible actions they offer. He emphasises that these interpretations conform to the action possibilities that LMS tools offer. According to Hutchby (2001), LMS tools are

[...] configured by and configuring, affected by capabilities they possess and affecting the way we interpret those capabilities. While objects do exist, the way in which we understand them is always subject to negotiation and interpretation. [...] To call those capabilities "perceived" is not always to say much (Hutchby, 2001).

It appears then that LMS do not provide any new affordances for use that were not already inherent in them, but it is a changing socio-cultural context that gives rise to the perception and development of new uses for the same tools (Day & Lloyd, 2007).

Furthermore, defining affordances clarifies the complexity of designing learning environments that afford learning opportunities. This complexity is substantiated by Wijekumar et al. (2006:196) when they point out that the difference in perception can cause significant difference in approach to LMS tools and their use. The complexity of designing learning environments that afford learning is attributed to the interaction of affordances of LMS tools with all other factors (Bower, 2008:15) to generate affordances of teaching and learning, particularly at a dual mode institution. It appears a challenge for teachers to apply evolving practices in designing learning activities and experiences (Conole, 2013). Wijekumar, et al. (2006:207) are of the opinion that the difference in using affordances of LMS tools can compromise learning. Thus, Kirscher et al. (2004) assert that the difference between lecturers' use of the affordances of LMS tools and anticipated learning affordance results in a weak learning environment, which results in a weak implementation of appropriate educational, social and technological affordances.

The above explanation clearly indicates the importance of aligning learning outcomes, resources and activities and assessment tasks with affordances of the tool. Without such alignment, student learning can be compromised. In conclusion, a mix of different learning experiences provides each student with opportunities to select relevant information, to organise selected information into verbal and visual models and to integrate these models into existing knowledge.

#### **2.5.3.4. Current use of learning technologies**

Studies indicate that multimedia resources are common learning resources added on the LMS. Researchers claim that some of these multimedia resources cause cognitive overload. It appears that if multimedia principles are not applied correctly, design of these resources can interfere with processing of information. Interference in the learning process possibly explains researchers' claim that multimedia resources provide students with minimal guidance in selecting relevant information (Clark & Mayer, 2012).

Furthermore, N'gambi, Gachago, Ivala, Bozalek and Watters (2012) and Yu-mei (2011), are of the opinion that the use of ICTs in higher education is still shaped by prescriptive learning and thus replicates traditional teaching practices, instead of e-learning. Draffan and Rainger (2006) define e-learning as the way in which students acquire and construct knowledge in online learning environments. This would mean that students can learn effectively when they are provided with opportunities to apply acquired knowledge (Williams, Karousou & Mackness, 2011:2).

Seemingly, in online learning environments students are expected to learn complex new materials independently and adjust to new ways of learning. According to Subotzky and Prinsloo (2011:182), if students do not have prior experiences with ICTs, they become confused, isolated and possibly drop out of their studies. Distance education appears to be isolating in nature, since students are isolated from other students, tutors, institutions. Distance education students in this study are even more isolated due to internal or external deployment.

Hara and Kling (2001) found that in online learning environments, students regularly report feelings of confusion, anxiety, and frustration. Peters (2004) is also of the opinion that teaching and learning activities in online learning environments comprise of impersonal dense information. In online learning environments, students interact more with content in isolation. The feeling of isolation is affirmed by Peters (2004) when he said "the more people are connected, the more isolated they

are.” This trend of isolating students is affirmed by Conole and Dyke (2004) citing Baumann when they say:

Unable to tread on each other’s toes in the mega community, we have stepped into our separate houses and closed the door, and then stepped into our separate rooms and closed the door.

(Conole & Dyke, citing Baumann, 2004).

In Peters’ (2004) view, when students have access to large quantities of information, there is a possibility of less quality in teaching and learning, since few opportunities are created for students to discuss with peers and lecturers. He points out that provision of lessons in portions offers tips on how best to learn the content, which makes sure that teaching and learning is more successful. Too much information results in students’ working memory being overloaded, wherein processing of information becomes inefficient and learning being slowed down (Clark & Mayer, 2012). Their claim probably explain why novice students in particular are assumed to become frustrated.

It can be seen from the discussion above that creation of student-student and student-teacher interaction provides “the real foundation of academic teaching” (Peters, 2004: 14). Without this foundation, Keegan (1995) claims that students become isolated, which in turn contributes to high dropout. Keegan (1995) found three reasons that cause distance education students to drop out of their studies:

- Distance education students have a tendency to drop out of those institutions in which structures for the reintegration of the teaching acts are not satisfactorily achieved.
- Distance students have difficulty achieving quality of learning in those institutions in which structures for the reintegration of the teaching acts are not satisfactorily achieved.
- The status of learning at a distance may be questioned in those institutions in which the reintegration of the teaching acts is not satisfactorily achieved.

Keegan’s reasons speak of my own experience about high number of students who drop out, prematurely withdraw from their studies or postpone their studies at the Faculty of Military Science of Stellenbosch University.

High dropout rate is both an international and national challenge, in South Africa in particular among first year students. Van Schalkwyk (2008) found that academics grapple in ensuring that first year students acquire academic literacy in order to participate in academic discourse. She found that not only students are underprepared to participate in the academic community, but lecturers as well have to consider dealing with their underpreparedness in dealing with diverse of student body in the first year classrooms. Van Schalkwyk's (2008) findings revealed that diverse academic literacy demands are made among first year students. In her opinion such demands create barriers that hinder student engagement in discourse community, especially among underprepared students. To promote student engagement among first year students, she recommended that student support services should be geared towards active learning. One way of promoting active learning in any study mode, is by creating opportunities for students to express their learning through writing (Van Schalkwyk, 2008). Expressing learning through writing appears significant for students participating in this study, since they are diverse in terms of age, rank, language, number of years being out of formal education, study mode and adaptation to academic discourse.

## **2.6. Specific case of military education**

Learning technologies are commonly used for warfare and security in the military (Eijkman & Herrmann, 2009). Due to security reasons in South African military units, a limited number of computers are connected to the Internet, accessed and controlled strictly and information censored. Traditionally, education in Education, Training and Development (ETD) institutions in the South African National Defence Force (SANDF) has been mainly self-study, paper-based modes, blended with contact sessions since the 1980s. These institutions have commonly been using email for submission of assignments and communication. The deployment nature of military personnel challenged the Department of Defence to pursue the provision of teaching and learning anytime and anywhere.

But there are some drawbacks because of lack of coordination within the Department of Defence (Van der Walt, 2009). The use of learning technologies in distance education and in a blended learning approach has not been fully implemented within the DoD, except the Faculty of Military Science (Esterhuyse, 2009; Venter, 2009, van der Walt, 2009). Possible reasons for distance education and blended learning not to become part of the educational system in the SANDF is lack of budgetary support for its full roll out, lack of structural organisational support from the SANDF, lack of distance education and blended learning specialists in the SANDF, the SANDF not being



web connected, computers in the SANDF not routinely connected to Internet due to security reasons and lack of blended learning and education policy (Esterhuysen, 2009:38).

The South African National Defence College and South African Army College were appointed as pilot units to present blended learning programmes to Department of Defence personnel via an LMS in 2006. The LMS pilot projects could not be implemented due to:

- insufficient and unreliable infrastructure, network traffic and bandwidth capacity;
- incapacitated local area network administrator on the functionalities of the LMS;
- lack of buy in, commitment and involvement from management and policy makers;
- limited Internet access allowed in the units. Internet connection is assumed to potentially, coincidentally or deliberately diffuse sensitive information which may compromise national security
- technical errors,
- low level of computer literacy among students;
- LMS was run from Department of Defence (DoD) Intranet. As a result, there was no communication facility available for non DoD members and International community.

The Faculty of Military Science that is hosted in the Military Academy, has added distance education as a pilot project in 2003. It has been noted that each year more students enroll on distance education mode than on full time basis. Although distance education is the fastest growing mode of teaching and learning in the organisation, studies show that distance education experiences low participation and high attrition (Galusha, 1998; Peters, 2004; Veletsianos, 2010; CHE, 2013).

The FMS as one of the ETD institutions and a faculty of Stellenbosch University started using Moodle as teaching and learning platform (LMS) in 2013. Moodle offers IT-enhanced learning model as reflected in the Strategic Plan for Teaching and Learning 2014-2018 of Stellenbosch University (Stellenbosch University, 2013).

The plan states that all curricular programmes should reflect the use of ICTs in teaching and learning in order to realise graduate attributes and student success (Stellenbosch, 2013). At the same time, the FMS required all first year modules to be available on the University's LMS by end of

2014. The FMS currently offers three undergraduate programmes on face-to-face and distance education study mode. All undergraduate modules are created on the University LMS, but only 46% of the first year modules have been active in 2015.

The FMS commonly use the LMS to upload course materials such as slides with or without voice over, video clips and Word documents. In addition, lecturing staff create assessment activities such as assignments with or without Turnitin and quizzes. Turnitin refers to an online tool that provides a report after comparing submitted files against online databases (turnitin.com). Lecturing staff also use collaboration tools such as email, discussion forum and chat. An analysis of data retrieved from the LMS will probably provide the FMS with information about the reasons why students engage in particular resources and activities added in the LMS.

### **2.6.1. Characteristics of students in military education**

This section provides information about characteristics of residential and distance education students. It would be important for the lecturing staff to know who the students are, because lecturing staff who participate in this study design learning resources that help both residential and distance students to learn.

Seemingly, lecturers are unaware of the preferred processing channels. Lecturing staff possibly have little information of who the visualizers are who can benefit more from presentation of information in diagrammatic form and verbalisers who benefit from textual presentation (Riding & Sadler, 1997). It can only be assumed that they design learning resources that are processed through visual, auditory or both channels (Riding & Saddler, 1997; Clark & Mayer, 2012). Riding and Saddler (1997:204) are of the opinion lecturers can help students to deal with information that does not suit their processing style. This can be done by making students aware of the information that matches or does not match their preferred way of learning and thus provide alternative ways of processing information by using adaptive, balanced and strategy approaches as explained earlier before. Studies found that when designers attempt to accommodate visual and auditory processing channels in learning resources, working memory appears to be overloaded.

Furthermore, students participating in this study are of very diverse age. On-campus students are generally young ranging between 22 to 28, while distance education students comprise of both young and older students, ranging between 24 to 60 (Appendices G and H). In addition, the rank of

the on-campus students ranges from candidate officers to junior officer (Captain), while that of the distance education students ranges from the lowest (Lance Corporal) rank to senior officers (General) (Appendices G and H). Rank seems hierarchical and discriminatory in the military environments. The age and rank difference implies that there is difference in their work experience, professional and academic qualifications, and employment status which impact students' use of learning resources in the LMS.

Khoza and Van Zyl (2015) found that difference in rank impacts student participation in face-to-face class and collaborative activities. They found that difference in rank impacts student-student and student-lecturer interaction. The impact is experienced when a rank senior shares same class or collaborative activity with a rank junior. Students participating in this study, study as rank affiliates. This a potential isolating factor by itself, which might require further research.

Also, distance education students are older. They appear to have prolonged absence from study opportunities since school, which often results in them being more underprepared for academic, social demands of higher education than their residential counterparts (Galusha, 1998; Peters, 2004; Figure 4.1). It appears a challenge for students with prolonged absence from studies to learn new information successfully.

Under-preparedness has been identified as a common challenge for in higher education. In South Africa, CHE (2013) identified secondary-tertiary articulation gap, not underpreparedness as a common challenge that HE requires to plan how to mitigate the gap. One implication of the articulation gap is that students have to create new schemas, because of lack of pre-existing schemas in their LTM (Bradford, 2011). In other words, such students experience challenges in processing new information because their WM is incapable of processing elements of new information that is not stored in their LTM (Gauvain, 2008). This would mean that the design of resources and activities should ensure that WM is capable of processing new information. Without providing opportunities of processing new information, students might not engage with learning resources as expected (Laurillard, 2013).

In addition, older students appear to possess a wealth of abilities, experiences and resources (Veletsianos, 2010), wherein they expect teaching and learning activities to incorporate authentic

activities. This implies that lecturing staff should design teaching and learning activities in real world contexts, which makes learning meaningful, relevant and applicable to their personal and professional lives. Students participating in this study are expected to apply acquired knowledge into their work environment. In other words, as soldiers, their studies develop them personally (career development) and the organisation benefits directly (Jacobs, 2004). At the same time, Van Merriënboer and Sweller (2005:150) are of opinion that real life teaching and learning activities that incorporate real life activities have high element of interactivity for novice students.

Military learning environments appear to be dominated by prescriptive learning (Esterhuysen, 2009:38; Juhary citing van Ree, 2009:52). This appears to be the case since students commonly report during the one week contact session at the start of every semester that their studies through the Faculty of Military Science is different from the military courses (Khoza & Van Zyl, 2015). Juhary (2009:52), further points out that prescriptive learning is a reflection of military discipline in that military personnel have been trained to take orders without questioning. Perhaps, one of the implications of such environments can be problematic in that students can become passive recipients of information, because they have been conditioned to render military obedience in all conditions (South African Defence Review, 2013:14-1).

In addition, young and old students appear to have different motivators. Galusha (1998) and Peters (2004) claim that older students are more motivated to learn than younger students. In the USA, Murphy (2009:53) has identified education as one of the main motivators for a student- soldier to join the military and for their career advancement. Similarly, in South Africa, education appears as a motivator for career advancement (Van Dyk, 2012:126). Besides career advancement, military working environment requires students to be academically professional soldiers (Van Dyk, 2012:130; Esterhuysen, 2009:38).

Thus, Huang (2002), Hase and Kenyon (2007), propose heutagogy as a theory that extends control to the students, wherein students are seen as the major development and control agent in their own learning. Knowles (1970:43) proposed the following principles:

- Adults need to be involved in the planning and evaluation of their instruction. Experience provides the basis for learning.
- Their personal schedules differ and they have variety of life and work experiences.

- Adults are most interested in learning subjects that have immediate relevance to their job or personal life.
- Adult learning is problem-centred not content-oriented.

A discussion of characteristics of students reveals that students participating in this study learn differently. This would mean design of teaching and learning activities should integrate student support services to help enhance student learning experiences. Clearly, there are multiple factors that lecturing staff should consider when adding resources and activities on the LMS in the institution case-studied.

### **2.6.2. Student support services**

In this section, I discuss main arguments that deal with student support, since it has been explained earlier in paragraph 2.2 that learning analytics provides information on students' progress, which enable educators to make early identification of at-risk-students (Drachsler & Greller, 2012:543). Such information enable educators to provide support and intervention measures accordingly. This would mean that learning resources are not only added on the LMS, but are integrated within existing student support services. In other words, the LMS is used a platform to provide academic support such as tutorials that can fit within the existing tutorial programme. At the same time, LMS tools such as forum, chat, blog and wiki can be used as a platform for provision of social interactions to create a sense of belonging, particularly among distance education students.

Prinsloo et al. (2012:9) however argues that analysis of data retrieved from the LMS only can result in faulty diagnosis which can lead to ineffective and misdirected interventions. He recommends that researchers should have other sources of data and not rely on the data retrieved from the LMS only. Moreover, researchers should have the ability to transform LMS data into educationally relevant data.

For lecturing staff to provide support accordingly, provision of student support should be seen as a complete paradigm shift in that the LMS is used for the facilitation of teaching and learning as well as provision of student support (Mowes, 2005:3). Students studying on full time basis in the institution case studied have access to the following support services available:

- mentoring;
- family structures that adopt them;

- tutorials that are integrated with class presentations or presented separately;
- early assessment that is written within the first six weeks;
- Language Centre in the main campus that provides language services;
- students from South Africa Air Force have access to Internet in their rooms;
- access to Internet in the computer labs;
- access to learning resources in the network
- accommodation and meals;
- health service centres in the vicinity (1.5km). Military transport is provided when they have to access health services away from the unit;

It can be seen that residential students have more support structures in place than distance education students. These support structures are mentioned in order to rule out their impact on student engagement with learning resources on and off the LMS. It can be argued that residential students experience a sense of belonging (Veletsianos, 2010; Subotzky & Prinsloo, 2011).

At the same time students studying on distance education mode appear to feeling isolated. Van Dyk (2012), affirms pointing out that military personnel on deployment are not only physically separated, but emotional instable due to feelings of being forgotten. In his opinion, failure of recognition by media, little recognition from commanders, lack of appreciation from host country and lack of recognition from home cause feeling of being forgotten, which impacts their studies. Mowes (2005) is of the opinion that distance education students think that they are not “smart” enough to understand course materials. Veletsianos (2010) and Mowes (2005) affirm that such isolation causes poor self-concept. Wood (2009) found that isolation lead to feelings of inadequacy and insecurity and lack of self-confidence.

It is thus assumed that the use of LMS should be seen as platform that can be used to facilitate teaching and learning as well as provision of student support services (Mowes, 2005; Czerniewicz, 2016). Brown and Diaz (2010) are of opinion that teaching and learning can involve transforming the way in which lecturing staff teach and how students learn. The transformation of teaching and learning depends on all stakeholders to accept that design of teaching and learning activities for on-campus and off-campus students is different in structure, approach, assessment and delivery techniques (Van Brakel & Chisenga, 2003). Salmon et al.’ (2008) studies in dual mode universities

also found that teaching and learning activities for on campus and off campus students should be designed separately. They however acknowledge that is not easy for lecturing staff to function on a dual face-to-face teaching and distance education mode.

Literature indicates that there is a higher dropout rate in distance education than in face-to-face classes. It is assumed that high dropout is caused by feeling of loneliness, inability to reconcile conflicting responsibilities, such as work, family and studies (Subotzky & Prinsloo, 2011; Veletsianos et al., 2016). For instance Peters (2004:13) found that unlike younger students, older students do not make full use of a first time opportunity to study, probably because their studies fit differently into their plans and life cycles and promises no direct benefit that outweighs the sacrifice. Veletsianos (2010) is of the opinion that the feeling of isolation impacts on students' motivation and enthusiasm to study. The feeling of isolation is possibly experienced acutely in the military environment since students participating in this study are mostly physically separated from their families for varied lengths of time (Van Dyk, 2012:125). Van Dyk further found that feeling of isolation causes stress, which in turn impacts on their academic duties.

Secondly, Veletsianos (2010:63) identified lack of timely feedback from lecturers as one factor that contributes to high dropout rate. Students in this study, particularly those who study on distance education mode, commonly go for military courses, internal or external deployment, border deployment, attend military courses or deploy to the field. As such, students do not easily access feedback even if it is provided in time. Khoza and Van Zyl (2015) found that students commonly withdraw, postpone or not participate in assessment activities studies due to deployment. Students commonly report lack of access to Internet, limited time on Internet and electricity to charge their mobile devices during deployment (Michelle, Wallace & Wirthlin, 2011; Khoza & Van Zyl, 2015).

Thirdly, literature indicates that both residential and distance education students are often underprepared. It appears that universities create little or no opportunities to deal with students' under-preparedness (Subotzky & Prinsloo, 2011; Czerniewicz, 2016). Universities can be better informed to offer support, because learning analytics is a data analysis technique that helps lecturing staff to early identify students who need extra help. Students' under-preparedness can be attributed to their lack of experience of studying at universities, little idea of studying in distance education mode and inability to cope with the reality of learning at a distance. As such, students realise that their studies require them to study independently and thus need academic survival skills.

It appears a challenge for students to develop survival skills in the military, as students are subjected to military regular duties and demands on them (Michelle, Wallace & Wirthlin, 2011; Murphy, 2009:54). The military environment is commonly assumed to be stressful. Particularly that these students are expected to render military obedience under all conditions, even with the risk of losing their own lives (Defence Review, 2013,13-2). Military obedience is spelt out by Judge Kriegler when he stated that,

the ultimate objective of military in time of peace is to prepare for war to support policies of the civilian government. Military organisation requires, as no any other system, the highest standard of discipline [which] can be defined as an attitude of respect for authority that is developed by leadership, precept and training. It is the state of mind which leads to willingness to obey an order no matter how unpleasant the task to be performed

(Defence Review, 2013:13-2).

It can be noted from Judge Kriegler's statement that the military demands and student life appear to be less rather non-complementary. They need to be able to prioritize among work, relationships and sacrifice time for some activities to focus on their studies (Veletsianos et al. 2016). Students that provide this type of military service should be provided with support to help them develop survival skills, since they work in stressful environment (Van Dyk, 2012). Universities seem to be underprepared to provide such support (Czerniewicz, 2016). It is assumed that most of soldier students lack time management, motivation and study skills (Berge & Huang, 2004:10). In contrast, Murphy (2009:53) found that non-academic support such as library, financial and technological support in USA commonly motivate military personnel to continue or pursue higher education when they go on external deployment. Murphy's study would have provided a deeper understanding if he included retention and throughput rate.

Simpson (2000:224) categorized student support into academic and non-academic support. Academic support deals with development of cognitive aspects. Development of cognitive aspects is relevant in this study because sifting through the LMS reports, might uncover hidden variables of student preferences in processing of information in the LMS (Larose, 2002:2). The uncovering of hidden knowledge can assist the dual mode institution to discover meaningful new correlations, patterns and trends on the use of resources on the LMS (Larose, 2005:2). This would mean that the LMS is used as a platform to provide tutorials and formative assessment tasks (Tait, 2006:296).



According to Rodgers et al. (2006) the use of academic support services enables students to be critical, creative, collaborative, and communicate in a sensible way.

Furthermore, non-academic support deals with affective and organisational (systemic) aspects (Simpson, 2000:224). Educational data mining techniques can be used to discover underlying factors on the use of learning resources in the LMS. This would mean that institutions are provided with invaluable information on how learning can be improved and thus provide support accordingly. Students are likely to face difficulty in self-evaluating their progress which can lead to frustration if they do not get support (Knapper, 1988:63). Students might drop out of their studies due to frustration that results from feelings of inadequacy as well lack of self-confidence (Wood, 1995:64).

In addition, Tait (2006:289) describes systemic support as an establishment of effective administrative processes and information management systems. He is of the opinion that ineffective administrative procedures, such as lack of individual timely feedback, contributes to high dropout rate. Literature shows that lack of timely feedback appears to be a common concern among students, particularly among distance education students. Learning analytics becomes a platform that provides feedback that informs students of where they are in the learning process and how their learning and performance can be improved. At the same time, feedback should not only inform students of where and how learning and performance can be improved, but should also provide students with opportunities to identify the gap in their knowledge (Osado, Merlo & Campo, 2013). In other words learning analytics becomes a data analysis technique that affords students with critical reflective opportunities.

Prinsloo et al. (2012:9) argues that analysis of data retrieved from the LMS only, can result in faulty diagnosis which can lead to ineffective and misdirected interventions. This would mean that researchers could collect student data outside the LMS. For example, student data collected from self-reflective activities, can provide reasons why they accessed resources, completed activities and spent time on learning resources and activities. In cases where researchers have access to LMS data only, it is recommended that they should be able to transform LMS data into educationally relevant data in order to understand underlying reasons for use of learning resources and thus provide support accordingly (Prinsloo et al., 2012:9). In other words, researchers can transform quantitative data into qualitative data (Plowright, 2012).

Furthermore, an analysis of contextual factors provide invaluable information in the use of resources in the LMS. This type of information could provide the dual mode institution with necessary information to understand and optimize learning within the environments in which it occurs. Such analysis provides necessary information that better prepares the dual mode institution to provide accurate non-academic support service for students who might drop out, discontinue or postpone their studies, particularly among distance education students.

To conclude, adding of learning resources on the LMS can possibly be viewed as a way of integrating student support services (Knight, 2005). An integration of student support services can be seen as provision of elements that are capable of responding to particular needs of the individual student (Thorpe, 2002:107). Learning analytics becomes a tool of providing feedback and critical reflective opportunities for lecturing staff and students. Without all information and skill of transforming it into educationally relevant data, the chances of integrating learning resources into student support services become slim.

## **2.7. SUMMARY OF LITERATURE REVIEW**

To conclude and summarize, in this chapter learning analytics has been explored in attempt to understand online teaching and learning in context. Learning analytics has been defined from various perspectives. I found the idea of viewing learning analytics as an educational data mining technique useful in my study in that my study has no hypothesis. In this study I have applied estimation, prediction and classification as data mining techniques to describe patterns and trends lying within and beyond data generated by LMS (Larose, 2005). These data mining techniques have a likelihood of providing a lens for examining the usage of materials in the LMS (Romero & Ventura, 2007:136). It should be noted the use of learning resources in the LMS depends on design of such resources

The exploration of impact of design has highlighted factors that are important in usage of resources on the LMS. The impact of design provided me with an opportunity to experience the challenge of designing learning resources suitable for students' learning styles, particularly for lecturing staff participating in this study, in that they teach on dual modes, both conventional face-to-face and distance education mode. It became apparent that designing learning resources that suit students' processing styles is complex. The complexity of designing such resources confronted me a researcher to apply educational data mining techniques as well as qualitative methods in order to explore underlying aspects in the usage of learning resources and activities in the LMS. An

examination of usage of learning resources is an attempt to explain variables associated with student learning resource preferences in the LMS.

Furthermore, in this chapter key issues concerning the use of learning analytics in universities highlighted factors associated with usage of resources in online teaching and learning environments. Literature reviewed could not provide convincing answers of the extent to which a host of factors can act to either enhance or constrain processing of information by students studying while working in the military. A gap still exists on studies undertaken that integrated teaching strategies, learning experiences, level of involvement and type of learning elicited by learning resources in and off online learning platforms with data generated by the LMS and data from other sources data in developing countries.

A review of literature on design teaching and learning activities on the LMS has set the contextual background of the current study. Leedy and Ormrod (2005: 141), Plowright (2012:167) call key areas that I research “conceptual framework.” In other words, the key areas has assisted me in constructing the conceptual framework.

## **2.8. CONCEPTUAL FRAMEWORK**

The framework maps out the visible and invisible aspects of learning. The framework provides the theoretical overview that guided my thinking about concepts of my topic to answer the question: which variables are associated with student learning resource preferences in the LMS at a Faculty of Military Science? For me to determine why student engage or do not engage on and off the LMS, activities that happen on and off the LMS will be captured through the descriptions of visible and invisible aspects of learning as outlined in the framework in Figure 2.3. The framework points to the relationship between patterns and tendencies of the use of resources and participation in assessment activities (visible indicators and predictors of learning) and context (invisible aspects) in the LMS, which explains why they engage or do not engage online. In this way, the relationship will highlight variables associated with learning resource preferences in the LMS. These ideas that I got from the literature influenced my choice of research approach and methodology. As a result, the developed conceptual framework (Figure 2.3) incorporates Figure 3.1 (See Conceptual framework on research approach and methodology). In a similar vein, the framework incorporates framework for analysis of learning resources (Table 3.1). My Curriculum Studies perspective as is outlined in

Chapter 1, paragraph 1.7 provides a lens through which analysis of findings of this study will be discussed and interpreted (See Table 2.4: Framework for analysis of learning resources)

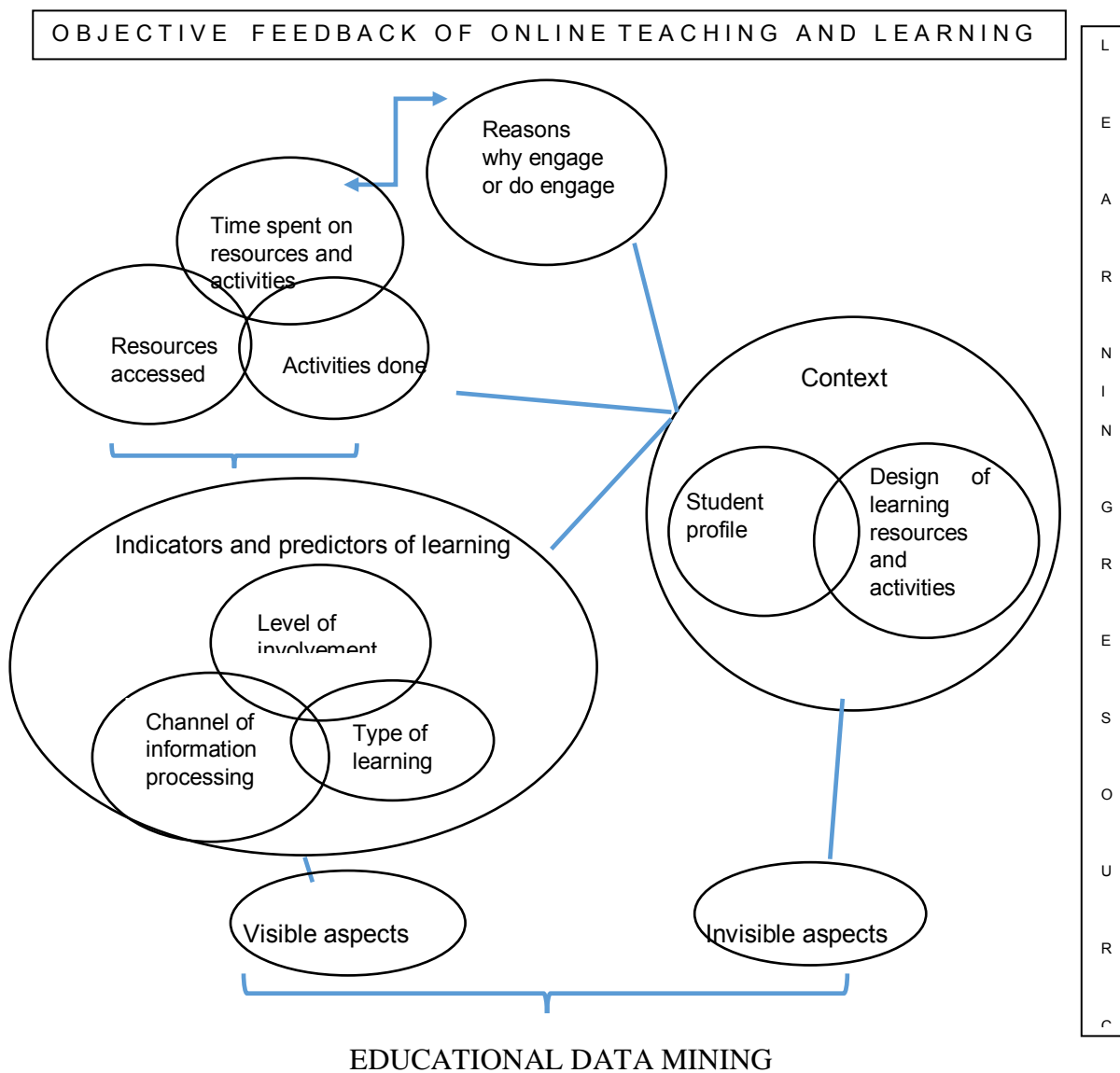


Figure 2.3: Conceptual framework: Variables associated with student learning resource preferences in the LMS

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1. INTRODUCTION

The purpose of this study was to explore variables associated with student learning resource preferences in the Learning Management system (LMS). This study intended to contribute to the current debate on how researchers examine teaching and learning processes from the big data in higher education. In this chapter I will describe how I devised strategies to answer my main research question - which variables are associated with student learning resource preferences in the LMS at a Faculty of Military Science? I will explain concepts that constitute the main research question according to the current study. The concept “variables” refers to factors that students consider important in using learning resources in the LMS. For this study, I have described impact of design of learning resources, type of learning resources, information processing style and student profile on student engagement with learning resources (Refer to Chapter 2, section 2.3). Learning resources are resources and activities created in the Learning Management System (LMS).

In this chapter, I explain detailed strategies that were used to collect, record and interpret data for this study. This study is a systematic process of collecting, analysing and interpreting data retrieved from the LMS reports, lecturer’s and students’ surveys and interviews to explore variables associated with student learning resource preferences in the LMS (Leedy & Ormord, 2005).

To interpret data retrieved from the LMS reports, I have adapted the strategies of Rogers et al. (2010), Clark and Mayer (2012), Ruipérez-Valiente et al.(2014), Chen and Wu (2014) to develop and validate a case that explored variables associated with student learning resource preferences in the LMS. The case studies of Rogers et al. (2010), Ruipérez-Valiente et al (2014), Chen and Wu (2014) have introduced me to data that I should collect from LMS to explain why students engage or do not engage on and off the LMS. Their studies have shown me how I could handle data collection and data analysis issues for this study.

Rogers and his colleagues’ findings offered me Key Educational Requirements (KER) and Key Performance Indicators (KPI) of the data that I collected from LMS reports. To answer the main research question, I have taken student engagement as the KER. To determine student engagement from the logs, I have analysed the logs in terms of the following KPI:

- number of times learning resources were visited;
- number of days learning resources were viewed;
- time spent on learning resources;
- month viewed;
- day of the week viewed;
- time of day viewed;

However, research shows that analysis of logs does not yield persuasive outputs and outcomes in measuring student engagement (Prinsloo, et al., 2012, Veletsianos, et al., 2016). In order to measure the outputs and outcomes of student engagement with learning resources from the LMS data, I analysed teaching and learning process from the learning resources. I identified teaching strategies employed in the learning resources. I further identified level of involvement elicited by the teaching strategies, which enabled me to predict elicited learning experiences according to Bloom's Taxonomy (1956). I then compared elicited learning experiences with the learning outcomes students are expected to achieve from learning resources in a Compulsory Module. In this way, I was able to predict types of learning elicited by learning resources in the LMS.

The literature review has contributed significantly to my decision about research methodology for this study. In the literature review chapter, I described the role of the literature in terms of understanding analysis of data gained from LMS reports. Secondly, I provided the rationale for conducting this study. Thirdly, I explained in depth data collection techniques. Fourthly, I explained how I decided on sampling participants, and modules for this study. Lastly, I discussed the approaches I applied for the analysis of collected data.

### **3.2. LITERATURE RELATED TO USE OF LEARNING ANALYTICS TO GENERATE DATA**

In Chapter 2 (section 2.2), I described the paradigm that conveyed my own understanding of analysing data retrieved in LMS reports to explore variables associated with student learning resource preferences in the LMS. The paradigm offered an appropriate the lens through which the empirical work of this study has been interrogated. This lens was offered by the discussion of the

KER, KPI and observable data that I extracted from LMS reports to measure learning and learning resources.

In addition, a discussion of how students' brains absorb and encode information (Clark & Mayer, 2011) revealed valuable information about impact of design on learning. In a similar vein, a discussion of design of resources and activities and approaches to accommodate students' processing styles highlighted factors that influence student preferences in learning resources in the LMS. The discussion of these key issues set the contextual background of the study, for collection, recording and interpretation of data for this study.

In other words, this contextual background acted as a contributor for getting a better understanding of variables associated with student learning resource preferences in the LMS (White 2003:26). As such, three roles of literature review became apparent:

- a. It disclosed that other researchers have already performed similar research.
- b. It provided better insight into the dimensions and complexity of integrating big data and data collected through qualitative and quantitative methods in order to explore variables associated with student learning resource preferences in the LMS.
- c. It revealed a gap in knowledge in sifting through LMS data and identifying emerging patterns to explore variables associated with student learning resource preferences in the LMS (White 2003: 26). This is a discovery driven study, in that it has no hypothesis, but the researcher attempts to discover why students engage or do not engage from patterns and tendencies in students' usage of learning resources on and off the LMS through estimation, prediction and classification, (Larose, 2005, Ventura, et al., 2007:371).

Creswell (2002:30) shares similar views with White by outlining the following roles of literature review:

- a. It shares with the reader the results of other studies that are closely related to this study.
- b. It relates this study to the on-going debate about using big data to understand teaching and learning processes, by filling in the gaps and extending the prior studies. In recent years, there has

been an increasing interest in learning analytics in order to understand digital teaching and learning environment.

- c. It provides a framework for establishing the importance of this study as well as a benchmark for comparing the results of this study with other findings.

Clearly, literature review on learning analytics assisted in interpreting and making sense of the findings. Thus, I relate the results of my study to the research of Rogers, et al. (2010), Ruipérez-Valiente et al.(2014), Veletsianos et al. (2016) on learning analytics. At the same time, I tied results of my study to those of Kalyuga, Chandler and Sweller, (1999), Van Merriënboer and Sweller (2005), Clark and Mayer (2012), Chen & Wu (2014) in order to explore variables associated with student learning resource preferences in the LMS. The literature review on learning analytics gave me theoretical perspectives that guided my thinking about what it was that I wanted to investigate (Plowright, 2012:12). In other words, the literature review enabled me to develop and construct a conceptual framework that I used to organise underpinning ideas in my study (Plowright, 2012:12, See Chapter 2, Figure 2.3).

### **3.3. TOWARDS A SUITABLE RESEARCH METHODOLOGY**

The purpose of this study was to explore variables associated with student learning resource preferences in the LMS.

I was interested in determining why students engage or do not engage on and off the LMS. Student preferences in learning resources appeared to be influenced by the first mental work that occurs during the selection of relevant information from learning resources. (Riding & Sandler-Smith, 1997; Rumble, 2001; Clark & Mayer, 2011). Riding and colleagues claim that students' working memory is limited. In their opinion learning resources in the LMS should be designed to facilitate selection of relevant information and limit processing of information not required for learning (Clark & Mayer 2011). According to Chen and Wu (2014), "if information exceeds working memory capacity, which Clark and Mayer call "cognitive overload", it may interfere with the learning process, learning may be compromised or information may not be learned at all (See chapter 2, section 2.4).



The researcher integrated trails of data collected from LMS reports with qualitative and quantitative data collected through interviews and surveys in order to get a full picture of student engagement with learning resources in and off the LMS. This analysis thus informed the researcher of the variables associated with student learning resource preferences in the LMS.

In this way, findings of this study can contribute invaluable information on preparedness of universities to deal with articulation gap among first year-cohorts (CHE, 2013), which in turn contributes to the current research on high dropout rate, in both face-to-face and distance education, in South Africa as a developing country.

As mentioned before, the aim of this study was to answer this key research question: Which variables are associated with student learning resource preferences in the LMS? In order to answer the key research question, I moved to a specific focus of enquiry by setting the following aims:

1. to explain trends of engaging with learning resources in the LMS;
2. to determine why students engage or do not engage on and off the LMS.

Furthermore, I narrowed my focus of enquiry by specifying the following objectives in order to reach the aims of the study:

- a. to describe patterns in usage of learning resources in the LMS;
- b. to identify the types of learning resources that students prefer in the LMS;
- c. to determine factors that students consider important in engaging with learning resources in the LMS;
- d. to analyse impact of these factors on student engagement with learning resources in the LMS;
- e. to identify teaching actions (strategies) represented by learning resources;
- f. identify level of involvement elicited by learning resources;
- g. to predict types of learning and learning experiences elicited by learning resources in and off the LMS.

Details on a suitable research methodology is outlined below. In order to reach each objective, the coloured lines in the diagram (Fig 3.1) link objectives to data collection techniques. The perspectives of Miles and Huberman (1994) and Plowright (2012) were integrated to develop and construct the researcher's map as outlined below:

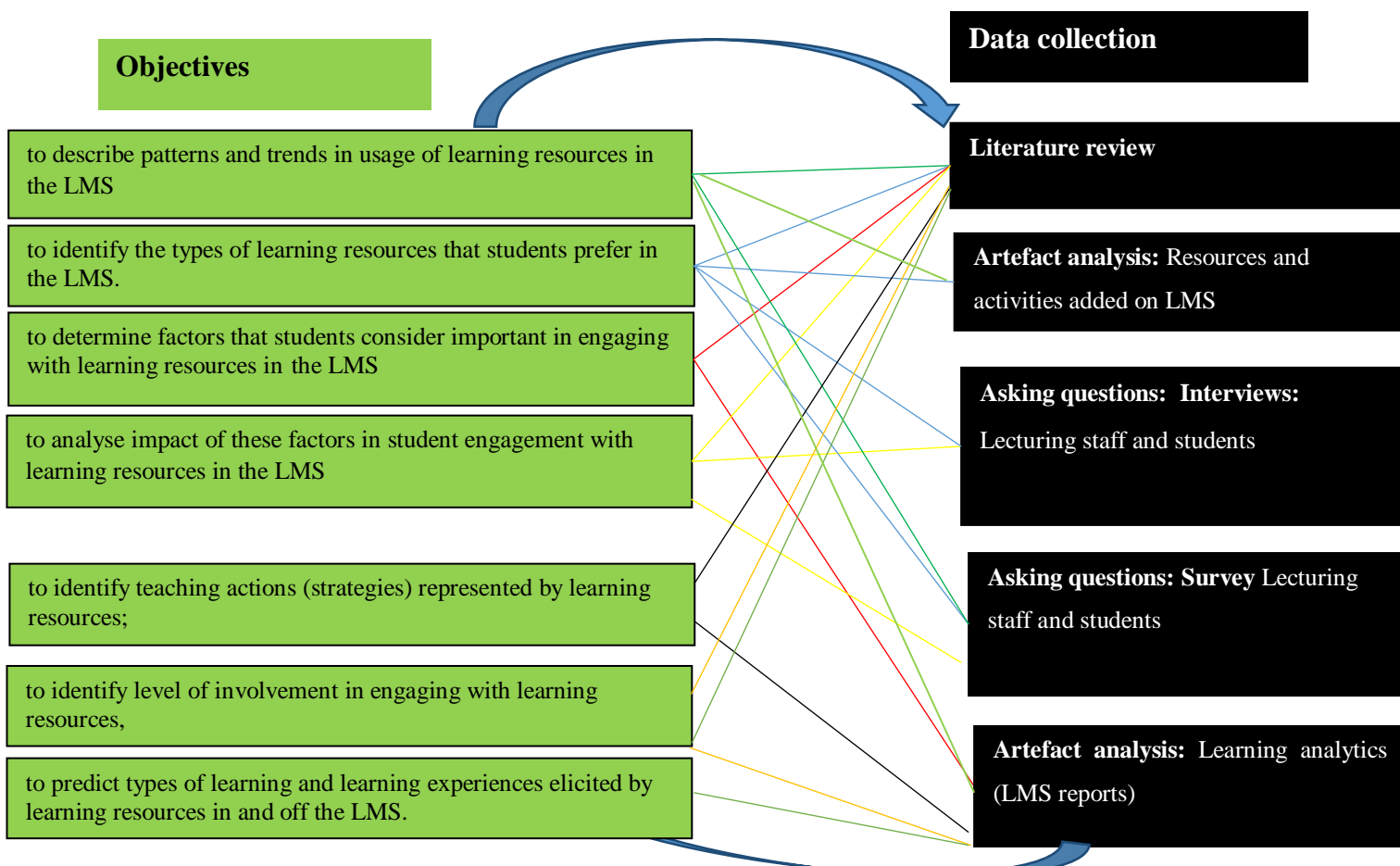


Figure 3.1: Conceptual framework (Adapted from: Miles & Huberman, 1994; Plowright, 2012)

I employed mixed methodology (Plowright, 2012:3) in order to answer the main research question: Which variables are associated with student learning resource preferences in the Learning Management System at a Faculty of Military Science? Both qualitative and quantitative research methods were employed to collect data. Rather than relying on one approach, data trails left in the LMS are interpreted with the combination of data collected through interviews and surveys to further inform my interpretation of the findings of this study (Leedy & Ormrod, 2005:95). Creswell (1998) calls use of qualitative and quantitative methods “incremental data collection methods.” In this study, the use of both quantitative and qualitative approach was supported by the following assumptions:

- a. The study attempted to answer the key research question: Which variables are associated with student learning resource preferences in the LMS. Firstly, I determined factors that are important in student engagement with learning resources on and off the LMS. To determine these, I analysed student engagement in terms of linking students' online and offline actions (what the student does with the learning resource) with revised Bloom's Taxonomy and classified the actions according to the framework on types of learning (Czerniewicz & Brown, 2009, Laurillard, 2013). Analysis of student engagement involved integrated methodology, because I analysed the number of times the resource was visited and time spent on the learning resource (Chapter 2, Table, 2.3). In addition I used number of visits and duration of visits in the interview questions to prompt students to explain their reasons for the number of visits and time spent on learning resources.
- b. Furthermore, I analysed student engagement by identifying level of engagement elicited by learning resources. Although the description and understanding of processing of information is personal, I validated the answer to the key research question through interviews (Appendix D and E). An analysis of data collected through interviews enabled me to verify level of involvement, learning experiences and level achievement of the learning outcomes elicited by learning resources (Table 3.1). An analysis of numerical data on LMS reports such as number of views on learning resources, time spent viewing resources and time spent doing activities, was done quantitatively, while an analysis of level of involvement was qualitative.
- c. This study looked at a small group of participants: In order to maximize internal validity, I have solicited only one lecturer to participate in this study because this one lecturer designs and teaches students participating in this study on the first and second year level. The lecturer teaches First Compulsory Module 144 and Compulsory Module 214 in the second semester and first semester respectively. In this way I have kept lecturer's personalities, experience, teaching style and design of learning resources constant in that the same students who are taught by this one lecturer participated in this study for six months in each module.
- d. Similarly, students participating in this study were similar in terms of level of study, mode of study and environmental factors. In this way, I was able to reduce an impact that these factors could have had on learning resource preferences in the LMS. To reduce effect of variables on student preferences in learning resources, I further explored student preferences on the basis of same age, gender, military-professional rank and study mode. Even though I reduced effect of identified variables, I further organized data according to age, gender, military-professional rank and study mode to make collected data easier to think about and to interpret preferences according to the meaning that emerges (Leedy & Ormrod, 2005:248). I acknowledge that the

design of this study could not rule out other influential factors that I could not have assessed or considered (Leedy & Ormrod, 2005:221). In this way, the use of a small group shed light on variables associated with student learning resource preferences in the LMS.

- e. The research design of this study was a case study, in which large amount of in-depth detail data were collected qualitatively. Data were collected from the LMS reports, through asking questions (interviews and surveys). In other words data were collected through an mixed methodology. Through these data collection techniques, I collected both numerical (quantitative) and narrative (qualitative) data. Since this is an in-depth study, I described numerical data collected through learning analytics and closed ended questions to better understand their interrelationships. Their interrelationships provided invaluable information on individual students and class patterns of preferences in learning resources in the LMS.
- f. At the same time, I transformed data collected through interviews and open ended questions in the questionnaire surveys into numerical data (Plowright, 2012:18). In other words, I reported data that I extracted from LMS reports, such as number of views on learning resources and time spent doing assessment tasks as means and medians. I used means and medians to describe trends and patterns of learning resources for the individual, and for 35 students studying on distance education mode and 52 students studying on traditional face-to face and distance education mode in Compulsory Module 144 and Compulsory Module 214 respectively. An explanation of the reasons why students devote specific time on resources and performing activities is qualitative. An analysis of lecturing staff and students' interviews and surveys determined accuracy of my interpretations (Cresswell, 2003:195).

It can be concluded that both qualitative and quantitative research involve gaining of an in-depth knowledge and critical deeper understanding of evaluating any conceptual framework underlying the research question (Bell, 1998:36).

### **3.3.1. Details on ways to generate qualitative and quantitative data**

The qualitative data needed to answer the main research question were generated through interviews and open ended survey questions. Qualitative data were aimed at gathering information on variables associated with student learning resource preferences in the LMS on Compulsory Module 144 and Compulsory Module 214 (See interview and survey questions in APPENDIX C, D and E). Quantitative data were mainly from the university LMS reports on number of visits on learning resources, time spent on each resource, time of the day spent on resources, day of the week viewing resources, month visited, number of tasks done and not done, time spent doing tasks, time of the day doing tasks and day of the week doing tasks.

### **3.3.2. Rationale for reporting data as a case study**

The researcher has adopted a case study research design for this study. I chose case study for this study, because it is considered especially suitable for learning more about little or poorly understood situations (Leedy & Ormrod, 2001:91). In this study, little is known about variables associated with student learning resource preferences in the LMS in the Faculty of Military Sciences of Stellenbosch University. Bell (2000:10) defines a case study as “an umbrella term for family of research methods that have a common purpose of enquiry around an instance”. There are on-going debates about why students view some learning resources more than others, particularly for this study because learning resources were designed for both residential and distance education students, thus for a dual teaching and learning mode.

Little was known about whether lecturing staff could design the same, different or adapted learning resources for residential and distance education students in the case identified for this study. Little was known about whether adaptation of learning resources was suitable for students’ information processing styles. In addition, if design of course materials suited students’ processing styles, it was not known to which extent lecturing staff could facilitate and accelerate the processing style?

All these questions were answered after studying patterns and trends of using learning resources in the LMS in-depth (Bell 1998:36) for a defined period of six months of each of sampled module. A disadvantage in making an enquiry around an instance, by indicating the results of a single case being studied, is that the results cannot be generalised to other situations (Leedy & Ormrod, 2001:91). Plowright (2012:24) offers another perspective of a case study and describes it as a “study of a single case with one or few participants.” He describes a case as the source of data. In the current study, sources of data were those reports automatically generated by the LMS when students

engaged with learning resources in the LMS, activities that they performed, accounts of what they did with the learning resources off the LMS, interviews, survey and students' biographic information obtained from the institutional enrolment list of the mother campus (Stellenbosch University) of students registered in Compulsory Module 144 and Compulsory Module 214 relevant to this scientific enquiry.

### **3.4. SAMPLING AND POPULATION**

The population of this study is made up of one particular lecturer, and students enrolled for two sampled modules, for anonymity sake referred to in this study as Compulsory Module 144 and Compulsory Module 214. The lecturer is the one who designs learning resources and teaches Compulsory Module 144 and Compulsory Module 214 to students participating in this study at first and second year level. Thirty five distance education students and fifty two residential and distance education students were the ones who used the LMS for Compulsory Module 144 and Compulsory Module 214 respectively. Two modules were sampled because they are enrolled by both residential and distance education students participating in this study for six months each module (July 2014 to December 2014 and January 2015 to June 2015). These two modules are commonly registered by a high number of residential and distance education students. An unusually high number of distance education students commonly do not get a writing mark, while residential students get a writing mark in the two sampled modules each year in the institution case-studied here.

Secondly, these modules compulsory to all first and second years enrolled in Human and Resource Development (HRD), Organisation and Resource Management (ORM) and Technology and Defence Management (TDM) programmes. The FMS offers five degree programmes: Human and Resource Development (HRD), Organisation and Resource Management (ORM), Security and Africa Studies (SAS), Technology (Tech) and Technology and Defence Management (TDM). Distance education students can register for one of only three of the five programmes, namely HRD, ORM or SAS, while residential students can register in any of the five programmes.

Preliminary observations indicated that student preferred to use some learning resources more than others. In addition, students participated more in some of the formative assessment activities created on the LMS than others. This could possibly explain why a high number of students, particularly distance education students did not qualify to write examination. At the same time, institutional records show that less than 40% of distance education students have graduated within the allotted 8 year period since the implementation of distance education in 2003, while almost 75% of residential

students graduate every year. Students at the institution case-studied are military personnel of the Department of Defence who study at state expense. Their being professionally employed and studying at state expenses, which covers all but study material expenses, explains the exclusion of cost as a variable in this study. They are responsible to pay the state money if they do not progress with their studies. Distance education students commonly go on internal or external deployment, on extended cross-border operations, attend extended military courses of varied durations, and perform various other routine occupational duties. Residential students reside in the institution case-studied for the duration of their studies.

Findings of this study could probably contribute to quality assurance, specifically on the revision of the university's "Policy on Teaching and Learning". Currently, the principles guiding the review and evaluation of Teaching and Learning materials state that teaching and learning materials should be reviewed regularly (Stellenbosch University, 2007). It also encourages individual lecturers to take responsibility for implementing the Teaching and Learning policy (Stellenbosch University 2007). It is envisaged that the findings will offer informative, comprehensive feedback of why students engage or do not engage on or offline. This could help the case-studied faculty and its mother organisation in making informed strategic decisions. The study has been envisaged to further contribute to the development of the distance education study model, since lecturing staff are required to design learning resources for dual mode of education.

Moreover, this study serves as an LMS audit, because the university invests many resources in the LMS. Equally important, lecturers also invest many resources in designing learning resources in the LMS.

Little is known about why some learning resources in the LMS have a higher number of visits than others. In addition, little is known why some students do not participate in some of the formative assessment activities created on the LMS. It can be assumed that students experience cognitive load when they engage with some of the learning resources in the LMS. A discrepancy in the number of visits and completion of activities in the LMS could be explained by a claim that students experience confusion, anxiety and frustration in online learning environments (Hara & Kling, 2001; Peters, 2004; Moore & Kearsely, 2011). It would be strange that students experience confusion, anxiety and frustration seeing that digital teaching and learning environments are assumed to provide mitigating and fitting opportunities for distance education students to learn just as favourably as when they were residential students (Mayes & Freitas, 2013). This study revealed variables associated with student learning resource preferences in the LMS.



The researcher did not apply any sampling techniques for this study, since the researcher relied on voluntary participation, which reduced the number of participants. Ideally, the researcher could have included lecturing staff and students from other faculties of Stellenbosch University and other universities all over the country in this study, for the findings to be properly generalised to the entire population. However, this was not possible, because of the nature of the study and restricting factors associated with performing a scientific enquiry within a sector of the military.

The nature of study does not permit the use of other universities, because the Faculty of Military Science is the only institution in South Africa that offers military undergraduate degree programmes to residential and distance education military personnel. A single faculty and two modules were selected for this study to ensure that learning resources are designed by a single lecturer and participants are taught by the same lecturer in the first year level in second semester and second year level in the first semester. In other words participants experience more or less similar contextual factors and use the same LMS. That participants are from a single institution and experience more or less similar factors, does not rule out extraneous variables that may impact student preferences in learning resources in the LMS. Any similar factors, however, cannot be guaranteed one hundred per cent.

Furthermore, two modules were selected because a large amount of in-depth data were collected about student engagement with learning resources in the LMS. Because the study was undertaken for six months at first year level in 2014 for Compulsory Module 144 and six months at second year level in 2015 for Compulsory Module 214 with the same cohort, a few cases were solicited to collect a large amount of in-depth information. It would thus be possible to look in-depth at every student, every resource, every assessment activity or every single data generated by the LMS.

Because FMS lecturing staff and students participating in this study are not a representative of general Higher Education institutions in South Africa, the findings could not be generalised beyond the institution case-studied, but could inform strategic decision makers of a diversity of stakeholders in this institution.



## **3.5. DATA COLLECTION TECHNIQUES**

This section describes data collection techniques that I applied to for this study.

### **3.5.1. Data collection method**

Both qualitative and quantitative methods were employed. Qualitative research uses multiple forms of data collection in one study. For this study, the methods listed below were used. I have obtained ethical clearance from Stellenbosch University Ethics Research Ethics Committee before commencing with empirical work of this study. I have submitted the approved research proposal, letter of permission from the FMS, informed consent letters for both lecturing staff and students, questionnaires and interview questions to Stellenbosch Ethics Committee for approval. Unconditional approval was obtained.

#### **3.5.1.1. Interviews**

I conducted semi-structured interviews in order to get the lecturer to talk about student preferences in learning resources in the LMS. I also conducted semi-structured interviews with seven students, two female (senior and junior officer) and 5 males (one senior, two junior and two non-commissioned officer) enrolled for Compulsory Module 144. In addition, I conducted semi-structured interviews with one focus group that consisted of twelve students enrolled for Compulsory Module 214. The interviewees of the focus group were three female (two candidate and one junior officer) and nine male students (eight candidate and one junior officer).

Participants comprised of non-commissioned, junior and senior officers who had high, medium and low number of visits on the LMS were asked to be interviewed. Students were interviewed to get a sense of the reasons for their preferences of learning resources in the LMS. In addition, student interviews offered a sense of the reasons they preferred specific types of learning resources (Bell, 2000:138). Open ended questions encouraged participants to talk about what is centrally significant to them, rather than to the researcher (Bell, 2000:138) (See interview questions on APPENDIX D and E).

Interview questions were used to make sure that all areas important in this study were covered. Through probes and prompts participants were steered in research focus rather than response

(Gillham, 2003:14). Interview questions were based on the analysis of data gained from LMS reports. Probes and prompts were used because participants might have been tempted to talk about what should have happened, rather than talking about variables associated with their learning resource preferences in the LMS (Leedy & Ormrod, 2005:146), especially since they were interviewed one to six months after doing Compulsory Module 144 and Compulsory Module 214. One lecturer, seven students who enrolled for Compulsory Module 144 and 12 students enrolled for Compulsory Module 214 were interviewed in order collect in-depth insights from a small number of participants (Descombe, 1998:110). The interviews were transcribed.

### **3.5.1.2. Official records, documents or artefacts**

In terms of the current study, official records and documents included data generated by the university LMS, learning resources in the LMS, student profile in terms of mode of study, age, military professional rank and number of students who qualified to write the Compulsory Module 144 and Compulsory Module 214 examination.

The researcher had organisational and institutional permission to use data from LMS reports, resources and activities added on the LMS. The researcher was ethically cleared to conduct the research.

### **3.5.1.3. Questionnaires**

I created questionnaire items that covered closed questions to yield quantitative data, and a small number of open-ended questions to yield qualitative data (Bell, 1998:36). The questionnaire items were based on analysis of LMS reports. The questions were both paper-based and electronic. I created pseudo identities for participants and the relevant module so that the information could not be traced back to participants (See Appendix C).

## **3.6. RATIONALE FOR MULTIPLE SOURCES OF DATA**

Data solicited through legacy logs from reports automatically generated by the LMS were supplemented and enriched with data obtained through a questionnaire and semi-structured interviews. The questionnaire comprised of closed and open ended questions. This approach was added to understand and develop a general understanding of participants' reasons why they either engage or not engage on and off the LMS. The open-ended questions also gave participants the

opportunity to raise issues not covered by the data automatically generated by the LMS and closed ended questions in the questionnaire. Since the open-ended questions included items that elicited responses to answer the research questions of this study, most categories came from the research questions. In addition, open ended questions elicited responses that affirmed responses on closed questions.

### **3.7. DATA ANALYSIS**

White (2003:82) refers to the data analysis process as an “inductive process of organising data into categories and identifying relationships among the categories”. For this study, I used a combination of thematic content and discourse analysis (See Chapter 2, section 2.2.1). Data was content analysed because I described, classified and clustered patterns of engagement with resources and activities in order to identify variables associated with student learning resource preferences in the LMS (Gillham, 2003:59). In other words, in terms of the current study, I tracked and monitored what a student did with the resources and activities added on the LMS. I applied thematic content analysis when analysing LMS reports. Closed coding schedule was applied, which resulted in the measuring of Key Performance Indicators (KPIs), which were in turn determined from Key Educational Requirements (KERs) (Plowright, 2012:109). Rogers et al. (2010) define KPI as student online behaviour that is tracked and monitored on a regular basis.

Since this study attempted to investigate variables associated with student learning resource preferences in the LMS, I have applied educational data mining as data analysis technique. Educational data mining technique is applied because this study has no preconceived hypothesis. The variables associated with student learning resource preferences in the LMS were uncovered by sifting through data (Larose, 2005:2). From sifting data, I described patterns lying within data. In addition to description, I uncovered variables associated with student learning resource preferences through estimation, prediction and classification (Larose, 2005:11). In this way, I examined usage of learning resources in the LMS (Romero and Ventura, 2007:136). Moreover, these data analysis techniques assisted me to discover meaningful new correlations, patterns and trends on the use of resources on the LMS (Larose, 2005:2). For this study, student engagement as KER was taken from the key research question as outlined below on Table 3.1. Below is the description of the teaching and learning constructs (KPI) that I analysed to determine student engagement as outlined in Table 3.1, in other words, what students did with learning resources on and off the LMS.

### **3.6.1. Learning resource:**

These are the resources (course materials) and the assessments activities that have been created on the LMS. Learning resources were analysed in terms of teaching strategies they elicit, since the lecturer is represented by learning resources that were designed to help students learn. Since the lecturer teaches students face-face and in distance education mode, the LMS is used as a platform to mediate the teaching and learning process. Most of the learning activities happen outside the LMS (Prinsloo et al., 2012; Veletsianos, 2016).

### **3.6.2. Teaching actions (strategies):**

These are the teaching strategies that the teacher employs to teach students. Since the lecturer teaches face-to-face and in distance education mode, the lecturer is represented by design of learning resources in the LMS.

### **3.6.3. Level of involvement:**

The level of involvement determines the level of participation with learning resources according to Dale's Cone of Learning (Krivickas, 2005; Jacobs, Hurley & Unite, 2008, 2.5 Fig. 2.2). Learning resources were analysed to determine level of involvement elicited by learning resources.

### **3.6.4. Learning experience:**

This is the level of understanding (According to Bloom's Taxonomy, 1956) that is likely to be elicited by the teaching action and level of involvement.

### **3.6.5. Learning outcomes:**

These are the levels of understanding that students are expected to achieve as stated in the learning resources in Compulsory Module 144 and Compulsory Module 214.

### 3.6.6. Types of learning:

This is the categorisation of teaching and learning events commonly found in learning theories, namely: “acquisition”, “inquiry”, “practice”, “production”, “discussion” and “collaboration” (Czerniewicz & Brown, 2009; Laurillard, 2013).

Table 3.1: Framework for analysis of learning resources (Anderson & Krathwohl, 2001; Krathwohl, 2002; Krivickas, 2005; Jacobs, Hurley & Unite, 2008; Czerniewicz & Brown, 2009; Laurillard, 2013)

<b>K E R</b>	<b>Learning resource</b>	<b>Teaching strategy (action)</b>	<b>Level of involvement</b>	<b>Learning experience elicited (Bloom’s Taxonomy)</b>	<b>Expected level of achievement (Learning outcomes)</b>	<b>Types of learning (Laurillard, 2013)</b>
<b>S T U D E N T  E N G A G E M E N T  O N  A N D  O F F T H E  L M S</b>		Facilitation	Participation  Giving a talk,  Participation in a discussion	<b>Evaluation</b> Appraise, Ascertain, Argue, Assess, Compare, Contrast, Convince, Criticise, Defend, Explain, Evaluate, Judge, Justify, Predict, Recommend		<b>Collaboration</b> Small Group Project, Discussing Others’ Output, Wikis, Chat Rooms
		Model	Participation  Giving a talk,  Participation in a discussion	<b>Synthesis</b> Argue, Arrange, Assemble, Categorise, Construct, Design, Establish, Generalise, Integrate, Modify, Organise, Propose		<b>Discussion</b> Tutorials, Seminars, Forums, Emails, Discussion Groups, Web-Conferencing
		Set up, frame, moderate, lead, facilitate discussions	Simulating real experience, Doing the real thing	<b>Analysing</b> Analyse, Appraise, Classify, Categorise, Compare, Contrast, Differentiate, Document, Examine, Explain, Group, Identify, Infer, Inspect, Observe, Order, Outline, Question, Review		<b>Production</b> Producing Articulations Using Essays, Reports, Photos, Videos, Blogs, E-Portfolios
		Model	<b>Visual receiving</b>  Seeing it done on a location	<b>Applying</b> Choose, Construct Determine, Develop, Draw, Illustrate, Modify, Organise, Predict, Present, Produce, Select, Sketch, Solve, Apply, Assess, Demonstrate		<b>Practice</b>  Using Models, Simulations, Virtual Labs, Field Trips, Role Play, Practice Based Projects
		Advice  Guide	<b>Visual receiving</b>  Looking at an exhibition	<b>Understanding</b>  Compare, Conclude, Contrast, Define, Demonstrate, Describe, Estimate, Explain, Identify, Interpret, Predict, Rewrite, Summarise, Associate, Change, Defend, Clarify		<b>Inquiry</b> Analysis Of Ideas And Information. Collection of Data And Analysis, Comparison, Searching and Evaluating Information and Ideas
		Show, demonstrate, describe, explain	<b>Verbal receiving</b>  Reading  Hearing	<b>Knowledge</b>  Arrange, Define, Describe, Identify, Label, List, Locate, Match, Memorise, Name, Outline, Recall, Select, Show		<b>Acquisition</b> Lecture Note, Reading Multimedia, Website, Digital Documents Aad Resources, Listening to Podcasts, Webcasts, Videos

The framework provides a way of evaluating alignment of resources, assessment activities, learning outcomes and affordances of learning technologies according to Dale's Cone of Learning (Krivickas, 2005; Jacobs, Hurley & Unite, 2008), Bloom's Taxonomy (1956), Czerniewicz and Brown's (2009) framework and Laurillard's (2013) type of learning. The development of this framework was informed by my Curriculum Studies theoretical position that influenced my choice of investigatory strategy in order to determine why students engage or do not engage on and off the LMS. This framework justifies my choice of research paradigm in that it is incorporated in the main conceptual framework (2.3). As a result, the framework addresses how I investigated the invisible aspects of my topic as outlined in the main conceptual framework (2.3).

The coding schedule was closed in that I used a coding schedule wherein data generated by the LMS were pre-structured and pre-coded as outlined in Table 3.1. Each learning resource was analysed in terms of the framework as outlined in Table 3.1. I defined student engagement in terms of linking students' online and offline actions (what the student does with the learning resource). This was done to clarify the meaning of "engage" or "not engage".

As Plowright (2012) points out, when measuring these elements, the researcher should display interest in developing an understanding of the patterns of using learning resources within and across the sample. Accordingly, I was able to identify the KPIs in order to infer the deeper meanings associated with learning resource preferences in learning resources in the LMS. To be objective, I considered data analysis as a 'detailed and systematic examination of contents of collected data for the purpose of identifying patterns, themes or biases within the collected data' (Leedy & Ormrod, 2005:108).

In addition to thematic content analysis, which is more structured, I also applied a less structured method of data analysis that allowed progression to a deeper level of analysis called "critical discourse analysis" (Plowright, 2012:115). Henning (2003:59) calls this less structured method "discourse analysis", "open coding", because I read collected data from LMS reports, interviews and surveys in order to get the global impression of the content. Unlike thematic content analysis, I made sense of the collected data through post-structuring and post-coding. Post-structuring and post-coding offered me an understanding of the context on variables associated with student learning resource preferences in the LMS. I applied Tesch's steps, cited by Creswell (2003:192), to analyse collected data by:

- a. reading all records I had to get a sense of the whole;
- b. interpreting meaning of all interviews in order to get underlying meaning
- c. making a list of all topics;
- d. clustering topics according to their relationship, revisiting data to see if new categories and codes emerge;
- e. categorising the topics using common description in order to reduce the data;
- f. making a final decision for each category, assembling data belonging to each category in order to perform a preliminary analysis;
- g. making meaning of data by asking “What were the lessons learned?”.

Furthermore, I sorted and categorized data, and gradually transformed them into small discoveries, revelations, enlightenments and insights (Lincoln & Guba, quoted by Creswell, 2002:194). In addition, I used deductive analysis to verify identified themes in collected data (Leedy & Ormrod, 2005:103).

Finally, I used triangulation as the last step of data analysis, with the hope that the multiple sources of data will converge (Bell, 1998:102). For this study, I examined evidence from data retrieved from the LMS, interviews, official records and questionnaires, and used them to build coherent justification of themes (Creswell, 2002:196).

In conclusion, quantitative data collected through surveys and data retrieved from LMS reports provided me with numerical data that I manipulated mathematically and statistically analysed (Leedy & Ormrod, 2005:150). As such, I used the results of these manipulations and analyses to interpret the key research question: Which variables are associated with student preferences in learning resources in the LMS? Similarly, qualitative data collected through interviews provided me with narrative data that required me to engage in ongoing active interpretation. The ongoing interpretation implied that I might consider some data as significant, while I might also have missed other potentially significant data (Leedy and Ormrod, 2005:150).

Qualitative data provided me with empirical evidence to construct a conceptual framework (Van Schalkwyk, Bitzer & Van der Walt, 2010) in order to respond to the key research question: Which variables are associated with student preferences in learning resources in the LMS? In other words, quantitative data provided basic research evidence, and qualitative data provided examples and reasons behind quantitative findings, and vice versa. Moreover, transformation of qualitative data

into numerical data and quantitative data into narrative data provided empirical evidence to answer the key research question stated above.

### **3.8. DELIMITATIONS**

This study was confined to the Faculty of Military Science (FMS) of Stellenbosch University. As explained in the section, Sampling and Population, the FMS is the only institution that traditionally provides face-to-face military degree programmes to commissioned officers, but has added distance education (DE) to provide HE study opportunities to both commissioned and non-commissioned officers in South Africa.

### **3.9. LIMITATIONS**

As explained before, it would have been ideal for the researcher to include all lecturing staff who use the university LMS and teach dual mode, residential and distance education. It was, however, not possible to include all of them because this research employs a case study method, wherein I had to focus on one or a few cases within its or their natural setting(s). For this study, I focused on two modules, named Compulsory Module 144 and Compulsory Module 214 for the purpose of this study and to secure confidentiality, in order to explore variables associated with student learning resource preferences in the LMS in great depth over twelve months. The second reason for sampling one module was that I enriched the data by collecting extensive data from LMS reports, learning resources designed in the LMS, interviews and surveys. An analysis of extensive data gave me an opportunity to explore themes in detail. These data provided me with sufficient and appropriate details to relate findings of this case study with variables associated with student learning resource preferences in the LMS.

Similarly, it would have been ideal for the researcher to include lecturers and students from other faculties in the mother campus, and other universities all over the country, for the findings to be properly generalised to the entire population. But this case study was characterised by a problem, context, lessons learned, and looked at people and settings holistically (Creswell, 2002:37).

The third limitation of this study was that the researcher had no control on contextual factors which might have influenced student preferences in learning resources in the LMS. It is possible that students could have had different intellectual ability or motivators for learning, which could have impacted on processing of information and therefore affected results of this study. Future or follow-up studies might reveal such factors and their potential impact.



The fourth limitation is that the LMS captured activities that happen within the system. The actual activities that constitute learning which happen outside the system were not captured. Future studies should include record of activities that happen outside the LMS.

## CHAPTER FOUR

### FINDINGS OF THE STUDY

#### 4.1. INTRODUCTION

In the previous chapter, the research methodology was described, explaining reasons for selecting research design for this study. In chapter 3, details were described on strategies that were used to collect, analyse and interpret collected data. This chapter reports the findings of the case study of data collected qualitatively and quantitatively. Quantitative data were collected from legacy logs of the LMS reports, survey and institutional documents. These data were statistically analysed and presented numerically and narratively. At the same time, qualitative data collected through interviews and open ended survey questions provided me with empirical evidence of the underlying reasons of the use of learning resources in the LMS. The evidence from multiple sources of data required me to engage in ongoing active interpretation of the collected data in order to respond to the key research question- Which variables are associated with student learning resource preferences in the Learning Management System at a Faculty of Military Science?

In the following paragraphs, I will respond to the key research question logically, by presenting results of this study. I will describe in details analysis of patterns and trends revealed in the usage of learning resources in the LMS. In this way, this chapter sets out findings that were generated when I sifted through data collected from legacy logs of the LMS reports and waited for the patterns to emerge. I specifically report on patterns and trends that emerged from the use of learning resources according to participants' demographic details, number of views, days and time spent according to the way in which resources were added and sequenced on the LMS. I will also report on students' participation in assessment activities.

Moreover, this chapter provides details of the analysis of the lecturer's and students' interviews and finally reports on responses to closed and open ended questions of the questionnaire. The analysed data reflect the usage of learning resources on the LMS in order to determine variables associated with student learning resource preferences in the LMS at the Faculty of Military Science. Tables and figures have in most instances been used for clarity, ease of understanding and interpretation (Appendices G to JJJ).

## **4.2. ANALYSIS OF DATA COLLECTED FROM DIFFERENT SOURCES**

As outlined in Chapter three, data were collected from five different sources. For this study, I analysed data collected from six months legacy logs of 12 credit Compulsory Module 144 in 2014 and Compulsory Module 214 in 2015 in the LMS reports of the institution case-studied. Data were also analysed from existing documents (institutional class list), transcribed the lecturer's interview responses, transcribed students' interview responses and students' questionnaire responses. Multiple approaches were used to generate data in order to determine the accuracy of the findings (Creswell, 2003:195). In other words, multiple data sources were used to validate the question (Leedy & Ormrod, 2005), "Which variables are associated student learning resource preferences in the LMS?"

Compulsory Module 144 and Compulsory Module 214 were sampled because they are core modules that are registered by students who enrolled for one of three academic programmes, a BMil in Human and Resource Development (HRD), Organisational and Resource Management (ORM) and Technology and Defence Management (TDM). These two modules are registered by a high number of students who study on full time basis, and those studying through the distance education mode (Appendix G). Students studying on a full time basis have to enroll six modules, while those studying on the distance education mode commonly enroll for three to four modules in a semester. However, students who enroll for the Compulsory Module 144 on the distance education mode commonly register for this module at the beginning of the semester and then either postpone, withdraw or discontinue with their studies every year, while those on full time registered for Compulsory Module 214 perform well. Thus, to me of those who continue with Compulsory Module 144 commonly become what Conway and Powell (1986) call "non-starters", because they commonly would not participate in any of the associated formative assessment activities.

## **4.3. ANALYSIS OF DATA GENERATED BY THE LEARNING MANAGEMENT SYSTEM (LMS)**

The response rate was 100% due to the fact that the researcher obtained participants' consent to collect data automatically generated by the LMS. Data from 14 July 2014 to 1 December 2014 and 20 January 2015 to 20 May 2015 for all participants, individual participants, individual resources and activities were retrieved from legacy logs in the LMS reports of Compulsory Module 144 and Compulsory Module 214. Data were downloaded as Excel files. These files provided a large

amount of data on time (date and time when the participant logged in); name of the participant (which was kept anonymous by researcher); affected participant; event context (information on resource or activity accessed by the participant); component (information on actions of the participant); event name (what the participant actually did); description (description of what the participant did); origin; IP address. Data mined from the LMS carries the risk of the researcher losing track of the purpose of study (See 2.2.1). I remained focused, however, because the purpose of my study was to determine underlying reasons why students access resources added in the LMS and participate in activities created on the LMS as a Key Performance Indicator. I thus analysed all data except data of the affected user, origin and IP address fields as illustrated in Appendices O to JJJ (Rogers et al., 2010:234).

I found myself “cycling back and forth”, as noted by Miles and Huberman (1984:228), in that the process of data collection, data interpretation and drawing of conclusions overlapped, as illustrated in Fig 2.3. An overlap of processes is affirmed by Stake (2005:450) who refers to a case study as a “continuous interpretation of data on first encounter and again and again”. Such continuous interpretation allowed me to concentrate on exploring patterns of students’ use of resources in the LMS in detail, in order to discover and spotlight their preferences (Bell, 1998). Since I investigated the variables associated with student learning resource preferences in the LMS, the context of use of resources and participation in activities, the patterns and trends of using resources and participation in assessment activities that came up, the lesson that I learned, the fact that my study is being bound by time and place, and by description of context, enabled me to study the situation in depth and thus gave me an opportunity to compile a report of data about “why” students prefer to access specific types of learning resources and participate in some assessment activities on the LMS (Bell, 1998).

I found that reporting on the findings was not linear because I had to “loop between data mining phases”, as illustrated in Figure 2.3 and Table 3.1, particularly that this is a discovery driven study. Since this study has no hypothesis, patterns and tendencies were discovered in students’ usage of learning resources and their participation in assessment activities on the LMS (Larose, 2005; Ventura, et al., 2007:371). Hence, this is an educational data mining study that attempts to determine why students prefer to visit some resources and participate in some activities on the LMS (Peregrina, et al., 2014).

The purpose of collecting students' data generated by the LMS was to sift through the data to determine: Which variables are associated with student learning resource preferences on the LMS? The raw data were first cleaned by highlighting records of users that were not part of the cohort that participated in the study (Larose, 2005). I used class lists of students enrolled for Compulsory Module 144 and Compulsory Module 214 that was obtained from the lecturer to ensure that appropriate data for this study were analysed.

Thirty five and 52 students were enrolled for Compulsory Module 144 and Compulsory Module 214 respectively. Compulsory Module 144 and Compulsory Module 214 were sampled because they are compulsory in three programmes, the only three of five programmes offered on the full time basis and DE platform, and they are registered by a high number of students as outlined in chapter 3 (3.4). Notably, these are modules that academically prepare future military leaders of the South African National Defence Force (and by affiliation, Stellenbosch University) towards their professional application and stated graduate attributes.

In Compulsory Module 144, all 35 students were enrolled on distance education mode. Distance education students used the LMS, while their residential counterparts did not. Appendix ZZ gives a list of 35 students anonymously who participated in the study, giving a breakdown of their number of times they accessed resources and activities, number of days viewed, average time on the LMS, number and percentage of resources viewed, activities participated in and their selected biographical information relevant to this study.

Compulsory Module 214 was registered by 52 students. Forty eight and four students were enrolled on full time basis and distance education mode respectively. Eighty six percentage (45) of the students were the residential students who had enrolled for Compulsory Module 144 in 2014 but were not compelled to use the LMS, and 2% (1) was a distance education student who was enrolled for Compulsory Module 144 in 2014 and was compelled to use The LMS in 2014.

### **4.3.1. Demographic details of participants enrolled for Compulsory Module 144 and Compulsory Module 214**

Appendix G and Appendix H provide demographic variables of students who participated in the study.

#### **4.3.1.1. Age and gender**

The use of resources and participation in activities on the LMS was analysed according to age and gender. Students' ages were put in categories of five year intervals. Their ages were obtained from the institutional class list. The participants of this study comprised of 14 female and 21 male students, 7 female and 45 male students in Compulsory Module 144 and Compulsory Module 214 respectively as shown in Appendices G and H. It was not possible to obtain an equal number of female and male participants, particularly that the military has been mainly male dominated historically, and remains so currently. The few number of females can be traced back to before 1970 when females were not recruited at all because of their perceived physical inferiority that led to the assumption that they were unsuitable for combat (Heineken, 2002). Moreover, women could not reside at the Faculty of Military Science before 1999.

One would have expected to have more female students, since it was endorsed in the White Paper on Distance Education that distance education should play a significant role in expanding access, equity, diversifying body of students, more especially for students who cannot afford to study on a full-time basis (DoE, 1997: 26). The LMS makes provision for students to access learning resources anytime and anywhere, but, findings in this study reveal that students prefer to view only some resources and participate only in some activities. Thus, access is not guaranteed through availability. This was evident when students cited time constraints as a challenge that impacted in their engagement with learning resources on and off the LMS.

“I am a single parent. When I get home, I must to prepare supper, help my kids with homework, play with them and wait for them to sleep so that I focus on my studies without distractions” [1423, 2015].

“I took the programme with a very demanding job. I am the OC [Officer Commanding] of the unit. Time is very limited for me. I have to squeeze in everything at night when my kids were asleep. Sometimes I almost missed the submission dates” [User 1402, 2015].

It can further be seen from the Appendix G that the majority of students were aged between 26 and 35 (77%), and the average age was 30 in Compulsory Module 144. In Compulsory Module 214, the majority of them were aged between 21 and 25 (71%), the average age was 24. In Compulsory Module 144 the oldest and youngest age of a male student 46 and 24 respectively, while the oldest and youngest female student was 40 and 26 respectively. It can also be seen that in Compulsory Module 214, the oldest and youngest of male student 36 and 21 respectively, while the oldest and the youngest female student was 29 and 23 respectively. It was noted that the oldest student in Compulsory Module 214 was studying in DE mode. Such a diverse body of students suggests that many students have been out of formal education for between 10 and twenty years. This statistic that not account for disparity in education, a potentially strong factor in students' ability and propensity to utilise LMS optimally.

It was found that the both young and old students were differently prepared for academic discourse. It was found that 33% of students enrolled for Compulsory Module 144 submitted their paragraph type activities (See Appendix WW). The low submission of paragraph type activities was evident in students having uploaded their draft assignments and case studies in the LMS, but did not submit them. One student pointed out he was less confident of the way he answered the question

“The quizzes were easy to do. If I studied the chapters well, I got total. With the case studies, even if I studied the chapters, but I was kind like not sure whether this is how the lecturer wanted me to answer” [User 1426, 2014].

Another student indicated in the survey questionnaire that the reason why he did not do some of the activities was that

“Research assignments required more effort and were more time consuming, although it does improve one's understanding of the work” (See Appendix EEE, Responses to open ended questions in the questionnaire, Question 3).

#### **4.3.1.2. Participants' rank according to the Arms of Service**

This section outlines activities of the participants in the LMS according to rank in the two sampled modules. The participants' military rank was categorised as Senior Officers (SO), Junior Officers (JO), Warrant Officers (WO), Non-Commissioned Officers (NCO) according to their Arms of Service and gender.

The following was found in Compulsory Module 144: It was found that two female and one male student from two Arms of Services never logged in on the LMS. One of them was a female senior officer who withdrew from the studies due to work commitments. Two of them were non-

commissioned officers who withdrew because of external deployment. It was established that all senior officers who logged in on the LMS viewed more than 50% of learning resources and participated in more than 50% of assessment activities. This would mean that junior and non-commissioned officers viewed less than 50% of resources and participated in less than 50% of quizzes and case studies respectively (Appendix WW and Appendix XX).

It was further found that all senior officers commonly visited the LMS late in the afternoon after office hours, in the evening and very early in the morning, whereas the junior and non-commissioned officers commonly visited the LMS in the morning and afternoon. It was found during interviews with one senior officer that senior officers did not have time to visit the LMS during working hours, due to work commitments and leadership responsibilities, whereas junior and non-commissioned officers requested permission to utilise the Internet in their offices and in libraries in their units during working hours. Besides work commitments, one senior officer indicated during interviews that she preferred to visit the LMS late at night and early in the morning so that she could concentrate on her studies without any distractions. She also indicated that she had to lead by example to her peers and junior colleagues also studying on distance education mode (User 1402, 2015).

Her explanation could be one of the reasons why all senior officers participated and submitted more than 50% of their activities. This then suggests that senior officers already had time management skills, since it was established in the LMS that they commonly worked at night until the early hours of the morning. This further suggests that the senior officers were able to reconcile the demands of their daily responsibilities in their military units, domestic responsibilities and their studies, whereas their junior counterparts appeared to find it challenging. Surely, control over time is a factor to consider in conjunction with time management skills per se. It was established that students in the lower rank found it challenging to cope with their daily responsibilities in their units and the actual package of their studies, particularly those who were the only ones studying in their units. Students whose colleagues were studying appeared to support one another. One of the students in the lower rank pointed out during interview that the reason for submitting all assessment activities was due to lack of Internet access during deployment.

“I had signal problem when I was in a border deployment. Couldn’t connect to Internet most of the time. Otherwise, I was gona [going] do the assignment in the Internet café, but transport was a problem. I could get transport to go to the café after work, but not in the evening and it was not safe to ask anyone for a lift. It’s a matter of doing it on weekend if I was off, or I ask permission which I sometimes did not



get. Sometimes, like when we are preparing for an operation, I have to be there” [User 1409, 2015].

Another student in the lower rank indicated the impact of lack of Internet access in the unit that resulted in inability to submit all assessment activities:

“The work was too much for me. It’s not easy to study part time. I can only do my assignments after 4. Yes, I can do the quiz in the library of the unit if I have time. But sometimes when you go there, you find someone using the computer with Internet” [User 1432].

Findings revealed that students enrolled for Compulsory Module 214 found that 81% and 19% were Candidate Officers and junior officers respectively. Students indicated during focus group interview that they visited the LMS when attending classes in the computer labs, during free periods and after hours.

It was also found that the less difference in rank enabled students to participate in collaborative activities. Student participation in collaborative activities can be seen in 42% and 27% of students who participated in discussion forum and commenting in each peers’ blogs (Appendices R and KK). It can be seen that students could easily interact as peers.

In addition, almost all students (94%) and only 6% enrolled for Compulsory Module 214 were studying on full times basis and distance education mode respectively (Appendix H). Before renovations started in the institution case studied, all residential students had access Internet in two computer labs. South African Air Force (SAAF) students had access to Internet in their rooms as well. The 3 (5.8%) students who never logged in on the LMS were studying on full time basis and had withdrawn from their studies, due to personal reasons.

#### **4.3.1.3. Year passed grade 12**

Figure 4.1 shows that 91% of students enrolled for Compulsory Module 144 passed grade 12 before 2005, while 63% of those enrolled for Compulsory Module 214 passed grade 12 after 2005. It would suggest that besides military courses, first-time HE distance education students started their

studies after a rather long absence from formal education, an absence of at least a decade. Such absences imply that these students need to balance a variety of complex commitments in their lives. These include being prepared for academic demands of social of higher education, time management, coping with daily work responsibilities, coping with reality of studying through a distance education mode, and managing domestic roles (Mowes, 2005, Makoe, 2006). In addition, it is commonly assumed that older students who enter universities without prerequisite learning technology skills are at a considerable disadvantage initially and thus need to adapt to academic social demands of higher education. This is aggravated by forces of habit associated with military courses which are largely dominated by prescriptive learning (Esterhuyse, 2009; Juhary, 2009). Perhaps one of the implications of prescriptive learning is that this type of learning can be problematic in that students can become passive recipients of information, in that military personnel have been trained to take orders without questioning (Esterhuyse, 2009). On the other hand, this begs the question why so many disciplined soldiers do not display the same discipline in submitting on time and in following clear assignment instructions. This is a factor that requires further scientific scrutiny as a potential performance enhancing factor in the distance education in the LMS.

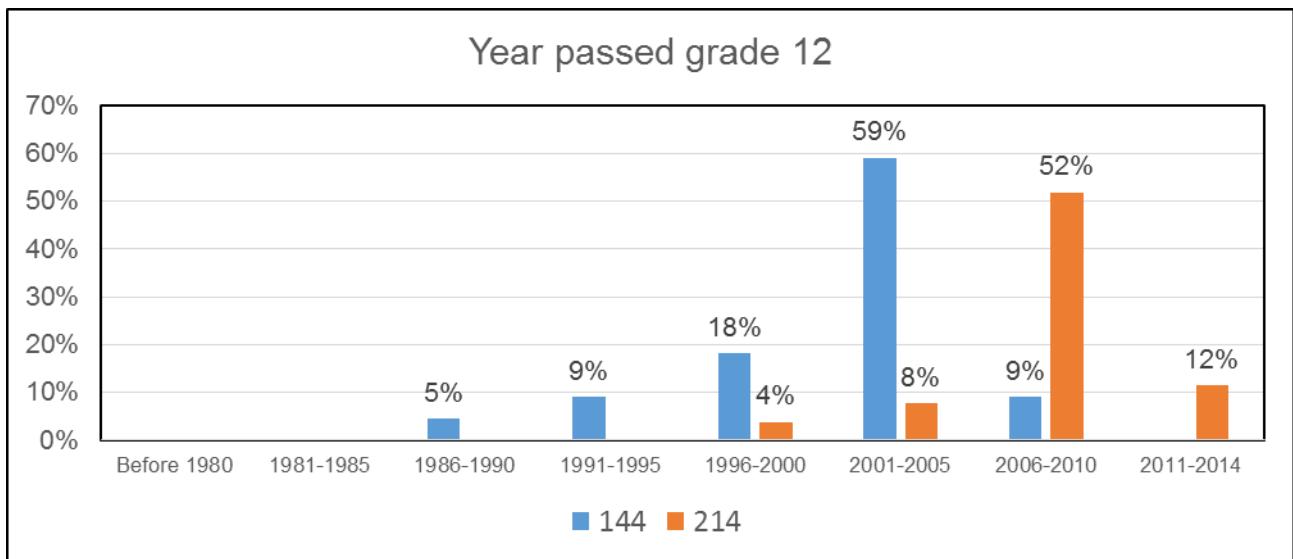


Figure 4.1: Year in which students passed grade 12

#### 4.3.1.4. Skill level of the LMS

One statement of the questionnaire survey asked students to rate their skill level of the LMS as either very confident users, confident users, not confident users or not used (Appendix C, Item 9). This question was asked to determine the extent to which the skill level possibly had an impact on students' access to resources and participation in assessment activities in the LMS. Responses on

skill level of the LMS show that almost all students were proficient with the LMS. Their proficiency can be seen in Fig 4.2 in which 82% of students enrolled for Compulsory Module 144 were confident and only 19% were non-confident users of the LMS. Their proficiency can further be seen from 95% of students enrolled for Compulsory Module 214 who were also confident users of the LMS. The non-confident users could be an explanation, for example, of why User 1404, User 1414 and User 1425 only viewed the course without accessing any specific resource or activity for the first three days that they visited the LMS (Appendix III).

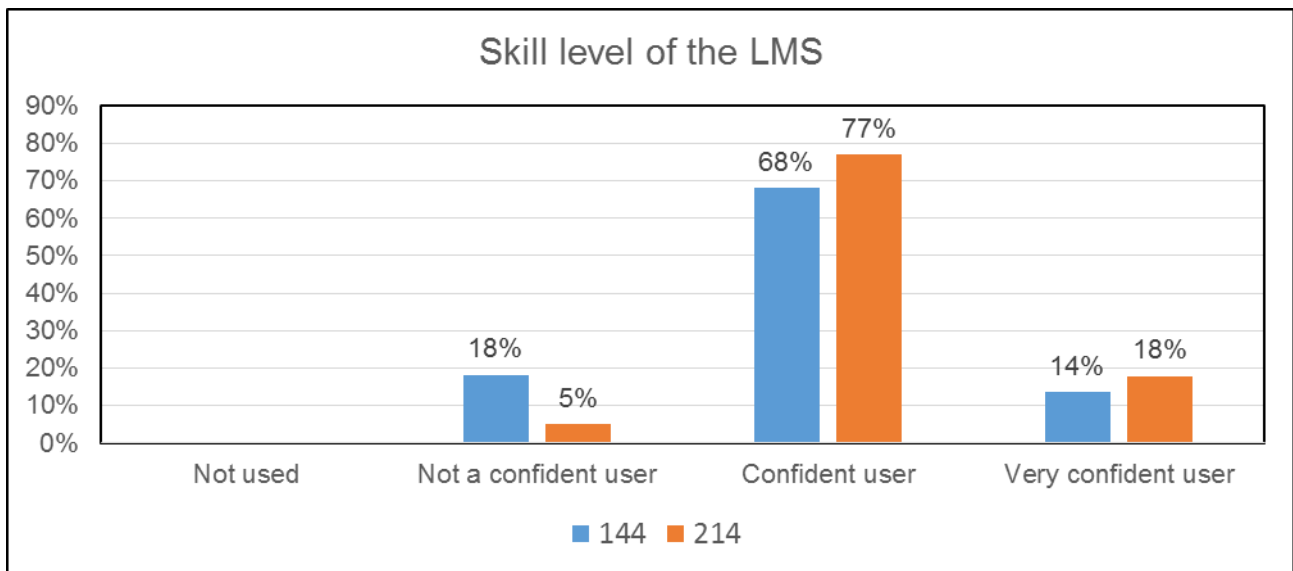


Figure 4.2: LMS Skill level of the LMS

The findings on demographic information indicate that the profile of students participating in this study is diverse. The demographic information provided important information in contextualising my analysis and my interpretation of students' data collected from the legacy logs of the LMS reports. Worthy of note is that the demographic information discussed above echoed much of what was found in the literature review. For example, the impact of age, capability, motivation and processing of information on LMS utilisation mirrors to a large extent what was discussed in Chapter 2 (2.6.4 and 2.6.5). It is evident that the incorporation of biographic information provided me with the context of understanding the patterns and trends of using learning resources and participation in assessment activities in the LMS, particularly since research relies on an educational data mining methodology.

### 4.3.2. Analysis of design of resources and activities on the LMS

In order to present the findings on the design of resources and activities on the LMS in as logical a manner as possible, it would be necessary to first outline the design of the resources and activities and then present findings on their usage according to how they were sequenced. These resources and activities of Compulsory Module 144 and Compulsory Module 214 were organised into folders and packaged into eight and twenty sections respectively as outlined in Appendices I and J. The detailed outline of learning resources presented in Appendices I and J was influenced by the Curriculum Studies positioning of my study as explained in paragraph 1.7.

Appendices Q to BBB provide an analysis of design of resources and activities on Compulsory Module 144 and Compulsory Module 214. In this study, learning resources encompass resources and activities. “Resources” comprise course content added on the LMS, while “activities” were activities that were created either for marks or not for marks to assess level of understanding of the course content. It was found that resources constituted 78% and 62% of learning resources of Compulsory Module 144 and Compulsory Module 214 (See Figure 4.3) respectively. It can also be seen on Figure 4.3 that assessment activities constituted 24% and 38% respectively.

It has been noted that although resources were more than assessment activities, students viewed and participated more in assessment activities than resources. One student pointed out that he was bound to do assessment activities. Students focused more on qualifying for the exam and passing the modules than on accessing resources.

“[...] The quizzes and case studies is a must” [User 1413, 2015].

Resource were mostly Word documents, PDFs, Powerpoint slides (PPT), audio files and collaborative activities packaged into sections as outlined in Appendices J and K. To determine how students engaged with resources on an off the LMS, I used the framework (Table 3.1) that I developed from the Curriculum Studies perspective. It was found that resources were mostly explanatory text, audio and visual information that students had to read, listen to and look at.

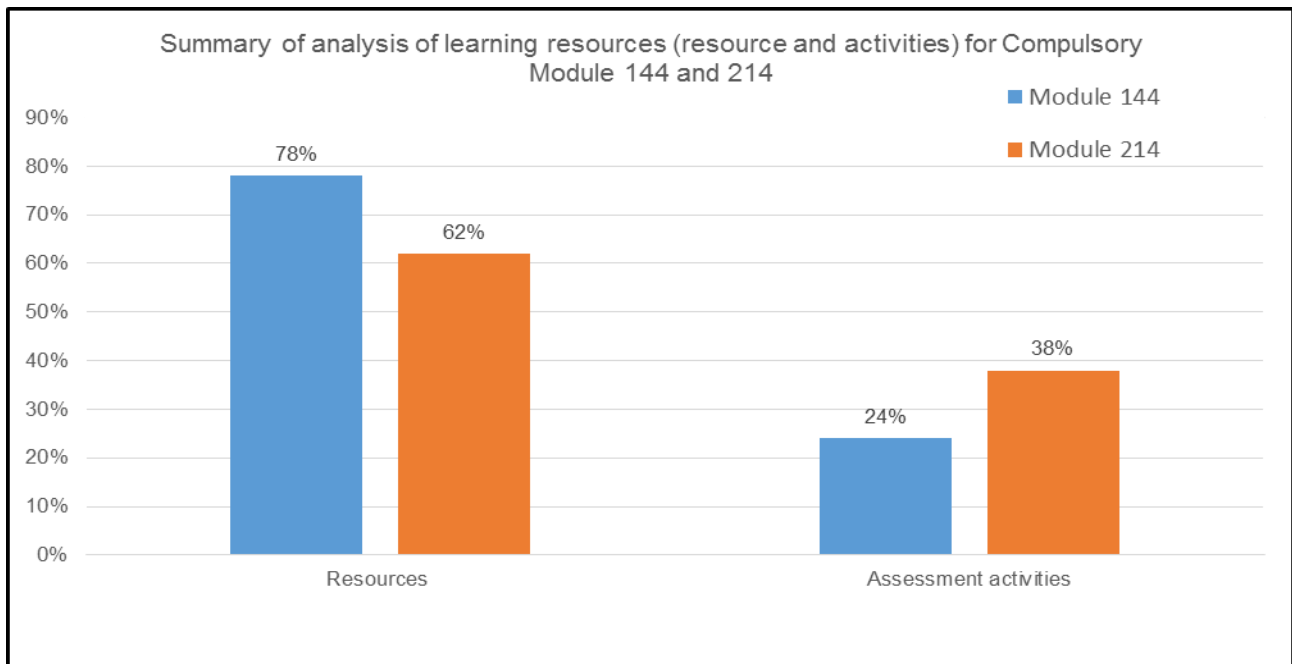


Figure 4.3: Summary of analysis of learning for Compulsory Module 144 and 214

#### 4.3.2.1. Analysis of the use of resources and students' participation in activities packaged in sections 1 to 8 of Compulsory Module 144

The chapters were all packaged in PPT slides. Each chapter began with a list of learning outcomes that students were expected to achieve at the end of a chapter (See Appendices P, T, X, BB, FF and JJ for list of verbs used in the learning outcomes). Each slide comprised of either of words, pictures or diagrams or both words and pictures and diagrams. It was noted that important information was mostly highlighted by using headings, bullets, italics, boldface, font size, underlying, arrows, icons, and were presented as diagrams and recorded as audio files. It was also noted and confirmed by the lecturer that each slide comprised of small chunks of information and only relevant information was included.

Each chapter was concluded by a set of questions that students could answer to assess their level of understanding, but not for submission or assessment towards their final mark. The number of slides of the chapters and calculation of the final mark of Compulsory Module 144 is outlined in Appendix K.

It was found that the content of the PPT slides required students to look, read and form concepts of the acquired information, either on, or off the LMS. The type of learning that students were involved in was commonly “acquisition” (See Appendices P, T, X, BB, FF and JJ, Figure 4.5).

It can be seen that the amount of content in all chapters ranged between one and sixty slides. According to the cognitive load theory, eight chapters with slides ranging in number between 31 and 60 can be considered to have more than reasonably acceptable amount of content to cover in one chapter, especially for students that have been out of formal education for more than ten years.

Two students attested to the impact of high number of slides on their decision to engage or not engage with resources:

“My mind just switches off when I see many slides” [User 1413, 2015].

“One chapter with 50 slides. It’s like reading the chapter from the textbook” [User 1413, 2015].

Too much content can have implications on the WM, since the WM is assumed to be limited in capacity. It is argued that the WM can readily process small amount of information at a time (See Chapter 2, 2.4.2). This then suggests that the amount of content in a lesson can impact on the encoding of information in the long term memory (2.4.2), particularly when students had to look at the resources, read them and understand the content on their own without lecturer’s face-to-face accessibility. The level of involvement with the resources was mostly verbal and visual. According to Dale’s Cone of Learning, students tend to remember between 10 to 30% of what they read, hear and see after two weeks (2.5.1.1, Figure 2.2).

Section 7 contained quizzes (See Figure 4.5). All quizzes were available on the LMS throughout the semester. Except Activity 1, students could open and complete them within a week. Section 8 had one assignment and five case studies (See Figure 4.5, Appendix RR). The assignment and five case studies were available throughout the whole semester, but students were supposed to upload them on the LMS on or before the due dates.

#### **4.3.2.2. Analysis of the use of resources and students’ participation in activities packaged in sections 1 to 20 of Compulsory Module 214**

Compulsory Module 214 comprised of 20 chapters, but chapter 13 was not prescribed content. It was found that resources and assessment activities, especially quizzes were integrated into sections 1 to 19, while section 20 comprised of paragraph type assessment activities only. Tools used to create learning resources in Compulsory Module 214 appeared to promote learning through “acquisition”, “inquiry”, “practice”, “production” and “discussion” as outlined in Appendices R, V, Z, DD, HH, LL, NN and PP.

For example, acquisition of knowledge was commonly promoted through reading content in PPT slides ranging between one and sixty and listening to voice over PPT slides. Practice have been promoted through onsite visit, while production have been promoted through taking photos during onsite visit, creating blogs, presentations and writing report. Discussion have been promoted through contributing in discussion forum. Lastly, collaboration have been promoted through wikis, critiquing and commenting on peers' blogs.

The types of learning promoted through learning resources in Compulsory Module 144 and 214 can be seen on Figure 4.4

It can clearly be seen in Appendix III and JJJ that resources and activities in the LMS were not accessed according to how they were packaged. The daily actions on Appendix III and JJJ reveal that students commonly accessed resources according their relationship. For example, a student would access Resource 1411 (Description of Activity 10) and then access Activity 1402, Activity 1410, Resource 1407, 1408, 1409, 1410 (chapters that a student should study in order to do Activity 2 and 10). On day one (Appendix III), User 1402 accessed Activity 1401, Resource 1401, Activity 10, Resource 1411 Resource 1407 Resource 1408 Resource 1409 Resource 1410.

Students often spent less time in such visits because they only clicked the resources and activities to download them. Students indicated that they downloaded the resources, saved them in their computers or printed them so that they could read offline. It was however found that they spent more time when they viewed resources and did a quiz or when they did a quiz only in one visit (See Appendices P, T, X, BB, FF, JJ, RR and TT for Compulsory Module 144. See Appendices R, V, Z, DD, HH, LL, NN, PP and VV.).

The results of how students accessed resources added on the LMS and participated in the activities are presented according to the way in which they were sequenced in sections one through eight for and one through 20 for Compulsory Module 144 and Compulsory Module 214 respectively.

#### **4.3.2.2.1. Findings on the use of resources added in section 1 of Compulsory Module 144 and Compulsory Module 214**

##### ***A. Compulsory Module 144***

As outlined in Appendix I, section 1 had six folders with descriptive titles. It was found that Resource 1401 was visited most than all resources in the LMS, because it contained the study guide, assignment guide that provided aspects that should be addressed in their assignment, an example of an assignment, submission dates of the graded activities and previous question papers. All seven students indicated during interviews that the information in Resource 1401, the textbook and the assessment activities was all they required to pass Compulsory Module 144. This high number of visits can be seen from Appendices O and P that Resource 1401 was accessed by 31% (11) of students in more than seven days, while another 31% (11) and 17% (6) accessed it for two to six days, and one day respectively.

It was found from the seven students who were interviewed that Resource 1401 was viewed most, because it contained the study guide. They indicated that the study guide provided all important information they needed for Compulsory Module 144. Another reason provided by four students during interviews was they wanted to ensure that they have downloaded all previous question papers in order to prepare for the semester test and examination. User 1429, for example, visited Resource 1401 a total of 92 times in 27 days (Appendix O).

It can further be seen in Appendix P that Resource 1401, Resource 1402 and Resource 1406 were visited by 31%, 6% and 6% of students respectively for more than one week. Seeing that 80% of students visited Resource 1401 for 83 days, shows that students wanted ensure that they have all necessary information. Another explanation provided by three students during interviews was that some files, such as submission dates, were updated and students were notified of the changes. It can be seen on Appendix P that Resource 1401 is the only resource that was viewed from July to November.

However, the number of students who visited resources in section 1 declined drastically in Resource 1402, because Resource 1402 was a collaborative activity (forum) that was not assessed. Students regarded learning resources that were not for marks as extra resources. Two students indicated during interviews that they did not have time for extra (See 2.4.2).

I don't have time for extra stuff. I read stuff that will be in the exam. I submitted quizzes and case studies for marks, but were too many for one module. I wanted to qualify for exam"  
[User 1413, 2015].



It's not like I am not interested, sometimes there's nothing interesting. I don't see the need why. How can I say it? Most of the time it's not necessary. I didn't see it necessary for me. I had to know the prescribed book that I had to use. If I see it is necessary for the exam" [User 1409, 2015].

Reasons provided for not engaging with resources regarded as extra can clearly be seen that the number of students dropped by 50%. Only 14 students visited Resource 1402 and Resource 1403, compared to 28 students who visited Resource 1401. Two students attested in the questionnaire survey that they preferred to search their own answer than using the LMS

"You may as well Google your question rather than to go on SUNLearn".

"I do not view you tube video on the sunlearn platform as I can access you tube without accessing sunlearn".

In similar vein, 50% (9) of 18 students who visited Resource 1404 did not visit Resource 1405. An explanation provided by three students during interviews was that Resource 1405 was a Word document that provided information on how Activity 9 (assignment) was going to be marked, of which the information was also provided in Activity 1409.

In section 1, only the first resource (Resource 1401) and last resource (Resource 1406) was visited by more than 50% of students, because Resource 1401 contained a study guide and Resource 1406 provided information on submission dates of all activities, and the lecturer periodically updated it. Resources in section 1 were mostly visited in the afternoon, because students had to read the resources for information. It was found during interviews that resources visited in the afternoon were the ones that required them to commit less cognitive energy (2.3.2).

It was further noted that none of the 15 resources placed below Resource 1406 were not visited. These resources comprised of a forum that was not marked, an online pre-course survey questionnaire and 13 audio files that the lecturer recorded of specific chapters that, according to the lecturer, students struggled with. An explanation for non-participation in these 15 resources was that all seven students who were interviewed considered them as additional resources since they had generic titles. An explanation provided during interviews was that the 15 resources were placed under one generic folder as a list of resources with non-descriptive titles, whereas all other

resources had descriptive titles, were partitioned and placed chronologically under descriptive themes. Four out of seven of the interviewees indicated that they were not aware of the audio files. Another explanation provided by the lecturer was that the audio files were added after realising that some students were struggling with the key concepts in some chapters.

It was further found from seven students who were interviewed that distance education students commonly saved and printed later, or printed resources rather than reading text from screen. They indicated that their mobile devices had small screens and they did not like scrolling. They also indicated that printed materials were more easily accessible than audio files because audio files needed mobile devices. Six out of seven students interviewed indicated they did not have access to electricity to charge their devices, in particular because they often worked “in the field” (away from physical resources). It was found that students on internal and external deployment commonly experience challenges of poor reception (2.6.1). Such challenges have been affirmed that military students on deployment face challenges of finding reliable Internet connectivity, or electricity to power their mobile devices (2.6.1). It was noted that Resource 1402 was a forum that students viewed instead of exchanging ideas. “Explanation” and “description” were the teaching strategies employed in section 1 except Resource 1402. The level of involvement on and off the LMS was reading and listening. It was clear that the learning experiences elicited was “apprehension”, and the type of learning was “acquisition”.

### ***B. Compulsory Module 214***

It was found that only two resources (Resource 1501 and 1506) out of twelve in section 1 were visited by less than 50% of students. It was not surprising that Resources 1501 and 1506 was accessed by students less than 50%, because felt that there was no need for them to login in the LMS. Two students pointed out during interview:

“I can only listen to the PPT slides with voice over if I missed something in class”  
[User 1511, 2015]

“Same content presented in the class was available in the Intranet” (See Appendix FFF).

Resource 1501 was a folder that comprised of a study guide, submission dates, assignment guide, assignment topics, assignment example, group activity and presentation rubric, while Resource 1506 was forum. Resources 1502 to Resource 1505 and Resource 1507 to Resource 1512 were not visited, because they were not for marks.

#### **4.3.2.2.2. Analysis of the use of resources added in section 2 of Compulsory Module 144 and Compulsory Module 214**

##### ***A. Compulsory Module 144***

It can be seen in Appendix V that the middle resource (Resource 1409) was visited most and students also spent most time on it. A reason provided during interviews was that Resource 1409 had much more content than other resources in section 2. It was also found during interviews that the amount of content led students to consider Resource 1409 to be containing complex information, because it had 31 to 40 slides

“One chapter with 50 slides. It’s like reading the chapter from the textbook” [User 1413, 2015].

“What is on the slides is actually what is in the book. There is no purpose for me to read the slides. I knew, it would not make a difference. Anyway, I must read the textbook even if I have the slides. I did not see the need for me to download the slides” [User 1407, 2015].

Students thus associate quantity with quality, often wrongfully. Such teaching and learning activities are described as having high elements of interactivity (2.3.2). Although Resource 1409 was viewed most, only 51.4% (18) of students visited it, while Resource 1411 was viewed by 60% (21) of students. One student expressed the feeling about the number of slides as:

“My mind just switches off when I see many slides” [User 1413, 2015].

One reason for Resource 1409 to be visited by students fewer times than those who visited Resource 1411 was that User 1429 alone (Appendix U) visited Resource 1409 an exceptional 45 times in 4 days. Seeing that User 1422, 1423, 1424, 1428, 1429 and 1435 (Appendix U) visited Resource 1409 more than one day, implies that students were struggling to understand the content of this resource.

It was found that only Resource 1409 and Resource 1411 were visited by students above 50%. Another reason for Resource 1409 to have been visited by students above 50% was that it stated in Resource 1404 (scope of the semester test) that the multiple choice questions (MCQ) would be from Resource 1408 and 1409 (See Appendix I).

At the same time, it was surprising to see that Resource 1407, 1408 and 1410 were visited by students below 50%, since it was stated in Resource 1404 that the MCQ would be from Resource 1408 and 1409 (See Appendix I). It was also found that Resource 1407 was viewed by students less than 50%, meanwhile Resource 1404 indicated that some of the short questions would be from Resource 1407 and that the marks counted 70% of the semester test. Besides the scope on the semester test, it can be seen that the resources were heavy in content since the number of slides in Resource 1407, 1408, 1409 and 1410 were between 20 and 50. At the same time, the verbs used for the learning outcomes covered both lower and higher order thinking skills. In addition, the description of activity in Resource 1411 indicated that students were expected to apply higher thinking skills. It can be seen from the verbs in the learning outcomes that the resources were sequenced according to level of complexity.

It was however not surprising to see that Resource 1410 was viewed by students less than 50%, since it was not included in the scope of the semester test in Resource 1404. It was found that although Resources 1407 to 1410 were viewed by 47% of students, 80% and 74% of students submitted Activity 2 and 10 respectively.

It was further found that resources in section 2 were viewed by all students in less than a week, because students downloaded and printed or saved them. Students visited these resources mostly in the morning, because they needed to recall the encoded information when doing Activity 1402 and in the semester test. It was found during interviews that students considered the evenings, night times and early mornings to be convenient times to access resources (chapters), download and read them offline. An explanation provided during interviews was that they took less time to download the content from the system, but more time to read the content offline. Two students pointed out:

“Part time is difficult. Unlike the residential students who listen to the lecturer in class. I must read and understand the work by myself. Can say, I take five times more than the residential students” [User 1432, 2015].

“You have to read the chapters and understand on your own. I sometimes had to read some chapters ja like uhm three to four times” [user 1421, 2015, Appendix F].

Participants indicated that they read the content offline several times to form their own concepts, so that they could recall the encoded information when doing MCQ quizzes (Multiple Choice

Questions), in the semester test and examination. They pointed out that it was challenging to understand the course materials without the supervision of the lecturer. This claim has been established from the patterns of their actions when they visited the LMS (Appendix III), which showed that the students commonly viewed Resource 1411 that provided description of Activity 1410, Activity 1411 and Resource 1407 to 1410 in one visit. They indicated during interviews that in such a visit they commonly downloaded the resources and read them offline afterwards. It can be seen in Appendix III that the length of visits was short when students viewed resources and activities, but longer when they did online quizzes. This pattern explains that they seldom read online; they simply download reading material and read offline.

It can be seen that the resources were created to explain content, and that the required level of involvement was “reading”. This then suggests that the teaching strategies elicited “apprehension” and the type of learning was “acquisition”, while the learning outcomes expected students to apply lower to higher order thinking skills. It can be seen from the verbs in the learning outcomes that students were expected to “understand”, “define”, “explain”, “identify”, “analyse”, “justify”, “compare”, “describe” and “discuss” at the end of the four chapters (See Appendix T). It can also be seen in the assessment activity that their level of understanding that students were expected to achieve “differentiate” and “analyse”.

### ***B. Compulsory Module 214***

It was found that MCQ assessment activities (Activity 1501 and Activity 1502) were visited more than Resource 1513 (PPT slides) and Resource 1514 (voice over PPT slides). It can be seen that the number of students who participated in assessment activities was less than those who accessed Resource 1513 and Resource 1514. The percentage of students who participated in Resource 1513, Resource 1514, Activity 1501 and Activity 1502 were 43%, 25%, 23% and 26% respectively. It can be seen that resources and activities in this section were accessed by less than 50% of students. The teaching strategy applied in Resource 1513 and Resource 1514 was “explanation” and “description”. It can be seen that students were less engaged because the level of involvement was “reading” and “listening”. The type of learning evoked by learning resources was “acquisition”. The verbs used in learning outcomes required students to “describe”, “explain”, “understand” and “account” (See Appendix V). In other words, students were expected to apply lower to higher order thinking skills. It can be seen that the level of engagement could not match the expected level of understanding that students had to achieve.

#### **4.3.2.2.3. Analysis of use resources added in section 3 (Theme 2)**

##### ***A. Compulsory Module 144***

As outlined in Appendix I, Section 3 contained six resources, Resource 1412 to Resource 1417. Resource 12 to Resource 16 were chapters with descriptive titles that were packaged in separate folders as PPT slides ranging between 10 and 40 slides. Students were expected to answer questions on Activity 1403 and Activity 1411 that tested their level of understanding on Resource 1412 to 1416. Resource 1417 was a Word file that provided details of Activity 1411 (Case study 2) that tested the level of understanding on Resource 1412 to 1416.

Appendix X shows that the first (Resource 1412) and last resource (Resource 1417) were viewed most and had an equal number of views (48), fairly equal time spent on them and similar number of students viewing them. Resource 1416 had the least number of views, because they did not expect questions from Resource 1416. Instead Resource 1404 stated that some of the short answer questions of the semester test would be from Resource 1412, 1413, 1414 and 1415 and long answer questions from Resource 1413.

Resources in this section were mostly viewed in the morning, because students downloaded the resources, read them and had to recall the information for Activity 1402 and for the semester test. Resource 1412 and 1417 were visited for 22 days and 10 days respectively. It can be seen that all students visited resources in this section in less than a week. All resources in section 3 were viewed by students above 50%, because verbs of the learning outcomes in Resource 1412 to 1417 expected students to use higher order thinking skills. The higher number of students who accessed Resource 1412 to 1417 is evident from the 63% of students who submitted Activity 1403 and 1411. In addition, students visited some of the resources for more than one day, which suggests that students considered the content to be more difficult. This claim can be attributed to five chapters in this theme, with slides ranging between 10 and 40.

It was further noted that the resources were created to explain content, and the level of involvement was “reading”. This then suggests that the teaching strategy elicited was “explanation” and the type of learning was “acquisition”, while the learning outcomes expected students to apply lower to higher order thinking skills. It can be seen from the verbs in the learning outcomes that students were expected to “state”, “describe”, “explain”, “distinguish”, “outline”, “develop”, “define”,

“compare”, “identify”, “stimulate”, “apply” and “discuss” at the end of the five chapters (See Appendix X). It can further be seen in the assessment activity that tested their level of understanding expected students to “analyse”, “comment”, “explain” and “argue” (Appendix X). It can be noted that the level of engagement elicited by learning resources did not match the level of understanding specified in the learning outcomes.

### ***B. Section 3 and 4 of Compulsory Module 214***

It was found that less than 50% of students accessed resources and participated in activities in section 3 and 4 (Appendix Z). Activity 1503 was the only activity that was accessed more than resources and activities in section 3 and 4. In these two sections, students were expected to apply lower to higher order thinking skills. These thinking skills could be seen from verbs that required students to “identify”, “describe”, “discuss”, “outline”, “understand”, and “summarise” (See Appendix Z). It was further noted that the resources were created to explain content, and the level of involvement was “reading” (See Appendix Z). This then suggests that the teaching strategy elicited was “explanation” and the type of learning was “acquisition”. It can be seen that the level of engagement elicited by learning resources did not match the level of understanding specified in the learning outcomes.

#### **4.3.2.2.4. Analysis of use of resources added in section 4 (Theme 3)**

##### *A; Compulsory Module 144*

In section 4, Appendix BB shows that the number of views, time spent, and number of students dropped in each subsequent resource. It can also be seen that the number of days were equal for Resource 1418 and Resource 1419, but drastically declined by 50% in the last resource (Resource 1420). The decline in number of views can be attributed to the fact that the information on Resource 1420 was provided in Activity 1412 (Case study 3). It has been noted that all three resources in section 4 were viewed by students above 50%, because it was stated in Resource 4 that some of the short questions for the semester test were going to be from Resource 1418 and 1419. Although Resource 1418 and 1419 were accessed by 60% of students, it was found that 40% and 37.1% of students submitted Activity 1405 and Activity 1412 respectively. It was found during interviews that four out of seven students indicated that they could not cope with submission of one quiz and one case study every fortnight, because they were enrolled for other modules.

“every fortnight, submitting one quiz and one case study was too much. I was not doing Compulsory Module 144 only. I was doing three modules. Sometimes I find that I have four assignments that I must submit in one week. I was under a lot of pressure. Most of the time I end up not submitting one of them” [User 1432, 2015].

Resources in this section were mostly viewed in the evening and at night, because students needed to recall the acquired information for Activity 1403 and for the semester test.

Furthermore, it was noted that the resources were created to explain content and the level of involvement was “reading”. This then suggests that the teaching strategies elicited “apprehension” and the type of learning was “acquisition”, while the learning outcomes expected students to apply lower to higher order thinking skills. It can be seen from the verbs in the learning outcomes that students were expected to explain “discuss”, “identify”, “differentiate”, “compare” and “advise” at the end of the two chapters (Appendix BB). It can also be seen in the assessment activity that students were also expected to “comment” and “argue” (Appendix BB). “Commenting” and arguing were higher order thinking skills, whereas the level of involvement was low. It can be inferred that the teaching strategy and level of involvement did not match level of understanding students were expected to achieve.

### *B. Compulsory Module 214*

It was found that Resource 1523 was the only resource accessed by 50% of students, while less than 50% of students accessed other resources and participated in MCQ activities in section 5, 6 and 7 (See Appendix DD). Activity 1506 that counted towards 10% of the final mark was accessed by 37% of students, and was the only activity accessed many times in these three sections. It was noted that the resources were created to explain content, and the level of involvement was “reading”. This then suggests that the teaching strategy elicited was “apprehension” and the type of learning was “acquisition”, while verbs used in the learning outcomes expected students to “distinguish”, “identify”, “account”, “explain”, “understand”, “analyse”, “describe”, “solve”, “establish”, “apply”, “interpret” and “carry out” (Appendix DD). It can clearly be seen that students were expected to achieve higher order thinking skills, whereas the level of involvement was low. In other words the strategy elicited by learning resources and level of involvement did not match level of understanding students were expected to achieve.



#### 4.3.2.2.5. Analysis of use of resources added in section 5 (Theme 4)

##### *A. Compulsory Module 144*

It can be seen in Appendix FF that the first (Resource 1421) and last resource and (Resource 1426) were viewed most, while the middle resources have fairly equal number of views. The six resources in this section were viewed by an almost equal number of students from August to November, mostly in September. The last resource (Resource 1426) was viewed for 22 days by students above 50%, because it provided information on Activity 1413 (case study 4). It can be seen that Resource 1421 to Resource 1425 were viewed by students less than 50%, because they did not expect questions for the semester test. The fewer number of students who accessed Resource 1421 to 1425 can also be seen in 34% and 40% of students who submitted Activity 1407 and Activity 1413 respectively.

At the same time, it was seen that User 1401, 1411 and 1420 for example viewed Resource 1421 to 1425 in more than one day (Appendix EE). Students could have perceived Resource 1421 to 1425 with PPT slides that ranged between 20 and 60 to be heavy in content and could have regarded the content to be difficult. Resources in this section were mostly viewed in the afternoon, because there were no questions for the semester test from these resources. They accessed Resource 1421 to 1425 in order to submit Activity 1407 and 1413 that were due during the semester test. Another explanation provided during by five students during interviews was that they were preparing for the semester at night.

Furthermore, it was noted that the resources were created to explain content, and the level of involvement was “reading”. This then suggests that the teaching strategies elicited “apprehension”, and the type of learning was “acquisition”. It was seen that the learning outcomes expected students to apply lower to higher order thinking skills. It can be seen from the verbs in the learning outcomes that students were expected to “advise”, “explain”, “describe”, “identify”, “develop”, “justify”, “appraise”, “differentiate”, “discuss”, “analyse”, “define”, “compare” and “debate” at the end of the five chapters (Appendix FF). It can also be seen in the assessment activity that students were expected to “analyse”, “argue”, and “identify”. It can be seen that the teaching strategy elicited by learning resources and level of involvement did not match level of understanding that students were expected to achieve.

### ***B. Compulsory Module 214***

It was found that less than 50% of students accessed resources and participated in MCQ assessment activities that were created in section 8, 9 and 10 (Appendix HH). Activity 1507 was accessed by 14% of students, but was the only activity accessed many times in these three sections. An explanation provided by the five students of focus group during interviews for a low participation in Activity 1507 and Activity 1508 was that the two activities were meant for distance education students. It was noted that students were “understand”, “explain”, “identify”, “apply”, “define”, “discuss”, “describe”, “account”, “outline”, “provide”, “differentiate”, “determine”, “set” and “perform” (Appendix HH). It could be seen that the teaching strategy elicited by learning resources was “explanation” and the level of involvement was “reading”. It was found that the type of learning “acquisition”. It could clearly be seen that the teaching strategy and level of involvement did not match the lower to higher order thinking skills specified in the learning outcomes.

#### **4.3.2.2.6. Analysis of use resources added in section 6**

##### ***A. Compulsory Module 144***

In section 6, Appendix JJ shows that Resource 1429 was viewed most, because it was a description of Activity 1414. Resource 1427 and Resource 1428 were viewed less, at fairly equal time for equal number of days and by 29% and 26% of students respectively, because students were supposed to study these two resources to answer Activity 1408 and Activity 1414. A low number of students accessed Resource 1427 and Resource 1428, as is evident from the fact that 43% and 34% of students submitted Activity 1408 and Activity 1414 respectively.

It was further noted that all resources in section 6 were viewed by students less than 50%, because Resource 1404 did not indicate any questions for the semester test from Resource 1428 and 1429, but students had to study them for the examination. It was also seen that all students viewed resources in this section in less than one week, because the content was considered less difficult since the section had two chapters with slides ranging between 20 and 40. It was also found that Resources 1427 and 1428 were viewed by 27% of students in less than a week, a week before the examination, which explains why less than 50% of students submitted Activity 1408 and 1414.

Resources in section 6 were mostly viewed in the afternoon, because students did not have to recall the information for the semester test. Six out of seven students indicated that they accessed resources 1427 to 1429 in the afternoon because they had to study for the semester test in the

evening, at night and early in the morning. It can clearly be seen on Appendix JJ that Resource 1428 was viewed by 9 students in one day only. It was found during interviews that five of seven students that were interviewed did not see the importance of submitting Activity 1408 and 1414, since they were due during the examination time. Two students felt that Activity 1408 and 1414 helped to prepare for the examination. In addition, five students felt it was not important to submit the Activity 1414, because they had already submitted three cases that counted 30% towards their final mark.

Furthermore, it was noted that the resources were created to explain content and that the level of involvement was “reading”. This then suggests that the teaching strategies elicited “explanation” and the type of learning was “acquisition”, while the learning outcomes expected students to apply lower to higher order thinking skills. It can be seen from the verbs in the learning outcomes that students were expected to “investigate”, “summarise”, “understand”, “explain”, “discuss”, “analyse” and “debate” at the end of the two chapters (See Appendix JJ). It can also be seen in the assessment activity that students were expected to “explain”, “describe” and “analyse”. It can be seen that the teaching strategy and level of involvement in this section did not match the learning outcomes that students were expected to achieve.

### ***B. Compulsory Module 214***

It was found that 94% of students accessed Activity 1509, because all students that logged in on Module 214 in the LMS uploaded pictures that they took during the onsite visit (Appendix LL). It can be seen that 8% of students participated in Activity 1510 and that it was accessed more than all resources and activities in section 11 and 12. A few number of students that participated in Activity 1510 can be explained by fact that the activity was meant for distance education students. It was found that the teaching strategies used in resources and activities in section 11 and 12 required students to learn through “acquisition”, “inquiry”, “practice”, “production”, “discussion” and “collaboration” (Appendix LL). It was found that the “explanation”, “modelling” and facilitation as teaching strategies and “reading”, “authentic learning experience by doing the real thing” and “production” as levels of involvement matched level of understanding that students were expected to achieve.

#### **4.3.2.2.7. Analysis of use resources added in section 13 to 16 for Compulsory**

##### **Module 214**

It was found that less than 50% of students accessed resources and participated in activities in section 13 to 16 (Appendix NN). It was found that the verbs used in the learning outcomes required students to apply lower to higher order thinking skills. It was noted however that the teaching strategy elicited by learning resources is “explanation”. It was noted that the level of involvement elicited was “reading”. As a result the type of learning promoted was acquisition. Students were expected to “identify”, “list”, “describe”, “set”, “explain”, “discuss”, “identify”, “describe”, “outline” and “supply” (See Appendix NN). It can be seen that the teaching strategy and level of involvement did not match level of understanding specified in the learning outcomes.

#### **4.3.2.2.8. Analysis of use resources added in section 17 to 19 for Compulsory**

##### **Module 214**

It was found that less than 50% of students accessed resources and participated in activities in section 17 to 19 (See Appendix OO). It was found that the verbs used in the learning outcomes required students to apply lower to higher order thinking skills, because students were expected to “name”, “describe”, “supply”, “identify”, “explain”, “indicate”, “discuss”, “define”, “account”, “understand” and “differentiate”. It was noted however that the teaching strategy elicited by learning resources was “explanation”. It was also noted that the level of involvement elicited was “reading”. As a result, the type of learning promoted was “acquisition”. It was seen that the teaching strategy and level of involvement did not match specified learning outcomes.

#### **4.3.2.3. Summary of analysis of use of resources added on the LMS**

This section summarises student engagement with learning resources on and off the LMS. In this section, I first explain the findings on the visible aspects of engagement and conclude the section by explaining the invisible aspects of student engagement

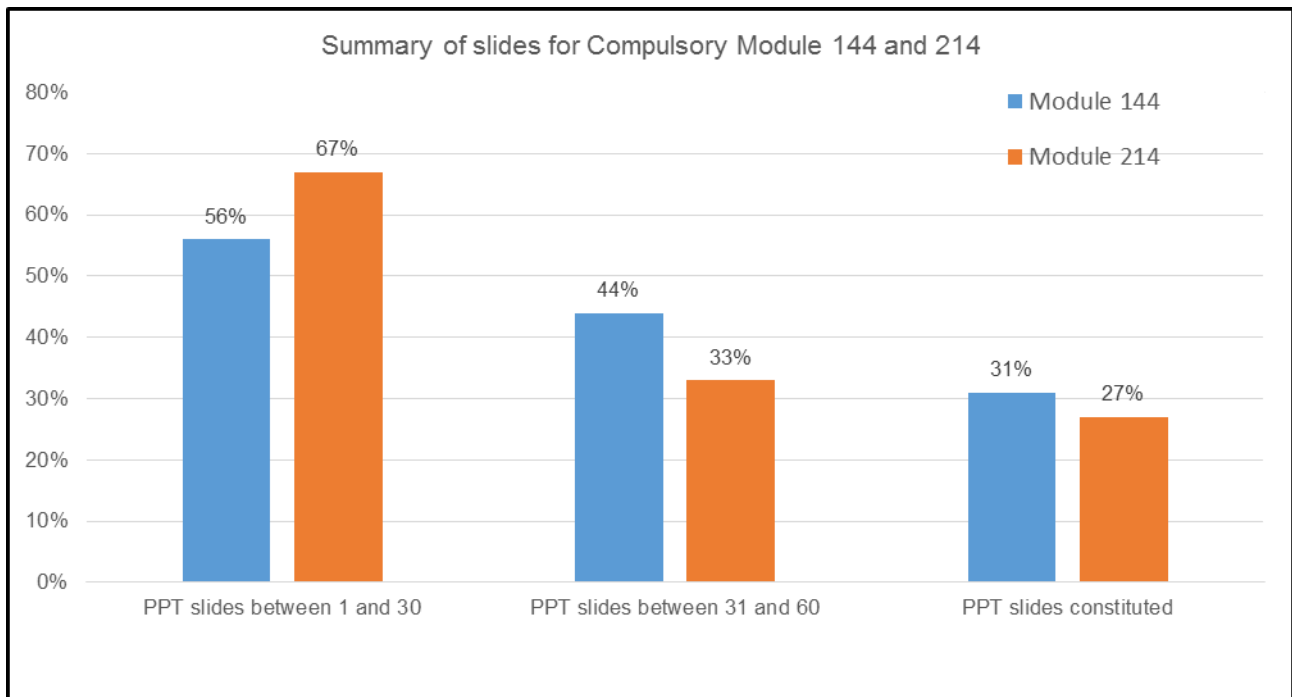


Figure 4.4: Summary of slides for Compulsory Module 144 and 214

#### 4.4.2.3.1. Compulsory Module 144

It can be clearly seen that the trend of viewing the first and last resources most was found in all sections except section 2. However, time spent on the first and last resources was high in section 1 and 5, while it alternated in the other sections. It was also found that time spent on resources was almost the same as the number of views. In addition, number of days spent on resources were high in the first and last resources in section 1 and section 6, highest in the last resource in section 5 and remained lowest in the last resources in section 2, 3 and 4.

It can clearly be seen that Resource 1401, Resource 1402 and Resource 1406 in Section 1 were the only resources viewed for more than one week. It is interesting to note that 80% of students viewed Resource 1401, because of the comprehensive information provided in the study guide, assignment guide, example of an assignment and previous question papers. Students indicated that they only accessed PPT slides of specific chapters that they could not fully understand when they read the chapters from their textbooks. They indicated that previous question papers guided them on how questions were going to be asked in the semester test and examination. Resource 1427 and Resource 1428 were the least viewed resources in Section 6, because some students felt pressed for time when the lecturer expected them to submit Activity 1408 and 1414 during examination time. It was

gathered that resources that were viewed most were the ones that students anticipated semester test and examination questions to be asked from.

It was explained above that of the 32 students who logged in on the LMS, only half of the students (51%) viewed more than 50% of the learning resources, while 49% (17) viewed less than 50% (Appendix ZZ). It was noted that 45% of students viewed more than 70% of the learning resources (resources and activities). It was further found that 8 (23%) female and 10 (29%) male students viewed more than 50% of resources. It can be seen that although female students were fewer than male students, almost an equal number of female and male participants viewed more than 50% of resources added on the LMS.

It can be seen that the common teaching strategy employed was “explanation” and “description”. This suggests that their level of involvement was “reading” and the learning experiences elicited was “apprehension” (Figure 4.4). The type of learning was “acquisition” in all resources, except Resource 1402 and the 15 resources that were not viewed in Section 1. The verbs used in the learning outcomes and assessment activities expected students to achieve lower to higher order thinking skills as outlined in each section.

#### **4.4.2.3.2. Compulsory Module 214**

It was found that resources and MCQ assessment activities were integrated in sections 1 to section 19. It was found that Resource 1523 and Activity 1509 were the only learning resources accessed by students above 50% in section 1 to section 19. It was seen that Resource 1523 and Activity 1509 were accessed by 50% and 94% of students respectively. It was found that that 94% of students accessed Activity 1509, because the teaching strategy elicited high level of involvement (Figure 4.4).

It was further evident from the 94% of students that uploaded pictures that they took during the onsite visit in the LMS. It was also found during interviews that students were of opinion that the blogs enhance their learning experiences. They cited that the blogs provided them with an opportunity to comment on their peers’ inputs, critique their own and peers’ inputs and reflect in their own learning experiences (Figure 4.4). It was seen that students participated more in MCQ assessment activities and less in accessing resources added in the LMS, because the quizzes counted towards 10% of their final mark. Less than 50% of students viewed resources in the LMS because they felt that there was no need to login in the LMS to access same resources were presented in

class and that were available in the Intranet. It could be seen that distance education students were the ones who visited the learning resource more (See Appendix BBB).

### **4.3.3. Analysis of student participation in assessment activities**

This section presents findings on student participation in assessment activities.

#### **4.3.3.1. Compulsory Module 144**

It has been explained in paragraph 4.1.1.2 (a) that Section 7 contained quizzes that were available on the LMS throughout the semester (See Appendix III). Students could open and complete them within a week, except Activity 1401. Activities 1401 and 1406 were optional. Activities 1402, 1403, 1404, 1405, 1407 and 1408 were timed, subject to a maximum of two attempts, and they were opened for a week. Activities 1402 to 1408 were created to check level of understanding on Themes 1, 2, 3, 4 and 5 respectively. It was stated in the description of each activity and in the study guide that the aim of the quizzes was for students to keep up with the course work and to assess their level of understanding in each theme. It was also stated in the study guide that Activities 1402, 1403, 1404, 1405, 1407 and 1408 counted 10% of the final mark. Activity 6 was an optional quiz that tested level of understanding on Resource 1410, and 1411 was not assessed.

Section 8 had one assignment and 5 case studies. Students were supposed to choose one topic from one file in Resource 1401 for Activity 1409. It was stated in the description of Activity 1409 and in the study guide that Activity 1409 counted 20% towards the final mark. Activities 1410, 1411, 1412, 1413 and 14 were case studies that checked level of understanding on Themes 1, 2, 3, 4 and 5 respectively. It was clearly stated in the description of Activities 1410 to 1414 and in the study guide that the aim of the case studies was for students to apply the acquired knowledge to practical situations, and for the lecturer to check if students in fact understood the work. It was also specified in the description of Activities 1410, 1411, 1412, 1413 and 1414 and in the study guide that three of the five case studies counted in total 30% (10% each) towards the final mark. Activities 1409 to 1414 (one assignment and 5 case studies) were available throughout the semester, but students were supposed to upload their assignments and case studies in the LMS on or before the due dates.

### **4.3.3.2. Compulsory Module 214**

It has been previously explained that Activities 1501 to 1514 comprised of MCQ quizzes that counted 10% of the final mark, onsite visit, writing a report on the visit, creating a blog. These activities were integrated with resources added in the LMS in section 1 to 19. Activities 1515 to 1524 were paragraph type questions.

### **4.3.3.3. Analysis of student participation in quizzes (1401 to 1408 in Section 7)**

In this section I explain the findings of how students engaged with quizzes that were created in the LMS. My analysis outlines visible and invisible aspects of student engagement in quizzes created in section 7.

#### **4.3.3.3.1. Compulsory Module 144**

The findings on student participation in quizzes revealed that the number of views on Activities 1401 to 1408 were 221, 4896, 1065, 963, 521, 59, 339, 744 respectively, but Activities 1 and 6 was not marked. It can clearly be seen in Appendix RR that the number of views declined in each subsequent quiz (Activities 1402, 1403, 1404, 1407 and 1408). It can be seen that Activity 1408 had the lowest number of views, because it was completed during examination time, but before Compulsory Module 144 examination was written. It was found during from two students that were interviewed who indicated that they completed Activity 8 with the purpose of preparing for the examination, while five of those interviewed indicated that they did not see the reason for them to complete the quiz during examination time. It was also found that Activity 1402 was viewed most because it was the first activity.

However, four of those interviewed students had mixed reactions about the number of activities that they were supposed to submit for Compulsory Module 144. They felt that submitting a quiz and a case study every fortnight was too much for one module, while three of the interviewees liked it because they indicated that they were able to keep up with their work. Five of the students interviewed felt that six quizzes were too many for them to count only 10% towards their final mark.

Furthermore, by comparison to other activities, students took more time, but fewer days to complete Activity 4. Time taken to complete quizzes increased from Activity 1401 to Activity 1404 and gradually declined. Students took the least time to complete the last activity, Activity 1408. The number of students who participated in the quizzes declined from Activity 1402 and remained equal in the last two quizzes, i.e. Activity 1407 and Activity 1408 (See Appendix RR).



It was further found that more than 50% of students participated (viewed or attempted) and submitted the first four quizzes, while less than 50% participated and submitted the last four quizzes. It was found from two users (among Users 1401, 1402, 1407, 1420, 1421, 1423, 1428 and 1433 who submitted all quizzes that were marked) during interviews that they submitted quizzes 1402, 1403, 1404, 1405, 1407 and 1408 because these six quizzes counted 10% towards their final marks. It can be seen that not all students who participated in the quizzes submitted them. Five of students who were interviewed indicated that they could not submit all six quizzes because the quizzes and case studies were too much for one module. Three of the students who did not submit all six marked quizzes felt that the lecturer was unfair to expect them to submit one quiz and one case study fortnightly because they have enrolled for more modules than Compulsory Module 144. User 1432 for example, expressed his opinion by pointing out:

“every fortnight, submitting one quiz and one case study was too much. I was not doing Compulsory Module 144 only. I was doing three modules. Sometimes I find that I have four assignments that I must submit in one week. I was under a lot of pressure. Most of the time I end up not submitting one of them” [User 1432, 2015].

It was only the second (Activity 1402) and the last quiz (Activity 1408) that were submitted by all students who participated in these activities. According to participants, quizzes were completed in the afternoon mostly, because quizzes required them to reproduce what they had memorised in the respective chapters.

It was found during interviews that students, particularly those in the lower and junior ranks, had to ask permission to access the Internet in their offices and in libraries in their military units to complete the quizzes. Three of the interviewed students who did not have access to Internet in their units indicated that they completed the quizzes in public libraries and Internet cafes during weekends. This was one of the reasons why quizzes were commonly submitted up to the afternoon of the due date. It appeared that the participants were reluctant to partially invest in the cost of their HE, since and all of them are full-time employed members of the DoD.

#### **4.3.3.4. Analysis of student participation in Activity 1409 to 1414 (essay type activities) in Section 8**

Activity 1409 was an assignment with a Turnitin plugin. It was created to check level of understanding of all five themes. Students were supposed to choose one topic from Resource 1401. Activities 1410 to 1414 were case studies that were created to check level of understanding for Themes 1, 2, 3, 4 and 5 respectively. The results on student participation in Activities 9 to 14 revealed that the number of views were 345, 431, 157, 150, 212 and 138 respectively. It can be seen in Appendix UU that Activity 1410 was the only activity viewed by most students (85%), because this was the first case study that they submitted. It can clearly be seen that students spent most time on Activity 1410. It was noted, however, that students spent more days (41) on Activity 1413 and only two days on Activity 1410. There was also an increase in the number of students who participated in Activity 1409 and Activity 1410, but a decline from Activity 1411 to Activity 1414. Clearly, very few students participated in the last case study (Activity 1414), because the due date was during the examination time. Three of the interviewed students had mixed opinions about submitting the case study during the examination time.

It was noted that more than 50% of students participated (viewed and uploaded draft, but did not submit) in Activity 1409 (written assignment), Activity 1410, 1411, 1412 and 1413 and less than 50% participated in the last one (Activity 1414) (See Appendix TT). However, not all students submitted their assignments and case studies, because only Activity 1410 and 1411 (cases 1 and 2) were submitted by more than 50% of students and less than 50% submitted Activities 1409, 1412, 1413 and 1414.

It was surprising to note that less than 50% students submitted their assignments (Activity 1409) knowing that the assignment counted 20% towards their final marks. At the same time, Activities 1410, 1411 and 1412 were submitted well in advance before the due dates, while Activities 1413 and 1414 were submitted until midnight of the respective due dates. An explanation provided by three students during interviews as that they knew that three case studies counted 30% towards their final mark. Another reason found during interviews was that Activity 1414 was due during the examination time.

It was noted that case studies were mostly done in the evening and at night. All seven students indicated during the interviews that they needed to think critically when doing case studies. They

also reported that this time affords them energy and a clear mind once they had rested and their family members had gone to sleep, which reduced potential disturbances. It was also found during interviews that students, especially non-commissioned officers (and junior ranked soldiers) who stayed in the military units, commonly shared their residences (bungalows / cabins [SA Navy]) with colleagues who were not studying. Two students explained that they could focus on their studies when their colleagues were asleep. Van der Walt (2009) found that students in the military units face the challenge of lack of understanding and empathy from colleagues, supervisors and the command element, especially when these officials are not HE qualified themselves. It was established during interviews that students whose co-workers were not studying felt lonely. Instead, Van der Walt (2009) recommends that “co-workers should be involved in the learning process by serving as mentors and first line assessors of the learning success, since they reap the benefits of the learning outcomes”.

It was further seen that 69% of students participated in Activity 1411 in one day, while less than 20% participated in Activity 1409, Activity 1410, Activity 1412, Activity 1413 and Activity 1414 in one day. It was noted that more than 50% of students participated in Activities 1409 through 1414 in less than one week, since students did these activities offline and only uploaded them on the LMS.

#### **4.3.3.5. Analysis of student participation in Activity 1515 to 1524 (Compulsory Module 214)**

The findings on assessment activities revealed that 90.%, 54%, 42%, 42%, 54%, 42%, 37%, 8%, 8% and 10% submitted Activities 1515, 1516, 1517, 1518, 1519, 1520, 1521, 1522, 1523 and 1524 respectively. The high number of submissions of Activity 1515 could be attributed to the fact that the assignment counted 10% and 40% of the final mark for residential and distance education students respectively. It was noted from the class list that all residential students that logged in on the LMS qualified to write examination. The lecturer indicated during interviews that all residential students that logged in on the LMS submitted all assessment activities. It was found that students were given an opportunity to submit hard copies of the activities, because of the inaccessibility of Internet in students' residences and computer labs due to big renovations in the institution in 2015. A low submission rate of Activity 1522, Activity 1523 and Activity 1524 was not a surprise, since these last three activities were supposed to be submitted by distance education students.

#### **4.3.3.6. Summary of participation in short answer (quizzes) and essay type activities (case studies and assignment)**

It was found that students had to apply the knowledge acquired from the same chapters in order to answer questions of the two activities (one quiz and one case study) that they had to submit fortnightly. An analysis of level of involvement with learning resources revealed the invisible aspects of student participation in assessment.

For Compulsory Module 144, it was found that more than 50% of students viewed, or viewed and attempted 50% of the quizzes, while more than 50% participated (viewed or uploaded drafts, but never submitted) in 83% of case studies. It was however noted that although more than 50% of students participated in 83% of case studies, only 33% submitted their assignments and case studies, while 50% participated and submitted the quizzes. One explanation found during interviews with four students was that they were less confident of the answers they provided on their essay type questions.

Their lack of confidence might be why 83% of students uploaded their drafts, and only 33% submitted their assignments and case studies (See Appendix TT). Students claimed that quizzes required lower order thinking skills, whereas case studies required higher order thinking skills. Another reason cited during interviews was the immediacy of feedback in quizzes as compared to case studies (Appendix FFF). They felt that the immediacy of feedback motivated and forced them to prepare beforehand. They also felt that quizzes helped them to keep up with the course work. It was found that quizzes were mostly completed in the afternoon, while case studies were mostly completed in the evening and at night. It was found from five students during interviews that students felt that Activities 1402, 1403, 1404, 1405, 1407 and 1408 (quizzes) required them to apply lower order thinking skills, whereas Activities 1410, 1411, 1412, 1413 and 1414 (case studies) required them to apply higher order thinking skills.

Findings in Compulsory Module 214 revealed that 92% (48) of students submitted assessment activities that counted towards their final marks (Appendix BBB). This high number of submissions is attributed to the scaffold that was provided that enabled students to achieve lower to higher order thinking skills as outlined in Figure

#### **4.3.4. Analysis of number of days and time spent by individual students on the LMS**

##### **A. Compulsory Module 144**

It can be seen in Appendix YY that 9 (26%) students visited the LMS Monday to Sunday, of which 6 (17%) were female and 3 (9%) male students in Compulsory Module 144. It was noted that during the week students visited the LMS mostly on Mondays, Tuesdays and Wednesdays. Wednesdays were peak days. The number of visits declined on Thursdays and Fridays. These days had a fairly equal number of visits. On weekends, Saturdays had the lowest number of visits. The number of students who visited the LMS remained relatively the same on Mondays to Wednesdays, and gradually dropped from Thursdays to Sundays. It was found that the number of male students and their visits on the LMS were more than their female counterparts on Mondays to Saturdays. It was noted that Sundays had the lowest number of students who visited the LMS, but more visits than Saturdays. It can be seen that an equal number of female and male students visited the LMS on Sundays. Sundays were the only days on which female students visited the LMS more than their male counterparts. An explanation gathered during interviews with four students was that Wednesdays were sport days, which in the military implies half-day working hours, in some cases being relieved even mid-morning. Students would then utilise these free hours to visit the LMS. It was also found during interviews with three students that Saturdays were regarded as rest days, or leisure days for participants and their families (such as school sport attendance).

In terms of months with highest frequency of visits, it was found that all students who qualified to write the examination, were the ones who visited the LMS from July to November or August to November (See Appendix YY). This implies that such students engaged more on the LMS. These 17 students submitted their assignments and submitted more than 50% of the case studies. User 1411 for example submitted her assignment, participated in more than 50% of quizzes and case studies, but she did not qualify to write the examination. It was found that User 1411 attempted Activities 1401 to 1413, but only submitted Activities 1402, 1403, 1409, 1410 and 1411. It also found that she could have overloaded her WM because she accessed resources from more than one theme and attempted to do more than one activity in one visit (See Appendix III).

For Compulsory Module 214, it was found that students visited the LMS every day of the week, but mostly on Mondays. The number of visits dropped from Monday to Saturday and increased on Sundays. It was also found that students visited the LMS from Jan to May. It was further found that

all students that spent five to 48 days in the LMS qualified for the examination. The effect of time spent in the LMS and average time spent per day on learning could not be explained, since almost all students that logged in on the LMS qualified to write examination.

It was found that on average students spent 15.1 and 5.7 minutes per day in Compulsory Module 144 and Compulsory Module 214 respectively on the LMS. On average, 46% (16) of students who spent more than 15.1 minutes a day, qualified to write the examination, and only 3% (1) spent less than 15.1 minutes and qualified to write as well in Compulsory Module 144. In Compulsory Module 214, average time spent on the LMS did not have any impact on students' performance.

It was found that on average User 1407 spent 12.4 minutes a day for 35 days and submitted 90% and 100% of the short answer type and essay type activities respectively in 35 days that he visited the LMS (Appendix ZZ). User 1407 was 24 years old and it was found during interviews that he was one of very few English mother-tongue speakers, which could have enabled him to understand the content much easier than most second and third language speakers of English. The impact of this factor on frequency of participation in the LMS as well as its impact on benefiting from the LMS, as compared to those students who are not native English speakers, requires further scientific investigation.

By comparison, User 1411 spent 23.3 minutes a day for 12 days and submitted 67% and 80% of the short answer type and essay type activities respectively. Considering that User 1411 spent 12 days on the LMS, but viewed 79% of resources, and her daily actions on Appendix III shows that she visited almost ten resources in one visit. It can be deduced that User 1411 might have overloaded her WM. In similar vein, it was found that User 1419 on average spent 21.3 minutes a day for 15 days. User 1419 submitted 77.8% and 80% of the short answer type activities and essay type activities respectively, but did not qualify to write examination. An explanation provided by the lecturer was that User 1419 did not submit Activity 9.

It was found that of the 120 notional learning hours that students were expected to spend on Compulsory Module 144 and 214, none of them spent the 48 hours contact time that the lecturer spent with students studying on full time basis. The amount of time on the LMS can be explained by the fact that students spent less time to download resources and upload activities and a bit longer

to complete online quizzes. Six students enrolled for Compulsory Module 144 indicated during interviews that they probably spent two to five times the of notional learning hours since they spent more time reading the textbooks and the PPT slides that guided them to understand the content on their own (without a physical lecturer or tutor present) as well as doing Activities 1409, 1410, 1411, 1412, 1413 and 1414 in Compulsory Module 144 offline. Students registered for Compulsory Module 214 could also have spent more time when doing Activities 1509, 1515, 1516, 1517, 1518, 1519, 1520, 1521, 1522, 1523 and 1524 offline. Calculating the amount of time spent on Compulsory Module 144 and 214 should be incorporated in the future research.

Four of the non-English speakers, particularly those who had long absences from formal education, pointed out that that they spent more time to read and understand the content on their own. This can be substantiated by the students' claim that the written essay type activities were challenging, since they were required to apply high order thinking and academic writing skills. This is evident from the 33% of students who submitted Activity 9 (written assignment), and Activities 1410, 1411, 1412, 1413 and 1414 (case studies) compared to 50% that submitted Activities 1402, 1403, 1404, 1405, 1407 and 1408 (quizzes).

It is further evident that students might have spent more time on Compulsory Module 144 and 214 than other modules, since they accessed resources and participated in the assessment activities Monday to Sunday and even on holidays. It is not easy to calculate notional learning hours on Compulsory Module 144 and 214, since notional learning hours are the “estimated time taken by an average students to achieve the specified learning outcomes” (CHE, 2012).

It was found that User 1435 spent 21.9 hours, which is almost 50% of the contact learning time for the residential students. The less time spent on the LMS then suggests that students could have overloaded their Working Memory when attempting to cover the course work, since the Working Memory is limited in capacity and can processes mostly small amounts of information at a time (Van Merriënboer & Sweller, 2005). An overload of the WM can be attributed to the number of resources that some students accessed during one visit, which were found to be more than what the WM can process (Appendices III and JJJ). Clearly, their WMs were overloaded if students really downloaded the resources, printed or saved them and then read them offline afterwards in one visit as they indicated during the interviews. Looking at the daily actions of individual students in Compulsory Module 144, it is evident that User 1403 for example could have overloaded her WM



when reading all information she downloaded from Resources 1401, 1411, 1407, 1408, 1409, 1410 and 1411 and also participated in Activities 1401 and 1410 on the first day she visited the LMS.

#### **4.3.5. Analysis of patterns that emerged from actions per visit on the LMS**

It can be seen in Appendices III and JJJ that students did not access resources or participate in assessment activities according the way they were packaged. It was found that students commonly viewed one assessment activity (case study), respective resource that describes the activity, the respective resources (chapters) that provide information for the activity in one visit. It was noted that most students submitted Activities 1402 and 1410 in their first to sixth visit on the LMS.

It was found that seven students submitted their activities even before accessing the respective resources. For example Users 1409, 1418, 1420, 1422, 1426, 1430, 1432 and 1433 submitted either Activity 1402 or 1410, or both activities on the first three days that they visited the LMS. These students submitted Activity 1402 and 1410 before accessing Resources 1407, 1408, 1409 and 1410. Five students indicated during interviews that they visited the LMS to do the activities for marks. To such students, the activities were more important than slides, since they had textbooks to get the information on the PPT slides. To find the patterns of accessing and participating in assessment activities, I have outlined the daily actions of the individual students, highlighting the activities that they attempted and submitted (Appendices III, day one to thirty seven and JJJ, day one to forty eight).

It can be seen from the daily actions that students visited the LMS to generate one common act of viewing resources and activities in Compulsory Module 144, while students registered for Compulsory Module 214 visited the LMS to upload their paragraph type activities. It was interesting to see that 92% (48) of students uploaded the pictures they took during the onsite visit.

The level of student engagement in Compulsory Module 144 was dominated by reading and looking at resources. This level of engagement could have resulted in students remembering four to six percent of the acquired information after six weeks (Jacobs, Hurley & Unite, 2008). Student interaction with resources on and off the LMS was prompted by the explanatory teaching strategy



that enabled acquisition of knowledge, but required application of lower to higher order thinking skills in the assessment activities. It appears that students used the LMS as a tool that transmits information, despite the collaborative learning resources such as forums that were created for students to learn through discussion. It was found that students only viewed one forum, whereas the lecturer's intention was to elicit interaction between students and between students and the lecturer. Students registered for Compulsory Module 214 used the forum to interact with the lecturer and peers.

#### **4.3.6. Summary of resources viewed and participation in assessment activities on the LMS**

It was seen that quizzes were viewed more than case studies, because quizzes were timed, had a specific number of attempts and had to be completed online within a specific period, while case studies were available in the LMS. Thus, students typed case studies and assignment offline and only submitted on or before the due dates. It was found that students who did not submit their assignments and case studies, only viewed the activities and uploaded drafts, but never submitted them on the LMS. In Compulsory Module 144, 17% of students uploaded the drafts but never submitted them. Three students indicated during interviews they planned to submit their drafts, but could not do so because they had to do one quiz and one case study every fortnight. Students' claim appeared not valid, because the lecturer indicated that students who missed the due dates were given an opportunity to mail, email or fax their assignments and case studies, but they were told that they would be subjected to 1 - 3% penalty for late submission.

Both students enrolled for Compulsory Module 144 and 214 indicated during interviews that they preferred case studies to online quizzes, because they could do the case studies with less anxiety.

This opinion however was contradictory, because less than 50% of students enrolled for Compulsory Module 144 submitted the assignment and case studies. They were of the opinion that case studies provided them with an opportunity to think critically. In particular the assignment and case studies required them to apply the acquired knowledge in practical situations. Students indicated that doing these activities offline, enabled them to edit their work and ensured that they submitted quality work. Their opinion is reflected in Appendix ZZ of Compulsory Module 144 which shows that only 51% of students accessed more than 50% of resources added in the LMS, while 54% and 60% participated in more than 50% of quizzes and case studies respectively.

An explanation provided by three students during interviews for students not to access all resources added on the LMS was that the resources guided them in identifying important information, but they still needed to read the chapters in detail in their textbooks. Students attested to the reason for not accessing all resources in the LMS.

To me the slides are straight forward. I scanned through the slides to have an overview of the chapter. So when I read the chapter from the textbook, I already know the important information I should focus on” [User 1407, 2015].

“What is on the slides is actually what is in the book. There is no purpose for me to read the slides. I knew, it would not make a difference. Anyway, I must read the textbook even if I have the slides. I did not see the need for me to download the slides” [User 1407, 2015].

In addition, three of the students that were interviewed felt that submitting two activities (one quiz and one case study) every two weeks for Compulsory Module 144 was a lot, since they needed time for the other modules for which they had been enrolled. This explains why only 49% of students qualified to write Compulsory Module 144 examination at the end of the semester.

Students registered for Compulsory Module 214 were of the opinion that listening to the presentation of their lecturer enabled them to understand content of the module. They indicated that they listened to voice over PPT slides in case they missed out some explanations provided by the lecturer. User 1510, an international student for example pointed out during interview he preferred PPT slides over voice over files. His explanation was that he wanted to ensure that he could spell out concepts of Compulsory Module 214 correctly, since he was a non-English mother tongue speaker.

In conclusion, my analysis of student engagement with learning resources on and off the LMS was informed by my Curriculum Studies position that is incorporated in the conceptual framework (Figure 2.3). My findings revealed that resources constituted 78% and 62% of learning resources for Compulsory Module 144 and 214 respectively (Figure 4.3). These were the resources that students engaged with through reading and listening on and off the LMS. An analysis of the student engagement with resources on and off the LMS, revealed that 74% and 46% constituted “acquisition” as the type of learning in Compulsory Module 144 and 214 respectively.

It was further found that assessment activities that required students to learn through “acquisition” constituted 24% and 41% of learning resources for Compulsory Module 144 and Compulsory Module 214 respectively (Figure 4.3). These were quizzes, case studies and assignment that students were expected to do in order to measure the level of understanding specified in the learning outcomes. An analysis of learning resources revealed that verbs used in the learning outcomes expected students to achieve lower to high order thinking skills according to Table 2.2.

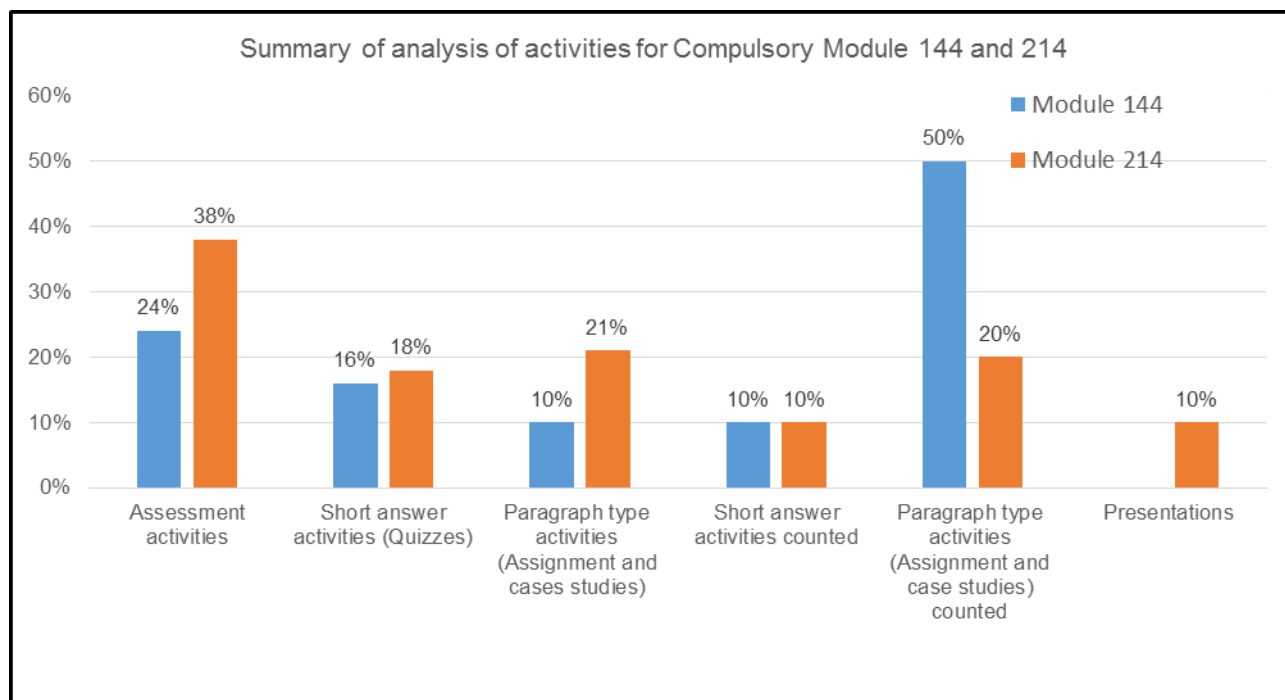


Figure 4.5: Types of learning elicited by learning resources

Lastly, it was found that resources and activities that expected students to engage in learning through “inquiry, practice, production, discussion and collaboration” constituted 3% and 16% of learning resources for Compulsory Module 144 and Compulsory Module 214 respectively (Figure 4.3). Compulsory Module 144 had two discussion forums, while Compulsory Module 214 had 10 resources comprising of discussion forums, chats, blog, wikis, clicker for pre-course and post course feedback, field trip and reflective activities.

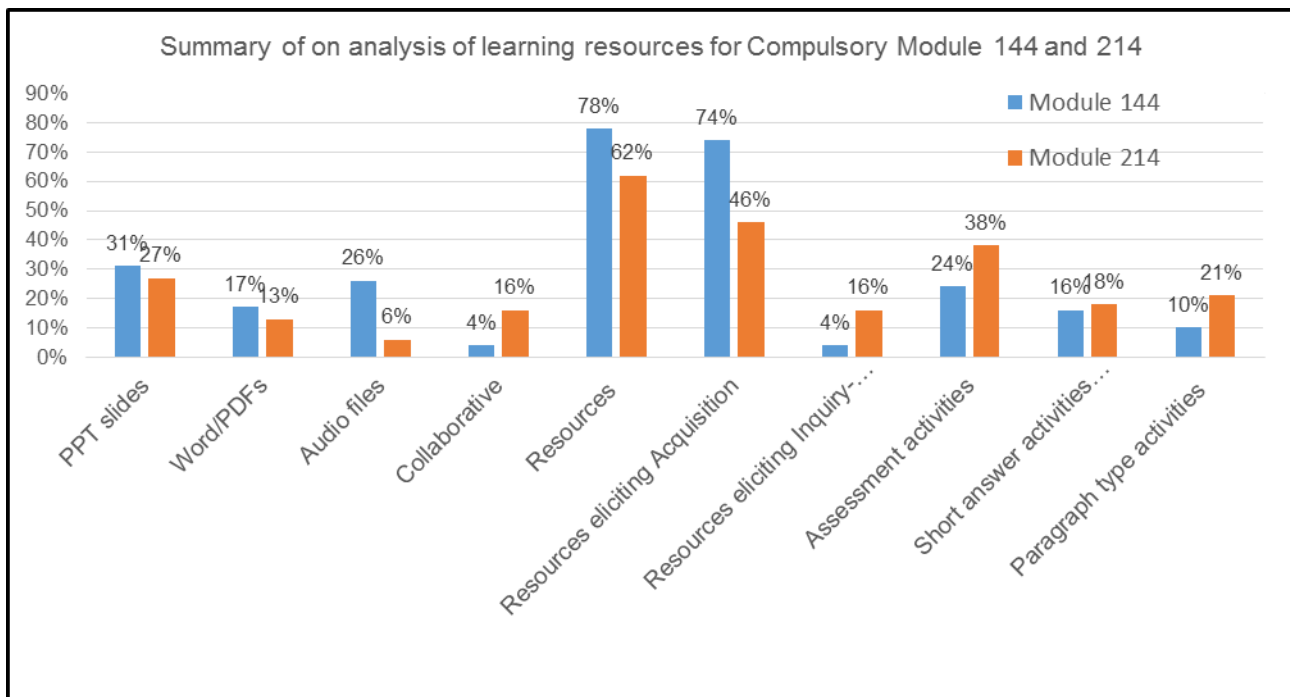


Figure 4.6: Summary on analysis of use of learning resources of Compulsory Module 144 and 214

It can be concluded that learning resources of Compulsory Module 144 required students to learn more through acquisition (Figure 4.6). Less opportunities were created for students to learn through “inquiry”, “practice”, “production”, “discussion” and “collaboration”. This would mean there is less correlation between student engagement and expected level of understanding specified in the learning outcomes in Compulsory Module 144. In a similar vein, learning resources of Compulsory Module 214 required students to learn through acquisition and opportunities were provided for students to learn through “inquiry”, “practice”, “production”, “discussion” and “collaboration” (Figure 4.6). This would mean that there is some form of correlation between engagement and expected level of achievement specified in the learning outcomes in Compulsory Module 214. In both modules the learning outcomes and assessment activities expected students to achieve lower to higher order thinking skills.

#### 4.3.7. Findings on responses to closed questions

Thirty two and forty nine students who visited the LMS, who were enrolled for Compulsory 144 and Compulsory Module 214 were asked to complete either a paper-based, or an online questionnaire that comprised of closed and open-ended questions created on Google Form. Distance education students enrolled for Compulsory Module 144 and those enrolled for Compulsory Module 214 were given the paper-based questionnaire on the first day of one the week-long contact session and beginning of semester 2 in the Faculty of Military Science of Stellenbosch University.

The electronic copy was sent to students' personal email addresses before the one week contact session commenced and at the beginning of semester 2 in the Compulsory Module 144 and Compulsory Module 214 respectively. There was a low return rate of 13% (4) and of the paper-based questionnaire. There was, however, a 69% (22) return of the online questionnaire. The results on students' opinions on the extent to which they found resources and activities created on the LMS "very helpful", "helpful", "less helpful", "not helpful" or "not sure" are summarised in percentages and actual numbers in brackets in Appendices CCC and DDD.

The questionnaire comprised closed questions, because the researcher formulated questions and provided participants with a range of options to choose from. The aim of closed questions was to yield numerical data. The percentage and numbers in brackets are used to explain the type of learning resources students preferred in the LMS.

It was found that students felt that the PPT slides and case studies enhanced their learning experiences. It can be seen on Appendices CCC and DDD that 72 % (16) and 27% (6) of students rated the PPT slides "very helpful", and "helpful" respectively, whereas, the Word documents, multimedia files and Internet based resources received ratings of "less helpful", "not helpful" and "unsure". It can further be seen that 64% and 36% felt that they preferred to view "all PPT slides" and "almost all slides" respectively. Their opinions, however, were contradictory because only 51% accessed more than 50% of the resources that the lecturer added on the LMS. It was gathered during the interviews that students felt that PPT slides guided their attention towards relevant information. They indicated that they studied chapters from the prescribed textbook, and then used the slides to guide them towards important information, because they felt that the PPT slides were summaries of Compulsory Module 144. This explanation can be attributed to the fact that students submitted their activities even before accessing the slides. At the same time, some students felt that resources with PPT packages of more than 30 slides were heavy in content, and they perceived such content to be difficult.

#### **4.3.8. Responses to open ended questions**

Responses to open ended questions are reflected in Appendix GGG. The participants shared positive opinions on why they considered that resources added on the LMS enhanced their learning. There were students who did not substantiate.

### **4.3.9. Analysis of students' and lecturer's interviews**

Data analysis was discussed in detail in Chapter 3 (3.6). To analyse the transcribed students and lecturer's interview responses, the method of "critical discourse analysis" was applied, which is also known as "open coding" (Henning, 2004, Plowright, 2012). Coding and clustering responses into categories was very time-intensive, yet contributed much to enrichment of the data.

Tesch's first six steps in coding the responses as quoted by Creswell (2003) was applied. Firstly, students' and the lecturer's interview responses were transcribed to get a sense of the utilisation of resources, and students' participation in assessment activities created on the LMS (Henning 2004). Secondly, the meaning of the transcribed students and lecturer's interview responses were interpreted in order to understand the reasons why students view resources, and participate in assessment activities created in the LMS. Thirdly, a list of all topics on reasons why students view resources and participate in activities created in the LMS was made. Fourthly, topics were clustered according to their relationships, and the data were revisited to see whether new categories and codes emerged. Fifthly, topics were categorised by using common description. Sixthly, a final decision for each category was made. Finally, the categories under three themes were clustered because data from the five sources converged to the same themes (variables). The open coding technique of students and lecturer's interview responses yielded categories discussed below:

#### **4.3.9.1. Student interviews**

##### **4.3.9.1.1 Compulsory Module 144**

Seven students, 2 female and 5 male were interviewed during the one week contact session at the beginning of semester two in 2015. I interviewed one student in my office when she did not attend classes. Six students were interviewed in the afternoon in their places of residence, since four of them were accommodated on site, while the other two were accommodated nearby (within 3 kilometres) the workplace. The interviews were characterised by a relaxed atmosphere. In their opinion, I was a guest to their residences and they treated me as one, especially since I was not military rank affiliated. The purpose of semi structured interviews was to find out from the students the type of resources they accessed and those that they did not, the type of activities they participated in, work they submitted and that which they did not, and their reasons for either submitting or not submitting.

#### 4.4.9.1.2. Compulsory Module 214

Semi-structured interviews were conducted with one focus group at the beginning of the second semester in 2015. Participants of the focus group comprised of three female (two candidate and one junior officer) and nine male students (eight candidate and one junior officers). Follow up semi-structured interviews were conducted in September 2015 with one female and one male international students who were part of the focus group.

#### **4.3.9.2. Categorisation of students' responses**

Appendix HHH provides a summary of categories that emerged during this process, with a summary of the responses drawn from the transcribed texts listed alongside in support of the categories.

I noted that the students whom I interviewed after working hours expressed themselves easier than one I interviewed in my office during office hours. The one student that I interviewed in my office responded in a formal way, being very brief and appeared to be focusing on giving the correct responses, whereas students interviewed in the afternoon were relaxed and spoke freely. One of the students I interviewed in the afternoon even code switched before the interviews.

The reasons provided by the students on why they accessed some of the resources and participated in some of the assessment activities on the LMS highlighted diverse factors that should be considered in designing a teaching and learning environment that facilitates learning. Their demographic profile in particular demonstrated the need to integrate student support services in order to help them learn. Learning design, student profile, reasons for engagement and non-engagement appeared to be the themes that surfaced from student interviews.

#### **4.4.9.3 Lecturer's interviews**

The interview was conducted with one lecturer who taught Compulsory Module 144 and Compulsory Module 214. The interview was conducted towards the end of semester one in 2015. The intention of the interview was for the lecturer to explain reasons underlying design of resources and activities of Compulsory Module 144 and Compulsory Module 214 on the LMS. I transcribed the interview session and closely read the transcribed texts to get a sense of the underlying reasons of the design of resources and activities on the LMS (Henning, 2004). The lecturer's responses

echoed much on learning design, which mirrors what was found in the student interviews and the literature review in paragraph 2.3 in Chapter 2.

#### **4.4.9.4 Categorisation of lecturer's responses**

Appendix GGG provides a summary of sub-categories that emerged during this process, with a summary of the responses drawn from the transcribed texts listed alongside in support of each sub-category.

The lecturer's responses echoed much of what was found in the literature review in chapter 2. This can be seen in the division of content into small chunks that could be processed in one lesson. The same can also be said about resources that were created in different formats to accommodate different styles of learning. The lecturer surveyed indicated that she was in the process of redesigning the module so that student support can be integrated within the design. It should be noted that the lecturer's responses are integrated into themes that emerged from the analysis of all other sources of data. This will be discussed again in detail in section 4.5.

### **4.4. SUMMARY**

The analysis of data on demographic information from the institutional class list, the LMS on the use of resources, participation and submission of as, and responses from the student and lecturer's interviews provided me with a comprehensive overview of all the data that I collected for this study to answer my main research question: Which variables are associated with student learning resource preferences in the LMS at a Faculty of Military Science? The overview became a reflection of all the relationships that exist among the data from each set. All the data from the different sources converged to the same variables that are associated with student learning resource preferences on the LMS. In other words, the analysis process assisted me to examine evidence from all sources of data, and I used the evidence to build a coherent justification of variables discussed below (Creswell, 2002). I have discussed each variable with comments and backed up my discussion by quoting evidence from the five sources of data. Each variable is a theme. I have categorised all the variables under one cluster. Quotations of students' and lecturer's responses are verbatim.



Table 4.1: Themes relating to student preferences in learning resources

Cluster	Themes (Variables)
Learning resource preferences	Contextual factors
	Personal factors (Internal and external)
	Learning design

#### 4.4.1. Themes related to student preferences

Paragraph 2.6.4 of the literature review provided the impact of contextual factors on the use of resources and activities. Data generated from the LMS, institution class list, questionnaire survey and students' and lecturer's interviews all pointed to the extent to which contextual factors, internal factors, external factors and learning design influence the way students engage with resources and activities on the LMS. It should be noted that it not easy to discuss contextual, internal and external factors separately, because are interrelated and interdependent.

##### 4.4.1.1. Contextual factors

This theme draws on data sets generated from the institutional list, legacy logs of LMS reports, questionnaire survey, student and lecturer's interviews. The biographic information from the institutional list, responses from the questionnaire survey, students and lecturer's responses from interviews, number and type of learning resources accessed, number of days and time spent on learning resources, time of the day and daily actions on the LMS emphasise the diversity of the students in terms of age, gender, rank, language, residence, work environment, professional status, attitude, intellectual ability and motivation. The following citations from question survey, students and lecturer's interviews emphasise it.

“most of the time I am in the field. I couldn't take along my tab or laptop to the field. Even if you take it, there's no place to charge it” [User 1432, 2015].

“I print the slides so that I know I have everything. I don't need to go to SUNLearn when I need them. Data bundles are expensive” [User 1409, 2015].

“I am a single parent. When I get home, I must to prepare supper, help my kids with homework, play with them and wait for them to sleep so that I focus on my studies without distractions” [1423, 2015].

“Sharing a bungalow with people not studying was hectic. They don’t care if I must submit a case study or a quiz. Had to wait for them to sleep” [User 1413, 2015].

“I took the programme with a very demanding job. I am the OC [Officer Commanding] of the unit. Time is very limited for me. I have to squeeze in everything at night when my kids were asleep. Sometimes I almost missed the submission dates” [User 1402, 2015].

“I sometimes changed submission dates to accommodate them, because I knew some of them could be attending military courses. Hence the quizzes were open for the whole week, so that they could do them on weekends. The settings on the quizzes had one day grace period. I am a soldier, I know and understand their challenges. So I told them that if they could not submit the case studies and the assignment on the LMS, they could email, mail or fax even after the due date, but they knew they would forfeit 1 to 3% for late submission. Some of them were not taking responsibility of their studies” [Lecturer, 2015].

“When you tell the OC that you cannot go on a course, he says you must do your studies after work and if you are in the field, there is no after work. Like if you are in the field for a week, and there is an assignment that is due, then you can’t submit. The whole of August I was in the field. There was no way I could submit the assignment” [User 1426, 2015].

“I had a family problem. I did not do some of the quizzes and case studies. So that led me not to write the exam” [User 1426, 2015].

“I had signal problem when I was in a border deployment. Couldn’t connect to Internet most of the time. Otherwise, I was going to do the assignment in the Internet café, but transport was a problem. I could get transport to go to the café after work, but not in the evening and it was not safe to ask anyone for a lift. It’s a matter of doing it on weekend if I was off, or I ask permission which I sometimes did not get. Sometimes, like when we are preparing for an operation, I have to be there” [User 1409, 2015].

“The work was too much for me. It’s not easy to study part time. I can only do my assignments after 4. Yes, I can do the quiz in the library of the unit if I have time. But sometimes when you go there, you find someone using the computer with Internet” [User 1432].

“I could not access the computer lab because of the renovations that were in the unit” [User 1545, 2015].

#### **4.4.1.2. Personal factors (Internal and external)**

Student characteristics such as information processing styles, intellectual abilities, personality, motivation, attitude, and work habits determine the level to which students engage with learning resources on the LMS. Citations from student and lecturer’s interview attested to this.

“I can only listen to the PPT slides with voice over f I missed something in class” [User 1511, 2015]

“The module is straight forward. I can listen to the voice recording if the subject is difficult. With this one, I am fine with the slides. If there is something that I do not understand, I can just phone the lecturer and she explained. I made sure that I submitted all quizzes, for marks and those not for marks. I submitted the assignment and all cases studies” [User 1402, 2015].

“To me the slides are straight forward. I scanned through the slides to have an overview of the chapter. So when I read the chapter from the textbook, I already know the important information I should focus on” [User 1407, 2015].

“Part time is difficult. Unlike the residential students who listen to the lecturer in class. I must read and understand the work by myself. Can say, I take five times more than the residential students” [User 1432, 2015].

“My mind just switches off when I see many slides” [User 1413, 2015].

“I wish I was a residential student. If my progress is not good, I know if I fail, I must pay back the money. What will my colleagues say?” [User 1402, 2015].

“Wanna [I want] [to] show my seniors that I’m junior in rank, but I’m senior academically. Wanna [I want to] show them I can outsmart them” [User 1413, 2015].

“I am an ITE student. I was doing three subjects” [User 1432, 2015]. I feel good that I have passed two subjects”. [User 1423, 2015].

Paragraph 2.6.5 in the literature review further provided information on how the learning resources can be integrated within the existing student support services. This was seen from students’ need of basic skills, such as study skills, time management and lack of experience of studying at

universities, little idea of studying in distance education mode and inability to cope with the reality of learning at a distance.

“every fortnight, submitting one quiz and one case study was too much. I was not doing Compulsory Module 144 only. I was doing three modules. Sometimes I find that I have four assignments that I must submit in one week. I was under a lot of pressure. Most of the time I end up not submitting one of them” [User 1432, 2015].

“The quizzes were easy to do. If I studied the chapters well, I got total. With the case studies, even if I studied the chapters, but I was kind like not sure whether this is how the lecturer wanted me to answer” [User 1426, 2014].

“I got worried of the quizzes that had limited time and got scared if I would ever finish on time” [Female student, 2015].

“To me, this was one of the military courses. I only found out during the induction week that this is at university level not military functional course. Writing an assignment is very different, the format, language, referencing, the amount of content that you read and the time you spend. For me, this was too much. I did not submit my assignment” [User 1409].

It is evident from students’ daily activities that although they rated PPT slides very helpful and helpful, some students submitted the activities even before accessing respective chapters. This explains that students had different learning styles, since some of them indicated that they first read chapters from the textbook, while others started with the slides. The following citations attest to difference in processing styles.

“Most of the time I read chapters from the textbook, then compare my notes with the slides to see if I missed out something” [User 1413, 2015].

“I scanned through the slides to have an overview of the chapter. So when I read the chapter from the textbook, I already know the important information I should focus on” [User 1407, 2015].

#### **4.4.1.3. Learning design**

The theme “Learning Design” draws from the design of resources and activities on the LMS and students’ and lecturer’s responses of interviews. The resources and activities were divided into folders into sections. Considering that Resource 1401 contained 13 files, it suggests that the total

number of resources was 56 in Compulsory Module 144. It was noted that 73.2% (PPT slides, PDFs, Word doc and pre-course survey), 23.2% (audio files) and 3.6% (forums) of the resources required students to read and look at the text, listen to audio and collaborate respectively. It was found that the students viewed only one forum, probably because there was no specific topic to lead. Students were expected to ask questions about the semester test, which of course constituted a topic. It can be seen that the acquisition of knowledge was the common way of learning.

There was an integration of resources and activities in Compulsory Module 214. For example quizzes were created with resources in section 1 to 19. Paragraph type assessment activities were packaged in a separate section 20.

Students' responses emphasised much on the extent to which title, sequence and the amount of content influenced their decisions in engaging with learning resources on the LMS. For example, they were of the opinion that chapters with more than 30 PPT slides were heavy in content and they perceived them to be difficult. Although Sections 2, 3 and 5 in Compulsory Module 144 appeared to have more content, the number of quizzes required students to study the resources in small chunks. For example, Activity 1405 evaluated students on Resources 1421 to 1423, while Activity 1407 evaluated them on Resources 1424 and 1425.

“It's easy to know which materials to download. I looked at the title, cos [because] they were divided into themes. I know once I download the course materials and I can go to SUNLearn to check case studies and due dates. Next time I login, I do the quiz and check the case study again. I type the case study offline and submit it the next day [User 1423, 2015].

“I downloaded resources and did activities that were meant for residential activities” [User 1511, 2015].

“One chapter with 50 slides. It's like reading the chapter from the textbook” [User 1413, 2015].

“What is on the slides is actually what is in the book. There is no purpose for me to read the slides. I knew, it would not make a difference. Anyway, I must read the textbook even if I have the slides. I did not see the need for me to download the slides” [User 1407, 2015].

“slides are less interactive” [User 1409, 2015].

“I added PPT slides, audio files that I recorded on some concepts that students were struggling with. I created two forums so that they could interact with me or their peers, but they did view one forum, instead of asking questions for the semester test. Instead, they called towards me the semester test and exam. I created a clicker pre-survey course survey, to know who my students were, but none of them responded. I redesigned my course after attending the Blended learning Short Course” [Lecturer, 2015].

It was evident that students expected some of the features of the face-to face classes to be integrated in the design of online learning resources. Two students pointed out they expected some of the slides to be set on a few questions that they could answer online as they progressed within one lesson. It was, however, not clear whether they would have answered the questions, particularly if their answers were not for marks. This is evident from the 50% and 33.3% of students who submitted quizzes and case studies for marks respectively in Compulsory Module 144.

“During induction, before the lecturer started with the presentation, she asked questions to recap what we did a day before. She also asked us questions during the presentation and when she recapped. For me it was difficult to remember everything that I studied in four chapters in one quiz. Better if we answered the questions at the end of each chapter for marks” [User 1426, 2007]

“Ja [yes], it’s like I expected the course to be MOOC like. I can read the chapters from the textbook. The slides were my notes” [User 1407, 2015].

“It’s not like I am not interested, sometimes there’s nothing interesting. I don’t see the need why. How can I say it? Most of the time it’s not necessary. I didn’t see it necessary for me. I had to know the prescribed book that I had to use. If I see it is necessary for the exam” [User 1409, 2015].

It was further evident from the students’ daily activities and the patterns of engaging with learning resources on the LMS that they viewed activities more than resources. It is evident from their daily actions that students submitted activities before downloading respective chapters. The trend was to view those learning resources that had anything to do with gaining marks. This then suggests students studied content of Compulsory Module 144 largely from their textbooks. Some students used the PPT slides to guide them on important information in their textbook.

“I did not download the stuff because I did not qualify for the exam. I did not do the quizzes when I was in the field. When patrolling or in the field I did not have access to Internet” [User 1413, 2015].

“We were two doing the subject in the unit. I got them [slides] from my colleague. Sometimes data is expensive. I did not download the slides, cos [because] it was not part of the exam and I did not qualify for the exam. I did not understand how one can prepare for the exam and submit a quizzes and case studies during exam time?” [User 1409, 2015].

“Yes, the quizzes are great. You don’t have to wait for your lecturer to know where you got wrong. I know the lecturer has received my assignment. You get the results immediately after submitting and with case studies you receive feedback after two or three weeks” [User 1432, 2015].

“Quizzes, helped us to be more or less in the same level with residential students. Without the quizzes, there is nothing that pushes you read the chapters. I knew I had to read before I doing the quiz, cos [because] I knew I would not finish if I try to look for answers in the textbook. The case studies did not push me much. I typed them offline and I could check the answers from the textbook. I submitted all of them” [User 1421, 2015].

“I don’t have time for extra stuff. I read stuff that will be in the exam. I submitted quizzes and case studies for marks, but were too many for one module. I wanted to qualify for exam” [User 1413, 2015].

“Most of the time I read chapters from the textbook, then compare my notes with the slides to see if I missed out something. The assignment and case studies that I did after completing the theme, made me to understand the work. I was interested in passing the module, not in quizzes. I can’t remember, the quizzes counted less, but the assignment and case studies counted more. The quizzes and case studies is a must” [User 1413, 2015].

“I gave them a quiz and a case study for every theme, to kind of force them to keep up with the work. Otherwise, they register and never submit the assignments” [Lecturer, 2015].

“Because of the renovations in the unit, students could not easily access computer labs. I allowed them to submit their assignment, case studies and reports in my office”.

## **4.5. CONCLUSION**

This chapter provided a descriptive summary of results obtained from analysis of legacy logs of the LMS reports of Compulsory Module 144 and Compulsory Module 214, questionnaire survey, students' and lecturer's interviews to determine variables that are associated with student learning resource preferences on the LMS. It was found that contextual factors, personal factors and learning design were the common variables associated with student learning resource preferences on the LMS. In the next chapter, the interpretation and a discussion will be drawn together to provide a synthesis of the findings.



## **CHAPTER FIVE**

### **DISCUSSION AND CONCLUDING REMARKS**

#### **5.1. INTRODUCTION**

In chapter 4, the findings on data collected from legacy logs of the LMS reports, institution existing documents, transcribed teacher's interview responses, transcribed students' interview responses and students' questionnaire responses were described. This chapter relates the findings of the research problem, literature, theories and research studies according to the key themes that were identified through triangulation. Triangulation enabled me to draw together three themes that highlighted the variables that emerged from the study as a whole (4.5.1). It should be noted that the themes were drawn together to report what the large body of data sets revealed to me, which in turn assisted me in the construction of the conceptual framework (Leedy & Ormrod, 2005:141). As such, the report answered the research question, in which the purpose of this study was outlined.

#### **5.2. ROLE OF THE CONCEPTUAL FRAMEWORK**

The purpose of this study was to determine variables associated with student learning resource preferences in the LMS in order to explain the reasons why students either engage or not engage on and off the LMS. I narrowed down my focus of enquiry by specifying the following objectives in order to reach the aim of the study:

- a.to describe patterns in usage of learning resources in the LMS;
- b.to identify the types of learning resources that students prefer in the LMS;
- c.to determine factors that students consider important in engaging with learning resources in the LMS;
- d.to analyse impact of these factors on student engagement with learning resources in the LMS;
- e.to identify teaching actions (strategies) represented by learning resources;
- f.identify level of involvement elicited by learning resources;
- g.to predict types of learning and learning experiences elicited by learning resources in and off the LMS.

The details of the purpose of the study have been described throughout this study. The study started by establishing the meaning of learning analytics, describing data mining techniques and pointing out the importance of contextualising analysis of data mined from digital learning environments (See Chapter 2. 2.2). The context within which this study was located was described to provide the reader with a full understanding of the natural setting in which the study was undertaken.

The current scholarly debate on whether the number of views of learning resources and time spent on them can be considered as predictors and indicators of learning in online teaching and learning environments, provided the background and the reasons for undertaking this study (Brown, 2012; Prinsloo et al., 2012; Dalton, 2015; Veletsianos et. al. 2016). Such predictors and indicators could not tell me all that I needed to know about reasons why students either engaged, or did not engage online. However, the visible aspects of the data that were mined from the LMS assisted me in determining the researchers' common focus of "tracking online behaviour, but less on gaining deep, qualitative, multidimensional understanding of student experiences in digital learning" (Veletsianos, 2015). In order to determine variables associated with student learning resource preferences in the LMS, I integrated multiple sets of data in order to "enrich my understanding of the gaps missed by the big data", (Veletsianos et al, 2016).

A literature review was undertaken to clarify the nature, scope and manifestation of the focus area in question, namely, *which variables are associated with student preferences in learning resources in the LMS?* The literature review provided the contextual background that enabled me to interpret and make sense of the findings in this study (White 2003).

The literature review was followed by a description of the study as a case study. Thereafter a report on the findings of the study was presented. This chapter presents a discussion and interpretation of the findings. The discussion of the findings implies that I was engaged in an ongoing active interpretation of a large body of data sets presented in chapter 4. The review of literature described in chapter 2 served as a lens through which I interpreted the large body of data sets. As such, I was able to construct a conceptual framework according to the revelation of the data sets.

The framework drawn in Chapter Figure 2.3 is an attempt to reflect or capture the essence and focus of this study. Since this is an educational data mining study, the definitions of educational data

mining were of significance (See Chapter 2. 2.2.1). In this study, the possible reasons why students either engage or do not engage on and off the LMS were revealed through the examination of the usage of resources and participation in assessment activities in the LMS (Romero & Ventura, 2007: 136). Said examination of data was conducted by analysing the number of visits to resources and activities in the LMS, and time spent on these resources and activities. Although the level of involvement, channel of information processing, learning experience and type of learning could be identified, these visible predictors and indicators could not reveal the underlying reasons why students either engage, or do not engage on and off the LMS. In order to gain a deep, qualitative understanding of why students either engage or do not engage on and off the LMS, I “explored the contextual factors and setting in which participants of this study learn” (Ferguson, 2012; Peregrina, Pradas, González & García 2014). The exploration of invisible aspects revealed the extent to which a complex combination of interrelated internal factors, external factors, contextual factors as well as design of learning resources (resources and assessment activities) determine why students either engage or do not engage on and off the LMS.

According to the definition of preferences (Paragraph 1.6.3) that I provided for this study as a greater desire to access resources and participate in assessment activities in and off the LMS justified why I wanted to address reasons why students either engage or not engage on and off the LMS. The discussion of my findings has highlighted variables associated with student learning resource preferences in the LMS (See Chapter 4). The research framework below points to the relationship between patterns and tendencies of the use of resources and participation in assessment activities (visible indicators and predictors of learning) and context (invisible aspects) in the LMS.

The findings of this study are discussed and interpreted according to the conceptual framework. In the following sections, I will interpret the results of the study on why students engage or do not engage online, and examine the possible implications for design of learning resources. This chapter commences with the discussion and interpretation of the findings that were presented in the previous chapter. My interpretation relates the findings to the research problem, literature and theories. Thereafter, I will discuss the recommendations for future research. Lastly, I will discuss the limitations of the study, followed by the final reflection.

The framework outlines the teaching and learning process that occurs in and off the LMS. Student engagement was measured in terms of number of visits and time spent on learning resources. At the same time, an analysis of design of the learning resources revealed level of involvement, learning

experience and type of learning elicited by teaching strategies. The context of teaching and learning process depends on interrelated and interdependent internal and external factors, as well as design of learning resources. These visible and invisible factors determine the extent to which students engage with learning resources on and off the LMS.

### **5.3. CONTEXTUALISING THE USE OF LEARNING RESOURCES**

The definition of learning analytics that was adopted by the Society for Learning Analytics Research (SoLAR) in the first International Learning Analytics Conference in 2011, points out the importance of contextualising the use of learning resources when attempting to understand students and the setting in which they learn (Romero & Ventura, 2010). Since this is an educational data mining study, data generated by the LMS were explored in an educational setting to better understand the relationship between student use of learning resources and reasons for using such resources (Baeppler & Murdoch, 2010; Veletsianos, Reich & Pasquini, 2016).

#### **5.3.1. Impact of internal and external factors in the use of learning resources**

This study has provided a composite profile of students enrolled for Compulsory Module 144 at the Faculty of Military Science of Stellenbosch University. It has been established in this study that students were diverse in terms of age, gender, military professional rank, language, place of residence, work environment, adapting to academic discourse, adapting to distance education or online mode, intellectual ability, and motivation. A complex combination of internal factors, external and contextual factors are reported in the paragraphs below:

##### **5.3.1.1 Student profile**

Male students are the primary participants in this study, a probable historical consequence of female students disallowed registration until two decades ago. The proportion of female and male students participating in this study is consistent with the profile of personnel in the military. A probable explanation is that female students cited that they needed to balance a variety of complex commitments in their lives (4.5.1) which demotivates registration for HE studies. The dominance of male participants can also be explained by the universal perception of equating the military with masculinity (Mankayi, 2010).

The impact of the difference in this variety of variables was evident from the findings on student engagement with resources and participation in assessment activities in the LMS. The findings affirm previous research that distance education students, whether male or female, find it challenging to reconcile conflicting demands of job, family and studies (Chapter 2: 2.6.5, Chapter 4: 4.4.2.1.b). Finding time for learning has been found to be the primary challenge for distance online working students (Subotzky & Prinsloo, 2011; Prinsloo et al., 2012; Khoza & van Zyl, 2015; Veletsianos et al., 2016). The implications of the challenge can be seen from the 100%, 40%; 41.7%; 75% and 0% of students aged 21 to 25, 26 to 30, 31 to 35, 36 to 40, 41 and above years respectively, who qualified to write Compulsory Module 144 examination. A probable explanation is that students aged 21 to 25 were all males who have been out of formal education for only a few years, are lower in rank with fewer responsibilities in their units and probably without families of their own, unlike their older counterparts.

It was, however, not a surprise that 75% of students aged between 36 and 40 years qualified to write examination. McGivney (2004) found that as students become older, they manage to reconcile their job and family responsibilities with their studies. Their ability to overcome such pressures was seen from their leadership roles at their units and the strategic approach to learning (4.1.1.1). It was evident that they had time management skills because they spent long hours at night until early morning in the LMS, and they spoke of leading their subordinates by example. Those in the lower professional rank cohort commonly visited the LMS in the morning and afternoon (Chapter 4: 4.5.1.1, Chapter 2: 2.4.1).

At the same time, students in the lower rank indicated that they needed permission from their colleagues to work on their studies during office hours (Chapter 4: 4.4.1.1), the same privileged being routinely claimed by the higher ranked. They indicated that they needed to visit the LMS during working hours because their residences were not conducive to learning. They felt that sharing military quarters (bungalows) with colleagues who were not studying had negative impact on their studies. This challenge corresponds with Van der Walt's (2009) finding that students experience lack of understanding from their colleagues, supervisors and the command element who should act as mentors and motivators. Thus, Knapper (1988) claims that students who lack support from colleagues become insecure about their studies and are therefore likely to drop out of their studies (Chapter 4: 4.4.3.2).

Although students learnt about time management skills during the one week contact sessions, they found it challenging to cope with the reality of their daily responsibilities in their units and the actual package of their studies. This finding corresponds with Kun and Williams (1997) that students who find it difficult to reconcile conflicting demands of their jobs, families and studies, tend to do less. Reconciling demands of job and studies appeared more conflicting for these students who render military obedience under all conditions, even for the forfeiture of their own lives (Defence Review, 2012). Judge Kriegler (2002) spelt out the requirement of military discipline:

The ultimate objective of military in time of peace is to prepare for war to support policies of the civilian government. Military organisation requires, as no any other system, the highest standard of discipline [which] can be defined as an attitude of respect for authority that is developed by leadership, precept and training. It is the state of mind which leads to willingness to obey an order no matter how unpleasant the task to be performed.

Being distance learning, adult working students, Mowes (2005) maintains that students identify themselves more with their roles as workers, than with their roles as students. These conflicting demands explain reasons for the 8.6% of students who never logged in on the LMS and those who missed submission dates due to internal and external deployment [4.5.1.1].

In addition, almost all students who had prolonged absence from formal education since high school appeared underprepared. They spoke of challenges they faced in understanding content on their own (without a face-to-face option), the format of assignments and amount of content that they had to read (Chapter 4: 4.4.5):

“Part time is difficult. Unlike residential students who listen to the lecturer in class. I must read and understand the work by myself. Can say, I take five time more than residential students”.

No students (0%) aged 41 and above qualified to sit for examination. Their reporting that too much time has to be spent on reading and understanding content affirms that older students experience a reduction of working memory capacity, because of general slowing of cognitive processing and a decline in the ability to repress irrelevant information (Van Merriënboer & Sweller, 2005:173, Chapter 4: 4.4.4, Chapter 2: 2.4.2).

At the same time, older students appeared more motivated to succeed in their studies than their counterparts (Peter, 2004, 2.6.4). They cited fear of losing face to juniors and as common reason why they engaged online (Khoza & Van Zyl, 2015; Chapter 4: 4.4.9.1). Conversely, being junior in rank served as motivation to perform better than their seniors (Chapter 4: 4.5.1.2). This was evident when one student reported:

“I want to show them that I am junior in rank, but I am senior academically. I want to show them that I can outsmart them”.

### **5.3.1.2 Adaptation to academic discourse**

Besides prolonged absence from education, almost all students attested to the difference of studying at the university and completing professional military courses, and the difficulties that they had in addressing them (Chapter 4: 4.5.1.2). Esterhuysen (2009) affirms that military learning environments are dominated by prescriptive learning that reflects military discipline of taking orders without questioning. Participants in this study attested to the challenges and demands of academic reading and writing that they had to adapt to in order to participate in academic social demands of higher education (Van Schalkwyk, 2006, Chapter 4: 4.5.1.2). These challenges were confirmed when students spoke of the difference in the format of their assignments, language used, referencing, the amount of content that they read and the time spent reading and doing assessment activities (Chapter 4: 4.5.1.2) as opposed to doing a military task. Their challenges are affirmed by the task team appointed by the Council of Higher Education which found that student under-preparedness is widely accepted as the dominant learning-related cause of the poor performance patterns in higher education (CHE, 2013).

### **5.3.1.3 Student under-preparedness**

Notably, a large number of students participating in this study were underprepared, particularly for studying on the distance education mode. They spoke of challenges they faced in understanding the content on their own (Chapter 4: 4.4.5). This suggests that the teaching actions represented by learning resources could not elicit learning experiences that ensured that they shared the same concept with the lecturer. This was evident, among others, in the routine academic instructional verbs included in the learning outcomes students largely failed to understand and apply correctly, namely: “explain”, “define”, “state”, “describe”, “discuss”, “identify”, “advise”, “investigate”, “summarise”, “analyse”, “justify”, “outline”, “develop”, “distinguish”, “differentiate”, “compare”,

“appraise”, “debate”, “stimulate” and “apply”. As a result, some students faced challenges in achieving the expected levels of understanding (Chapter 4: 4.5.1.2).

Student under-preparedness, whether residential or DE, is confirmed by Van Schalkwyk (2006) who found that almost all first year students from under resourced schools are underprepared in terms of disciplinary knowledge as well as academic skills and literacies, approaches to study, educational background or contextual knowledge, and forms of social capital. That only 33.3% of students submitted the essay type assessment activities explains that the curriculum of Compulsory Module 144 contained key transitions for which students were differentially prepared (CHE, 2013). This then suggests that academic literacy should be included as one of the modules for all first years and lecturers should be encouraged to explore innovative ways of creating opportunities for students to express their learning in their writing (Van Schalkwyk, 2008) in disciplinary context.

### **5.3.2. Impact of design on use of learning resources**

Design has been described in detail in Chapter 2: 2.3. In this study, I have adopted the perspective of Bannan-Ritland (2003) and Conole (2012) who describe “design” as a recursive process that involves continuous evaluation of teaching and learning components. In this section, I have discussed impact of information processing styles, provision of student support services, affordances of learning technologies, time constraints, complexity of learning resources, alignment of teaching strategy with learning outcomes, resources and assessment, affordances of learning technologies on learning. It was not possible to discuss these constructs separately, because of interrelatedness and interdependence in teaching and learning context on and off the LMS. The discussion of the findings presented in chapter 4 draws on Clark and Mayer’s (2011) Cognitive Learning Theory.

#### **5.3.2.1. Information processing style**

The accommodation of processing styles was evident when students spoke of scanning resources and use of resources as summaries (4.5.1.2). The lecturer also indicated that content that students found difficult to understand, was recorded and uploaded as audio files (4.5.1.3). None of the audio files were viewed, because some students considered them as additional or extra resources, not as an integral part of essential course material. According to Mayer (2005), when students consider



resources to be unnecessary, the processing channel becomes overloaded (2.4.2). Another reason cited by students for not accessing audio files was that they were under one generic folder and had generic titles, whereas other resources had descriptive titles. Misrepresentation of information thus contributed to student behaviour.

Students' information processing preferences were accommodated as the module was redesigned in blended learning mode of practice (Chapter 4:4.4.9.4.a). The analysis of learning resources of Compulsory Module 144 in the LMS revealed that the learning resources were divided into sections as explained in chapter 4:4.4.2. The sections comprised of words, diagrams (pictures) and audio files and important information was highlighted (Chapter 4: 4.4.9.2, 4.4.2, 2.4.2). This then suggests that students' attention was guided towards important information (2.3). According to Clark and Mayer (2011: 142), Cognitive Learning Theory implies that when students' attention is guided towards important information, they are able to organise selected information into verbal or visual models and integrate it with existing knowledge (Chapter 2: 2.3), especially at undergraduate level, one suspects.

Students' mixed interpretations of the amount of content to be covered was evident when they reported that they thought chapters with more than 30 slides had more content. Hence students felt that reading the chapter from the textbook was better than using slides (4.5.1.3). One student said:

“What is on the slides is actually what is in the book. There is no purpose for me to read the slides. I knew, it would not make a difference. Anyway, I must read the textbook even if I have the slides. I did not see the need for me to download the slides” [User 1407, 2015].

Mayer and Moreno (2010) point out that Working Memory (WM) becomes overloaded when too much information is processed at a time. Their recommendation is that lessons with much information should be broken down into smaller chunks in order to allow students to digest less information more frequently. The implications of processing too much information is that new information may not be learnt at all (Clark & Mayer, 2011).

### **5.3.2.2. Provision of student support services**

Some students felt that the design did not provide them with enough opportunities that “enable them to generate their articulations and actions that modulate their concepts and practice” (Laurillard, 2013:98). It then suggests that students' mental models were challenged, without providing enough

support for them to process new information, without overloading their working memory (Vermunt & Verloop, 1999; Entwistle, 2005; Michael, 2006). In other words, students' mental models were incomplete, which implies that there was less enhancement of learning experiences (Riding & Saddler, 1997; Michael, 2006), Chapter 2: 2.4.2).

The provision of feedback on the marked assessment activities appeared to have challenged students' conceptions. The settings that allowed only a single submission however restricted students from assuring that they share the same conceptualisation with their lecturer. Students appeared to focus more on their grades than on their engaging with the feedback:

“I do not have time for extra stuff. I read stuff that will be in the exam. I submitted quizzes and case studies for marks, but were too many for one module, I wanted to qualify for exam” [User 1413, 2015].

This then suggests that students become uncomfortable and anxious, which then impacts adversely on learning. (Entwistle & Peterson, 2004). Mowes (2005) recommends that the design of learning resources for distance education students should be seen as a complete paradigm shift that facilitates teaching and learning as well as provision of student support services.

### **5.3.2.3. Time constraints**

It was also found that anxiety was experienced from the pressure of time. The pressure was highlighted by students' anxiety when doing timed online quizzes. Some students were anxious about not finishing in time, particularly since they knew the quizzes counted towards their final mark (Chapter 4: 4.5.1.2). The impact of anxiety experienced in online assessment corresponds with Bradford's (2011) finding that assessment causes cognitive load.

The pressure of time was also evident from students' reported opinion that the amount of work that had to be covered in one semester was too much (4.5.1.2). Such students possibly adopted a surface approach towards the content, focussing more on qualifying for the examination and passing the module (Chapter 2: 2.4.1; Chapter 4: 4.4.8) than mastering the content. They confirmed this by reporting that they engaged mostly with resources that they were going to be assessed on in the examination (Chapter 4: 4.5.1.3). The focus on examination was evident from more than 50% of students that visited Resource 4 (Scope of the semester test).

There was, according to the lecturer, not enough time to provide continual practice opportunities, since the sampled Compulsory Module 144 is only a semester module. Hence, students appeared to

focus on qualifying for the examination and passing it, and probably less on achieving a level of understanding. Some students were of the opinion that if the set of questions at the end of each chapter were for marks, that could have provided them with adequate practice opportunities (4.5.1.3). It is unknown whether students would have utilised such opportunities, since they had had mixed feelings about the number of assessment activities that they had to submit every second week. They contradict themselves to a certain extent, which might be indicative of an underlying factor not revealed through this study. In similar vein, the notional learning time for a 120 credit module was another factor that was considered in the design of the learning resources. This was evident in that only 5.7% (2) of students that submitted all assessment activities, whether assessed for marks or not, while the rest submitted only activities that counted towards their final marks (Chapter 4: 4.5.1.2).

Furthermore, it is unknown whether students could have utilised more than one submission opportunities, since they tied their submission to grades. They spoke of not having time for extra resources (Chapter 4: 4.5.1.3). Hence, the main focus was for them to qualify for the examination and pass the module. Laurillard (2013) points out that not just students, but lecturers too experience competing demands from their universities - to improve throughput as well to develop, active, autonomous and critical thinking students.

#### **5.3.2.4. Complexity of learning resources**

There were mixed reports about the number of summarised slides. The high number of slides in this case could not be equated to content size, because each chapter started with learning outcomes and ended with a set of questions. The questions in the slides were not for marks. Moreover, some of the slides comprised of diagrams. It can only be assumed that the challenge was not the number of slides, but was probably on the mental effort that students had to exert to process quantity of information or complexity of content, which the lecturer could not reduce without impacting the width and depth of knowledge associated with such a module (Mayer & Moreno, 2003; Chen & Wu, 2014, 2.4.2 (i), (ii), (iii)).

The diverse profile of these students is a probable explanation of the challenge they faced to use complex cognitive processes that were probably not stored in their long term memory (Riding & Saddler-Smith, 1997; Clark and Mayer, 2011). The division of each chapter into slides was one

strategy of mitigating overload of the WM. Veletsianos et al. (2016) confirm that students in MOOCs commonly struggle with intellectual difficulty of learning resources. In addition, it is assumed that all students, particularly students with lower grade point averages struggle online (Xu & Jagger, 2014; Czerniewicz, 2016).

### **5.3.2.5. Alignment of teaching strategy with learning outcomes, resources and assessment**

The assessment activities provided students with opportunities to apply lower to higher order thinking skills. This was seen in the verbs used in the learning outcomes, in which students were expected to “discuss”, “identify”, “advise”, “investigate”, “summarise”, “analyse”, “justify”, “outline”, “develop”, “distinguish”, “differentiate”, “compare”, “appraise”, “debate”, “stimulate” and “apply” as outlined in P, R, T, V, X, Z, BB, DD, FF, HH, JJ, LL, NN, PP, TT, and VV;. Not all students could have achieved the level of understanding as expected, since some students adopted a surface approach, as explained above.

For students to achieve the expected level of understanding, they were supposed to submit six quizzes, five case studies and one assignment for marks. An analysis of the learning resources revealed that the specified learning outcomes expected students to achieve lower to higher order thinking skills, while explanation of content as the dominant teaching strategy elicited low level of involvement which resulted in acquisition of knowledge (Krivickas, 2005; Jacobs, Hurley & Unite, 2008; Laurillard, 2013; Czerniewicz, 2016; P, R, T, V, X, Z, BB, DD, FF, HH, JJ, LL, NN, PP, TT, and VV;). The settings of the activities however did not provide enough practice opportunities for students to engage with feedback or to resubmit to ensure that they understood they have improved from the previous submission.

Similarly, the 33.3% and 51.4% of students enrolled for Compulsory Module 144 who submitted essay type activities (assignment and case studies) and quizzes respectively, and citation of lack of confidence in submitting case studies and assignment, affirmed that students might not have achieved the intended levels of understanding (Chapter 4: 4.4.3.2). That students cited the helpfulness of quizzes confirms students’ lack of academic literacy skills that was required in writing rather than simply selecting answers, such as is required in interpreting case studies and writing assignments (Van Schalkwyk, 2006; Chapter 4: 4.4.8).

It is evident that students enrolled for Compulsory Module 214 have acquired academic literacy skills. It could be evident from the 92% of students who submitted their assignments and case studies and thus qualified to write examination. The

In order to provide enough opportunities for students to achieve the intended levels of understanding, the CHE (2013) task team recommends additional formal time in the undergraduate curricula for all students who in fact need it. Hence the task team has identified the curriculum structure as a key framework that enables or constrains effective teaching and learning in higher education (CHE, 2013).

The implications of less enhancement of learning experiences could be seen from teaching strategy that elicited reading as the only level of involvement. This was evident from daily activities in the LMS which revealed that students visited the LMS to download learning resources, do quizzes, view resources and activities, upload assignments (Chapter 4: 4.4.6). Hence, they spent more time when doing quizzes and less time on other resources, or when uploading assignments and cases studies. It is evident that almost all learning activities happened outside the LMS. They spoke of saving data bundles by downloading many resources and printing them in one visit, so that they could easily access them without logging into the LMS (Chapter 4: 4.5.1.1).

At the same time, an analysis of resources showed that explanation of concepts as a teaching strategy prompted reading as the level of involvement for them to acquire knowledge on and off the LMS. This was evident when students spoke of visiting the LMS to download course materials and read offline, to do quizzes or upload their case studies and assignments. One student said:

“It’s not like I am not interested, sometimes there’s nothing interesting. I don’t see the need why. How can I say it? Most of the time it’s not necessary. I didn’t see it necessary for me. I had to know the prescribed book that I had to use. If I see it is necessary for the exam” [User 1409, 2015].

A low level of involvement beyond reading confirms that online teaching and learning often simply replicates traditional practice of teaching (Peters, 2004; Kirscher, 2004; Yu-mei, 2011; N’gambi, Gachago, Ivala, Bozalek & Watters, 2012; Czerniewicz, 2016). At the same time, all learning outcomes specified in the chapters as well as assessment activities required students to apply lower to higher order thinking skills (Appendices P, R, T, V, X, Z, BB, DD, FF, HH, JJ, LL, NN, PP, TT, and VV; Czerniewicz & Brown, 2009; Laurillard, 2013).

Furthermore, the number of assessment activities for students to understand the content and be assured that they share the same conceptualisation with their lecturer appeared sufficient (Laurillard, 2013: 88). Such opportunities could be seen from the set of questions that concluded each chapter (not for marks), quizzes, case studies and assignment that students were supposed to submit for marks. It was, however, not a surprise when students indicated that they expected integration of resources and assessment activities. They indicated that they expected a set of questions at the beginning of a lesson to recap the previous lesson, during and at the end of a lesson to recap the current lesson (Chapter 4: 4.5.1.3). Although each chapter had a set of questions that they could answer any time and repeatedly, for them not to be marked implies that there was no feedback provided for these questions. This then suggests that students would be unsure of the level of understanding that they achieved (4.5.1.3).

#### **5.3.2.6. Affordances of learning technologies on design of learning resources**

Laurillard (2013) speaks of providing students with opportunities to generate articulations of concepts through continual exchange of ideas. In this study, the lecturer created two forums so that students could exchange ideas through discussion for Compulsory Module 144. These opportunities were underutilised, since only 40% of students viewed one forum and refrained from exchanging ideas (Appendix P, 4.2.2.1.a), while 42% (Appendix R) of students enrolled for Compulsory Module 214 discussed and exchanged ideas. The lecturer expected students to ask questions regarding the semester test. Students indicated that they called the lecturer to ask questions and the lecturer attested to it [Chapter 4: 4.5.1.3]. Calling the lecturer indicates students' desire for personal interaction (with a person, not a machine). Literature shows that students feel isolated if there is no personal contact with the lecturers (Conole & Dyke, 2002; Peters, 2004; Van Schalkwyk, 2008).

In comparison with Compulsory Module 214, students used the forums to discuss and exchange ideas. This finding affirms earlier findings that students enrolled for Compulsory Module 214 had a sense of belonging, because they attended face-to-face classes, while those enrolled for Compulsory Module 144 felt isolated (Veletsianos, 2010; Subotzky & Prinsloo, 2011, Czerniewicz, 2016). It was found that students enrolled for Compulsory Module 144 are physically isolated by their distance education study mode and experience feeling of isolation due deployment that separates them from their families (Van Dyk, 2012). Hence students enrolled for Compulsory Module 144 focused more on resources and activities that counted towards their marks, as they spoke of not having time for extra materials (4.2.2.1.1).

In the two forums created in Compulsory Module 144, there was no specific question or issue that led the discussion, so that students could generate ideas (Laurillard, 2013:98, Chapter 4: 4.5.1.3). In the forum, chat, wiki and blog created in Compulsory Module 214, students were led by specific issues to collaborate. It was noted that students enrolled for Compulsory Module 214 were required to comment in their peers' blogs and use a wiki to give feedback on their educational excursion. This then explains the importance of considering the affordances of the tool when designing learning resources (Chapter 2: 2.5.3.3).

Students might not have participated in the two forums as expected, because they appear to lack digital skills expected from ideal active, autonomous, independent and self-regulated students (Beetham, 2015; Czerniewicz, 2016; Veletsianos, et al. 2016). Hence, without collaborative skills, most students feel excluded from online teaching and learning environments (Beetham, 2015).

## **5.4. SUMMARY AND CONCLUSION**

This study has systematically probed factors that play an important role when engaging learning resources in the LMS. The findings of this study confirmed that a complex combination of internal, external and contextual factors influence why students engage or do not engage on or off the LMS (Galusha, 1998; Prinsloo et.al, 2012; Veletsianos, 2016). However, an analysis of learning resources, revealed that the level of involvement elicited by resources could not match the level of understanding specified in the learning outcomes. As result, students focused more on passing examination than on achieving specified learning outcomes.

The findings discussed here emphasised the importance of taking into account limited capacity of the working memory (WM) when adding resources and creating assessment activities in the LMS. It was therefore evident that the teacher's knowledge and skills in designing learning resources should be guided by underlying the pedagogy and multimedia principles to mitigate cognitive load and overload (2.4.2).

In conclusion, learning resource preferences depend on contextual factors, internal factors, external factors and the extent to which the pedagogy and design of learning resources and activities guide students to select relevant information and organise it into coherent mental representations. The mental representations enable students to develop their own concepts and practice the developed concepts according to the level of understanding that was intended to be achieved (Laurillard, 2013).

My interpretation from the Curriculum Studies perspective led to infer that “explanation” was the common teaching strategy elicited by learning resources. As a result, the type of learning was mainly “acquisition”, specifically for students enrolled for Compulsory Module 144 (4.4.6, Figure 4.6). Acquisition as the type of learning is evident from 74% and 46% that was elicited by resources uploaded in Compulsory Module 144 and 214 respectively. At the same time, assessment activities created in the LMS elicited 4% and 16% of “inquiry”, “practice”, “production”, “discussion” and “collaboration” in Compulsory Module 144 and 214 respectively. Reasons for students to engage or not engage with learning resources on and off the LMS was due to level of engagement evoked by learning resources, internal, external and contextual factors specifically for students in the military (5.2, 2.6).

The extent to which students develop concepts as intended depends on the mental effort that they exert to process information. The lecturer, however, has no control over the cognitive processes that are required for learning. The lecturer as a designer of learning resources should take into account the diverse profile of students as well as contextual factors that influence the use of these learning resources in the LMS. It can be concluded that the research question that was posed, namely, *Which variables are associated with student preferences in learning resources in the LMS?*, has been answered by the reasons reported on regarding why students engage or do not engage on and off the LMS. In this way, the conclusion drawn from the quantitative and qualitative data collected as analysed and interpreted has achieved the aim of this study.



## 5.5. RECOMMENDATIONS

The findings of this study reveal reasons why students engage or do not engage on and off the LMS. To account for the effectiveness of use of learning resources in the LMS implies that there should be ongoing review of use of learning resources of each module in the institution case-studied. In this way, lecturers are given an opportunity to evaluate the level to which teaching strategies elicit the level of involvement and learning experiences that ensure the achievement of specified learning outcomes, university graduate attributes, and the type of learning as planned. Lecturers as teachers and designers of learning resources would be able to make informed decisions to modify their teaching approach, particularly since they are required to teach both residential and distance education students (Romero & Ventura, 2007).

A potentially negative implication could be that review of modules can be viewed as a policing activity that interferes with lecturers' academic freedom. It is recommended that lecturers as teachers, designers of learning resources and reflective practitioners need support in constantly evaluating their design in order to improve or modify the online pedagogy. Future research should incorporate offline learning experiences, since almost all activities that students engage in occur outside the LMS. This kind of support is important, since for thousands of years teaching and learning has been taking place at a closed and close proximity, which suggests that lecturers in this study reside in varied academic domains (Peters, 2004).

The institution has been operating as a single mode face-face institution for fifty three years before distance education has been established as a pilot project thirteen years ago. Significantly, the pilot was supposed to be supported by the appointment of mode-qualified lecturers (online specialists), yet this never materialised. The pilot became the norm. Residential lecturers were required to adapt or perish, were even threatened to accept their dual load or risk being closed down as an institution. Negative psychological contract, the acceptance of DE as an add-on, if not unwanted extra, surely is likely to impact on the pedagogy of online teaching as well as the desire of lecturers to change and change over. And this surely has to impact on students' lived experience of DE learning in this institution. This is a matter for dedicated future research in this and similar institutions of HE nationally.

Lecturers need to be supported to blend their traditional way of teaching in order to design or redesign learning resources for both face-to-face and distance education students. It is recommended that lecturers use the available blended learning guide as a roadmap to design or

review their existing modules individually, and as peers at a departmental level. This was evident when students expected an incorporation of blended learning aspects in the design of Compulsory Module 144 (4.5.1.2).

It should be noted that the offering of the Blended Teaching and Learning Short Course indicates the need for capacity building in terms of designing and redesigning modules in blended mode. In addition, the establishment of a teaching hub and the appointment of a Blended Learning Coordinator in this and other faculties is an indication of the university to decentralise the provision of lecturers' support.

The findings revealed that the use of learning resources was tied to grades. With this mind-set the university's aim to produce graduates with an enquiring mind, engaged citizenship, dynamic professionalism and well-roundedness could only be partially achieved when students' focus is more on the marks and the passing the module than on achievement of learning outcomes (Stellenbosch University, 2013). These findings correspond with those of Osando, Merlo and Campo (2013) that students commonly focus more on their grades and less on engagement with feedback. I recommend that students be given opportunities to take ownership of their learning process through creating multiple reflective opportunities.

Clearly, the lecturer and students had pressure of time, since the Compulsory 144 Module 144 and 214 are only semester modules. Provision should therefore be made for both lecturer and students to be assured that they share the same conceptualisation. I support the proposal of Hase and Kenyon (2007) who sees students as the major development and control agent in their own learning. As adults, in this case, even mature adults and senior professionals, they need to be involved in the planning and evaluation of learning. I recommend consideration of self and peer assessment in order to extend control to students and reduce workload from the lecturer.

The establishment of distance education lecturers' forum has created a platform for the lecturers to discuss and share best practices of teaching and learning. The establishment of a task team that focusses on the development of the institution's distance education study model will incorporate findings of this study as well as the recommendations of the CHE (2013) task team.

## 5.6. LIMITATIONS OF THE STUDY

This study offers several important findings, yet there are some limitations as well. The limitations of this study were discussed in chapter 3 (3.8), wherein I pointed out that the results could not be generalised, as the number of participants was small. However, as explained in chapter 3, paragraph 3.8, in this study the variables associated with student learning resource preferences in Compulsory Module 144 and 214 were studied in great depth, since this is a case study. Although the study was conducted in great depth, sampling was a limitation, since the study was conducted in two modules, with 35 and 52 students enrolled in Compulsory Module 144 and 214 respectively and in one institution. The context and description of the context, however, sets boundaries of this study in that this study is undertaken in an institution in which students experience similar conditions as explained throughout the study. Students could be experiencing similar conditions, but as a researcher, I do not have control over those personal and contextual factors which might have influenced their preferences in learning resources in the LMS.

A comparison of reasons why students either engage or do not engage on and off the LMS in all modules that participants were registered for, could have provided invaluable information on early identification of at risk students as well as pedagogical decisions that lecturers have to take when designing or redesigning learning resources in the LMS or modifying their teaching approach (Romero and Ventura, 2007).

A further comprehensive comparison could have been offered, if the participants comprised of the same student body registered for Compulsory Module 144 in 2014 and those enrolled for Compulsory Module 214 in 2015, especially that the sampled modules was enrolled by students who study on full time basis as well as students enrolled in the distance education mode. Moreover, the study could have offered a richer and a deeper understanding of learning resource preferences if Compulsory Module 114 of the first semester was sampled. It was, however, not possible because Compulsory Module 114 was not designed in the LMS. Although the university has an e-learning policy, lecturers cannot be coerced to use the LMS. A study undertaken in African universities has shown that academics invest their time in something that solves a problem (Czerniewicz, 2016), not something coerced.

I was the sole researcher of this project. As a blended learning coordinator, I had to “suspend any preconceived notions or personal experiences that would have unduly influenced what the participants were saying during the interviews” (Leedy & Ormrod, 2005: 139). I first asked participants to share their experiences of Compulsory Module 144 in the LMS and used probes

from the set of questions for them to talk about the reasons they either engaged or did not engage on and off the LMS. As Ehrich (1999:19) points out, it is “not humanly possible to be completely unbiased and to bracket completely the natural attitude”. I found myself having to set aside my own beliefs, perspectives and predispositions through ongoing self-reflection in my research portfolio and discussions with my mentors. I used triangulation to support the validity of the findings (Leedy & Ormrod, 2005: 105). Unlike almost all learning analytics case studies that relied heavily on quantitative data mined from the LMS, the employment of integrated methodology provided me with a full picture of why students either engage or do not engage on and off the LMS (3.3; White, 2003; Plowright, 2012). I have thus ensured that I provide a thick description by reporting the findings in detail so that the reader can draw his or her own conclusions from the presented data.

Another limitation of this study is that the interviews were conducted six month and one month after Compulsory Module 144 and 214 were assessed respectively. The time lapse probably resulted in students speaking of preferences in learning resources in any of their modules in general, not specifically for Compulsory Module 144. In each interview session, I had legacy logs of individual students and I asked questions based on the logs. The implications of conducting interviews after the module was done, was noted when three students were of the opinion that listening to the audio files made them feel as if they were part of the face to face class and two of them felt that they could easily recall information from the audio files in the test and examination. Their opinions were contradictory in that none of the audio files of Compulsory Module 144 were viewed. Their opinion indicates that students needed to interact with their lecturer. Lecturers could consider creating spaces to interact with students through tutorials. Despite this finding, the employment of integrated methodology and multiple sources of data generated enough evidence to validate the findings.

The third limitation of this study was that the researcher had no control on contextual factors which might have influenced student preferences in learning resources in the LMS. It is possible that students could have had different intellectual ability or motivators for learning, which could have impacted on processing of information and therefore affected results of this study. Future or follow-up studies might reveal such factors and their potential impact.

The fourth limitation is that the LMS captured activities that happen within the system. The actual activities that constitute learning which happen outside the system were not captured. Future studies should include record of activities that happen outside the LMS. I validated reasons why students

engage or not engage on and off the LMS from the Curriculum Studies perspective by using the framework (Table 3.1). I predicted level of involvement elicited by teaching strategy used in the design of learning resources (Table 3.1).

The fifth limitation is that student working memory was not be measured. The impact of WM on student engagement with learning resources on and off the LMS was predicted through number of activities that students completed in one day, number of days that students visited the LMS and compared it with the learning process according to Cognitive Learning Theory (Clark & Mayer 2012).

## **5.7. FINAL REFLECTION**

In this study, I have investigated the reasons why students either engage or do not engage on and off the LMS. I studied the patterns and trends of use of learning resources in the LMS. The underlying reasons why students engage or do not engage on and off the LMS were revealed through analysis of data generated by the LMS, interviews and questionnaire survey. Since this was an educational data mining study, I explored both qualitative and quantitative data on the use of learning resources in the LMS at a Faculty of Military Science of Stellenbosch University. The study was conducted to better understand a diverse group of 35 and 52 students enrolled for Compulsory Module 144 and 214 respectively and the setting in which they learn (Romero & Ventura, 2010). The findings have revealed a complex combination of interrelated and interdependent personal and contextual factors which determined whether students either engage or do not engage on and off the LMS (Prinsloo et al. 2012; Veletsianos et al 2016).

The study could make a contribution in the field of learning analytics that has recently received considerable attention in higher education sector in providing information that can be used to design digital learning environments to enhance student learning experiences in higher education. Learning analytics “attempt to understand human behaviour in the context of digital environment” (Roger, et al., 2010). This study extends on previous studies that researchers critiqued because they relied mostly on quantitative data generated by the digital teaching and learning environments (Rogers, 2010; Ruipérez-Valiente, Merino, Leony & Kloos, 2014; Brown, 2012; Dalton, 2015; Veletsianos, 2015).

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## Appendix A: Consent letter

### STELLENBOSCH UNIVERSITY CONSENT TO PARTICIPATE IN RESEARCH

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#### Variables associated with student learning resource preferences in the Learning Management System at a Faculty of Military Science

You are asked to participate in a research study that will be exploring variables associated with student learning resource preferences in the LMS. Lindiwe Mhakamuni Khoza a PhD student in the Faculty of Education, Department of Curriculum Studies is conducting a study towards fulfilment of the requirements of a PhD. Findings of this study will be written up in a PhD thesis, presented in conference and an article will be published in a journal. You are asked as a possible participant in this study because you use resources and do assessment created in the Learning Management System (SUNLearn) in the designated module.

#### 1.PURPOSE OF THE STUDY

The purpose of this research is to explore variables associated with student learning preferences in the LMS at a Faculty of Military Science. The findings will be disseminated in Stellenbosch University, conferences and an article will be published in a journal.

#### 2.PROCEDURES

If you volunteer to participate in this study, I will ask your permission to use data collected about your activities in designated module in the LMS (SUNLearn). The reports generated in the LMS about your engagement with resources and activities will form part of the discussion during the interviews. The discussion will have no impact on your marks in the designated module. I will ask you to do the following:

- Complete a paper based or an electronic questionnaire survey that will take you between 25 to 35 minutes during the course of the study;
- Participate in an interview that will be conducted for 30 to 40 minutes to get you talk about factors that play important in your engagement with resources and assessment activities in the designated module in the LMS. The interviews will be audio recorded and the audio record files will be transcribed for the purpose of analysing what was said;

I wish also ask for your permission to use data collected from the LMS about your activities in the LMS, questionnaire survey and interviews. As a researcher, I intend to analyse the collected data and disseminate findings at Stellenbosch University, conferences and publish an article.

### **3.POTENTIAL RISKS AND DISCOMFORTS**

This study is considered to be minimal risk. There are no known additional risks to those who will take part in this project. The only potential risk is that a third party will have access to data automatically generated by the LMS about your activities other than your lecturer or tutor.

### **4.POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY**

The findings from the project will be used to make recommendations to the Faculty of Military Science and the university policy makers.

### **5.PAYMENT FOR PARTICIPATION**

[You will not be remunerated for participation. You will not incur any costs in participation.

.]

### **6.CONFIDENTIALITY**

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of using pseudonyms in publications. Your identity will thus remain confidential at all times and no collected data will be reported at any stage in a way that could be linked to you. Confidentiality of data generated by the LMS will be maintained by identifying each with a code. The master list linking codes with identities will be saved on personal computer that is protected from direct access by requiring a username and a password, to which only one the researcher has access and that is protected from network access by firewall maintained by Department of Defence Local Area Network Desktop Support and State Information Technology (SITA).

Questionnaires will be anonymous. Each completed questionnaire will be identified by a code and locked in a steel cabinet. Data collected on biographical information such as rank, gender, age, etc will be used for the purpose of classification during statistical evaluation and under no circumstances will be disclosed to any other party, but the researcher. Electronic versions of data collected from questionnaires will be kept in a computer described above.

Confidentiality of audio recorded files and transcribed data will be maintained by only identifying each with a code and date. These audio files will not be used for any other purpose other than transcription for the study and will be erased once the data has been published in a professional journal. Your identity will thus remain confidential at all times and nothing that you say during the interview will be reported at any stage in way that could be linked to you. The master list linking the codes with identities will be saved on a personal computer described above for data collected from the LMS. Printed transcripts will be identified by means of a code only. Confidentiality of the recorded audio files will be maintained by keeping them locked in a steel cabinet. The researcher is the only person who has access to the key of the steel cabinet. You will not be asked to put your name on anything except in this form.



If you will be interviewed, you will be welcome to listen to the audio recorded files made of your interview. It is intended that the results of this study will be made available in a PhD thesis to the examiners concerned. In addition, the researcher will present the findings in a conference and publish an article in a journal. In all cases, the results will be reported in such a way that no information can be linked to you.

## **7.PARTICIPATION AND WITHDRAWAL**

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

## **8.IDENTIFICATION OF INVESTIGATORS**

If you have any questions or concerns about the research, please do not hesitate to contact:

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Faculty of Military Science, Stellenbosch University

## **9. RIGHTS OF RESEARCH SUBJECTS**

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this pilot study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [[mfouche@sun.ac.za](mailto:mfouche@sun.ac.za); 021 808 4622] at the Division for Research Development.

<b>SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE</b>
--

The information above was described to [*me/the subject/the participant*] in [*Afrikaans/English/Xhosa/other*] and [*I am/the subject is/the participant is*] in command of this language or it was satisfactorily translated to [*me/him/her*]. [*I/the participant/the subject*] was given the opportunity to ask questions and these questions were answered to [*my/his/her*] satisfaction.

*[I hereby consent voluntarily to participate in this study/I hereby consent that the subject/participant may participate in this study.]* I have been given a copy of this form.

---

Name of Subject/Participant

---

**Name of Legal Representative (if applicable)**

---

Signature of Subject/Participant or Legal Representative Date

<b>SIGNATURE OF INVESTIGATOR</b>
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I declare that I explained the information given in this document to \_\_\_\_\_ [*name of the subject/participant*] and/or [his/her] representative \_\_\_\_\_ [*name of the representative*]. [He/she] was encouraged and given ample time to ask me any questions. This conversation was conducted in [Afrikaans/\*English/\*Xhosa/\*Other] and [no translator was used/this conversation was translated into \_\_\_\_\_ by \_\_\_\_\_].

---

Signature of Investigator Date

## **Appendix B: Letter accompanying questionnaire survey**

Dear Student:

Thank you for agreeing to participate in this research project. You have been asked to participate in the project because you have been using the LMS in Compulsory Module 144. The purpose of the study is to gain a better understanding of the factors that influence distance education students to engage with course materials in the LMS, in the manner they do.

The purpose of the questionnaire is to gain insight on various factors that influence students to engage or not engage with the course materials.

The course materials in the LMS are designed to enhance your learning. Your responses will inform lecturers of the factors that they should consider when they design course materials in the LMS.

I ask you to answer all questions frankly and objectively. The questionnaire will take not more than fifteen minutes of your time to answer. Your response will only be used for research purposes. It will be impossible to identify the respondents involved after the completed instruments have been processed.

Thank you for the courtesy of your assistance.

**Appendix C: Questionnaire: students****A. BIOGRAPHIC INFORMATION**

Mark with an x:

1. How old are you?

18-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60

2.A

Male	Female

Are you a female or male?

3. What is your military rank:

4. What is your Arm of Service

SA Army	SAAF	SAN	SAMHS

5. Are you studying on full time basis or distance education (DE) / (ITE)?

Residential	DE (ITE)

6. What is your nationality?

South African	International student

7. When did you pass grade 12?

Before 1980	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014

## B.ACCESS TO SUNLEARN AND USE

8.Briefly share your first experience when you logged in on SUNLearn. Share the positive and negative experience.

9.Rate your skill level on SUNLearn. Mark with an x.

Never used SUNLearn	
Not a confident user	
Confident user	
Very confident user	

10.How often did you login on SUNLearn. Mark with x.

Daily	
Once a week	
More than once a week	
Once a month	
More than once a month	
Once a semester	
Never logged in	
Other (Specify)	

11.Select one device that you commonly used to access SUNLearn.

Cellphone	
Desktop computer	
Laptop	
iPad	
Tablet PC	
Other (Specify)	

12.Please complete the table below: Please rate the extent to which the following learning resources helped you learn:

	Very helpful	Helpful	Less helpful	Not helpful	Not sure
Text based content such as Powerpoint slides, Word documents					
Multimedia files, such as Powerpoint slides with voice over					
Multimedia files, such as audio recorded files					
Multimedia files, such as video recorded files					
Internet resources such as websites, YouTube videos					

13. Please complete the table below: Please indicate which of the following learning resources on SUNLearn you preferred to view.

	All of them	Almost all of them	Some of them	None of them	Not sure
Text based content such as Powerpoint slides, Word documents					
Multimedia files, such as Powerpoint slides with voice over					
Multimedia files, such as audio recorded files					
Multimedia files, such as video recorded files					
Internet resources such as websites, YouTube videos					

14. If there are some of resources that you preferred to access most, briefly explain the primary reason why.

15. If there are some of resources that you least preferred or did not access at all, briefly explain the primary reason why.

16. Please rate the extent to which the following activities on SUNLearn helped you learn:

	Very helpful	Helpful	A little helpful	No at all helpful	Not sure
Quiz					
Assignment without Turnitin plugin					
Assignment with Turnitin plugin					
Discussion forum					
Chat					
Clicker					
Blog					
Wiki					

17. If there are activities that were helpful or very helpful, briefly explain why (with reference to your answer given above).

18. If there are activities that were a little helpful or not at all helpful, briefly explain why (with reference to your answer given above).

19. Please indicate which of the following activities on SUNLearn did you prefer doing or participating in?

	Always	Most of the time	Some of them	Sometimes	Never
Quiz					
Assignment without Turnitin plugin					
Assignment with Turnitin plugin					
Discussion forum					
Chat					
Clicker					
Blog					
Wiki					

- 20.If there were activities that you preferred to do always or most of the time, or participate in in your module, briefly explain why?
- 21.If there are activities that you sometimes or never preferred to do or participate in in your module, briefly explain why?
- 22.If there are some resources and activities that you would have preferred, but were not included in your module, please list them (two resources and two activities). Briefly explain why you would have preferred such resources and activities?

## **Appendix D:Semi-structured interview questions: lecturing**

### **STAFF**

- 1.Tell me about your experience in your Module 144 in the LMS. What do you think worked well? Why do you think it worked well?
- 2.Is there anything that you think did not work according to your expectations?
- 3.Is there anything that you think you could have done differently?
- 4.Which criteria did you consider when adding resources on Compulsory Module 144 on SUNLearn?
- 5.Briefly explain why you think these criteria are important when you add resources on SUNLearn.
- 6.Which criteria did you consider when creating formative assessment activities on SUNLearn?
- 7.Briefly explain why you think these criteria are important when you add assessment activities on the LMS.
- 8.In your experience, which course materials do your students commonly prefer to use on your module?
- 9.Why do you think students prefer these course materials?
- 10.In your experience, which assessment activities do your students commonly prefer to do on your module?
- 11.Why do you think students prefer to do these assessment activities?
- 12.Based on your experience, is there anything that you think can help students learn better on the LMS? What would that be?



## **Appendix E:Semi-structured interview questions: students**

- 1.Please tell me what you did when you logged in on SUNLearn.
- 2.How did you know which materials to access when you logged in on the LMS?
- 3.What did you do with the course materials that you accessed on the LMS?
- 4.What type of course materials did you prefer to access in Compulsory Module 144 on LMS?
- 5.Please explain the primary reason why you preferred to access these resources.
- 6.Which type of course materials did you least prefer to access in Compulsory Module 144 in the LMS?
- 7.Briefly explain the primary reason why you least preferred to access these course materials in Compulsory Module 144 in the LMS.
- 8.Which assessment activities did you prefer to participate in or do in Compulsory Module 144 in the LMS?
- 9.Briefly explain the primary reason why you preferred to participate or do such assessment activities in Compulsory Module 144 in the LMS.
- 10.Which assessment activities did you least prefer to participate in or do in Compulsory Module 144 in the LMS?
- 11.Briefly explain the primary reason why you least preferred to participate or do such assessment activities in Compulsory Module 144 in the LMS.

## Appendix F: Example of transcribed interview

**INTERVIEWER:** Lindiwe Mhakamuni Khoza

**RESPONDENT:** User14 21

**DATE:** 19 July 2015

**INTERVIEWER:** User 1421, thank you for agreeing to participate in this research project. As I indicated in the consent letter that you signed, I want to confirm that the confidentiality of the interview will be maintained. Thank you for allowing me to interview you at your place.

**RESPONDENT:** I am glad I can help.

**Interviewer:** How did you it go with your studies last semester?

**Respondent:** I have passed two modules. Uhm, I did not write the third one. I did not get the writing mark.

**Interviewer:** Congratulations. You did well. Do not be too hard on yourself. The purpose of today's session is for you to share your experience in using SUNLearn in Compulsory Module 144. I would like you to tell me what you think worked well and why do you say so. I have few questions that I will ask you. The questions will be based on what you did on SUNLearn.

**Respondent:** Alright. I must just think a bit. I did this module last year. We used SUNLearn on Compulsory Module 144 and Module X. Module Y was not on SUNLearn.

**Interviewer:** Not a problem. You can take your time. Please tell me, what do you think worked well in Compulsory Module 144?

**Respondent:** We got everything, the slides. The slides were summaries of all the chapters in the textbook. We were two doing Compulsory Module 144 in the unit. After downloading the slides, I printed them and gave my colleague to make copies. He did the same so that we could save data bundles. We also got previous questions papers that helped us to see how questions were going to be asked in the test and exam. I liked the video clips as well.

**Interviewer:** Alright. I see you accessed Resource 1 eight times for six days. Why did you access same resource for six days? Resource 1401 had a study guide, submission dates, assignment topics that you had to choose from, example of an assignment and previous test papers.

**Respondent:** Er, I wanted to be sure that I have everything. Sometimes the lecturer changed submission dates and were notified of the changes.

**Interviewer:** How did you know which resources or activities to access when you logged in?

**Respondent:** The lecturer informed us via email if there is anything that was uploaded. She told us during that we need to visit SUNLearn regularly. We had Whatsapp group, so used to remind our group about due dates of the quizzes and case studies. I also looked at the titles. Ours said ITE. The slides I could leave, because I had a textbook. Even if I downloaded slides, I must still study the chapters from the textbook. The quizzes and case studies is must that I must do. I wanted to qualify for the exam. I cannot remember how much they counted. I liked the quizzes. They forced me to study and keep up with the work. If I studied well, I got total.

**Interviewer:** What about the assignment and case studies?

**Respondent:** Ja, they did not force me to prepare as I did with the quizzes. Quizzes, helped us to be more or less in the same level with residential students. Without the quizzes, there is nothing that pushes you read the chapters. I knew I had to read before doing the quiz, cos [sic] I knew I would not finish if I try to look for answers in the textbook. The case studies did not push me much. I typed them offline and I could check the answers from the textbook. I submitted

all of them before the due dates. The case studies, I had to wait for the lecturer to mark. Ja, by the time I get feedback, I would be busy focussing on the next quiz and case study. I checked the mark that I got.

**Interviewer:** What did you do with the feedback that you received on the case study?

**Respondent:** I read it, but I could not use it in the same case study. I could only use it in other case studies. The thing is with the case studies, there is no one correct answer. You have to think how you apply what you studied in the textbook in a real situation. The case studies were not difficult, the problem was my er, er writing. My experience is that writing assignments in here is different from the military courses that I did.

**Interviewer:** May you explain a bit what do you mean when you say writing assignments in your modules is different.

**Respondent:** I have to think critically. I can't use the textbook only. Lecturers give us extra materials to use. I have to get information from other sources like articles that they refer us to. I have to read, read and read {laughs}. I must reference. I am a student, I am learning.

**Interviewer:** Okay. I can see that you are a fast learner. Which of the course materials do you think were helpful?

**Respondent:** Uhm, the quizzes helped me to keep up with the work. To be honest, the assignment and case studies were the ones that helped. The problem is er uhm my writing skills. I have to think critically about each sentence that I write. The example of an assignment that was on SUNLearn helped me a lot. Ja, but putting all ideas together is a problem. With the slides, I only had to read and study the chapters from the textbook. I must say, it is not easy to study part time. You have to read the chapters and understand on your own. I sometimes had to read some chapters ja like uhm three to four times. It takes a lot of time. My wife understands, cos she is also studying. Ja, the other thing that helped me was that my colleague and I used to meet some Wednesdays after doing sport, to discuss how we could answer the case studies and the assignment.

**Interviewer:** Uhm, that was a good idea. Could that be the reason why you accessed the forum two times, but you did not ask a question regarding the semester test?

**Respondent:** I clicked the forum to check if there is anyone who posted something. I prefer to call the lecturer if there is anything that I do not understand. It works better for me to talk to the lecturer directly than using the forum.

**Interviewer:** Maybe everyone wanted to check whether there is anything posted on the forum. You could have been the first one to post something. Did you consider including others in your discussion by using the forum created on SUNLearn?

**Respondent:** Uhm, ja, I do not think they would have responded. Not a single one posted in the forum. Whatsapp could have been better. We used Whatsapp for reminders, not to discuss specific concepts or chapters. With the forum on SUNLearn you have to wait for days to get a response. Else you should request everybody to be logged on a specific day and time.

**Interviewer:** Okay. I can see why you did not ask a question in the forum. Uhm, I see you did a quiz before you accessed the slides.

**Respondent:** It was not important to access them on SUNLearn. Uhm, as I said before, I could have got copies from my colleague. It was no longer necessary to download them again. What mattered most was to do the quizzes and submit case studies and assignment so that I could get a writing mark.

**Interviewer:** Our discussion has covered most of the questions that I had. Can you tell me about course materials and activities that you least preferred.

**Respondent:** Uhm, this is not easy to answer. Uhm, what can I say? All materials and activities were important. I did not like submitting or I think the last case study during exam time. I cannot blame the lecturer though. The case studies and the assignment were available throughout the semester. I should have planned well. It is not easy though to study part time. There are a lot of challenges, work, family and studies. I was doing three modules. I decided to focus more on two modules when I realised that I could no longer cope with work of three modules.

**Interviewer:** Thank you very much for your time. All the best with your studies.

**Respondent:** I need to make more time for my studies. Thanks to you.



**Appendix G:Age and gender of participants**

Module	Less than 20	Female		Male		Total	
		No	%	No	%	No	%
Compulsory Module (CM) 144	21-25	0	0	3	8.9	3	8.9
	26-30	8	22.9	7	20	15	42.9
	31-35	4	11.4	8	22.9	12	34.3
	36-40	2	5.7	2	2.7	4	11.4
	41-45						
	45-50			1	2.9	1	2.9
	<b>Total</b>	<b>14</b>	<b>40%</b>	<b>21</b>	<b>60%</b>	<b>35</b>	<b>100%</b>
	Average age	30.6					
Compulsory Module (214)	21-25	6	11.3	31	59.6	37	71.1
	26-30	1	1.9	13	25	14	26.9
	31-35	0		0	0	0	0
	36-40	0		1	1.9	1	1.9
	<b>Total</b>	<b>7</b>	<b>13.5%</b>	<b>45</b>	<b>86.5%</b>	<b>52</b>	<b>100%</b>
	Average age	24					

**Appendix H: Rank of participants according to arms of service**

Compulsory Module 144	SA Army				SAAF				SAN				Tot
	F		M		F		M		F		M		
	No	%	No	%	No	%	No	%	No	%	No	%	
Sen O	2	5.7			1	2.9							3
Jun O	3	8.6	5	14.3	1	2.9			1	2.9	2	5.7	12
WO													
NCO	4	11.4	12	34.3	2	5.7	2	5.7					20
<b>Total</b>	<b>9</b>	<b>25.7</b>	<b>17</b>	<b>48.6</b>	<b>4</b>	<b>11.4</b>	<b>2</b>	<b>5.7</b>	<b>1</b>	<b>2.9</b>	<b>2</b>	<b>5.7</b>	<b>35</b>
<b>Compulsory Module 214</b>													
Candidate Officers (CO)/ ESN	7	13.5	2	3.8			26	50.0			7	13.5	80.8
Jun O	1	1.9					8	15.4			1	1.9	19.2
<b>Total</b>	<b>8</b>	<b>15.4</b>	<b>2</b>	<b>3.8</b>			<b>34</b>	<b>65.4</b>			<b>8</b>	<b>15.4</b>	<b>100</b>

## Appendix I: Description of resources and activities of Compulsory Module 144 on the LMS

Category 2014	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8
<b>Description of the resources and activities</b>	Administrative information	4 Chapters and Word File on description of Activity 1410	5 Chapters and Word file on description of Activity 1411	2 Chapters and Word file on description of Activity 1412	5 Chapters and Word file on description of Activity 1413	2 Chapters and Word file on description of Activity 1414	8 Activities Activity 1401 and 6 were optional, 1402, 1403, 1404, 1405, 1407 and 1408 for marks	Activity 1409, 1410, 1411, 1412, 1413 and 1414 for marks
<b>Content of the resources and activities</b>	Resource 1401: *3 Folders: -Folder 1: Administration <i>Word doc Study guide and Submission dates</i> -Folder 2: <i>PDF assignment guide, Word assignment guide, Word Assignment topics, Word assignment example</i> -Folder 3: 7 <i>PDF Previous test and exam question papers.</i>	Resource 1407: *Folder with 20-30 PPT slides	Resource 1412: *Folder with 10-20 PPT slides	Resource 1418: *Folder with 10-20 PPT slides	Resource 1421: *Folder with 20-30 PPT slides	Resource 1427: *Folder with 20-30 PPT slides	Activity 1401: *Optional MCQ Quiz on Resource 1407 to 1412	Activity 1409: *Marked Turnitin assignment on Compulsory Module 144's work
	Resource 1402: *Forum on semester test	Resource 1408: *Folder with 20-30 PPT slides	Resource 1143: *Folder with 30-40 PPT slides	Resource 1419: * Folder with 1-10 PPT slides	Resource 1422: *Folder with 20-30 PPT slides	Resource 1428: *Folder with 30-40 PPT slides	Activity 2: *Graded MCQ Quiz on Resource 1412 to 1414	Activity 1410: *Graded case study on Resource 1407 to 1410
	Resource 1403: *Page on Prescribed textbook	Resource 1409: *Folder with 40-50 PPT slides	Resource 1414: *Folder with 30-40 PPT slides	Resource 1420: *Word doc on description of Activity 12	Resource 1423: *Folder with 50-60 PPT slides	Resource 1429: * Word doc on description of Activity 1414	Activity 1403: *Graded MCQ Quiz on Resource 1415 to 1416	Activity 1411 *Graded case study on Resource 1412 to 1416
	Resource 1404: *Page on Scope of semester test: It stated that multiple choice questions would be from Resource 8 and 9, short answer questions from Resource 1407, 1412, 1413, 1414, 1415, 1418 and 19, while long answer questions	Resource 1410: *Folder with 30-40 PPT slides	Resource 1415: *Folder with 30-40 PPT slides		Resource 1424: *Folder with 20-30 PPT slides		Activity 1404: *Graded MCQ Quiz on Resource 1418 to 1419	Activity 1412: *Graded case study on Resource 1418 to 1419

Category 2014	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8
	would be from Resource 1413 and specification of percentage of each question type.							
	Resource 1405: *Page on Rubric for grading of Activity 9	Resource 1411: *Word doc on description of Activity 10	Resource 1416: *Folder with 20-30 PPT slides		Resource 1425: *Folder with 30-40 PPT slides		Activity 1405: *Graded MCQ Quiz on Resource 1421 to 1423	Activity 1413: *Graded case study on Resource 1421 to 1425
	Resource 1406: *Page on Submission dates of Activity 1402, 1403, 1404, 1405, 1407, 1408, 1409, 1410, 1411, 1412, 1413 and 1414		Resource 1417: *Word doc on description of Activity 11		Resource 1426: *Word doc on description of Activity 13		Activity 1406: Optional MCQ Quiz on Resource 1421 to 1424	Activity 1414: *Graded case study on Resource 1427 to 1428
	15 Non viewed resources: <i>*forum not graded,</i> <i>*online pre-course survey</i> <i>*13 audio files of 5 to 10MB recorded by the lecturer on some chapters.</i>						Activity 1407: Graded MCQ Quiz on Resource 1425 to 1426	
							Activity 1408: Graded MCQ Quiz on Resource 1427 to 1428	



## Appendix J:Description of resources and activities of Compulsory Module 214 on the LMS

Category 2015	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section	Section 8
<b>Description of the resources and activities</b>	Administrative information	Resource 1513: *20-30 PPT slides Chap 1	Resource 1515: *10-20 PPT slides Chap 2	Resource 1518: *30-40 PPT slides Chap 3	Resource 1519: *20-30 PPT Slides Chap 4	Resource 1522: *10-20 PPT slides Chap 5	Resource 1523: *1-10 PPT slides Chap 6	Resource 1525: *30-40 PPT slides Chap 7
<b>Content of the resources and activities</b>	Resource 1501: *3 Folders: Folder 1: Administration <i>Word doc Study guide and Submission dates, Word assignment guide, Word Assignment topics, PDF assignment example, Word Group Activity, Presentation rubric</i>	Resource 1514: PPT slides with voice over Resource 1513 (Chap 1)	Resource 1516: *10-20 PPT slide with voice over Resource 1515	Activity 1504: * MCQ Resource 1518	Resource 1520: *PPT Slides with voice over Resource 1519		Resource 1524: *PPT slides with voice over Resource 1523	Resource 1526: *Page Description of Case Study 1 (Description Activity 1518 and Activity 1523)
	Resource 1502: *Choice individual assignment	Activity 1501: *MCQ on Resource 1513	Resource 1517: *Word doc Description of Task on Resource 1515 (Description Activity 1516)		Resource 1521: *Word doc Description of Task on Resource 1519 (Description Activity 1517 and Activity 1522)		Activity 1506: *MCQ Quiz on Chap 6 and Chap 7 (Class Test 2)	
	Resource 1503: *Module Concept Clicker survey	Activity 1502: *MCQ on Resource 1513, 1515 & 1519 (Class Test 1)	Activity 1503: *MCQ on Resource 1515		Activity 1505: MCQ on Resource 1519			
	Resource 1504: *Pre-course survey							
	Resource 1505: *Course feedback							
	Resource 1506: *Forum							
	Resource 1507: *Chat							
	Resource 1508: Choice Presentations							
	Resource 1509: *Wiki Educational Tour expectations							
	Resource 1510: *Wiki Educational Tour feedback							
	Resource 1511:							

Category 2015	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section	Section 8
	*Choice: Course feedback:							
	Resource 1512: *Page: Semester test scope							
Category 2015 (2)	Section 9 Chap 9	Section 10 Chap 10	Section 11 Chap 11	Section 12 Chap 12	Section 13 Chap 14	Section 14 Chap 15	Section 15 Chap 16	Section 16 Chap 17
Description of the resources and activities	Resource 1527: *40-50 PPT Slides	Resource 1528: *20-30 PPT Slides	Resource 1529: *10-20 PPT Slides	Resource 1531: *10-20 PPT Slides on Chap 12	Resource 1533: *20-30 PPT Slides on Chap 14	Resource 1534: *20-30 PPT Slides on Chap 15	Resource 1535: *20-30 PPT Slides on Chap 16	Resource 1537: *10-20 PPT Slides on Chap 17
Content of the resources and activities	Activity 1507: *MCQ Class Test 3 on Resource 1527 (DE)	Activity 1508: *Class Test 3 on Resource 1528 (DE)	Activity 1509: *Folder Onsite visit Pictures by students onsite and to write a report on visit	Resource 1532: *Word doc Description of Task 4 on Chap 12 (Description of Activity 1520)		Activity : 1512: *Class Test 5 Chap 15 (DE)	Resource 1536: *Word doc Description of Task on Chap 15, Chap 16 and Chap 17 (Description of Activity 1521)	Activity 1513: *MCQ on Chap 17
			Resource 1530: *Description of Task on Resource 1529 (Description of Activity 1519 report)					
			Activity 1510: *MCQ Class Test 4 on Resource 1527 and Resource 1529 (DE)					
			Activity 1511: *Feedback on visit					
	Section 17 Chap 18	Section 18 Chap 19	Section 19 Chap 20	Section 20 Submissions				
	Resource 1537: *Word doc Chap 18	Resource 1538: *10-20 PPT Slides Chap 19	Resource 1539: *30-40 PPT Slides 20	Activity 1515: *Individual assignment				
	Activity 1514: *Class Test 6 Chap 18 (DE)			Activity 1516: *Task 2: Residential				
				Activity 1517: *Group Task Chap 4				
				Activity 1518: *Case Study Chap 7				
				Activity 1519: *Chap 11 Report				

Category 2015	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section	Section 8
				Activity 1520: *Chap 12 Task				
				Activity 1521: *Chap 15, 16 & 17 Task				
				Activity 1522: *Task 1 Chap 4 (DE)				
				Activity 1523: *Case Study (DE)				
				Activity 1524: *Case Study 2 (On Resource 1527)				

**Appendix K: Number of slides of Compulsory Module 144**

<b>Number of slides</b>	<b>Number of resources (Chapters)</b>
1 to 10	1
11 to 20	3
21 to 30	6
31 to 40	2
41 to 50	5
51 to 60	1
<b>Total</b>	<b>18</b>
<b>Chapters with slides between 1 and 30</b>	<b>55.6% (10)</b>
<b>Chapters with slides between 31 and 60</b>	<b>44.4% (8)</b>

**Appendix L: Calculation of the final of Compulsory Module 144**

<b>Activities of Compulsory Module 144 that counted towards the final mark</b>	<b>Percentage</b>
3 of the 5 Case studies (Activity 10 to 14)	3 x 10% = 30%
6 quizzes activities (Activity 2, 3, 4, 5, 7 and 8)	10%
One assignment (Activity 9)	20%
Semester Test	40%
Total = Semester mark	100%
Writing mark	40%
<b>Semester mark counted</b>	<b>40% of the final mark</b>
<b>Exam mark counted</b>	<b>60% of the final mark</b>
<b>Total</b>	<b>100%</b>

**Appendix M: Number of slides of Compulsory Module 214**

<b>Number of slides</b>	<b>Number of resources (Chapters)</b>
1 to 10	1
11 to 20	5
21 to 30	6
31 to 40	4
41 to 50	2
<b>Total</b>	<b>17</b>
<b>Chapters with slides between 1 and 30</b>	<b>66.7% (12)</b>
<b>Chapters with slides between 31 and 60</b>	<b>33.3% (6)</b>

**Appendix N: Calculation of the final mark of Compulsory Module 214**

<b>2015 Activities that counted towards the final mark</b>	<b>Percentage</b>
<b>Res</b>	
2 x Case studies	10%
Class tests	10%
Presentations	10%
One assignment	10%
2 x Semester Test	30%
Total = Semester mark	70%
Writing mark	40%
<b>Semester mark counted</b>	<b>40% of the final mark</b>
<b>Exam mark counted</b>	<b>60% of the final mark</b>
<b>Total</b>	<b>100%</b>
<b>DE</b>	
Assignment	40%
Case Studies	20%
1 x Semester Test	40%
Total	100%

## Appendix O: Student participation in resources in section 1 in Compulsory Module

### 144

Compulsory Module 144	Resource 1401 (Folder)		Resource 1402 (Forum)		Resource 1403 (Page)		Resource 1404 (Page)		Resource 1405 (Page)		Resource 1406 (Word doc)	
	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days
User 1401	12	6	0		2	2	2	2	0		2	2
User 1402	14	9	4	3			3	1	1	1	1	1
User 1403	13	11	2	2							2	2
User 1404	4	2	1	1			1	1			1	1
User 1405												
User 1406	11	7	2	2	1	1	2	2			1	1
User 1407	5	4					1	1			2	2
User 1408												
User 1409	10	7			1	1						
User 1410	20	10			1	1						
User 1411	27	9	6	1			2	1	2	1	3	3
User 1412	1	1			1	1						
User 1413	5	3			1	1	1	1	1	1		
User 1414	1	1					1	1	1	1		
User 1415												
User 1416					1	1						
User 1417												
User 1418	26	10	11	3	2	1	3	2			5	4
User 1419	4	1										
User 1420	19	4	9	9			4	4	2	1	12	4
User 1421	8	6	2	1							2	1
User 1422	9	6	7	2	3	2	2	2			3	3
User 1423	4	4					1	1			1	1
User 1424	2	1			1	1						
User 1425												
User 1426	1	1										
User 1427	11	10	2	2	3	2	2	2	4	3	3	3
User 1428	20	13	1	1	3	3	2	2	1	1	6	2
User 1429	92	27	12	8	10	5	5	5	1	1	11	7
User 1430	1	1										
User 1431	8	5	2	1							1	1
User 1432	6	6					1	1				
User 1433							1	1	1	1	2	2
User 1434	9	6										
User 1435	9	8	1	1	3	3	1	1			12	9



## Appendix P: Comparative analysis on use resources added in section 1 in Compulsory Module 144

	Resource 1401 (Folder)	Resource 1402 (Forum)	Resource 1403 (Page)	Resource 1404 (Page)	Resource 1405 (Page)	Resource 1406 (Page)	Resources not viewed (15)	Tot
Learning outcome		Collaboration					Collaboration	
Teaching action/strategy	Explanation description	Explanation description	Explanation description	Explanation description	Explanation description	Explanation description	Explanation description	
Level of involvement	Reading	Reading	Reading	Reading	Reading	Reading	Listening	
Learning experience	Apprehension	Discussion	Apprehension	Apprehension	Apprehension	Apprehension	Apprehension	
Type of learning	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition	
Number views	352	62	33	35	14	70	0	
Time in mins	290	52	30	32	14	66	0	
Days	83	28	17	23	11	34	0	
Mon	13	4	1	2	2	5		27
Tues	12	5	3	3	1	7		31
Wed	13	5	3	6	1	5		33
Thurs	14	6	3	5	2	8		38
Fri	11	4	3	2	3	3		26
Sat	14	2	3	2	2	4		27
Sun	6	2	2	3		2		15
Jul	14		8					
Aug	27	1	7					
Sep	22	14	2	17	7	16		
Oct	17	9		3	3	16		
Nov	3	4		3	1	2		
<b>Tot days Jul-Nov</b>	<b>83</b>	<b>28</b>	<b>17</b>	<b>23</b>	<b>11</b>	<b>34</b>		
Number students	28	14	14	18	9	18	0	
Average views per student in one semester	12.6	4.4	2.4	1.9	1.6	3.9	0	
<b>% students who viewed Resource 1 to 6</b>	<b>80.0</b>	<b>40.0</b>	<b>40.0</b>	<b>51.4</b>	<b>25.7</b>	<b>51.4</b>	<b>0</b>	
Number views in the morning	112	19	11	11	2	21		176
Number views in the afternoon	135	16	19	13	6	19	0	208
Number views in the evening and night	105	27	3	11	6	30		182
Number students and %								
Number students who did not view Resource 1401 to 1406	7 (20%)	21(60%)	21(60%)	17(48.6)	26(74.3)	17(48.6%)		
Number students who viewed Resource 1401 to 1406 in 1 day	6 (17.1%)	6(17.1%)	8(22.9%)	10(28.6)	8(22.9)	6(17.1%)		
Number students who viewed Resource 1401 to 1406 in 2-6 days	11(31.4%)	6(17.1%)	6(17.1%)	8(22.9)	2(2.9)	10(28.6%)		
Number students who viewed Resource 1401 to 1406 in 7 days and more	11(31.4%)	2(5.7%)				2(5.7%)		

## Appendix Q: Student participation in resources added in section 1 of Compulsory Module 214

Compulsory Module 214		Resource 1501 (Folder)		Resource 1502-1505		Resource 1506 (Forum)		Resource 1507-1512	
		No	Days	No	Days	No	Days	No	Days
User 1501	M								
User 1502	M	2	1			1	1		
User 1503	M	1	1			1	1		
User 1504	M	3	2			1	1		
User 1505	M								
User 1506	M					2	1		
User 1507	M	3	2						
User 1508	M					2	2		
User 1509	M								
User 1510	M					2	2		
User 1511	M	5	2			1	1		
User 1512	M								
User 1513	M					1	1		
User 1514	M	1	1						
User 1515	M								
User 1516	M								
User 1517	M	1	1			2	2		
User 1518	F								
User 1519	M	2	2						
User 1520	M	1	1			4	2		
User 1521	M	7	6			4	2		
User 1522	F								
User 1523	F								
User 1524	M	1	1						
User 1525	M	1	1						
User 1526	M	1	1						
User 1527	F					1	1		
User 1528	M								
User 1529	M	6	4			5	3		
User 1530	M								
User 1531	M								
User 1532	M					5	3		
User 1533	F	8	2			1	1		
User 1534	F					2	1		
User 1535	M	5	4						
User 1536	F								
User 1537	M	3	3			7	3		
User 1538	M								
User 1539	M	1	1			3	1		
User 1540	M	10	5						
User 1541	M								
User 1542	M								
User 1543	M	1	1						
User 1544	M					1	1		
User 1545	M	1	1			9	3		

Compulsory Module214		Resource 1501 (Folder)		Resource 1502-1505		Resource 1506 (Forum)		Resource 1507-1512	
User 1546	M	2	1			3	1		
User 1547	M								
User 1548	M								
User 1549	M								
User 1550	M								
User 1551	M								
User 1552	M	3	1			1	1		

## Appendix R: Comparative analysis on use resources added in section 1 of Compulsory Module 214

2015	Resource 1501 (Folder)	Resource 1502 - 1505 (Choice, Clicker)	Resource 1506 (Forum)	Resource 1507-1512 (Chat, Choice, Wiki, Choice, Page)	Tot
Learning outcome					
Teaching action/strategy	Explanation description	Explanation description	Discussion	Collaboration, Explanation	
Level of involvement	Reading	Reading	Collaboration	Collaboration	
Learning experience	Apprehension	Apprehension	Discussion	Discussion	
Type of learning	Acquisition	Acquisition	Collaboration	Collaboration	
Number views	66		59		
Time in mins	67		42		
Days	40		25		
Mon	5		25		30
Tues	4		42		46
Wed	4		3		7
Thurs	7		6		13
Fri	4		3		7
Sat	3		7		10
Sun	3				3
Jan			5		
Feb	10		7		
Mar	12		7		
Apr	4		5		
May	2		2		
Jun					
<b>Tot days Jan-May</b>	<b>40</b>		<b>26</b>		
Number students	23		22		
Average views per student in one semester	3		2.7		
<b>% students who viewed Resource 1 to 6</b>	<b>44.2</b>		<b>42.3</b>		
Number views in the morning	36		25		61
Number views in the afternoon	12		7		19
Number views in the evening and night	18		27		45
Number students who did not view Resources 1501 to 1512	29		30		
Number students who viewed Resources 1501 to 1512 in 1 day	13		13		
Number students who viewed Resource 1501 to 1512 in 2-6 days	10		9		
Number students who viewed Resource 1501 to 1512 in 7 days and more					

## Appendix S: Student participation in resources added in section 2 of Compulsory Module 144

Resources	Resource 1407 (Folder PPT slides 20-30)		Resource 1408 (PPT slides 20-30)		Resource 1409 (PPT slides 40-50)		Resource 1410 (PPT slides 30-40)		Resource 1411 (Word document)	
	No	Days	No	Days	No	Days	No	Days	No	Days
User 1401	2	1	2	1	1	1	0		1	1
User 1402	2	2			1	1	1	1	2	1
User 1403	1	1	1	1	1	1	1	1	1	1
User 1404									1	1
User 1405										
User 1406	2	2	1	1	1	1	1	1	1	1
User 1407					2	1	1	1	1	1
User 1408										
User 1409					1	1			2	1
User 1410	2	1								
User 1411	3	1	2	1	3	1	2	1	3	2
User 1412	1	1			1	1	1	1	1	1
User 1413	2	2	1	1	1	1	1	1	1	1
User 1414										
User 1415										
User 1416	3	2	1	1	1	1	1	1	1	1
User 1417										
User 1418										
User 1419	2	1	2	1	2	1	2	1		
User 1420										
User 1421									1	1
User 1422	1	1			2	2	2	2	2	1
User 1423	9	2	7	2	4	2	2	2	2	1
User 1424	2	2	1	1	2	2	2	2	4	3
User 1425									1	1
User 1426										
User 1427			1	1	2	1	1	1	2	1
User 1428	5	1	2	1	4	3	2	2	5	3
User 1429					45	4	3	1	1	1
User 1430										
User 1431										
User 1432										
User 1433									1	1
User 1434										
User 1435	1	1	1	1	3	2	1	1	6	1

## Appendix T: Comparative analysis of use resources added in section 2 in Compulsory Module 144

Section 2						
	Resource 1407 (Folder PPT slides 20-30)	Resource 1408 (Folder PPT slides 20-30)	Resource 1409 (Folder PPT slides 40-50)	Resource 1410 (Folder PPT slides 30-40)	Resource 1411 (Word doc File)	Tot
Verbs used for Learning Outcomes	Understand, Define, Explain	Define, Identify, Analyse, Justify	Explain Compare Describe Discuss, Identify	Describe, Understand, Identify, Explain	Differentiate, Analyse	
Teaching action	Explanation description	Explanation description	Explanation description	Explanation description	Explanation description	
Level of involvement	Reading	Reading	Reading	Reading	Reading	
Learning experience	Apprehension	Apprehension	Apprehension	Apprehension	Analyse	
Type of learning	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition	
Number of views	38	22	77	24	40	
Time in mins	28	18	54	20	39	
Days	17	12	21	16	12	
Mon	2	1	4	3	2	12
Tues	4	2	4	4	2	16
Wed	4	2	4	2	3	15
Thurs	3	3	5	4	2	17
Fri	3	2	1	1	1	8
Sat	1	2	2	2		7
Sun			1		2	3
July	14		8			
Aug	27	1	7			
Sep	22	14	2	17	7	
Oct	17	9		3	3	
Nov	3	4		3	1	
<b>Tot days Jul-Nov</b>	<b>17</b>	<b>12</b>	<b>21</b>	<b>16</b>	<b>12</b>	
Number students	15	12	18	16	21	
Average views per student in one semester	2.5	1.8	4.3	1.5	1.9	
% students who viewed Resource 1407 to 1411	42.9	34.3	51.4	45.7	60.0	43.6
Number views in the morning	15	6	46	9	7	83
Number views in the afternoon	16	10	18	6	19	69
Number views in the evening and at night	7	6	13	9	14	49
Number students who did not view Resource 1407 to 1411	20 (57.1%)	22(62.9%)	17(48.6%)	19(54.3%)	14(40.0%)	
Number students who viewed Resource	9 (25.7%)	11(31.4%)	12(34.3%)	12(34.3%)	18(51.4%)	

Section 2					
1407 to 1411 in 1 day					
Number students who viewed Resource 1407 to 1411 in 2-6 days	6 (17.2%)	2(5.7%)	6(17.1%)	4(11.4%)	3(8.6%)

## Appendix U: Student participation in resources and activities added in section 2 of Compulsory Module 214

2015	Section 2							
	Resource 1513: *20-30 PPT slides Chap 1		Resource 1514: PPT slides with voice over Resource 1513 (Chap 1)		Activity 1501: *MCQ on Resource 1513		Activity 1502: *MCQ on Resource 1513, 1515 & 1519 (Class Test 1)	
	No	Days	No	Days	No	Days	No	Days
User 1501								
User 1502			1	1	1	1		
User 1503	2	2					1	1
User 1504							1	1
User 1505								
User 1506	1	1						
User 1507	1	1	1	1			2	1
User 1508	1	1	1	1			27	3
User 1509								
User 1510					19	2		
User 1511								
User 1512								
User 1513							1	1
User 1514								
User 1515	1	1						
User 1516								
User 1517								
User 1518								
User 1519	1	1			1		1	1
User 1520	1	1				1	1	1
User 1521	1	1	1	1	2	2		
User 1522	1	1	3	2				
User 1523								
User 1524	1	1					1	1
User 1525								
User 1526								
User 1527	3	2	1	1				
User 1528								
User 1529	7	3	6	3			22	3
User 1530	3	2			1	1	3	1
User 1531								
User 1532	3	2	4	1			7	2
User 1533	1	1	1	1	3	1		
User 1534	1	1	1	1				
User 1535					13	1		
User 1536					3	1		
User 1537	2	2	7	2				
User 1538								



2015	Section 2							
User 1539					30	2		
User 1540					14	1		
User 1541	1	1	1	1				
User 1542	2	2						
User 1543							1	
User 1544								1
User 1545	1	1			3	3	4	2
User 1546					14	1		
User 1547								
User 1548								
User 1549								
User 1550	5	2	3	3				
User 1551	1	1					1	1
User 1552								

## Appendix V: Comparative analysis of use resources and activities added in section 2 in Compulsory Module 214

Section 2					
2015	Resource 1513: *20-30 PPT slides Chap 1	Resource 1514: PPT slides with voice over Resource 1513 (Chap 1)	Activity 1501: *MCQ on Resource 1513	Activity 1502: *MCQ on Resource 1513, 1515 & 1519 (Class Test 1)	Tot
Verbs used for Learning Outcomes	Describe, Explain, Understand, Account	Describe, Explain, Understand, Account			
Teaching action	Explanation description	Explanation, description			
Level of involvement	Reading	Listening			
Learning experience	Apprehension	Apprehension			
Type of learning	Acquisition	Acquisition			
Number of views	32	31	104	73	
Time in mins	32	21	61	43	
Days	17	12	9	6	
Mon	3	3	2	1	9
Tues	2	2	3	1	8
Wed	3	1	1	1	6
Thurs	4	2	1	1	8
Fri	5	4	2	1	12
Sat					
Sun				1	1
Jan	8	8		1	
Feb	6	3	6	5	
Mar	2		1		
Apr	1	1			
May			2		
<b>Tot days Jul-Nov</b>	<b>17</b>	<b>12</b>	<b>9</b>	<b>6</b>	
Number students	22	13	12	14	
Average views per student in one semester	1.9	2.4	8.7	5.2	
% students who viewed Resource 7 to 11	43.3	25	23.1	26.2	
Number views in the morning	10	11	25	15	61
Number views in the afternoon	14	7	1	30	52
Number views in the evening and at night	19	13	78	28	138
Number students who did not view Resources 1513 to 1514	30	39	40	38	

Number students who viewed Resource 1513 to 1514 in 1 day	14	9	8	9
Number students who viewed Resource 1513 to 1514 in 2-6 days	8	3	4	5

**Appendix W: Student participation in resources added in section 3 of Compulsory****Module 144**

Resources	Resource 1412 (Folder PPT slides 10-20)		Resource 1413 ( Folder PPT slides 30- 40)		Resource 1414 (Folder PPT slides 30- 40)		Resource 1415 PPT (Folder PPT slides 30-40)		Resource 1416 PPT (Folder PPT slides 10-20)		Resource 1417 (Word doc file)	
	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days
User 1401	3	2	3	2	4	3	5	4	3	2	2	2
User 1402	1	1	1	1	1	1	2	1	1	1	4	2
User 1403	1	1	1	1	1	1	1	1	1	1	1	1
User 1404							2	1			2	2
User 1405												
User 1406	1	1	2	1	1	1	1	1			2	1
User 1407	2	2	1	1	1	1	1	1	1	1	2	2
User 1408												
User 1409							1	1			1	1
User 1410	2	1	2	1	2	1	1	1	2	1		
User 1411	1	1	1	1	1	1	1	1	1	1	7	2
User 1412							1	1			2	1
User 1413	2	2	1	1	1	1	1	1	1	1		
User 1414	1	1							1	1	1	1
User 1415												
User 1416							1	1			1	1
User 1417												
User 1418	2	1	2	1	2	1	2	1	3	2	3	1
User 1419							1	1			1	1
User 1420	8	1	3	2	3	2	6	3	2	2	4	3
User 1421	1	1	1	1	1	1	1	1	1	1	1	1
User 1422	4	2	2	2	3	2	2	2	2	2	2	3
User 1423	1	1	3	1	2	1	2	2	1	1	2	2
User 1424	1	1	2	2	1	1	1	1	1	1	1	1
User 1425												
User 1426												
User 1427	3	2	2	2	2	1	4	3	3	3	3	1
User 1428	1	1	1	1	1	1	1	1	1	1	1	1
User 1429	8	4	3	2	6	1	1	1	1	1	1	1
User 1430												
User1431	2	1									2	1
User 1432					1	1	2	2	1	1		
User 1433	1	1	1	1	1	1	1	1	1	1	2	1
User 1434												
User 1435	2	2	3	3	2	2	2	2	2	2		

## Appendix X: Comparative analysis of use resources added in section 3 in Compulsory Module 144

Section 3							
	Resource 1412 (Folder PPT slides 10-20)	Resource 1413 (Folder PPT slides 30-40)	Resource 1414 (Folder PPT slides 30-40)	Resources 1415 (Folder PPT slides 30-40)	Resource 1416 (Folder PPT slides 10-20)	Resource 1417 (Word doc file)	Tot
Verbs used for Learning Outcomes	State, Describe, Explain	Explain Distinguish, Outline, Develop	Define, Explain, Describe, Compare, Identify	Explain, Describe, Stimulate, Apply	Describe, State, Discuss, Explain	Analyse Comment Explain Argue	
Teaching action	Explanation, description	Explanation, description	Explanation, description	Explanation, description	Explanation, description	Explanation, description	
Level of involvement	Reading	Reading	Reading	Reading	Reading	Reading	
Learning experience	Apprehension	Apprehension	Apprehension	Apprehension	Apprehension	Apprehension	
Type of learning	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition	
No of views	48	35	37	44	30	48	
Time in sec	38	32	32	40	27	44	
Days	22	21	20	23	23	10	
Mon	5	5	4	6	6	2	28
Tues	3	3	3	4	2	2	17
Wed	3	3	4	3	4	2	19
Thurs	4	4	5	4	3	1	21
Fri	2	2	2	3	3	1	13
Sat	3	2	1	1	2	1	10
Sun	2	2	1	2	3	1	11
July							
Aug	15	14	15	14	15	10	
Sep	6	5	5	7	7		
Oct		1			1		
Nov	1	1		1	1		
<b>Tot days Aug-Nov</b>	<b>22</b>	<b>21</b>	<b>20</b>	<b>22</b>	<b>24</b>	<b>10</b>	
Number Students	21	19	20	25	20	23	
Average views per student in one semester	2.3	1.8	1.9	1.8	1.5	2.1	
<b>% Students who viewed resources</b>	<b>60.0</b>	<b>54.3</b>	<b>57.1</b>	<b>71.4</b>	<b>57.1</b>	<b>65.7</b>	
Number views in the morning	22	20	15	14	12	17	100
Number views in the afternoon	16	9	10	15	12	14	76
Number views in the evening and at night	10	6	12	15	6	17	66
	22	20	15	14	12	17	100
Number of students who did not view Resources 1412 to 1417	14 (40.0%)	16(45.7%)	15(42.9%)	10(28.6%)	10(42.9%)	12(34.3%)	
Number of students who viewed Resources 1412 to 1417 in 1 day	14(40.0%)	12(34.3%)	16(45.7%)	18(51.4%)	14(40.0%)	15(42.9%)	
Number of students who viewed Resources 1412 to 1417 in 2 to 6 days	7(20.0%)	7(20.0%)	4(11.4%)	7(20.0%)	6(17.1%)	8(22.9%)	

## Appendix Y: Student participation in resources and activities added in section 3 and 4 of Compulsory Module 214

2015	Section 3								Section 4			
	Resource 1515: *10-20 PPT slides Chap 2		Resource 1516: *10-20 PPT slide with voice over Resource 1515		Resource 1517: *Word doc Description of Task on Resource 1515 (Description Activity 1516)		Activity 1503: *MCQ on Resource 1515		Resource 1518: *30-40 PPT slides Chap 3		Activity 1504: * MCQ Resource 1518	
	No	Days			No	Days	No	Days	No	Days	No	Days
User 1501												
User 1502			12	5	1	1						
User 1503	2	2					1	1	1	1	1	1
User 1504			11	4	1	1	6	1				
User 1505												
User 1506	1	1										
User 1507	1	1			1	1						
User 1508			1	1	6	2			1	1	1	1
User 1509												
User 1510			2	2			3	1			8	1
User 1511			9	3								
User 1512												
User 1513												
User 1514												
User 1515	1	1										
User 1516												
User 1517			1	1								
User 1518												
User 1519	2	1	2	2	1	1	7	1	1	1		
User 1520			2	1	1	1						
User 1521	1	1	2	2					1	1		
User 1522	1	1										
User 1523												
User 1524	2	1							2	1		
User 1525												
User 1526			17	2								
User 1527	3	1			2	1			1	1		
User 1528							1	1				
User 1529	3	1	5	3	1	1			1	1		
User 1530	1	1										
User 1531												
User 1532	1	1			1	1			1	1	1	1
User 1533	1	1					1	1				
User 1534												
User 1535												
User 1536	2	1	1	1	2	1	3	1			1	1

2015	Section 3								Section 4			
User 1537	2	1	11	4	2	1	13	1	1	1		
User 1538												
User 1539	1	1					7	1				
User 1540			3	1	1	1						
User 1541	1	1			1	1						
User 1542	1	1			1	1			1	1		
User 1543												
User 1544			1	1	2	1						
User 1545	1	1	3	3	2	2	3	3	1	1	2	2
User 1546							6	1			1	1
User 1547			2	1								
User 1548			10	4								
User 1549	1	1										
User 1550	2	1	1	1	9	2			1	1		
User 1551												
User 1552	1	1	12	5								

## Appendix Z: Comparative analysis of use resources and activities added in section 3 and 4 of Compulsory Module 214

Section 3					Section 4		Tot
2015	Resource 1515: *10-20 PPT slides Chap 2	Resource 1516: *10-20 PPT slide with voice over Resource 1515	Resource 1517: *Word doc Description of Task on Resource 1515 (Description Activity 1516)	Activity 1503: *MCQ on Resource 1515	Resource 1518: *30-40 PPT slides Chap 3	Activity 1504: *MCQ Resource 1518	
Verbs used for Learning Outcomes	Identify, Describe, Discuss, Outline,	Identify, Describe, Discuss, Outline,			Understand, Describe, Identify, Summarise,		
Teaching action	Explanation description	Explanation description			Explanation description		
Level of involvement	Reading	Listening			Reading		
Learning experience	Apprehension	Apprehension	Apprehension	Apprehension			
Type of learning	Acquisition	Acquisition	Acquisition	Acquisition			
Number of views	32	26	35	51	13	15	
Duration in sec	22	18	23	26	12	7	
Days	13	10	11	8	8	8	
Mon	3	3	4	2	1	11	24
Tues	2	3	2	3	1	8	19
Wed	3	1	1		1	2	8
Thurs	3	2	1	2	2	3	13
Fri	3	2	2	1	3		11
Sat							
Sun							
Jan	3	4	3				
Feb	7	6	8	3	6	4	
Mar	2			1	1	1	
Apr	1			1	1	1	
May				3		2	
<b>Tot days Jan-May</b>	<b>13</b>	<b>10</b>	<b>11</b>	<b>8</b>	<b>8</b>	<b>8</b>	
Number students	22	10	17	11	12	7	
Average views per student in one semester	1.5	1	2.1	4.6	1.1	2.1	
% students who viewed Resources 1515 to 1518	42.3	19.2	32.7	21.1	23.1	13.1	
Number views in the morning	12	21	19	15		11	
Number views in the afternoon	7		12	9		3	
Number views in the evening and at night	13	5	4	27		1	



	Section 3				Section 4	
Number students who did not view Resource Resources 1515 to 1518	12	42	35	44		45
Number students who viewed Resource Resources 1515 to 1518 in 1 day	21	8	14	10		6
Number students who viewed Resource Resources 1515 to 1518 in 2-6 days	1	2	3	1		1

## Appendix AA: Student participation in resources added in section 4 of Compulsory Module 144

Resources	Resource 1418 (Folder PPT slides 10-20)		Resource 1419 (Folder PPT slides 1-10)		Resource 1420 (Word doc file)	
	No	Days	No	Days	No	Days
User 1401	2	2	2	1	9	2
User 1402	3	2	1	1	1	1
User 1403	1	1	1	1	2	1
User 1404						
User 1405						
User 1406	2	2	1	1	2	2
User 1407	1	1	1	1	1	1
User 1408						
User 1409	1	1				
User 1410	4	1	2	1		
User 1411	4	2	2	2	1	1
User 1412						
User 1413	2	2	2	2		
User 1414	1	1	1	1	1	1
User 1415						
User 1416						
User 1417						
User 1418	3	2	5	2	2	1
User 1419					1	1
User 1420	8	3	6	3	2	1
User 1421	2	1	1	1	1	1
User 1422	1	1	1	1		
User 1423	1	1	1	1	2	1
User 1424						
User 1425						
User 1426						
User 1427	1	1	1	1	2	1
User 1428	2	1	2	1	2	2
User 1429	12	6	4	2	4	2
User 1430						
User 1431			1	1	1	1
User 1432	2	2	2	2	2	1
User 1433	1	1	1	1	1	1
User 1434						
User 1435	4	3	3	3	1	1

## Appendix BB: Comparative analysis of use resources added in section 4 of Compulsory Module 144

Section 4				
	Resource 1418 (Folder PPT slides 10-20)	R1419 (Folder PPT slides 1-10)	Resource 1420 (Word doc file)	Tot
Verbs used for Learning Outcomes	Describe, Explain, Discuss, Identify	Differentiate, Explain, Compare, Advise, Explain	Comment, Argue	
Teaching action	Explain, describe	Explain, describe	Explain, describe	
Level of involvement	Reading	Reading	Reading	
Learning experience	Apprehend	Apprehend	Apprehend	
Type of learning	Acquisition	Acquisition	Acquisition	
Number of views	58	41	38	
Time in mins	43	35	29	
Number of days	21	21	11	
Mon	2	5	2	9
Tues	3	2	2	7
Wed	4	3	2	9
Thurs	2	3		5
Fri	2	2	2	6
Sat	6	2	1	9
Sun	2	4	2	8
Jul				
Aug	4	3	2	
Sep	14	15	9	
Oct	2	2		
Nov	1	1		
<b>Tot days Aug-Nov</b>	<b>21</b>	<b>21</b>	<b>11</b>	
Number students	21	21	19	
Average views of resources per student one semester	2.8	2.0	2.0	
<b>% of students who viewed Resource 18 to 20</b>	<b>60.0</b>	<b>60.0</b>	<b>54.3</b>	
Number of views in morning	19	16	8	43
Number of views in the afternoon	19	13	10	42
Number of views in the evening and at night	20	12	20	52
	No students and %			
Number students who did not view Resources 1421 to Resource 1426	14(40.0%)	14(40.0%)	16(45.7%)	
Number students who viewed Resources 1421 to 1426 in 1 day	11(31.4%)	14(40.0%)	15(42.9%)	
Number students who viewed Resources 1421 to 1426 in 2 to 6 days	8(22.9%)	7(20.0%)	4(11.4%)	

## Appendix CC: Comparative analysis of use resources and activities added in section 5, 6 and 7 of Compulsory Module 214

2015	Section 5								Section 6				Section 7			
	Resource 1519: *20-30 PPT Slides Chap 4		Resource 1520: *PPT Slides with voice over Resource 1519		Resource 1521: *Word doc Description of Task Resource 1519 (Description Activity 1517 and Activity 1522)		Activity 1505: MCQ on Resource 1519		Resource 1522: *10-20 PPT slides Chap 5		Resource 1523: *1-10 PPT slides Chap 6		Resource 1524: *PPT slides with voice over Resource 1523		Activity 1506: *MCQ Quiz on Chap 6 and Chap 7 (Class Test 2)	
	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days
User 1501																
User 1502			1	1												
User 1503	1	1					1	1			1	1				
User 1504	1	1	1	1					1	1	1	1				
User 1505																
User 1506									1	1						
User 1507																
User 1508	1	1	1	1	3	3	1	1	1	1	1	1			18	1
User 1509																
User 1510							7	1							1	1
User 1511																
User 1512																
User 1513															1	1
User 1514																
User 1515																
User 1516																
User 1517	1	1	1	1					1	1	3	2				
User 1518											1	1			1	1
User 1519	2	2			2	2	12	2			2	2			1	1
User 1520					1	1	14	1			1	1			3	2
User 1521	2	2							2	2	2	2				
User 1522															1	1
User 1523															1	1
User 1524	2	1							4	1	2	1				
User 1525																
User 1526					1	1	9	1								
User 1527	1	1			2	1					1	1				
User 1528	1	1							1	1	1	1			2	1
User 1529	2	2	7	3	3	2			4	3	3	2			41	1
User 1530	1	1							1	1	1	1				
User 1531																
User 1532											1	1			26	3
User 1533	2	2			1	1	1	1			1	1				
User 1534																
User 1535	1	1	1	1					1	1	1	1				
User 1536	1	1					7	1							8	4

2015	Section 5								Section 6		Section 7					
User 1537	1	1	3	1	1	1	12	1	1	1	3	3			4	3
User 1538																
User 1539	1	1					1	1	1	1	1	1			2	1
User 1540	1	1									2	2			1	1
User 1541					1	1					1	1				
User 1542	1	1							1	1	1	1				
User 1543																
User 1544					2	1										
User 1545	1	1			2	2	2	2	1	1	1	1			1	1
User 1546							11	1			4	2			2	2
User 1547																
User 1548			1	1											1	2
User 1549	1	1									1	1				
User 1550	1	1	1	1					1	1	4	3			1	2
User 1551					1	1										
User 1552	1	1									1	1				

## Appendix DD: Comparative analysis of use resources and activities added in section 5, 6 and 7 of Compulsory Module 214

Section 5				Section 6	Section 7				Tot
2015	Resource 1519: *20-30 PPT Slides Chap 4	Resource 1520: *PPT Slides with voice over Resource 1519	Resource 1521: *Word doc Description of Task on Resource 1519 (Description Activity 1517 and Activity 1522)	Activity 1505: MCQ on Resource 1519	Resource 1522: *10-20 PPT slides Chap 5	Resource 1523: *1-10 PPT slides Chap 6	Resource 1524: *PPT slides with voice over Resource 1523	Activity 1506: *MCQ Quiz on Chap 6 and Chap 7 (Class Test 2)	
Verbs used for Learning Outcomes	Distinguish, Identify, Account, Explain,				Understand, Identify, Analyse, Describe, Solve	Distinguish, Identify, Establish, Apply, Interpret, Carry out			
Teaching action	Explanation description	Explanation description	Explanation description		Explanation description	Explanation description	Explanation description		
Level of involvement	Reading	Listening	Reading		Reading	Reading	Listening		
Learning experience	Apprehension	Apprehension	Apprehension						
Type of learning	Acquisition	Acquisition	Acquisition						
Number of views	27	17	20	78	22	42		116	
Time in mins	26	17	17	31	18	38		70	
Days	14	7	11	10	11			12	
Mon	2	1	2	3	2	3		2	
Tues	2	1	2	2	2	2		2	
Wed	2	1		1	3	4		1	
Thurs	5	1	2	1	3	4		4	
Fri	2	3	3	1	1	2		2	
Sat				1		1		2	
Sun			2	1					
Jan						14			
Feb	12	5	7	4	10	1		7	
Mar	1	1	2	1	1	1		3	
Apr		1							
May	1		2	5				2	
<b>Tot days Jan-May</b>	<b>14</b>	<b>7</b>	<b>11</b>	<b>10</b>	<b>11</b>	<b>16</b>		<b>12</b>	
Number students	22	9	12	12	15	26		19	
Average views per student in one semester	1.2	1.9	1.7	6.5	1.5	1.6		6.1	
% students who viewed Resource 1519 to 1524	42.3	17.3	23.1	23.1	28.8	50		36.5	
Number views in the morning	10		9	27	4	11		57	
Number views in the afternoon	5	6	4	15	5	9		7	
Number views in the evening and at night	12	11	7	36	13	22		52	
Number students who did not	30	43	40	40	37	26		33	

	Section 5				Section 6	Section 7		
view Resources 1519 to 1524								
Number students who viewed Resources 1519 to 1524 in 1 day	18	8	8	10	13	19		12
Number students who viewed Resources 1519 to 1524 in 2-6 days	4	1	4	2	2	7		7

## Appendix EE: Student participation in resources added in section 5 of Compulsory Module 144

Resources	Resource 1421 (Folder PPT slides 20-30)		Resource 1422 (Folder PPT slides 20-30)		Resource 1423 (Folder PPT slides 50 to 60)		Resource 1424 (Folder PPT slides 20-30)		Resource 1425 (Folder PPT slides 30 to 40)		Resource 1426 (Word doc file)	
	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days
User 1401	5	4	2	2	1	1	0		2	2	2	2
User 1402	1	1	1	1	1	1	1	1	1	1	2	1
User 1403	2	1	1	1	2	2	1	1	1	1	1	1
User 1404												
User 1405												
User 1406									1	1	1	1
User 1407	1	1	1	1	1	1	1	1	1	1	1	1
User 1408												
User 1409											3	3
User 1410												
User 1411	8	2	5	2	2	2	2	2	1	1	2	1
User 1412												
User 1413	1	1	1	1	1	1						
User 1414												
User 1415												
User 1416												
User 1417												
User 1418	2	1	2	1	2	1	2	1	2	1	2	1
User 1419												
User 1420	6	2	3	2	2	1	2	1	4	3	4	1
User 1421	1	1	2	1	1	1	1	1	1	1	1	1
User 1422	2	2	3	2	1	1	1	1	1	1	2	2
User 1423	2	1	1	1	1	1	1	1	1	1	2	2
User 1424												
User 1425												
User 1426												
User 1427	2	2	2	2	2	2	2	2	3	3	4	2
User 1428	1	1	3	2	1	1	1	1	1	1	7	3
User 1429	5	4	1	1	1	1	1	1	1	1	2	2
User 1430												
User 1431											3	2
User 1432	6	2	1	1	1	1	1	1	2	2	5	1
User 1433	2	2	1	1	1	1	1	1	1	1	3	2
User 1434												
User 1435	3	1	1	1	2	2	1	1	1	1	4	3



## Appendix FF: Comparative analysis of use resources and activities added in section 5 of Compulsory Module 144

	Section 5						Tot
	Resource 1421(Folder PPT slides 20-30 )	Resource 1422 (Folder PPT slides 20-30)	Resource 1423 (Folder PPT slides 50-60)	Resource 1424 (Folder PPT slides 20-30)	Resource 1425 (Folder PPT slides 30-40)	Resource 1426 (Word doc file)	
Verbs used in Learning Outcomes	Advise Explain	Explain Describe Identify Develop Justify Appraise	Explain Differentiate Discuss Describe Advise Analyse	Define Identify Analyse Compare Appraise	Explain Identify Discuss Debate Describe	Analyse Argue Identify	
Number of views	50	31	23	19	25	51	
Teaching action	Explanation description	Explanation description	Explanation description	Explanation description	Explanation description	Explanation description	
Level of involvement	Reading	Reading	Reading	Reading	Reading	Reading	
Learning experience	Apprehension	Apprehension	Apprehension	Apprehension	Apprehension	Apprehension	
Type of learning	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition	
Time (in mins) taken to view resources	44	26	21	17	23	43	
Number of days	18	17	15	13	18	22	
Mon	4	4	4	4	4	3	23
Tues	5	4	3	3	4	5	24
Wed	2	2	1		1	5	11
Thurs		1	2	1	2	3	9
Fri	1	2	1	1	1	2	8
Sat	2	1	1	1	3	1	9
Sun	4	3	3	3	3	3	19
Jul							
Aug	2	2	2	2	2		10
Sep	11	9	8	8	9	9	54
Oct	3	2	3	3	7	13	31
Nov	2	4	2				8
Dec							
<b>Tot days Aug-Nov</b>	<b>18</b>	<b>17</b>	<b>15</b>	<b>13</b>	<b>18</b>	<b>22</b>	
Number students	17	17	17	15	17	19	
Average resources viewed per student in one semester	2.9	1.8	1.4	1.3	1.5	2.7	
<b>% students who viewed Resource 1421 to Resource 1426</b>	<b>48.6</b>	<b>48.6</b>	<b>48.6</b>	<b>42.9</b>	<b>48.6</b>	<b>54.3</b>	<b>47.4</b>
Number views in the morning	18	12	8	8	9	16	71
Number views in the afternoon	22	13	10	8	10	25	88
Number views in the evening and at night	10	6	5	3	6	10	40
Number students who did not view Resources 1421 to 1426	18(51.4%)	18(51.4%)	18 (51.4%)	20(57.1%)	18(51.4%)	16(45.7%)	
Number students who viewed Resources 1421 to 1426 in 1 Day	9(25.7%)	11(31.4%)	13(37.1%)	13(37.1%)	13(37.1%)	9(25.7%)	
Number students who viewed Resources 21 to 26 in 2 to 6 days	8(22.9%)	6(17.1%)	4(11.4%)	2(5.7%)	4(11.4%)	10(28.6%)	
Number students who viewed Resources 1421 to 1426 in 7 days and more							

## Appendix GG: Student participation in resources and activities added in section 8, 9 and 10 of Compulsory Module 214

2015	Section 8				Section 9				Section 10			
	Resource 1525: *30-40 PPT slides Chap 7		Resource 1526: *Page Description of Case Study 1 (Description Activity 1518 and Activity 1523)		Resource 1527: *40-50 PPT Slides Chap 9		Activity 1507: *MCQ Class Test 3 on Resource 1527 (DE)		Resource 1528: *20-30 PPT Slides		Activity 1508: *Class Test 3 on Resource 1528 (DE)	
	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days
User 1501												
User 1502												
User 1503	1	1	1	1	1	1						
User 1504	1	1	1	1	1	1			1	1		
User 1505			1	1								
User 1506			4	2					1	1		
User 1507					1	1			2	1		
User 1508							24	2	1	1	8	1
User 1509												
User 1510	1	1	3	2	4	2						
User 1511												
User 1512												
User 1513												
User 1514			1	1								
User 1515												
User 1516												
User 1517	1	1	1	1	1	1			2	1		
User 1518	2	1	1	1					1	1		
User 1519	2	2	2	2	1	1	1	1	4	4		
User 1520			1	1			39	1	1	1	6	1
User 1521	1	1			3	3			3	3		
User 1522			1	1								
User 1523												
User 1524					2	1			2	1		
User 1525												
User 1526					2	1					1	1
User 1527	1	1			2	1						
User 1528	1	1	1	1								
User 1529	3	1	2	2	2	1	80	1	2	2	13	1
User 1530	1	1			1	1						
User 1531												
User 1532	1	1			1	1	37	2	2	1	8	1
User 1533	1	1			1	1						
User 1534												
User 1535												
User 1536			1	1					2	1		
User 1537	1	1	1	1	1	1	40	1	1	1	9	1
User 1538												
User 1539	1	1			1	1						

2015	Section 8				Section 9				Section 10			
User 1540	2	1	1	1	2	2	2	2				
User 1541					1	1			1	1		
User 1542	1	1							1	1		
User 1543												
User 1544			1	1								
User 1545	1	1	4	3	3	2			2	1		
User 1546	2	2	1	1	1	1						
User 1547									2	1		
User 1548			2	2					1	1		
User 1549	2	1			2	1			1	1		
User 1550	3	1							2	2		
User 1551									1	1		
User 1552	1	1	1	1								

## Appendix HH: Comparative analysis of use resources and activities added in section 8, 9 and 10 of Compulsory Module 214

	Section 8		Section 9		Section 10		
2015	Resource 1525: *30-40 PPT slides Chap 7	Resource 1526: *Page Description of Case Study 1 (Description Activity 1518 and Activity 1523)	Resource 1527: *40-50 PPT Slides Chap 9	Activity 1507: *MCQ Class Test 3 on Resource 1527 (DE)	Resource 1528: *20-30 PPT Slides Chap 10	Activity 1508: *MCQ Class Test 3 on Resource 1528 (DE)	Tot
Verbs used for Learning Outcomes	Understand, Explain, Identify, Apply		Explain, Define, Discuss, Describe, Account, Outline,		Provide, Differentiate, Explain, Identify, Determine, Set, Describe, Perform		
Teaching action	Explanation description		Explanation description		Explanation, description		
Level of involvement	Reading	Reading	Reading		Reading		
Learning experience	Apprehension	Apprehension	Apprehension		Apprehension		
Type of learning	Acquisition	Acquisition	Acquisition	Acquisition	Acquisition		
No of views	31	32	34	223	36	45	
Time in mins	27	32	28	110	33	19	
Days	9	14	14	7	14	2	
Mon	1	2	3	2	1	1	10
Tues	1	3	2	1	1	1	9
Wed	2	3	3	1	4		13
Thurs	3	3	2	2	4		14
Fri	1	3	3		1		8
Sat	1	1			2		4
Sun			1		1		2
Jan							
Feb	8	9	5	2			
Mar	1	5	3	5	7	2	
Apr			5		5		
May			1		2		
<b>Tot days Jan-May</b>	<b>9</b>	<b>14</b>	<b>14</b>	<b>7</b>	<b>14</b>	<b>2</b>	
Number students	22	21	21	7	22	6	
Average views per student in one semester	1.4	1.5	1.6	31.9	1.6	7.6	
% students who viewed Resource 1525 to 1528	42.3	40.3	40.4	13.5	42.3	9.6	
Number views in the morning	13	15	15	50	11	7	111
Number views in the afternoon	12	11	6	43	15		87
Number views in the evening and at night	6	6	13	150	10	38	223
Number students who did not view Resources 1525 to 1528	30	31	31	45	30	46	
Number students who viewed Resources	20	15	17	5	18	6	

	Section 8		Section 9		Section 10	
1525 to 1528 in 1 day						
Number students who viewed Resources 1525 to 1528 in 2-6 days	2	6	4	2	4	

## Appendix II: Student participation in resources added in section 6 of Compulsory Module 144

Resources	Resource 1427 (Folder PPT slides 20-30)		Resource 1428 (Folder PPT slides 30-40)		Resource 1429 (Word doc file)	
	No	Days	R28	Days	R29	Days
User 1401	0		0		4	2
User 1402					1	1
User 1403	1	1	1	1	2	1
User 1404						
User 1405						
User 1406	1	1			3	2
User 1407	1	1	1	1	3	1
User 1408						
User 1409						
User 1410						
User 1411						
User 1412						
User 1413						
User 1414						
User 1415						
User 1416						
User 1417						
User 1418	2	1	2	1	4	2
User 1419						
User 1420			1	1	6	1
User 1421	3	1	2	1	3	1
User 1422						
User 1423	1	1	1	1	3	3
User 1424						
User 1425						
User 1426						
User 1427	1	1	1	1	2	1
User 1428					4	2
User 1429						
User 1430						
User1431					1	1
User 1432	1	1			2	2
User 1433	2	2	1	1	4	2
User 1434						
User 1435	1	1	1	1	5	2

## Appendix JJ: Comparative analysis of use of resources added in section 6 of Compulsory Module 144

Section 6				
	Resource 1427 (PPT slides folder)	Resource 1428 (PPT slides folder)	Resource 1429 (Word doc file)	Tot
	Investigate, Summarise Understand, Explain	Discuss Analyse Debate	Explain Describe Analyse	
Teaching action	Explanation, description	Explanation, description	Explanation, description	
Level of involvement	Reading	Reading	Reading	
Learning experience	Apprehension	Apprehension	Apprehension	
Type of learning	Acquisition	Acquisition	Acquisition	
Number of views	14	11	47	
Time (in mins) taken to view resources	11	10	41	
Number of days taken to view resources	6	5	8	
Mon	1	1	2	4
Tues	1	1	1	3
Wed	2	1	2	5
Thurs	1	1	1	3
Fri	1	1	1	3
Sat			1	1
Jul				
Sun				
Aug				
Sep				
Oct	5	5	5	
Nov	1		3	
Dec				
<b>Tot days Oct-Nov</b>	<b>6</b>	<b>5</b>	<b>8</b>	
Number of students who viewed resources	10	9	15	
Average resources viewed per student in one semester	1.4	1.2	3.1	
% students of students who viewed resources	28.6	25.7	42.9	27.1
Number views in the morning	2	2	14	
Number views in the afternoon	7	5	22	
Number views in the evening and night	5	4	11	
	Number of students and %			
Number students who did not view Resource 1427 to 1429	25(71.4%)	26(74.3%)	20(57.1%)	
Number students who viewed Resource 1427 to 1429 in 1 day	9(25.7%)	9(25.7%)	7(20.0%)	
Number students who viewed Resource 1427 to 1429 in 2 to 6 days	1(2.9%)		8(22.9%)	
No students who viewed Resource 1427 to 1429 in 7 days and more				

## Appendix KK: Student participation in resources added in section 11 and 12 of Compulsory Module 214

2015	Section 11										Section 12			
	Resource 1529: *10-20 10-20 PPT Slides Chap 11		Activity 1509: *Folder Onsite visit Pictures by students onsite and to write a report on visit		Resource 1530: *Description of Task on Resource 1529 (Description of Activity 1519 report)		Activity 1510: *MCQ Class on Resource 1527 and Resource 1529 (DE)		Activity 1511: *Feedback on visit (Blog)		Resource 1531: *10-20 PPT Slides on Chap 12		Resource 1532: *Word doc Description of Task 4 on Chap 12 (Description of Activity 1520)	
	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days		
User 1501														
User 1502			1	1										
User 1503			1	1			2	1			1	1		
User 1504			1	1										
User 1505			1	1										
User 1506	1	1	1	1					1	1				
User 1507			1	1							1	1		
User 1508	3	1					14	1			7	2		
User 1509			1	1										
User 1510			1	1			1	1	1	1				
User 1511			1	1										
User 1512			1	1										
User 1513														
User 1514			1	1					1	1				
User 1515			1	1					1	1				
User 1516														
User 1517	1	1	1	1							1	1		
User 1518			1	1			2	1	1	1				
User 1519			1	1			1	1			3	3		
User 1520			1	1			3	1	2	1	1	1		
User 1521	1	1	1	1							3	3		
User 1522			1	1										
User1523			1	1										
User 1524	2	1	1	1							6	1		
User 1525			1	1										
User 1526			1	1							1	1		
User 1527			1	1										
User 1528			1	1							2	1		
User 1529	3	2	1	1			37	3	1	1	1	1		
User 1530			1	1										
User 1531			1	1										
User 1532							13	4			1	1		
User 1533			1	1					1	1				
User 1534			1	1										
User 1535			1	1										
User 1536			1	1					3	3	2	1		



2015	Section 11										Section 12			
User 1537			1	1			7	2	1	1	1	1		
User 1538														
User 1539			1	1										
User 1540			1	1					1	1				
User 1541	1	1	1	1							1	1		
User 1542			1	1										
User 1543			1	1										
User 1544			1	1										
User 1545	1	1	1	1					2	1	2	1		
User 1546			1	1					1	1				
User 1547			1	1					2	1				
User 1548			1	1							1	1		
User 1549			1	1							1	1		
User 1550			1	1			1	1			1	1		
User 1551			1	1										
User 1552			1	1										

## Appendix LL: Comparative analysis of use of resources added in section 11 and 12 of Compulsory Module 214

	Section 11					Section 12		
2015	Resource 1529: *10-20 10-20 PPT Slides Chap 11	Activity 1509: *Folder Onsite visit Pictures by students onsite and to write a report on visit	Resource 1530: *Description of Task on Resource 1529 (Description of Activity 1519 report)	Activity 1510: *MCQ Class Test on Resource 1527 and Resource 1529 (DE)	Activity 1511: *Feedback on visit (Blog)	Resource 1531: *10-20 PPT Slides on Chap 12	Resource 1532: *Word doc Description of Task 4 on Chap 12 (Description of Activity 1520)	Tot
Verbs used for Learning Outcomes	Explain, Define, Realise, Understand, Explain, Plan, Assemble, Calculate, Specify	Write a report			Critique, Comment, Defend, Collaborate, Reflect	Understand, Explain, Describe, Identify,		
Teaching action	Explanation description	Facilitation, Model	Explanation description		Facilitation, Model			
Level of involvement	Reading	Doing the real thing (Authentic learning)	Reading		Producing			
Learning experience	Apprehension		Apprehension					
Type of learning	Acquisition	Practice, Production	Acquisition		Production Collaboration			
Number of views	13	47		81	19	37		
Time in mins	10			62	19	27		
Days	8			5	10	11		
Mon	1			1	1	1		4
Tues				1	1	2		4
Wed	2			1	2	2		7
Thurs	1			1	2	2		6
Fri	1			1	3	2		7
Sat	2					1		3
Sun	1				1	1		3
Jan								
Feb								
Mar	5			5	9	5		
Apr	3				1	6		
May								
<b>Tot days Jan-May</b>	<b>8</b>			<b>5</b>	<b>10</b>	<b>11</b>		
Number students	8	47		10	14	19		
Average views per student in one semester	1.6	1		19.2	1.4	1.9		
% students who viewed Resources 1529 to 1532	15.4	90.4		8.1	26.9	36.5		
Number views in the morning	5			9	7	20		41
Number views in the afternoon	5			5	8	6		24

	Section 11				Section 12		
Number views in the evening and at night	3			67	4	11	85
Number students who did not view Resources 1529 to 1532	44			42	38	33	
Number students who viewed Resources 1529 to 1532 in 1 day	7			7	13	16	
Number students who viewed Resource 1529 to 1532 in 2-6 days	1			3	1	3	

**Appendix MM: Student participation in resources and activities added in section 13, 14, 15 and 16 of Compulsory Module 214**

2015	Section 13		Section 14				Section 15				Section 16			
	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days		
	Resource 1533: *20-30 PPT Slides on Chap 14		Resource 1534: *20-30 PPT Slides on Chap 15		Activity : 1512: *Class Test 5 Chap 15 (DE)		Resource 1535: *20-30 PPT Slides on Chap 16		Resource 1536: *Word doc Description of Task on Chap 15, Chap 16 and Chap 17 (Description of Activity 1521)		Resource 1537: *10-20 PPT Slides on Chap 17		Activity 1513: *MCQ on Chap 17	
User 1501														
User 1502														
User 1503			1	1			1	1			2	2		
User 1504														
User 1505														
User 1506														
User 1507														
User 1508			3	1			2	1			1	1		
User 1509														
User 1510														
User 1511														
User 1512														
User 1513														
User 1514														
User 1515														
User 1516														
User 1517			1	1			1	1			1	1		
User 1518														
User 1519			2	1			2	2			2	2		
User 1520														
User 1521			2	2			2	2			3	2		
User 1522														
User 1523														
User 1524														
User 1525														
User 1526														
User 1527			1	1							2	1		
User 1528			1	1			1	1						
User 1529			1	1			2	1			2	1		
User 1530			4	1										
User 1531														
User 1532														
User 1533			1	1										
User 1534														
User 1535														

2015	Section 13		Section 14				Section 15				Section 16			
User 1536														
User 1537			1	1			1	1			1	1		
User 1538														
User 1539														
User 1540														
User 1541			1	1			1	1			1	1		
User 1542														
User 1543														
User 1544														
User 1545														
User 1546														
User 1547														
User 1548														
User 1549			1	1			1	1			1	1		
User 1550														
User 1551														
User 1552														

## Appendix NN: Comparative analysis of use resources and activities added in section 13, 14, 15 and 16 of Compulsory Module 214

	Section 13	Section 14		Section 15		Section 16		Tot
2015	Resource 1533: *20-30 PPT Slides on Chap 14	Resource 1534: *20-30 PPT Slides on Chap 15	Activity : 1512: *Class Test 5 Chap 15 (DE)	Resource 1535: *20-30 PPT Slides on Chap 16	Resource 1536: *Word doc Description of Task on Chap 15, Chap 16 and Chap 17 (Description of Activity 1521)	Resource 1537: *10-20 PPT Slides on Chap 17	Activity 1513: *MCQ on Chap 17	
Verbs used for Learning Outcomes	Identify, List, Describe, Set	Explain, Discuss, Identify,		Explain, Discuss, Describe, Outline,		Explain, Describe, Discuss, Supply,		
Teaching action	Explanation description	Explanation description	Explanation description	Explanation description				
Level of involvement	Reading	Reading	Reading	Reading				
Learning experience	Apprehension	Apprehension	Apprehension	Apprehension				
Type of learning	Acquisition	Acquisition	Acquisition	Acquisition				
Number of views		20		14		16		
Time in mins		15		13		14		
Days		9		7		9		
Mon		3		3		3		9
Tues		1		1		1		3
Wed		2		1		2		5
Thurs								
Fri		1				1		2
Sat		1		1		1		3
Sun		1		1		1		3
Jan								
Feb								
Mar								
Apr		7		6		7		
May		2		1		2		
<b>Tot days Jan-May</b>		<b>9</b>		<b>7</b>		<b>9</b>		
Number students		13		10		10		
Average views per student in one semester		1.3		1.4		1.6		
% students who viewed Resource 1533 to 1537		25		19.2		19.2		
Number views in the morning		7		5		6		18
Number views in the afternoon		11		7		6		24
Number views in the evening and at night		2		2		4		8
Number students		39		42		42		

	Section 13	Section 14		Section 15		Section 16	
who did not view Resources 1533 to 1537							
Number students who viewed Resources 1533 to 1537 in 1 day		12		8		7	
Number students who viewed Resources 1533 to 1537 in 2-6 days		1		2		3	

**Appendix OO: Student participation in resources and activities added in section 17, 18 and 19 of Compulsory Module 214**

2015	Section 17				Section 18		Section 19	
	Resource 1538: *Word doc Chap 18		Activity 1514: *Class Test 6 Chap 18 (DE)		Resource 1539: *10-20 PPT Slides Chap 19		Resource 1540: *30-40 PPT Slides 20	
	No	Days	No	Days	No	Days	No	Days
User 1501								
User 1502								
User 1503								
User 1504								
User 1505								
User 1506								
User 1507								
User 1508	5	2			2	1	2	1
User 1509								
User 1510								
User 1511								
User 1512								
User 1513								
User 1514								
User 1515								
User 1516								
User 1517	1	1			1	1	1	1
User 1518								
User 1519	1	1			1	1		
User 1520								
User 1521	1	1			1	1		
User 1522								
User 1523								
User 1524								
User 1525	1	1			1	1		
User 1526								
User 1527								
User 1528	1	1			1	1	2	2
User 1529	3	2			2	1	2	1
User 1530								
User 1531								
User 1532								
User 1533	1	1			1	1		
User 1534								
User 1535	1	1						
User 1536								
User 1537	2	2			1	1	1	1
User 1538								
User 1539	2	1			1	1		



2015	Section 17				Section 18		Section 19	
User 1540								
User 1541	2	2			1	1	1	1
User 1542								
User 1543								
User 1544								
User 1545							1	1
User 1546								
User 1547	2	1						
User 1548								
User 1549	1	1			1	1		
User 1550								
User 1551								
User 1552								

## Appendix PP: Comparative analysis of use resources and activities added in section 17, 18 and 19 of Compulsory Module 214

	Section 17		Section 18	Section 19	
2015	Resource 1538: *Word doc Chap 18	Activity 1514: *MCQ Class Test 6 Chap 18 (DE)	Resource 1539: *10-20 PPT Slides Chap 19	Resource 1540: *30-40 PPT Slides 20	Tot
Verbs used for Learning Outcomes	Name, Describe, Supply, Identify, Explain, Indicate, Discuss		Define, Account, Explain, Understand, Describe, Discuss	Understand, Identify, Differentiate, Describe, Understand	
Teaching action	Explanation, description		Explanation, description	Explanation, description	
Level of involvement	Reading		Reading	Reading	
Learning experience	Apprehension		Apprehension		
Type of learning	Acquisition		Acquisition		
Number of views	24		14	10	
Time in mins	19		12	8	
Days	12		9	8	
Mon	4		3	4	11
Tues	3		2	1	6
Wed	2		2	1	5
Thurs			1	1	2
Fri					
Sat	2				2
Sun	1		1	1	3
Jan					
Feb					
Mar					
Apr	6		3	4	
May	6		6	4	
<b>Tot days Jan-May</b>	12		9	8	
Number students	14		12	6	
Average views per student in one semester	1.7		1.7	1.7	
% students who viewed Resources 1538 to 1540	26.9		23.1	11.5	
Number views in the morning	13		5	2	20
Number views in the afternoon	6		4	3	13
Number views in the evening and at night	5		5	5	15
Number students who did not view Resource 1538 to 1540	38		40	46	
Number students who viewed Resource 1538 to 1540 in 1 day	10		14	5	
Number students who viewed Resource 1538 to 1540 in 2-6 days	14			1	

## Appendix QQ: Student participation in activities added in section 7 of Compulsory Module 144

Activities	Activity 1401		Activity 1402		Activity 1403		Activity 1404		Activity 1405		Activity 1406		Activity 1407		Activity 1408	
	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days
User 1401	4	2	25	2	71	2	49	1	64	1	0		36	2	59	3
User 1402	23	6	23	2	61	2	73	1	28	2	29	2	45	3	68	2
User 1403	5	1	21	1	50	1	66	1			0		30	1	58	1
User 1404			23	1	30	1			26	1	0		0		0	
User 1405											0		0		0	
User 1406	26	3	15	1	8	2	37	1	22	1	0		0		43	2
User 1407	1	1	18	1	27	1	36	1	25	1	0		25	2	32	1
User 1408											0		0		0	
User 1409			18	2	37	2			44	1	0		0		0	
User 1410					19	1					0		0		0	
User 1411	2	2			66	1	48	1	1	1	0		14	1	0	
User 1412			15	1			1	1			0		0		0	
User 1413	8	2	14	1	1	1					0		0		0	
User 1414			18	1	82	1	17	1			0		0		0	
User 1415											0		0		0	
User 1416			17	1							0		0		0	
User 1417											0		0		0	
User 1418	16	5	20	1	48	1	60	1			0		33	3	41	1
User 1419	8	1	26	1	56	1	65	1	30	1	0		0		40	1
User 1420	20	4	17	1	52	1	68	1	36	1	0		40	3	56	1
User 1421	9	2	19	1	44	1	50	2	7	1	30	1	25	2	46	1
User 1422	11	3	18	2	55	1	2	1			0		0		0	
User 1423	12	3	13	1	24	1	73	1	37	2	0		11	2	50	1
User 1424	8	1	24	2							0		0		0	
User 1425			11	1	41	1					0		0		0	
User 1426			14	1							0		0		0	
User 1427	4	3	22	1	34	1	47	1	43	1	0		0		63	1
User 1428	6	3	12	1	71	1	41	1	45	2	0		36	1	43	2
User 1429	13	3	13	1	31	3	41	1	25	2	0		1	1	0	
User 1430			16	1							0		0		0	
User 1431	22	3	15	1	36	1					0		0		0	
User 1432	2	2	19	1			107	2	21	1	0		12	1	49	2
User 1433			16	1	28	1	47	1	28	1	0		14	2	32	1
User 1434	8	2	14	2	54	1					0		0		0	
User 1435	13	3			39	1	35	1	39	1	0		17	2	64	2

## Appendix RR: Comparative analysis of activities added in section 7 of Compulsory Module 144

	Activity 1401 (MCQ) 1 Nov	Activity 1402 (MCQ)	Activity 1403 (MCQ)	Activity 1404 (MCQ)	Activity 1405 (MCQ)	Activity 1406 (Optional) (MCQ)	Activity 1407 (MCQ)	Activity 1408 (MCQ)	Tot
No of views	221	496	1065	963	521	59	339	744	
Time spent on activities	111	221	325	354	205	32	200	136	
Number days taken on activities	37	7	7	4	5	2	7	7	Tot wk days Activity 2, 3, 4, 5, 7 & 8
Mon	5	1	1	1	1		1	2	7
Tues	7	2	2	1	1	1	1	1	8
Wed	6	1	1	1		1	1	1	5
Thurs	6	1					2	1	4
Fri	5	1	1		1		1	1	5
Sat	4	1	1	1	1		1	1	6
Sun	4	1	1		1			2	5
Jul									
Aug	19	7	7						
Sep	8			4	5	2			
Oct	8						7	4	
Nov	2							2	
Number students	21	28	25	20	17	2	14	15	
<b>Number Submitted</b>	<b>20</b>	<b>28</b>	<b>22</b>	<b>18</b>	<b>14</b>	<b>2</b>	<b>12</b>	<b>15</b>	
	10.5	17.7	42.6	48.2	30.6	29.5	24.2	49.6	
<b>% Students</b>	<b>60</b>	<b>80.0</b>	<b>71.4</b>	<b>57.1</b>	<b>48.6</b>	<b>5.7</b>	<b>40.0</b>	<b>42.9</b>	
< 50%									50%
>50%									50%
<b>% Submitted</b>	<b>57.1</b>	<b>80.0</b>	<b>62.9</b>	<b>51.4</b>	<b>40.0</b>	<b>5.7</b>	<b>34.3</b>	<b>42.9</b>	
<50%									50%
>50%									50%
Number views in the morning	52	115	221	140	130	0	60	189	907
Number views in the afternoon	82	247	704	610	278	59	198	474	2652
Number views in the evening and at night	87	134	139	214	113	0	81	81	849
No students and %									
Number students who did not participate in Activity 1401 to 1408	14(40.0%)	7(20.0%)	10(10.0%)	15(42.9%)	18(51.4%)	33(94.3%)	21 (60.0%)	20(57.1%)	
Number students who participated in Activity 1401	4(11.4%)	22(62.9%)	20(57.1%)	18(51.4%)	13(37.1%)	1(2.9%)	6(14.3%)	9 (25.7%)	

	Activity 1401 (MCQ) 1 Nov	Activity 1402 (MCQ)	Activity 1403 (MCQ)	Activity 1404 (MCQ)	Activity 1405 (MCQ)	Activity 1406 (Optional) (MCQ)	Activity 1407 (MCQ)	Activity 1408 (MCQ)	Tot
to 1408 in 1 day									
Number students who participated in Activity 1401 to 1408 in 2-6 days	17(48.6%)	6(17.1%)	5(14.3%)	2(5.7%)	4(11.4%)	1(2.9%)	9(25.7%)	6(17.1%)	
Number students who participated in Activity 1401 to 1408 in 7 and more days									

## Appendix SS: Student participation in activities added in section 8 of Compulsory Module 144

Activities	Activity 1409		Activity 1410		Activity 1411		Activity 1412		Activity 1413		Activity 1414	
	No	Days	No	Days	No	Days	No	Days	No	Day	No	Days
User 1401	14	3	11	6	5	1	5	2	10	4	8	3
User 1402	28	6	11	5	11	1	8	2	20	8	8	3
User 1403	11	2	6	3	4	1	4	1	7	3		
User 1404	14	2	11	2	5	1			4	2		
User 1405			3	2								
User 1406	12	3	8	3	8		6	3	13	6	5	2
User 1407	8	1	12	4	5		5	2	10	1	4	1
User 1408												
User 1409			14	5	9				1	1		
User 1410			1	1								
User 1411	15	3	23	2	5		2	1	9	3		
User 1412			7	2	2							
User 1413			6	3								
User 1414	1	1	7	1	8		13	2				
User 1415												
User 1416			8	2	6							
User 1417												
User 1418	13	2	8	2	11		26	3	16	4	10	2
User 1419	6	1	11	3	5		2	1	1	1		
User 1420	27	6	22	2	5		6	2	9	6	29	2
User 1421	13	2	9	3	5		10	2	7	3	10	2
User 1422	1	1	21	3	8		8	2	3	3		
User 1423	15	4	20	3	5		10	4	11	5	2	2
User 1424			9	3								
User 1425			16	1								
User 1426												
User 1427	10	3	37	8	10		8	3	15	6	6	2
User 1428	3	2	19	6	4		3	2	4	3	8	2
User 1429	68	7	55	2	8		4	2	25	5		
User 1430												
User 1431	55	4	3	1	13				11	2		
User 1432	4	3	21	5	6		10	2	15	5	8	2
User 1433	13	4	6	3	4		6	2	11	4	8	2
User 1434	1	1	37	7	4							
User 1435	13	3	9	2	1		14	3	10	6	8	1
	345	64	431	95	157	4	150	41	212	81	114	26

## Appendix TT: Comparative analysis of student participation in case studies (assignments) in section 8 of Compulsory Module 144

	Activity 1409 (Turnitin Assignment)	Activity 1410 (Case study 1)	Activity 1411 (Case study 2)	Activity 1412 (Case study 3)	Activity 1413 (Case study 4)	Activity 1414 (Case study 5)	Tot
		Differentiate Analyse	Analyse Comment Explain Argue	Comment Argue	Analyse Argue Identify	Explain Describe Analyse	
Number of views	345	431	157	150	212	138	
Time spent on activities	220	275	83	92	149	88	
Days	31	20	2	12	39	9	
Mon	5	3		2	6	1	17
Tues	4	4		3	7	2	20
Wed	4	3		2	6	2	17
Thurs	5	3	1	3	8	1	21
Fri	5	3	1	1	3	1	14
Sat	5	2	1	2	6	1	17
Sun	3	2		1	3	1	10
Jul		4					
Aug	2	6	3	2	1		
Sep	22			10	21		
Oct	7				17	5	
Nov						4	
Dec							
Number of students	22	30	25	19	21	13	
<b>Number submitted</b>	<b>17</b>	<b>26</b>	<b>22</b>	<b>13</b>	<b>14</b>	<b>12</b>	
Average views per student in one semester	15.7	14.4	6.3	7.9	10.1	10.6	
<b>% students viewed</b>	<b>62.9</b>	<b>85.7</b>	<b>71.4</b>	<b>54.3</b>	<b>60.0</b>	<b>37.1</b>	
<50%							17.3%
>50%							83.3%
<b>% Submitted</b>	<b>48.6</b>	<b>74.3</b>	<b>62.9</b>	<b>37.1</b>	<b>40.0</b>	<b>49.5</b>	
<50% Submitted							66.7%
>50% Submitted							33.3%
Number views in the morning	96	87	20	23	39	30	295
Number views in the afternoon	68	111	55	51	64	28	377
Number views in the evening and at night	181	245	72	73	109	80	760
	Number students and %						
Number students who did not participate in Activity 1409 to 1414	13(37.1%)	5(14.3%)	10(28.6%)	16(45.7%)	21(40.0%)	22(62.9%)	
Number students who participated in Activity a to 1409 to 1414 in 1 day	5(14.3%)	4(11.4%)	24(68.6%)	3(8.6%)	3(8.6%)	2(5.7%)	
Number students who participated in Activity 1409 to 1414 in 2 to 6 Days	16(45.7%)	24(68.6%)	1(2.9%)	16(45.7%)	17(48.6%)	11(31.4%)	

	Activity 1409 (Turnitin Assignment)	Activity 1410 (Case study 1)	Activity 1411 (Case study 2)	Activity 1412 (Case study 3)	Activity 1413 (Case study 4)	Activity 1414 (Case study 5)	Tot
Number students who participated in Activity 1409 to 1414 in 14 days and more	1(2.9%)	2(5.7%)				1(2.9%)	



## Appendix UU: Student participation in paragraph type activities (case studies and assignments) in section 20 of Compulsory Module 214

2015		Section 20																				
		Activity 1515: *Individual assignment		Activity 1516: *Task 2: Residential		Activity 1517: *Group Task Chap 4		Activity 1518: *Case Study Chap 7		Activity 1519: *Chap 11 Report		Activity 1520: *Chap 12 Task		Activity 1521: *Chap 15, 16 & 17 Task		Activity 1522: *Task 1 Chap 4 (DE)		Activity 1523: *Case Study (DE)		Activity 1524: *Case Study 2 (On Resource 1527)		
		No	Days	No	Days	No	Days	No	Days	No	Days	No	Days	No	Days	No	Day	No	Days	No	Days	
User 1501																						
User 1502	18	10	3	3	2	2	3	3	10	5	3	3	12	5								
User 1503	27	13	8	1	7	2	6	1	6	1	1	1										
User 1504	9	2	2	2	1	1							11	4								
User 1505	11	3					1	1	1	1												
User 1506	46	9					1	1														
User 1507	18	1							1	1												
User 1508 DE	17	2	3	2	1	1			1	1			1	1	7	1	10	1	15	1		
User 1509	14	4																				
User 1510	38	9	1	1			12	3	14	1			2	2								
User 1511	90	33	2	2			2	1					9	3								
User 1512	14	1	17	5	1	1	1	1							1	1				1	1	
User 1513 DE					1	1																
User 1514	9	2																				
User 1515	13	2							6	1												
User 1516																						
User 1517	10	1					8	1			2	1	1	1								
User 1518	28	1							7	1	2	1								1	1	
User 1519	17	6	2	2	3	2	1	1	4	4	15	2	2	2								
User 1520	11	2	6	2	3	1	2	1	1	1	1	1	2	1								
User 1521	14	6	8	1	6	1			6	1	1	1	2	2								
User 1522	29	18					1	1	1	1												
User1523	26	2	1	1	5	3	7	2			1	1						1	1			
User 1524	9	2	1	1	1	1	1	1	1	1	2	2										
User 1525	21	7																				
User 1526	9	2	3	3	18	2			1	1	1	2	17	2								
User 1527	28	1	2	1					9	1	30	2										
User 1528	11	3			2	1																
User 1529 DE	17	2	1	1	2	2	2	2	1	1	4	3	5	3	2	1	26	7	9	3		
User 1530	46	2	1	1																		
User 1531	9	3																				
User 1532 DE	3	1	4	3	7	4	2	2	9	2	18	5			1	1	12	5	2	2		
User 1533	8	2					1	1	3	2												
User 1534	11	2									6	1										

2015	Section 20																		
User 1535	15	8							3	1									
User 1536	7	3	6	2	2	1	3	3	31	7	1	1	1	1					
User 1537	14	6	3	3	11	3	4	2	8	2	6	1	11	4					
User 1538																			
User 1539	7	1																	
User 1540	20	10	1	1	8	2			2	1			3	1					
User 1541	7	1	9	1							6	1							
User 1542	11	2	1	1															
User 1543	12	2																	
User 1544	14	3	9	2	11	2	8	3	2	2	2	2	1	1					
User 1545	16	8	7	5	13	6	16	4	6	5	10	5	3	3					
User 1546	40	3	1	1															
User 1547	26	3											2	1					
User 1548	11	1	7	1	1	1			2	1	2	2	10	4					
User 1549	13	6			7	2	8	1	1	1									
User 1550	12	4	2	2									1	1					
User 1551	16	1	2	2					1	1	1	1							
User 1552	8	2					9	1	1	1	7	2							

## Appendix VV: Comparative analysis student participation in paragraph type activities (case studies and assignments) in section 20 of Compulsory Module 214

Section 20											
2015	Activity 1515: *Individual assignment	Activity 1516: *Task 2: Residential	Activity 1517: *Group Task Chap 4	Activity 1518: *Case Study Chap 7	Activity 1519: *Chap 11 Report	Activity 1520: *Chap 12 Task	Activity 1521: *Chap 15, 16 & 17 Task	Activity 1522: *Task 1 Chap 4 (DE)	Activity 1523: *Case Study (DE)	Activity 1524: *Case Study 2 (On Resource 1527)	Tot
Verbs used for Learning Outcomes											
Teaching action											
Level of involvement											
Learning experience											
Type of learning											
Number of views	880	113	113	99	139	122	96	11	49	28	
Time in mins	485	77	70	65	81	63	66	6	30	14	
Days											
Mon	7	7	6	3	4	4	4	2	3	1	41
Tues	7	6	5	6	3	4	3	1	3	1	39
Wed	7	3	1	2	3	4	1	1	2	1	25
Thurs	7	4	4	3	5	2	2		1	1	29
Fri	7	4	3	4	4	4	2	1	2	2	33
Sat	5		2	1	1	3			2		14
Sun	8	4	3	2	2		1				20
Jan		5									
Feb		12	12	3				3	2		
Mar	3	9	8	12	13	11		1	9	5	
Apr	29	2	4	4	7	7	12		2	1	
May	17	1	2	2	2	2	3		1	1	
<b>Tot days Jan-May</b>	49	33	26	21		20	15	4	14	7	
Number students	47	28	22	22	28	22	19	4	4	5	
Average views per student in one semester	18.7	4	5.1	4.5	5	5.5	5.1	2.3	12.3	5.6	
% students who viewed Resource 7 to 11	90.4	53.9	42.3	42.3	53.9	42.3	36.5	7.7	7.7	9.6	
Number views in the morning	256	47	33	30	43	83	71	7	13		583
Number views in the afternoon	76	26	50	12	50	4	17		13	1	249
Number views in the evening and at night	548	40	33	57	46	35	8	4	23	27	821
Number students who did not view Resource 7 to 11	5	24	30	30	24	30	33	48	48	47	
Number students	10	13	10	13	20	10	8	4	2	3	

Section 20										
who viewed Resource 7 to 8 in 1 day										
Number students who viewed Resource 7 to 11 in 2-6 days	28	15	22	9	7	12	11		2	2
Number students who viewed Resource 7 in more than a week	9				1					

### Appendix WW: Summary of access to resources and participation in activities in a scale of 0 to 100% of Compulsory Module 144

Resources viewed and participation in activities (0-100%)	No of students who viewed resources	% of students who viewed resources	No students participated in quizzes	% students participated in Short type activities	No students participated in Case studies	% students participated in Case studies
0	3	8.6%	5	14.3%	5	14.3%
1-19	5	14.3%	3	8.6%		
20-30	3	8.6%	3	8.6%	6	17.1%
30-40	5	14.3%	1	2.9%		
40-50	1	2.9%	4	11.4%	3	8.6%
50-60	1	2.9%	1	2.9%		
60-70	1	2.9%	2	5.7%	4	11.4%
70-80	7	20%	7	20%		
80-90	9	25%	7	20%	4	11.4%
90-100	0		2	5.7%	13	37.1%
<b>Less than 50%</b>	<b>17</b>	<b>48.6%</b>	<b>16</b>	<b>45.7%</b>	<b>14</b>	<b>40%</b>
F<50%	6	17.1%	6	17.1%	5	14.3%
M<50%	11	31.4%	10	28.6%	9	25.7%
<b>&gt; 50%</b>	<b>18</b>	<b>51.4%</b>	<b>19</b>	<b>54.3%</b>	<b>21</b>	<b>60%</b>
<b>&gt; 50% Submitted</b>				<b>50%</b>		<b>33.3%</b>
F>50%	8	22.9	8	22.9	9	25.7
M>50%	10	28.6	11	31.4	12	34.3

## Appendix XX: Summary of access to resources and participation in activities in a scale of 0 to 100% of Compulsory Module 214

2015 Resources viewed and participation in activities (0-100%)	No of students who viewed resources	% of students who viewed resources	No students participated in assessment activities	% students participated in assessment activities
0	7	13.5	3	5.9
1-19	18	34.6	22	43.1
20-30	13	25.0	10	19.6
30-40	5	9.6	8	15.7
40-50	6	11.5	2	3.9
50-60		0.0	5	9.8
60-70	3	5.8	2	3.9
<b>Less than 50%</b>	<b>49</b>		<b>45</b>	
F<50%	7		6	
M<50%	42		39	
<b>&gt; 50%</b>	<b>3</b>		<b>7</b>	
<b>&gt; % Submitted</b>				<b>50%</b>
F>50%			1	
M>50%			6	

## Appendix YY: Analysis of individual students' visits on the lms according to days of the week of Compulsory Module 144

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Tot	Jul	Aug	Sep	Oct	Nov	Dec	
User 1401	9	7	3	5	1	3	5	33	3	11	9	6	4		Q
User 1402	5	7	5	4	3		8	32	3	10	7	9	3		Q
User 1403	4	3	4	3	3	3	3	23		7	6	9	1		Q
User 1404	2	5	6			1		14	5	6	2	1			DNQ
User 1405	1	1						2	1	1					DNQ
User 1406	8	6	11	5	2	1		33	5	9	6	7	5		Q
User 1407	9	8	5	9	3	1		35	5	9	10	10	1		Q
User 1408								0							DNQ
User 1409	5		2	1	3	1	1	13		9	1	2		1	DNQ
User 1410	3	2	3	3			1	12	5	5	2				DNQ
User 1411	4	2	3			2	1	12	5	4	3				DNQ
User 1412		1	4	2		1		8		4	4	1			DNQ
User 1413	1	3	3	3	2		2	14	3	8	2	1			DNQ
User 1414		1	5	1		2	1	10	3	4	3				DNQ
User 1415								0							DNQ
User 1416	2	2	2		1			7	1	5		1			DNQ
User 1417								0							DNQ
User 1418	3	6	9	3	5	2	3	31		11	7	10	3		Q
User 1419	4	3	5	1	1	1		15	4	5	4	2			DNQ
User 1420	10	5	7	4	5	2	3	36		8	12	12	4		Q
User 1421	4	3	5	2	4	4		22	2	6	7	5	2		Q
User 1422	2	3	5	1	4	2		17	2	6	5	3	1		Q
User 1423	8	6	4	4	4	2	2	30	1	10	9	9	1		Q
User 1424	2	2	2	2		1	2	11	3	8					DNQ
User 1425	2		2	1	1	1		7	4	3					DNQ
User 1426	2				2			4	1	3					DNQ
User 1427	6	4	7	2	6	1		26	5	9	6	5	1		Q
User 1428	8	9	6	4	5	2	3	37	4	12	8	11	2		Q
User 1429	4	4	7	1	3	3	8	30	2	10	10	7	1		Q
User 1430					1			1		1					DNQ
User 1431	1	2	3	3	4			13	3	3	2	3	2		Q
User 1432	6	5	6	3	2	1	2	25	1	7	8	7	2		Q
User 1433	1	8	2	2	1		3	17	1	5	4	5	2		Q
User 1434	2	1	3	1	3		3	13	2	11					DNQ
User 1435	4	6	8	2	5	1	2	28		6	9	9	4		Q
								0							
Total	122	115	137	72	74	38	53	611	74	216	146	135	39		
Actual no days								121							
Total female visits	49	51	46	26	26	15	31	244	21	85	59	61	18		
Total male visits	73	64	91	46	48	23	22	367	53	131	87	74	21		
No students	29	30	29	26	25	22	18		25	32	25	23	17	1	
No female	11	11	10	8	9	7	9		8	12	9	8	7		
No male	18	19	19	18	16	15	9		17	20	16	15	10	1	
No visited daily	9	25.7 %											14		

## Appendix ZZ: Number of days, time spent, number and percentage of resources viewed, number and percentage of activities (MCQ and paragraph type) of individual students of Compulsory Module 144

Name	Age	No of views	No Resources viewed (45)	% Resources viewed	No Quizzes (9)	% Quizzes	Case studies (5)	% Case studies	Assignment	Days	Time on LMS	Hrs	Avg learning time /day	Results
User 1401	28	616	36	80.0	8	88.9	5	100	Sub	33	660	11.0	20.0	Q
User 1402	40	676	39	86.7	9	100	5	100	Sub	32	608	10.1	18.9	Q
User 1403	27	422	37	82.2	8	88.9	3	60	Sub	23	365	6.1	15.9	Q
User 1404	31	178	14	31.1	4	44.4	3	60		14	146	2.4	10.3	DNQ
User 1405	27	13	1	2.2	0	0.0	1	20		2	4	0.1	3.0	DNQ
User 1406	24	369	34	75.6	7	77.8	5	100	Sub (Email)	33	402	6.7	12.2	Q
User 1407	25	367	37	82.2	8	88.9	5	100	Sub	35	297	5.0	8.6	Q
User 1408	28			0.0		0.0		0				0.0	0	DNQ
User 1409	32	233	14	31.1	6	66.7	1	20		13	274	4.6	21.2	DNQ
User 1410	31	85	12	26.7	1	11.1	1	20		12	98	1.6	8.0	DNQ
User 1411	28	448	35	77.8	6	66.7	4	80	Sub	12	559	9.3	46.5	DNQ
User 1412	31	58	12	26.7	2	22.2	2	40		9	127	2.1	15.8	DNQ
User 1413	30	123	23	51.1	3	33.3	1	20		14	191	3.2	13.7	DNQ
User 1414	26	195	16	35.6	4	44.4	3	60		10	184	3.1	18.6	DNQ
User 1415	27			0.0		0.0		0				0.0	0	DNQ
User 1416	32	89	11	24.4	1	11.1	2	40		7	103	1.7	14.6	DNQ
User 1417	26			0.0		0.0		0				0.0	0	DNQ
User 1418	38	621	35	77.8	7	77.8	5	100	Sub	31	453	7.6	14.7	Q
User 1419	27	293	19	42.2	7	77.8	4	80		15	512	8.5	34.0	DNQ
User 1420	30	812	35	77.8	8	88.9	5	100	Sub	36	979	16.3	27.2	Q
User 1421	36	431	36	80.0	9	100	5	100	Sub	22	543	9.1	24.8	Q
User 1422	25	318	32	71.1	5	55.6	4	80	Sub (Email)	17	378	6.3	22.2	Q
User 1423	29	534	39	86.7	8	88.9	5	100	Sub	30	537	9.0	18.0	Q
User 1424	36	119	15	33.3	2	22.2	1	20		11	194	3.2	17.5	DNQ
User 1425	30	75	4	8.9	2	22.2	1	20		7	73	1.2	10.3	DNQ
User 1426	46	25	2	4.4	1	11.1	0	0		4	58	1.0	15.0	DNQ
User 1427	30	544	40	88.9	7	77.8	5	100	Sub	26	614	10.2	23.5	Q
User 1428	31	600	40	88.9	8	88.9	5	100	Sub (Email)	37	832	13.9	22.5	Q
User 1429	32	1123	35	77.8	7	77.8	4	80	Sub	30	655	10.9	21.8	Q
User 1430	31	19	1	2.2		0.0		0		1	42	0.7	42.0	DNQ
User 1431	32	278	16	35.6	4	44.4	3	60	Sub	13	394	6.6	30.5	Q
User 1432	28	443	28	62.2	8	88.9	5	100		25	404	6.7	16.1	Q
User 1433	35	311	34	75.6	7	77.8	5	100	Sub	17	535	8.9	31.4	Q
User 1434	30	217	7	15.6	4	44.4	2	40		13	181	3.0	13.8	DNQ
User 1435	33	566	39	86.7	7	77.8	5	100	Sub	28	1312	21.9	46.9	Q
Total		11201								612	12714			
Actual		10885								121				



Name	Age	No of views	No Resources viewed (45)	% Resources viewed	No Quizzes (9)	% Quizzes	Case studies (5)	% Case studies	Assignment	Days	Time on LMS	Hrs	Avg learning time /day	Results
Number of students		35												
No visited		32												
No not visited		3												
Credits		12												
Notional learning time		120 hrs												
Number qualified for exam		17	48.6%		F	7	20%							
					M	10	28.6%							
Number DNQ for examination		18	51.4%		F	7	20%							
					M	11	31.4%							
Average														

### Appendix AAA: Analysis of individual students' visits on the LMS according to days of the week of Compulsory Module 214

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Tot	Jan	Feb	Mar	Apr	May	Jun	Results
User 1501															DNQ
User 1502	4	2	3	3	4		2	18	1	3	5	7	3		Q
User 1503	5	6	5	4	5	2	2	29	1	7	6	6	9	1	Q
User 1504	4	2	3	3	1			13		6	1	5	1		Q
User 1505	1	1	1	1	1			5			4		1		Q
User 1506	4	7	3	4		1	2	21	2	4	8	3	4	2	Q
User 1507	2	1		2	1		3	9	1	4	4			1	Q
User 1508	3	3	3	4	5			18		7	6	3	2		Q
User 1509	3	2	1	3				9			2	3	1		Q
User 1510	4	4	4	6	2	1	2	23		6	6	7	4		Q
User 1511	5	7	5	5	4	2	7	35	1	1	3	24	8	1	Q
User 1512	2	2		1			1	6	2	3	2			2	Q
User 1513				1		1	1	3		2	1				DNQ
User 1514	2	1	3					6		1	3	2			Q
User 1515	3	3	1		1	1		9	1		5	2	1	1	Q
User 1516															DNQ
User 1517	5	1	4	2	2	2		16		4	5	4	3		Q
User 1518	1		2	2	1		1	7		1	3	2	1		Q
User 1519	6	2	6	4	4	1	3	26	2	8	7	6	3	2	Q
User 1520	5	3	1	3				12	1	3	3	4	1	1	Q
User 1521	7	6	4	6	2		2	27	2	7	10	5	3	2	Q
User 1522	5	4	4	6	3	1	1	24	3		3	14	4	3	Q
User 1523	2	3					1	6		2	3	2			Q
User 1524	1	3	1		1	1		7		1	3	3			Q
User 1525	1	1	4	1	1		2	9			3	5	2		Q
User 1526	4	2	5		4		1	16		5	4	5	2		Q
User 1527	3	4	1	2	3		1	14	2	2	7	3		2	Q
User 1528	3	1		3				7		2	2	2	1		Q
User 1529	7	3	5	4	5	4	3	31	4	8	10	7	2	4	Q
User 1530	3	1	2	1				7	1	3	2	1		1	Q
User 1531	2		1		2		1	6		2	1	3			Q
User 1532	4	4	3	4	1	1	1	18	1	5	9	3		1	Q
User 1533	3	3	1	1	1			9		2	4	1	2		Q
User 1534	1	2	1	1				5	1		3	1		1	Q
User 1535	3	3	2	3	1	1	2	15		4	4	6	1		Q
User 1536	3	3	1	2	3		1	13		5	5	3			Q
User 1537	11	6	6	8	11	2	4	48	4	13	14	12	5	4	Q
User 1538															DNQ
User 1539	2	2		2	1			7		4	1		2		Q
User 1540	8	5	3	2	3	3	1	25		11	6	5	3		Q
User 1541	4		3				2	9	1	3	2	2	1	1	Q

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Tot	Jan	Feb	Mar	Apr	May	Jun	Results
User 1542	2	2	2	1				7	1	2	2		2	1	Q
User 1543	4		1					5		1	2	1	1		Q
User 1544	2	4	1		3			10	2	3	4	1		2	Q
User 1545	7	8	4	1	3	2	3	28	1	10	10	3	4	1	Q
User 1546	2	4		3	2	1	1	13	1	4	3	2	3	1	Q
User 1547	2	1	2	1	2			8			2	4	2		Q
User 1548	4	2	4	1	1		2	14	1	7	3	3		1	Q
User 1549	3	3	3	2	1	1	1	14		4	2	6	2		Q
User 1550	3	5	1	3	2			14	3	4	5	1	1	3	Q
User 1551	2	1	1				1	5	1		3		1	1	Q
User 1552	2	5	2	1				10		5	5				Q
Total	169	137	113	105	87	28	55	694	41	179	211	182	86	41	
Actual number days															
Total female visits															
Total male visits															
Number students	49	43	43	39	34	17	17	49	25	41	49	41	44	49	
Number female	7	6	5	5	5	1	5	7	5	5	7	7	3	3	
Number male	42	37	38	34	29	16	12	42	20	36	42	34	41	46	
Number visited daily							18	34.6							

**Appendix BBB: Number of days, time spent, number and percentage of resources viewed, number and percentage of activities (MCQ and paragraph type) of individual students of Compulsory Module 214**

Name	Age	No of views	Resources viewed (39)		Assessment activities (24)		Days	Time on LMS	Hrs	Avg learning time /day	Time spent /day	Results
			No	%	No	%						
User 1501	25		0	0.0	0	0.0						DNQ
User 1502	24	104	5	12.8	8	33.3	18	84	3.5	4.1		Q
User 1503	24	123	12	30.8	10	41.7	29	28	1.2	1.0		Q
User 1504	22	70	11	28.2	6	25.0	13	49	2.0	3.8		Q
User 1505	22	26	1	2.6	3	12.5	5	25	1.0	5.0		Q
User 1506	22	109	8	20.5	2	8.3	21	257	10.7	12.2		Q
User 1507	24	50	9	23.1	2	8.3	9	74	3.1	8.2		Q
User 1508	23	240	24	61.5	10	41.7	18	569	23.7	31.6		Q
User 1509	24	20		0.0	1	4.2	6	17	0.7	2.8		Q
User 1510	26	183	9	23.1	8	33.3	23	292	12.2	12.7		Q
User 1511	24	124	2	5.1	4	16.7	37	259	10.8	7.0		Q
User 1512	25	54		0.0	6	25.0	7	79	3.3	11.3		Q
User 1513	24	5	1	2.6	3	12.5	3	4	0.2	1.3		DNQ
User 1514	24	28	4	10.3	1	4.2	6	13	0.5	2.2		Q
User 1515	25	33	2	5.1	3	12.5	9	211	8.8	23.4		Q
User 1516	28	0		0.0		0.0						DNQ
User 1517	24	73	16	41.0	8	33.3	16	291	12.1	18.2		Q
User 1518	25	66	4	10.3	8	33.3	7	96	4.0	13.7		Q
User 1519	22	176	19	48.7	14	58.3	26	291	12.1	11.2		Q
User 1520	30	153	11	28.2	13	54.2	12	374	15.6	31.2		Q
User 1521	24	134	18	46.2	9	37.5	27	284	11.8	10.5		Q
User 1522	24	72	5	12.8	4	16.7	24	306	12.8	12.8		Q
User 1523	25	63		0.0	7	29.2	7	106	4.4	15.1		Q
User 1524	26	55	10	25.6	9	37.5	7	61	2.5	8.7		Q
User 1525	25	40	3	7.7	1	4.2	10	44	1.8	4.4		Q
User 1526	26	145	6	15.4	8	33.3	16	36	1.5	2.3		Q
User 1527	23	158	14	35.9	4	16.7	14	168	7.0	12.0		Q
User 1528	26	48	11	28.2	4	16.7	7	63	2.6	9.0		Q
User 1529	36	397	27	69.2	15	62.5	31	773	32.2	24.9		Q
User 1530	25	81	9	23.1	4	16.7	7	189	7.9	27.0		Q
User 1531	30	20		0.0	1	4.2	6	8	0.3	1.3		Q
User 1532	30	190	17	43.6	15	62.5	18	190	7.9	10.6		Q
User 1533	25	72	15	38.5	6	25.0	9	55	2.3	6.1		Q
User 1534	23	34	3	7.7	2	8.3	5	48	2.0	9.6		Q
User 1535	23	63	6	15.4	3	12.5	15	54	2.3	3.6		Q
User 1536	29	159	9	23.1	12	50.0	13	196	8.2	15.1		Q
User 1537	28	286	26	66.7	13	54.2	48	279	11.6	5.8		Q
User 1538	28	0		0.0		0.0			0.0			DNQ

Name	Age	No of views	Resources viewed (39)		Assessment activities (24)		Days	Time on LMS	Hrs	Avg learning time /day	Time spent /day	Results
User 1539	22	83	11	28.2	5	20.8	7	99	4.1	14.1		Q
User 1540	25	105	9	23.1	8	33.3	25	148	6.2	5.9		Q
User 1541	22	52	16	41.0	3	12.5	9	100	4.2	11.1		Q
User 1542	25	31	9	23.1	2	8.3	7	24	1.0	3.4		Q
User 1543	23	24	1	2.6	2	8.3	5	22	0.9	4.4		Q
User 1544	28	78	4	10.3	7	29.2	10	57	2.4	5.7		Q
User 1545	25	232	19	48.7	13	54.2	28	230	9.6	8.2		Q
User 1546	25	113	8	20.5	7	29.2	13	220	9.2	16.9		Q
User 1547	26	73	3	7.7	2	8.3	8	73	3.0	9.1		Q
User 1548	25	70	5	12.8	7	29.2	14	45	1.9	3.2		Q
User 1549	22	51	12	30.8	4	16.7	14	34	1.4	2.4		Q
User 1550	27	99	14	35.9	5	20.8	14	78	3.3	5.6		Q
User 1551	21	38	3	7.7	5	20.8	5	45	1.9	9.0		Q
User 1552	25	49	7	17.9	4	16.7	10	31	1.3	3.1		Q
Total		5700						114				
Actual No of students		4752										
No visited		52										
No not visited		49										
Credits		3										
Notional learning time		12										
Number qualified for exam	F	7	13%									
	M	41	79%									
		48	92.3%									
Number DNQ for examination		4	7.7%									

## Appendix CCC: Evaluation of the extent to which students find the following resources and activities created on the LMS helpful

Statement: In your opinion, to what extent do the following resources help you learn?					
Resources added in the LMS	Very helpful	Helpful	Less helpful	Not helpful	Not sure
PPT slides ( 144, n=22)	72.7% (16)	27.3% (6)	0	0	0
PPT slides ( 214, n=46)	89.1% (41)	10.9% (5)			
Word docs/ Pdf files (144, n=22)	27.3%(6)	27.3% (6)	31.8% (7)	13.6% (5)	0
Word docs/ Pdf files (214, n=46)	69.6% (32)	30.4% (14)	0	0	0
Multimedia files such as audio recorded files(144, n=22)	22.7% (5)	36.4% (8)	27.3% (6)	9.1% (2)	4.5% (1)
Multimedia files such as audio recorded files(214, n=46)	78.3% (36)	13.04% (6)	6.5% (3)	2.2% (1)	
Internet based resources such as YouTube files (n=22)	36.4% (8)	36.4% (8)	27.3% (6)	0	0
Internet based resources such as YouTube files (214, n=46)	28.3% (13)	60.9 (28)	8.7% (4)	2.2% (1)	0
In your opinion, to what extent do the following activities help you learn?					
Assessment activities such as quizzes (144, n=22)	40.1% (9)	31.8% (7)	22.7% (5)	0	4.5 (1)
Assessment activities such as quizzes (214, n=46)	41.3% (19)	43.4% (20)	15.2% (7)		
Assessment such as assignments without Turnitin (144, n=22)	31.8% (7)	50% (11)	4.5% (1)	4.5% (1)	9.1% (2)
Assessment such as assignments without Turnitin (214, n=46)	41.3 (19)	45.7% (21)	8.7 (4)	4.4% (2)	
Assessment activities such as assignments with Turnitin (144, n=21)	28.6% (6)	42.9% (9)	4.8 (1)	0	23.8% (5)
Assessment activities such as assignments with Turnitin (214, n=46)	41.3% (19)	37% (17)	15.2% (7)	4.4% (2)	2.2% (1)
Forum (144, n=21)	27.3% (6)	22.7% (5)	13.6% (3)	4.5% (1)	31.8% (7)
Forum (214, n=46)	23.9% (11)	30.4% (14)	32.6% (15)	6.5% (3)	6.5% (3)
Clicker (144, n=21)	23.8% (5)	19% (4)	9.5% (2)	0	47.6% (10)
Clicker (214, n=46)	26.1% (12)	28.3% (13)	30.4% (14)	8.9% (4)	6.5% (3)
Chat (214, n=45)	28.9% (13)	37.8% (17)	24.4% (11)	8.9% (4)	
Blog (214, n=46)	26.1% (12)	32.6% (15)	28.3% (13)	10.3% (5)	2.2% (1)
Wiki (214, n=46)	17.4% (8)	13.0% (6)	37% (17)	15.2% (7)	17.4% (8)

**Appendix DDD:Resources and activities students prefer to participate in in the LMS**

Which of the following resource and activities do you prefer to participate in in the LMS?					
	All of them	Almost all of them	Some of them	None of them	Not sure
PPT slides (144, n=22)	63.6% (14)	36.4% (8)	0	0	0
PPT slides (214, n=46)	37% (17)	56.2% (26)	6.5% (3)		
Word docs/ Pdf's (n=19)	68.4%(13)	26.3% (5)	0	0	5.3% (1)
Word docs/ Pdf's (n=46)	32.6% (15)	45.6% (21)	10.9% (5)	8.7% (4)	2.2% (1)
Multimedia files such as audio recorded files(n=21)	23.8% (5)	19% (4)	33.3% (7)	14.3% (3)	9.5% (2)
Multimedia files such as audio recorded files(n=46)	34.8% (16)	41.3% (19)	4.3% (2)	10.9% (5)	8.7% (4)
Internet based resources such as YouTube files (n=22)	31.8% (7)	22.7% (5)	27.3% (6)	4.5% (1)	13.6% (3)
Internet based resources such as YouTube files (n=46)	28.3% (13)	52.2% (24)	13% (6)	6.5% (3)	
Which of the following activities do you prefer to do or participate in?					
Quiz activities such as quizzes (144, n=21)	42.9% (9)	38.1% (8)	4.8% (1)	4.8% (1)	9.5% (2)
Quiz activities such as quizzes (214, n=46)	41.3% (19)	58.8% (27)			
Assessment activities such as assignments without Turnitin (144, n=22)	50% (11)	45.5% (10)	0	0	4.5% (1)
Assessment activities such as assignments without Turnitin (214, n=214)	26.1% (12)	30.4% (14)	34.8% (16)	8.7% (4)	
Assessment activities such as assignments with Turnitin (144, n=19)	36.8% (7)	42.1% (8)	10.5 (2)	0	10.5% (2)
Assessment activities such as assignments with Turnitin (214, n=46)	30.4% (14)	23.9% (11)	37% (17)	2.2% (1)	6.5% (3)
Forum (144, n=22)	22.7% (5)	22.7% (5)	9.1% (2)	27.3% (6)	18.2% (4)
Forum (214, n=46)	26.1% (12)	26.1% (12)	28.3% (13)	8.7% (4)	10.9% (5)
Clicker (144, n=21)	19% (4)	23.8% (5)	14.3% (3)	14.3% (3)	28.6% (6)
Clicker (214, n=46)	26.1% (12)	23.9% (11)	28.3% (13)	15.2% (7)	6.5% (3)
Blog (214, n =46)	6.5% (3)	26.1% (12)	32.6% (15)	8.7% (4)	
Chat (214, n= 46)	15.1% (7)	23.9% (11)	28.3% (13)	32.6% (15)	
Wiki (214, n= 46)	19.6% (9)	23.9 (11)	19.6% (9)	37% (17)	

**Appendix EEE: Responses to open ended questions in the questionnaire**

<b>Question 1</b>	<b>If your answer on resources is “Very helpful” or “Helpful”, briefly explain why you say so.</b>
	<p><b>Six students felt that resources on the LMS provided information that they needed in order to answer quizzes and assignments.</b></p> <p><b>Four students liked the fact that resources were available anytime and anywhere.</b></p> <p><b>Seven students felt that the previous question papers helped them to have an idea of how questions could be asked in the examination and were able to prepare accordingly.</b></p> <p><i>“Slides and previous question papers”.</i></p> <p><i>“Old question papers. get to know the answers”.</i></p> <p>Three students indicated that listening to the voice of the lecturer made them feel as if they were part of the face to face lecture.</p> <p><i>“videos, the always trigger some interest in the subject and makes learning more fun”.</i></p> <p><i>“Videos can summarise lecturers if it has been missed or not understood”.</i></p> <p><b>Two students felt that they could easily recall information from the audio files in the test and examination.</b></p> <p><b>Three students felt that the PPT slides provided summaries of the chapters in their textbook.</b></p> <p><i>“I preferred the use of Powerpoint slides to guide me through the work that I should focus on and they were sufficient to that extent”.</i></p> <p><i>“They are summaries of the chapters that we did”.</i></p> <p><i>“I can study the slides on my own. Because they help when doing assignments to get information.”</i></p> <p><b>Three students felt that quizzes helped them understand content.</b></p> <p><i>“quizzes help us to understand which questions are mostly likely to be asked by the lectures.”</i></p> <p><i>“Because they helped me to understand the module, and to test my knowledge that I gained from the module”.</i></p> <p><i>“Quiz questions assisted in preparing for examinations”</i></p> <p><b>One students was of the opinion that collaborative activities enhanced learning experience.</b></p> <p><i>“Quizzes, assignments and the blog we did as a group provided the opportunity to view the work in depth and discuss it to gain a better understanding”.</i></p>
<b>Question 2</b>	<b>If your answer on resources is “Less helpful” or “Not helpful at all”, briefly explain</b>



	<b>why you say so.</b>
	<p>Most students felt that resources added on the LMS were helpful. They would not substantiate, their responses were “None”.</p> <p>Four students felt that the multimedia files (audio) were very big to download. Two students indicated that they could not listen to the files because the format was not compatible with their devices. <i>“Multimedia files take long to open, resulting in high Internet cost. I prefer something that I can print and then read. I can take along the printed materials wherever I go.”</i></p> <p>Two students felt that some resources were less interactive.</p> <p><i>“Video and voice over are not interactive. Audio and video have a problem to download and view”.</i></p> <p><i>“Multimedia files are not informative and can only used at specific times”.</i></p> <p>Two students indicated challenges of availability of some resources. <i>“Most of the time I work in the areas where there is no signal”.</i> <i>“Multimedia files can only accessed at specific times.”</i> <i>“Audio and video have a problem to download and view.”</i></p> <p>Three students were of the opinion that some resources provided additional information, which they could access on their own. <i>“Internet links. You may as well Google your question rather than to go on SUNLearn.”</i></p> <p><i>“I do not view you tube video on the sunlearn platform as I can access you tube without accessing sunlearn”.</i></p> <p>One student was of the opinion that resources added in the LMS <i>“assist students in achieving objectives of the module but help broaden the mind of a student to be critically when assessing problems”.</i></p> <p>One student felt that online assessment activities disadvantaged those who cannot type fast.</p>
<b>Question 1</b>	<b>If your answer on activities is “Very helpful” or “Helpful”, briefly explain why you say so</b>
	<p>Students felt quizzes were more helpful</p> <p><b>1. Immediacy of feedback</b></p> <p><i>“Quizzes assist with content to be studies[d]. Quiz is easy and quick to complete.”</i></p> <p><i>“Quiz is helpful because is easy and fast and they help to learn, you are able to test your knowledge not too long assignment”.</i></p> <p><i>“Quizzes are marked in time. Assignments that are not marked in time.”</i></p> <p><b>2. They were of the opinion that quizzes helped to prepare for the test and examination.</b></p> <p><i>“Quizzes help me to study in detail”</i></p> <p><i>“Get an idea of how questions will be asked in the test and examination”</i></p> <p><i>“Because they helped me to understand the module, and to test my knowledge that I gained from the module”.</i></p> <p><i>“Quizzes improved study method for the exams”.</i></p>

	<p><i>“Turnitin, help us a lot in order to rectify cases of plagiarism”</i></p> <p><i>“quiz[z]es help us to understand which questions are mostly likely to be asked by the lectures”.</i></p> <p><i>“Quizzes helped me to prepare for the exam”.</i></p> <p><i>“Quiz let me know the basis of questioning”</i></p> <p><i>“Quizzes allow you to see how questions will be asked. Turnitin assignments let you see what has been copied, thus allowing you to study the work more as you know what”</i></p> <p><b>3. Students felt assessment helped them to keep up with their work.</b></p> <p><i>“Quizzes force you to cover work. Quizzes help to know the type of questions and help studying.”</i></p> <p><i>“Quiz helps to keep up with work and not to derail.”</i></p> <p><i>“It was compulsory to do quizzes and assignments.”</i></p> <p><i>“The frequent quizzes and assignments helped me to stay focused on my studies because of target dates and allocated times”.</i></p> <p><b>4. One student felt that the forum helped them to further discuss part of work not well understood in class.</b></p> <p><i>“Forum would help students to discuss or explain things not understood in class.”</i></p>
<b>Question 2</b>	<b>If your answer(on activities) is “Less helpful” or “Not helpful at all”, briefly explain why do you say so</b>
	<p><b>Two students felt that they needed time to adapt to the use of the tool.</b></p> <p><b>Four students indicated that they could not complete quizzes because they were timed</b></p> <p><i>“I got worried of the quizzes that had limited time and got scared if I would ever finish on time.”</i></p> <p><i>“Not to be able to complete a quiz that have time given to complete.”</i></p> <p>One student could not see the importance of using social media tools on the LMS. <i>“Forum is not necessary as I have other social platforms that I use for this purpose.”</i></p> <p>One student did not like group work. <i>“Can be misled by information from peers.”</i></p>
<b>Question 3</b>	<b>If there are activities that you did not do, briefly explain why.</b>
	<p><b>One student expressed the following opinion about essay type activities:</b></p> <p><i>“Research assignments required more effort and were more time consuming, although it does improve one’s understanding of the work. I did not make use of Wiki, Chat or Discussion forums and I thus wish not to comment”.</i></p>

**Appendix FFF:Category and summary of students' responses**

Categories	Sub categories	Summary of responses
Learning design	Sequence of content	Division of content into descriptive titles Sequence of content Highlighting of important information Summaries of chapters in the textbook Marked quizzes Marked case studies Immediacy of feedback on quizzes
	Provision of guidance	Acquisition of knowledge Recall of information in the test and examination Qualifying to write examination Passing the assignment, quiz, test and examination
	Reasons for engagement	Title specified that resources were for residential and DE students File size Resources meant for marked assessment activities Guidance from the scope on type of questions to expect in the semester test and examination. Guidance by the type of questions asked in previous question papers. Facial expressions and tone of the lecturer when presenting overview of Compulsory Module 144 and recapping during the one week contact session. Facial expression of the lecturer during class. Specification of learning outcomes in each chapter. Comparison of students' notes with lecturer's slides. Resources not covered in the study guide. Update of information. Complexity of content on specific chapters on the textbook. Download of almost all resources in one visit so that they can be easily accessible offline. Lack of textbooks. Knowledge on the calculation of the final mark. Due dates of assessment activities (quizzes, case studies and assignment) forced students to study all chapters of each theme. Settings on quizzes forced students to study the all chapters of each theme before doing the quiz. Need to qualify to write examination in all modules registered for in a semester Knowing that the LMS monitored and tracked all their actions.
	Reasons for not engaging	Resources meant for residential or DE students Additional resources. Allocation of marks for commenting on peers'

Categories	Sub categories	Summary of responses
		<p>work.</p> <p>Work understood during face-to-face presentation.</p> <p>Inaccessibility of computer labs due to renovations.</p> <p>Inaccessibility of Internet in residences occupied by SAAF students during renovations in the unit.</p> <p>Resources not mentioned in the scope of the semester test or examination</p> <p>Same resources downloaded and shared with peers via email or social media.</p> <p>Same resources available in the Intranet</p> <p>Big files that take long to download</p> <p>Resources on less complex chapters.</p> <p>Assessment activities which were not marked.</p> <p>Less emphasis on resources from the lecturer's tone during the one week contact session.</p> <p>Knowing that short type activities (quizzes) counted 10% towards the final mark.</p> <p>Being in the field.</p> <p>Activities due during examination time.</p>
Personal factors	Motivation	<p>Passing modules they registered for.</p> <p>Avoiding RTU'ed (Returned to military unit).</p> <p>Avoid payback if not progressing with studies</p> <p>Outsmarting peers.</p> <p>Fear of losing face to juniors, peers</p> <p>Relevance of acquired knowledge to work environment</p>

### Appendix GGG:Category and subcategories of lecturer's responses

Category	Subcategories	Summary of responses
Learning design	Sequence of content	<p>Division of content into themes</p> <p>Avoiding scroll of death</p> <p>Division of content into small chunks</p> <p>Sequence of content according to level of difficulty</p> <p>Alignment of learning outcomes, assessment and affordances of learning technologies</p>
	Provision of guidance	<p>Highlight important information</p> <p>Summaries</p> <p>Drawing students' attention</p>
	Reduction of cognitive load	<p>Divide content into small chunks</p> <p>Student feedback</p> <p>Multimedia principles</p> <p>Application of knowledge from Blended Learning Short Course</p> <p>Redesigning Compulsory Module 144 and Compulsory Module 214</p>
	Accommodation of learning styles	<p>Content available as PPT slides, Word documents, Pdfs, audio files, YouTube video clips</p> <p>Content presented as words, pictures and diagrams</p> <p>Individual activities</p> <p>Group work</p>

	Achievement of learning outcomes	Specification of learning outcomes in each chapter Quizzes for every theme Case studies for every theme Questions not for marks at the end of each lesson Assignment
	Student engagement	Pre-course survey Collaborative activities, such as forum, blogs, wikis and chat Marked assessment activities (quizzes and case studies)
	Student profile	Designing learning resources for residential and distance education students Demographic factors Under-preparedness Reconciliation of often diverse conflicting responsibilities
	Student support	Work environment Mode of study
Factors that led to student success	Personal traits	Intellectual abilities Motivation Student attitude Time management skills Taking responsibility of their own studies Native language matching language of instruction

### Appendix HHH: Age, number of views, and time taken by individual students on resources and activities and time spent in the LMS in descending order

Name	Age	Name	No views						Time spent
User 1426	46	User 1429	1123	30	655	User 1430	566	28	1312
User 1402	40	User 1420	812	36	979	User 1420	812	36	979
User 1418	38	User 1402	676	32	608	User 1428	600	37	832
User 1421	36	User 1418	621	31	453	User 1401	616	33	660
User 1424	36	User 1401	616	33	660	User 1429	1123	30	655
User 1433	35	User 1428	600	37	832	User 1427	544	26	614
User 1435	33	User 1435	566	28	1312	User 1402	676	32	608
User 1409	32	User 1427	544	26	614	User 1411	448	12	559
User 1416	32	User 1423	534	30	537	User 1421	431	22	543
User 1429	32	User 1411	448	12	559	User 1423	534	30	537
User 1431	32	User 1432	443	25	404	User 1433	311	17	535
User 1404	31	User 1421	431	22	543	User 1419	293	15	512
User 1410	31	User 1403	422	23	365	User 1148	621	31	453
User 1412	31	User 1406	369	33	402	User 1432	443	25	404
User 1428	31	User 1407	367	35	297	User 1406	369	33	402
User 1430	31	User1422	318	17	378	User 1431	278	13	394
User 1413	30	User 1433	311	17	535	User 1422	318	17	378
User 1420	30	User 1419	293	15	512	User 1403	422	23	365
User 1425	30	User 1431	278	13	394	User 1407	367	35	297
User 1427	30	User 1409	233	13	274	User 1409	233	13	274
User 1434	30	User 1434	217	13	181	User 1424	119	11	194
User 1423	29	User 1414	195	10	184	User 1413	123	14	191
User 1401	28	User 1404	178	14	146	User 1414	195	10	184
User 1408	28	User 1413	123	14	191	User 1434	217	13	181
User 1411	28	User 24	119	11	194	User 1404	178	14	146
User 1432	28	User 1416	89	7	103	User 1412	58	9	127
User1403	27	User 1410	85	12	98	User 1416	89	7	103
User 1405	27	User 1425	75	7	73	User 1410	85	12	98
User 1415	27	User 1412	58	9	127	User 1425	75	7	73
User 1419	27	User 1426	25	4	58	User 1426	25	4	58
User 1414	26	User 1430	19	1	42	User 1430	19	1	42
User 1417	26	User 1405	13	2	4	User 1405	13	2	4
User 1407	25	User 1408				User 1408	0		0
User 1422	25	User 1415				User 1415	0		0
User 1406	24	User 1417				User 1417	0		0

Name	Age								Days	
Name	Resources					Activities			No days	
User 1427	28	12		User 1402	25	14	User 1428	600	37	832
User 1428	27	13		User 1421	22	14	User 1420	812	36	979
User 1435	27	12		User 1428	27	13	User 1407	367	35	297
User 1403	26	11		User 1423	26	13	User 1401	616	33	660
User 1423	26	13		User 1407	24	13	User 1406	369	33	402
User 1402	25	14		User 141	23	13	User 1402	676	32	608
User 1411	25	10		User 1420	22	13	User 1418	621	31	453
User 1407	24	13		User 1432	15	13	User 1429	1123	30	655
User 1429	24	11		User14 27	28	12	User 1423	534	30	537
User 1401	23	13		User 1435	27	12	User 1435	566	28	1312
User 1418	23	12		User 1418	23	12	User 1427	544	26	614
User 1422	23	9		User 1406	22	12	User 1432	443	25	404
User 1406	22	12		User 1433	22	12	User 1403	422	23	365
User 1420	22	13		User 1403	26	11	User 1421	431	22	543
User 1421	22	14		User 1429	24	11	User 1422	318	17	378
User 1433	22	12		User 1419	8	11	User 1433	311	17	535
User 1413	19	4		User 1411	25	10	User 1419	293	15	512
User 1432	15	13		User 1422	23	9	User 1404	178	14	146
User 1424	12	3		User 1414	9	7	User 1413	123	14	191
User 1410	10	2		User 1431	9	7	User 1431	278	13	394
User 1414	9	7		User 1404	7	7	User 1409	233	13	274
User 1431	9	7		User 1409	7	7	User 1434	217	13	181
User 1412	8	4		User 1434	1	6	User 1411	448	12	559
User 1416	8	3		User 1413	19	4	User 1410	85	12	98
User 1419	8	11		User 1412	8	4	User 1424	119	11	194
User 1404	7	7		User 1424	12	3	User 1414	195	10	184
User 1409	7	7		User 1416	8	3	User 1412	58	9	127
User 1425	1	3		User 1425	1	3	User 1416	89	7	103
User 1426	1	1		User 1410	10	2	User 1425	75	7	73
User 1430	1			User 1426	1	1	User 1426	25	4	58
User 1434	1	6		User 1405	0	1	User 1405	13	2	4
User 1405	0	1		User 1430	1		User 1430	19	1	42
User 1415	0			User 1415	0		User 1408			
User 1417	0			User 1417	0		User 1415			
User 1408				User 1408			User 1417			

## Appendix III: Daily activities of students in Compulsory Module 144 day 1 to day 37

### Day 1 to day 3

	Day 1		Day 2		Day 3	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401	Resource 1403 Resource 1401	5	Activity 1410 Resource 1411 Resource 1409	4	Activity 1410 Resource 1411 Resource 1409	4
User 1402	Resource 1407	1	Resource 1401	1	Resource 1401	1
User 1403	Activity 1401 Resource 1401 Activity 10 Resource 1411 Resource 1407 Resource 1408 Resource 1409 Resource 1410		<b>Submitted Activity 10</b> <b>Submitted Activity 2</b>	13	Activity 1410	1
User 1404	Course view	1	Course view	1	Course view	1
User 1405	Activity 1410	3	Activity 1410	1		
User 1406	Resource 1407	3	Resource 1410 Resource 1409 Resource 1401	18	Resource 1407 Resource 1408	3
User 1407	Resource 1401	1	Resource 1401	2	Resource 1401	1
User 1408						
User 1409	Resource 1401 Activity 1401 Activity 1410	1	Resource 1401 <b>Submitted Activity 1402</b>	14	Resource 1411 Activity 1410	3
User 1410	Resource 1401	5	Resource 1401 Resource 1403	4	Resource 1401	1
User 1411	Activity 1401 Activity 1410 Resource 1401 Resource 1407 Resource 1408 Resource 1409 Resource 1410	47	<b>Submitted Activity 1410</b> Resource 1401 Activity 1411	95	Resource 1401 <b>Submitted Activity 1403</b>	53
User 1412	Resource 1403 Resource 1401	63	Course view	1	Course view	1
User 1413	Resource 1433 Resource 1407	22	Resource 1407 Resource 1408 Resource 1409 Resource 1410	28	Activity 1410 Resource 1401	4
User 1414	Course view	1	Course view	1	Course view	1
User 1415						
User 1416	Resource 1407 Resource 1403	20	Activity 1410	3	Resource 1407 Resource 1408 Resource 1409 Resource 1410	9
User 1417						
User 1418	Activity 1401	9	Activity 1401	8	<b>Submitted Activity 1402</b>	37
User 1419	Course view	1	Resource 1401 Resource 1407 Resource 1408 Resource 1409 Resource 1410	47	Course view	2
User 1420	<b>Submitted Activity 1402</b> Activity 1401 <b>Submitted Activity 1410</b>	74	<b>Submitted Activity 1410</b>	16	Course view	1
User 1421	Resource 1401	1	Resource 1401 Activity 1410 Resource 1411	26	Activity 1410	1
User 1422	Resource 1401 Resource 1403	13	Resource 1401	2	<b>Submitted Activity 1402</b> Activity 1401	26
User 1423	Activity 1410 Resource 1407 Resource 1408 Resource 1409 Resource 1410 Resource 1411	27	Resource 1408 Resource 1409 Resource 1410	27	<b>Submitted Activity 1402</b>	24
User 1424	Resource 1407 Resource 1409 Resource 1410	12	Resource 1411 Resource 1407 Resource 1408	72	Course view	1



	Day 1		Day 2		Day 3	
			Resource 1409 Resource 1410 Resource 1401 Activity 1410 Resource 1403			
User 1425	Course view	1	Course view	1	Course view	1
User 1426	Course view	2	Course view	1	<b>Submitted Activity 1402</b>	32
User 1427	Resource 1403 Resource 1401 Resource 1408	22	Course view	1	Activity 1410 Resource 1411	14
User 1428	Resource 1401	2	Resource 1401, Resource 1403	1	Resource 1403	1
User 1429	Resource 1401 Resource 1403 Resource 9	107	Resource 1401 Resource 1403 Resource 1409 Resource 1410	90	Activity 1410 Resource 1401 Resource 1411 Resource 1409 Resource 1403	24
User 1430	Resource 1401 <b>Submitted Activity 1402</b>	42				
User 1431	Resource 1401	9	Resource 1401	1	Resource 1401	2
User 1432	Activity 1410	1	Resource 1401 <b>Submitted Activity 1402</b> Activity 1410	39	Activity 1410 Activity 1401 Resource 1401	24
User 1433	Activity 1410	1	<b>Submitted Activity 1402</b> Activity 1410	42	<b>Submitted Activity 1410</b>	1
User 1434	Resource 1401	2	Resource 1401	2	Activity 1410	16
User 1435	Activity 1410 Resource 1401 Resource 1411 Resource 1409 Resource 1403 Activity 1401	1	<b>Submitted Activity 1410</b>	179	Course view	4

## Day 4 to day 6

	Day 4		Day 5		Day 6	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401	Resource 1401 Activity 1410	2	Resource 1401 Submitted Activity 1410	34	Activity 1402 Activity 1401 Submitted Activity 1410	52
User 1402	Activity 1410	2	Activity 1402 Activity 1401 Activity 1410	1	Activity 1402 Activity 1401 Activity 1410	40
User 1403	Course view	1	Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416 Resource 1417 Submitted Activity 1403	118	Resource 1401	13
User 1404	Activity 1410	3	Resource 1411	1	Submitted Activity 1402	29
User 1405						
User 1406	Resource 1401		Resource 1401 Resource 1411 Activity 1410	8	Submitted Activity 1402	23
User 1407	course view	1	Resource 1401	15	Activity 1402	27
User 1408						
User 1409	Submitted Activity 1410 Activity 1409	4	Activity 1410	2	Activity 1410	5
User 1410	Activity 1410	1	Resource 1	5	Resource 7	3
User 1411	Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416 Resource 1417	8	Resource 1411, Resource 1401, Submitted Activity 14011	42	Activity 1404 Resource 1420 Resource 1418 Resource 1419 Submitted Activity 1412 Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425 Resource 1401	103
User 1412	Resource 1411 Resource 1407 Resource 1409 Resource 1410	10	Course view	1	Submitted Activity 1402	34
User 1413	Resource 1411	8	Activity 1402 Activity 1401	2	Submitted Activity 1401 Submitted Activity 1402 Activity 1410	42
User 1414	Submitted Activity 1402	33	Submitted Activity 1410	5	Submitted Activity 1403	43
User 1415						
User 1416	Submitted Activity 1402	32	Submitted Activity 1410	5	Submitted Activity 1411 Resource 1417 Resource 1415	33
User 1417						
User 1418	Course view	1	Submitted Activity 1410 Resource 1401	12	Activity 1410	1
User 1419	Activity 1410	1	Activity 1410 Submitted Activity 1402	55	Submitted Activity 1410	4
User 1420	Resource 1411	4	Resource 1415 Resource 1417	4	Resource 1415	1
User 1421	Submitted Activity 1402	30	Submitted Activity 1410	4	Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416 Resource 1417	29
User 1422	Activity 1410 Activity 1402	26	Submitted Activity 1410 Resource 1401 Resource 1407 Resource 1409 Resource 1410 Resource 1411 Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416	85	Resource 1403 Activity 1401 Activity 1410	4
User 1423	Submitted Activity 1410	113	Activity 1410	2	Course view	5
User 1424	Course view	10	Resource 1411 Submitted Activity 1410	21	Activity 1402	2
User 1425	Resource 1411	15	Submitted Activity 2	18	Submitted Activity 10	14
User 1426	Resource 1401	23				

	Day 4		Day 5		Day 6	
User 1427	Activity 1410 Resource 1403 Resource 1401	37	Course view	1	Resource 1401 Activity 1410	2
User 1428	Resource 1403 Activity 1410 Resource 1401 Resource 1411 Resource 1409 Resource 1410	21	Activity 1410 Resource 1401 <b>Submitted Activity 1402</b>	3	Activity 1402	20
User 1429	Resource 1409 Activity 1410	2	Resource 1401 Resource 1403 <b>Submitted Activity 1402</b> Activity 1401	35	Activity 1410 Resource 1401	85
User 1430						
User 1431	<b>Submitted Activity 1402</b> Activity 1410	23	<b>Submitted Activity 1403</b>	47	<b>Submitted Activity 1411</b> Resource 1401 Activity 1401 Resource 1412 Resource 1417	27
User 1432	Activity 1410 Resource 1401	4	<b>Submitted Activity 1410</b>	64	Course view	1
User 1433	Course view	2	Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416 Resource 1417 <b>Submitted Activity 1403</b>	87	<b>Submitted Activity 1411</b>	2
User 1434	Activity 1410	74	Activity 1410	3	Activity 1401 <b>Submitted Activity 1402</b> Activity 1410 Resource 1401	78
User 1435	Resource 1401 Resource 1403 <b>Submitted Activity 1403</b>		Activity 1401 Resource 1401	30	Resource 1401 Resource 1403 Resource 1407 Resource 1408 Resource 1409 Resource 1410 Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416 Resource 1418 Resource 1419 Activity 1411	18

## Day 7 to day 9

	Day 7		Day 8		Day 9	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401		1	Resource 10	1	Activity 1	1
User 1402	<b>Submitted Activity 1410</b> Resource 1411 Resource 1407	5	<b>Submitted Activity 1410</b>	23	Activity 1401 Activity 1403 Resource 1401 Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416 Resource 1417	8
User 1403	<b>Submitted Activity 1411</b>	2	Resource 1401	1	Resource 1401 Resource 1420	3
User 1404	<b>Submitted Activity 1410</b>	5	<b>Submitted Activity 1403</b>	29	Resource 1417 Resource 1415	29
User 1405						
User 1406	Activity 1410	5	Activity 1410	2	Activity 1403	1
User 1407	Activity 1410 Resource 1409 Resource 1410 Resource 1411 Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416	5	Activity 1410	4	<b>Submitted Activity 1410</b>	3
User 1408						
User 1409	Activity 1403 Resource 1401	8	<b>Submitted Activity 1403</b>	49	<b>Submitted Activity 1411</b> , Resource 1417 Resource 1401 Resource 1418 Resource 1403 Resource 1415	115
User 1410	Resource 1401	10	Resource 1401	1	Resource 1401 <b>Submitted Activity 1403</b>	57
User 1411	Resource 1405 Resource 1401 Activity 1405	8	Resource 1406 Activity 1413 Activity 1409	5	Resource 1426 Activity 1413 Activity 1409 Resource 1401 Resource 1402 Resource 1404 Resource 1405 Resource 1406 Resource 1418 Resource 1419 Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425	62
User 1412	<b>Submitted Activity 1410</b>	1	Activity 1411 Activity 1415 Resource 1417	14	Activity 1404	1
User 1413	Course view	4	Course view	60	<b>Submitted Activity 1410</b> Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416	6
User 1414	<b>Submitted Activity 1411</b> Resource 1417	6	Activity 1413 Activity 1409	6	Resource 1412 Resource 1416 Activity 1404	58
User 1415						
User 1416	Course view	1				
User 1417						
User 1418	Resource 1401 Resource 1417	31	Course view	1	<b>Submitted Activity 1403</b>	56

	Day 7		Day 8		Day 9	
	Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416				Activity 1401	
User 1419	<b>Submitted Activity 1403</b> Activity 1401	106	Resource 1417 Resource 1415	12	<b>Submitted Activity 1411</b>	2
User 1420	Resource 1412, Resource 1413, <b>Submitted Activity 1403</b>	117	Resource 1417 Resource 1414 Resource 1416 <b>Submitted Activity 1411</b> Activity 1401	36	Resource 1402 Activity 1409	2
User 1421	<b>Submitted Activity 1403</b>	48	<b>Submitted Activity 1411</b> Resource 1401	24	Activity 1404 <b>Submitted Activity 1412</b> Resource 1420	25
User 1422	Resource 1417 Resource 1412 Resource 1413 Resource 1415 Resource 1416 Resource 1409 Resource 1410 Activity 1401	75	Activity 1411	19	Activity 1404 Activity 1412	27
User 1423	Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416 Resource 1417	5	<b>Submitted Activity 1403</b>	47	Resource 1417	22
User 1424	Activity 1401	3	<b>Submitted Activity 1402</b>	42	Resource 1411 Activity 1410	3
User 1425	<b>Submitted Activity 1403</b>	23				
User 1426						
User 1427	<b>Submitted Activity 1402</b> Resource 1401	5	Activity 1410	18	<b>Submitted Activity 1410</b> Activity 1401	2
User 1428	<b>Submitted Activity 1410</b> Resource 1411 Resource 1410	8	course view	1	Resource 1401 Resource 1411 Activity 1410	10
User 1429	Activity 1403 Resource 1412 Resource 1417	1	Resource 1401 Resource 1412 <b>Submitted Activity 1403</b>	14	Resource 1401 <b>Submitted Activity 1403</b>	50
User 1430						
User 1431	Resource 1426	4	Activity 1409	1	Activity 1401 <b>Submitted Activity 1413</b> Resource 1401 Resource 1426 <b>Submitted Activity 1409</b> Resource 1405 Resource 1419 Resource 1402	145
User 1432	Resource 1415	1	<b>Submitted Activity 1411</b>	2	Resource 1401 Resource 1414 Resource 1415	9
User 1433	Activity 1409 Activity 1412 <b>Submitted Activity 1404</b> Activity 1413 Resource 1418 Resource 1419 Resource 1420 Resource 1421 Resource 1422	45	<b>Submitted Activity 1412</b> Activity 1409	2	Resource 1404 Resource 1405 Resource 1406 Activity 1409 Activity 1413	7

	Day 7		Day 8		Day 9	
	Resource 1423 Resource 1424 Resource 1405					
User 1434	<b>Submitted Activity 1410</b> Activity 1402	2	Activity 1410	6	Resource 1401	1
User 1435	Activity 1413 Resource 1401 Resource 1420	9	Activity 1412 Activity 1413 Activity 1409, Resource 1401	19	<b>Submitted Activity 1404</b> Activity 1413	51

## Day 10 to day 12

	Day 10		Day 11		Day 12	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401	Resource 1417 Resource 1413 Resource 1414 Resource 1415 Resource 1416	7	<b>Submitted Activity 1403</b>	51	<b>Submitted Activity 1403</b> Resource 1401 Resource 1417 Resource 1415	8
User 1402	Activity 1403	83	Resource 1417 Activity 1401 Resource 1409 Resource 1410 Resource 1401	15	Activity 1411	8
User 1403	<b>Submitted Activity 1404</b>	63	<b>Submitted Activity 1412</b> Activity 1413 Resource 1401	11	Resource 1402 Resource 1401	5
User 1404	Resource 1417 <b>Submitted Activity 1411</b>	8	<b>Submitted Activity 1413</b> Resource 1406 Resource 1404 Resource 1401 Activity 1405	11	Activity 1409 Activity 1413 Resource 1401	42
User 1405						
User 1406	Activity 1401	3	Resource 1417 Resource 1412 Resource 1413 Resource 1414 Resource 1415	11	Activity 1403	23
User 1407	Activity 1410	1	Activity 1401	2	Resource 1417	1
User 1408						
User 1409	Resource 1401 Resource 1426 <b>Submitted Activity 1413</b>	62	Activity 1413 Resource 1401 Resource 26	3	Resource 1401	1
User 1410	Resource 1401 Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416 Resource 1418 Resource 1419	16	Resource 1401	1	Resource 1401	2
User 1411	Resource 1401 <b>Submitted Activity 1409</b>	44	course view	1	Resource 1401 <b>Submitted Activity 1407</b> Activity 1413	90
User 1412						
User 1413	Activity 1414003	2	Resource 1412 Resource 1418 Resource 1419 Resource 1404	12	Course view	1
User 1414	Resource 4 <b>Submitted Activity 1412</b> Resource 1405 Resource 1401 Resource 1420 Resource 1418 Resource 1419	30				
User 1415						
User 1416						
User 1417						
User 1418	<b>Submitted Activity 1411</b>	7	Course view	1	Activity 1410 Activity 1412 Activity 1413 Resource 1416 Resource 1402	55
User 1419	Activity 1412 Resource 1420	3	<b>Submitted Activity 1412</b>	48	Course view	1
User 1420	Activity 1412 Activity 1409 Resource 1401	5	Resource 1402, Resource 1418 Resource 1419	4	Resource 1418 Resource 1419 Resource 1402 Resource 1421 Activity 1409 Resource 1416 Activity 1401 <b>Submitted Activity 1404</b> Activity 1413 Activity 1412	202

	Day 10		Day 11		Day 12	
User 1421	Activity 1412 Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425 Resource 1401 Resource 1418 Resource 1149	11	<b>Submitted Activity 1412</b>	3	Resource 1406 Resource 1402 <b>Submitted Activity 1405</b>	53
User 1422	<b>Submitted Activity 1412</b> Activity 1413	2	Activity 1413 Resource 1401 Activity 1409 Resource 1404 Resource 1426 Resource 1421 Resource 1422 Resource 1406	30	Resource 1402, Resource 1401, Resource 1404	26
User 1423	<b>Submitted Activity 1411</b>	4	Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425	4	Resource 1420, Resource 1418, Resource 1419	2
User 1424	Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416	15	Resource 1417 Resource 1413	1413		
User 1425						
User 1426						
User 1427	Activity 1410	12	Activity 1410 Resource 1401	9	Resource 1401 Activity 1401 <b>Submitted Activity 1403</b> Resource 1417 Resource 1416 Resource 1415 Resource 1414 Resource 1413 Resource 1412	92
User 1428	Activity 1410	1	Activity 1410	1	Resource 1401	2
User 1429	Resource 1418 <b>Submitted Activity 1411</b>	4	Activity 1409 Activity 1412 Resource 1401 Resource 1418 Resource 1420	3	Resource 1401 Resource 1421	4
User 1430						23
User 1431	Activity 1410	1	Activity 1410 Activity 1413 Activity 1401 Resource 1426	107	Course view	
User 1432	<b>Submitted Activity 1412</b> Activity 9 <b>Submitted Activity 1404</b> Resource 1416 Resource 1401	40	Activity 1404	13	Activity 1412, Resource 1401	6
User 1433	Activity 1413 <b>Submitted Activity 1405</b> Resource 1426 Resource 1421	92	<b>Submitted Activity 1409</b>	7	<b>Submitted Activity 1413</b> Activity 1407 Resource 1426 Resource 1406	141
User 1434	Resource 1 Activity 1410 Activity 1401	14016	<b>Submitted Activity 1403</b>	51	<b>Submitted Activity 1411</b> Resource 1401	1
User 1435	<b>Submitted Activity 1412</b> Resource 1406	202	Activity 1413, Activity 1426, Resource 1406	11	Resource 18 Resource 19 Resource 6 <b>Submitted Activity 140 5</b> Resource 1404	153



Day 13 to day 15

Day 13			Day 14			Day 15		
Resources and Activities	Duration		Resources and Activities	Duration		Resources and Activities	Duration	
Course view	1		Activity 11	7		Activity 12 Resource 16 Resource 15 Resource 21 Resource 25 Resource 20 Resource 18	31	
Resource 1418 Resource 1419 Resource 1420 Resource 1401 Activity 1409 Activity 1412 Resource 1422 Resource 1402 Resource 1425 Resource 1424	7		Resource 1402 Resource 1401 Activity 1413	2		<b>Submitted Activity 1404</b> Activity 1409 Resource 1401 Activity 1413	46	
Resource 1421 Resource 1418 Resource 1401	2		<b>Submitted Activity 1409</b>	8		Resource 1406 Resource 1401 Resource 1402	4	
Resource 1402 Activity 1409	12			2				
<b>Submitted Activity 1411</b>	8		Activity 1411	3		Activity 1409	3	
Resource 1417 <b>Submitted Activity 1403</b>	43		<b>Submitted Activity 1411</b>	8		Activity 1412 Resource 1418 Resource 1419 Resource 1420 Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425	12	
Course view	3							
Resource 1401	1		Resource 1401 Resource 1405 Resource 1418 Resource 1419 Resource 1421 Resource 1422 Resource 1423	13				
Resource 1401 Activity 1412 Resource 1403	4		Resource 1420 Resource 1418 Resource 1419	12		<b>Submitted Activity 1412</b> Resource 1401	39	
<b>Submitted Activity 1405</b>	122		Activity 1409	7		Activity 1408	101	
Activity1409 Activity 1413 <b>Submitted Activity 1412</b>	12		Activity 1413	1		Resource 1404	1	
<b>Submitted Activity 1406</b>	50		<b>Submitted Activity 9</b>	74		Resource 1	1	
Resource 1418 Resource 1419 Resource140 6 Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425	15		Resource 1402 Resource 1401 Resource140 6	22		Course view	1	
Resource 1415 Activity 1401 Activity 1404 Activity 1409 Activity 1412	88		Activity1409 Activity 1412 Activity 1413 Resource 1407 Resource 1401	10		Activity 1412	1	
<b>Submitted Activity 1411</b>	3		Activity 1404 Activity 1412 Activity 1413 Activity 1409 Resource 1401 Resource 1416 Resource 1415	36		<b>Submitted Activity 1404</b> Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425 Resource 1401 Activity 1412 Activity 1409 Resource 1405 Resource 1404	114	

	Day 13		Day 14		Day 15	
			Resource 1420 Resource 1418 Resource 1419			
	Resource 1401 Resource 1412 Resource 1413 Resource 1414 Resource 1415 Resource 1416 Resource 1417 Resource 1421	16	<b>Submitted Activity 1403</b>	76	Activity 1401	1
	Activity 1412 Resource 1401 Resource 1420 Resource 1418 Activity 1409 Resource 1412 Resource 1413 Resource 1419 Resource 1421 Resource 1403	11	Resource 1402 Resource 1418 Activity 1409 Resource 1401	2	<b>Submitted Activity 1404</b> Resource 1421	32
	Resource 1429	4				
	Resource 1420 Resource 1419 Resource 1418	4	Activity 1413 Activity 1409	2	Resource 1419 Resource 1418 <b>Submitted Activity 1405</b>	88
	<b>Submitted Activity 1407</b>	51	Activity 1414 Resource 1427 Resource 1428 Resource 1429 <b>Submitted Activity 1408</b>	48	<b>Submitted Activity 1414</b> Resource 1429 Resource 1427	5
	Activity 1409	1				
	Activity 1409 Activity 1413 Resource 1401	20	Resource 1401 Resource 1406	40	Resource 1421 Resource 1419 Resource 1418 Resource 1146 Resource 1415 Resource 1414 Resource 1413 Resource 1412 Resource 1426 Resource 1422 Resource 1423 Resource 1424 Resource 1425	23

## Day 16 to day 18

	Day 16		Day 17		Day 18	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401	Resource 1420 <b>Submitted Activity 1404</b> Resource 1418 Resource 1419 Resource 1421 Resource 1422 Resource 1423	77	<b>Submitted Activity 1412</b> Resource 1421 Activity 1413	8	Activity 1401 Resource 1425	1
User 1402	<b>Submitted Activity 1412</b> Activity 1413 Activity 1401	7	Resource 1413 Resource 1418 Resource 1426 Resource140 6 Activity 1409 Resource 1404 Resource 1405 Activity 1405	12	<b>Submitted Activity 1405</b> Activity 1406 Activity 1401 Resource 1401	171
User 1403	Course view	1	<b>Submitted Activity 1409</b>	8	Resource 1406	2
User 1404						
User 1405						
User 1406	Activity 1412 Resource 1420	2	<b>Submitted Activity 1404</b> Activity 1412 Resource 1418 Resource 1419 <b>Submitted Activity 1401</b>	35	Resource 1418 Resource 1420 Resource 1406 Activity 1412	47
User 1407	<b>Submitted Activity 1404</b>	23	<b>Submitted Activity 1412</b> Resource 1406	4	Resource 1406	5
User 1408						
User 1409						
User 1410						
User 1411						
User 1412						
User 1413						
User 1414						
User 1415						
User 16						
User 1417						
User 1418	Resource140 4 Resource 1401	1	<b>Submitted Activity 1412</b>	11	Resource 1402	2
User 1419						
User 1420	Activity 1409	2	Resource 1402 Resource 1404 Resource 1418 Resource 1419	5	<b>Submitted Activity 1405</b> Resource 1406 Resource 1402	49
User 1421	<b>Submitted Activity 1409</b>	9	Activity 13 Activity 7 Resource 26	12	<b>Submitted Activity 1</b>	5
User 1422	Activity 1413 Resource 1426	4	Course view	1		
User 1423	Activity 1412 Resource 1401	8	Resource 1401 Activity 1413 Resource14 26	2	Activity 1401	1
User 1424						
User 1425						
User 1426						
User 1427	<b>Submitted Activity 1412</b>	2	Resource 1404 Resource 1405 Activity 1413 Resource 1426	5	<b>Submitted Activity 1405</b>	94
User 1428	<b>Submitted Activity 1411</b>	3	Course view	8	Resource 1420 Activity 1412	2
User 1429	Resource 1412 Resource 1413 Resource 1415	9	Resource 1401 Resource 1426	3	Resource 1406 Resource 1401 Activity 1405	16

	Day 16		Day 17		Day 18	
	Resource 1416 Resource 1418 Resource 1419 Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425 Resource 1406 Resource 1401 Activity 1401		Resource 1405		Resource 1418 Resource 1419	
User 1430						
User 1431						
User 1432	Activity 1409	2	Activity 1413	2	Activity 1413 Activity 1401	3
User 1433	Course view	1	Course view	1		
User 1434						
User 1435	<b>Submitted Activity 1409</b> Activity 1413 Resource 1413	39	Course view	1	Course view	1

## Day 19 to day 21

	Day 19		Day 20		Day 21	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401	<b>Submission Activity 1405</b> Resource 1426	66	<b>Submitted Activity 1409</b>	33	Resource 1413 Resource 1414	2
User 1402	<b>Submitted Activity 1406</b>	55	Activity 1409 Activity 1413	2	Activity 1409	1
User 1403	<b>Submitted Activity 1407</b> Resource 1401 Activity 1413 Resource 1426	17	<b>Submitted Activity 1413</b>	2	Resource 1429 Resource 1401 Resource 1423 Resource 1424 Resource 1425 Resource 1427 Resource 1428	16
User 1404						
User 1405						
User 1406	Course view	1	<b>Submitted Activity 1405</b>	43	Activity 1401 Resource 1404 Resource 1401	25
User 1407	Course view	1	<b>Submitted Activity 1405</b>	23	Course view	1
User 1408						
User 1409						
User 1410						
User 1411						
User 1412						
User 1413						
User 1414						
User 1415						
User 1416						
User 1417						
User 1418	Resource 6 <b>Submitted Activity 1409</b>	25	Resource140 6	3	Activity 1413 Resource 1401 Resource 1406 Activity 1407 Activity 1401	12
User 1419						
User 1420	Resource 1402 Resource 1404 Resource 1415 Resource 1401	60	Course view	1	<b>Submitted Activity 1409</b>	21
User 1421	<b>Attempted Activity 1407</b> <b>Submitted Activity 1413</b>	45	Resource 1427 Resource 1428 Resource 1429 <b>Submitted Activity140 8</b> Activity 1414	54	<b>Submitted Activity 1414</b>	19
User 1422						
User 1423	<b>Submitted Activity 1405</b>	49	Resource 1404 Resource 1401 Resource 1406	5	Activity 1409	2
User 1424						
User 1425						
User 1426						
User 1427	Resource 1402 Resource 1401 Resource 1406	3	<b>Submitted Activity 1409</b>	4	Activity 1413 Resource 1406 Resource 1405 Resource 1401	9
User 1428	<b>Submitted Activity 1404</b>	17	Activity 1412 Resource 1401 Resource 1420	3	<b>Submitted Activity 1405</b>	45
User 1429	Resource 1401 Resource 1402 Resource 1404	6	Resource 1402 Resource 1401 Resource 1404 Activity 1409 Activity 1413 Resource 1406	11	Resource 1401, Resource 1406, <b>Submitted Activity 1405</b>	51
User 1430						
User 1431						

	Day 19	Day 20	Day 21	
User 1432	Activity 1413 Resource 1402 Resource 1425 Resource 1424 Resource 1423 Resource 1422 Resource 1421	11	<b>Submitted Activity 1407</b> Resource 1421 36	Resource 1425 <b>Submitted Activity 1413</b> 6
User 1433				
User 1434				
User 1435	Activity 1407	6	<b>Submitted Activity 1407</b> 110	Resource 1426 <b>Submitted Activity 1413</b> Resource 1406 107

## Day 22 to day 24

	Day 22		Day 23		Day 24	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401	Resource 1407 Resource 1408	4	Resource 1406 Activity 1409 Resource 1401 Resource 1414 Resource 1415 Resource 1412	31	Activity 1409 Resource 1426	3
User 1402	<b>Submitted Activity 1409</b>	4	Activity 1413	2	Resource 1401 Activity 1413 <b>Submitted Activity 1407</b>	14
User 1403	<b>Submitted Activity 1408</b>	60	Resource 1422 Resource 1423	2		
User 1404						
User 1405						
User 1406	Activity 1409 Resource 1404 Resource 1401	2	course view	1	<b>Submitted Activity 1409</b> Activity 1413	10
User 1407	Resource 1402 Resource 1412 Resource 1404	3	course view	1	Course view	1
User 1408						
User 1409						
User 1410						
User 1411						
User 1412						
User 1413						
User 1414						
User 1415						
User 1416						
User 1417						
User 1418	Activity 1401 <b>Submitted Activity 1407</b>	26	Resource 1419 Resource 1418 Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425	41	<b>Submitted Activity 1407</b>	21
User 1419						
User 1420	Resource 6 Activity 1413	28	Resource 1406 Resource 1401 Activity 1413	21	Activity 1413 Resource 1426 Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425	10
User 1421	Resource 1401	1				
User 1422						
User1423	<b>Submitted Activity 1409</b>	31	course view	1	Course view	1
User 1424						
User 1425						
User 1426						
User 1427	Resource 6 Activity 1413 Resource 1425 Resource 1426	4	Activity 1413 Resource 1402	6	<b>Submitted Activity 1408</b> Activity 14014 Resource 1427 Resource 1428 Resource 1429	23
User 1428	Activity 1405	24	Activity 1409, Resource 1418 Resource 1419 Resource 1421 Resource 1422 Resource 1423 Resource 1424 Resource 1425 Resource 1426	99	Activity 1401 Resource 1401 Resource 1404	101

	Day 22		Day 23		Day 24	
User 1429	Resource 1401 Activity 1409 Resource 1402 Resource 1404 Resource 1406 Resource 1414	3	Resource 1401 Resource 1404 Submitted Activity 1409	54	Activity 1409 Resource 1406 Resource 1401	13
User 1430						
User1431						
User 1432	Resource 1425 Activity 1413	6	Resource 1429	2	Submitted Activity 1408 Activity 1414	47
User 1433						
User 1434						
User 1435	Resource 1406	5	Activity 1408 Resource 1427 Resource 1428 Resource 1429 Resource 1406	48	Resource 1406 Submitted Activity 1408	89



## Day 25 to day 27

	Day 25		Day 26		Day 27	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401	Activity 1413 Resource 1406	5	<b>Submitted Activity 1407</b>	58	<b>Submitted Activity 1407</b>	40
User 1402	<b>Submitted Activity 1407</b>	20	Activity 1407	1	<b>Submitted Activity 1413</b>	6
User 1403						
User 1404						
User 1405						
User 1406	Activity 1413 Resource 1401 Resource 1402 Resource 1426 Resource 1425	44	<b>Submitted Activity 1413</b>	6	Activity 1414 Resource 1429 Resource 1427	6
User 1407	<b>Submitted Activity 1409</b>	5	Resource 1426	1	course view	1
User 1408						
User 1409						
User 1410						
User 1411						
User 1412						
User 1413						
User 1414						
User 1415						
User 1416						
User 1417						
User 1418	<b>Submitted Activity 1413</b>	27	Resource 1401	1	Resource 1427 Resource 1428 Resource 1429	3
User 1419						
User 1420	Activity 1407 Resource 1402 Activity 1413	11	Resource 1425 Resource 1426	23	Activity 1407	52
User 1421						
User 1422						
User 1423	Resource 1426 <b>Attempted Activity 1407</b> Activity 1413	12	Activity 1407 Activity 1413	4	<b>Submitted Activity 1413</b>	4
User 1424						
User 1425						
User 1426						
User 1427	<b>Submitted Activity 1414</b> Activity 1401 Resource 1416 Resource 1415 Resource 1412 Resource 1413 Resource 1410 Resource 1409	63				
User 1428	Resource 1407 Resource 1408 Resource 1409	6	Resource 1406 Resource 1426 Resource 1401 Resource 1402 Resource 1409 Resource 1403 Resource 1418	66	Activity 1413 Resource 1401	7
User 1429	Resource 1401 Resource 1402	2	Resource 1401 Activity 1413 Resource 1426	2	Resource 1401 Activity 1407 Activity 1413	3
User 1430						
User 1431						
User 1432	<b>Attempted Activity 1408</b> Activity 1414	3	Resource 1427	1		
User 1433						

	Day 25		Day 26		Day 27	
User 1434						
User 1435	Course view	1	Resource 1429 Resource 1406 <b>Submitted Activity</b> <b>1414</b>	61	Activity 1401 Resource 1423	5

## Day 28 to day 30

	Day 28		Day 29		Day 30	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401	<b>Submitted Activity 1413</b>	3	<b>Submitted Activity 1408</b> Activity 1414 Resource 1429	60	<b>Submitted Activity 1408</b> Resource 1429	32
User 1402	Activity 1414 Resource 1429 Activity 1408	2	<b>Submitted Activity 1408</b>	62	Activity 1414	1
User 1406	Activity 1408	1	Resource 1429 <b>Submitted Activity 1408</b> <b>Submitted Activity 1414</b>	11	Course view	1
User 1407	Course view	1	<b>Submitted Activity 1407</b>	7	<b>Submitted Activity 1407</b>	25
User 1418	Resource 1401 Resource 1406 <b>Submitted Activity 1408</b>	41	Resource 1404, Activity 1414 Resource 1429	4	<b>Submitted Activity 1414</b>	3
User1420	<b>Submitted Activity 1407</b> Activity 1401	30	Resource 1406 Resource 1425 Resource 1403 Resource 1401 Resource 1402	67	Course view	1
User 1423	Activity 1408 Resource 1429	4	Activity 1414 Resource 1429 Resource 1427 Resource 1428	3	<b>Submitted Activity 1414</b> Resource 1429	53
User 1428	Course view	1	Course view	1	Resource 1401 Resource 1406 Resource 1404 Resource 1422	6
User 1429	<b>Submitted Activity 1413</b> Resource 1401 Resource 1402	8	Resource 1402 Resource 1401 Resource 1426	7	Course view	1
User 1435	Activity 1401 Resource 1423	5	Activity 1407	51	Activity 1407	25

## Day 31 to day 33

	Day 31		Day 32		Day 33	
Name	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1401	Activity 1414	22	<b>Submitted Activity 1414</b> Activity 1408	4	Resource 1421 Resource 1422 Resource 1401 Resource 1404	9
User 1402	<b>Submitted Activity 1414</b>	1	Course view	1		
User 1406	course view	1	Resource 1401 Resource 1402 <b>Submitted Activity 1401</b>	46	Course view	1
User 1407	<b>Submitted Activity 1413</b>	36	Course view	3	Resource 1427 Resource 1429 Resource 1428	5
User 1418	Resource 1402	1				
User 1420	Resource 1402	3	<b>Submitted Activity 1408</b> Activity 1414 Resource 1429 Resource 1428	46	<b>Submitted Activity 1414</b> Resource 1402	62
User 1423	Activity 1414 Resource 1429					
User 1428	Activity 1413	2	Resource 1405 Activity 1413 <b>Submitted Activity 1407</b>	125	Resource 1401 Resource 1426	8
User 1429						
User 1435						

## Day 34 to day 37

Name	Day 34		Day 35		Day 36		Day 37	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1407	<b>Submitted Activity 1408</b>	17	<b>Submitted Activity 1414</b>	10				
User 1420	Course view	4	Course view	2	Course view	1		
User 1428	Activity 1401	2	Activity 1414 Resource 1429 <b>Submitted Activity 1408</b>	50	<b>Submitted Activity 1414</b> Activity 1408 Resource 1429	83	Resource 1422	5

### Appendix JJJ: Daily activities of students in Compulsory Module 214 day 1 to day 48

#### Day 1 to day 3

Name	Day 1		Day 2		Day 3	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502	Resource 1513, Resource 1515, Resource 1517	3	Resource 1501, Resource 1506, Activity 1516,	2,	Resource 1519	1
User 1503	Resource 1517, <b>Activity 1516 submitted,</b>	3	<b>Activity 1517 submitted,</b>	3	Activity 1517, Activity 1501	1
User 1504	Resource 1501, Resource 1517, Activity 1516	2	Resource 1521	1	Resource 1501, Activity 1517, Activity 1516, Activity 1502	3
User 1505	Resource 1517, Activity 1519, <b>Activity 1518 submitted,</b>	12	Activity 1515	8	Activity 1515	3
User 1506	Resource 1513, Resource 151	2	Resource 1522	1	Course	1
User 1507	Resource 1514, Resource 1513, Resource 1516	1	Resource 1521	1	Resource 1501	1
User 1508	Activity 1516	51	Resource 1522, Resource 1524, Resource 1521, Resource 1520, Resource 1518, Activity 1516, Activity 1517, Resource 1513, Activity 1501	13	Activity 1502, Resource 1516, Resource 1517, Resource 1521,	21
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User 1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						

Name	Day 1		Day 2		Day 3	
User 1536						
User 1537	Resource 1513, Resource 114	22	Course	1	Resource 1516, Resource 1517, Resource 1513, Resource 1514	10
User 1538						
User 1539	Resource 1520, Resource 1524, Resource 152, Resource 1522	1	Resource 1525, Resource 1527	1	Resource 1516, Resource 1501, Activity 1502	12
User 1540	Resource 1539	1	Resource 1501	34	Resource 1501	4
User 1541	Resource 1516, Resource 1513, Resource 1514, Resource 1517, <b>Activity 1516 Submitted</b>	17	Activity 1517	1	Resource 1524	1
User 1542	Resource 1513	1	Resource 521, Activity 1516	1	Resource 1513, Resource 1516, Resource 1518, Resource 1519, Resource 1524, Resource 1522, Resource 1525	6
User 1543	Activity 1502	1	Resource 1501	1	Activity 1515	18
User 1544	Resource 1506	7	Resource 1521, <b>Activity 1516 Submitted</b>	4	Activity 1516	4
User 1545	Resource 1513, Resource 1516, Resource 1521	1	Course	1	Course	1
User 1546	Activity 1516	1	Activity 1504	6	<b>Activity 1501 Submitted, Activity 1503 Submitted, Activity 1505 Submitted,</b> Resource 1524, Resource 1525, Resource 527	50
User 1547	Course	3	Activity 1515 Submitted	38	Activity 1515	1
User 1548	<b>Activity 1516 Submitted</b>	3	Resource 1520	2	Resource 1521,	1
User 1549	Activity 1517,	1	Resource 1516, Resource 1520, Resource 1525	1	Activity 1517	1
User 1550	Resource 1513, Resource 1514	1	Resource 1513, Resource 1514, Resource 1521, Resource 1517, Activity 1516	3	Resource 1516, Resource 1514	2
User 1551	Activity 1516, Resource 1513	2	Course	1	Activity 1519, Resource 1521, Activity 1520, Resource 1506, Activity 1516	6
User 1552	Activity 1502	1	<b>Resource 1517, Activity 1518 Submitted</b>	5	Resource 1516	2

Day 4 to day 6

Name	Day 4		Day 5		Day 6	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502	Course	1	Course	1	<b>Activity 1519 Submitted</b>	2
User 1503	Course	1	Resource 1517, Activity 1518	3	Activity 1506	1
User 1504	Course	1	Resource 1517	1	Resource 1520, Resource 1522, Resource 1524, Resource 1525, Resource 1527	
User 1505	Activity 1515	1				
User 1506	Resource 1517	2	Resource 1517, Activity 1518 submitted	1	Resource 1529	1
User 1507	Resource 1501	1	Activity 1502	1	Activity 1519	1
User 1508	Activity 1502	1: 39 mins	Resource 1517, Resource 1521,	27	Activity 1503	35
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User 1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Course	1	Activity 1516	1	Resource 1501	3
User 1538						
User 1539						
User 1540	Activity 1516, Resource 1501	5	<b>Activity Submitted 1517</b>	2	Activity 1517	1
User 1541	Resource 1527	1	<b>Activity 1520</b>	2	<b>Activity 1515 Submitted</b>	42



Name	Day 4		Day 5		Day 6	
			<b>Submitted</b>			
User 1542	<b>Activity 1515 Submitted</b>	13	Activity 1515	1	Course	1
User 1543	Activity 1515	1	Course	1		
User 1544	Resource 1521, <b>Activity 1517 Submitted</b>	5	<b>Activity Submitted 1518</b>	1	Activity 1518	1
User 1545	Resource 1520, Resource 1522, Resource 1524, Resource 1518	7	Resource 1521, <b>Activity Submitted 1517</b>	5	Activity 1517, Activity 1516, Resource 1517, Activity 1502, Resource 1521	24
User 1546	Resource 1521, Resource 1501, Resource 1525, Activity 1506, Resource 1524	11	Resource 1506, Resource 1501	1	Activity 1511	1
User 1547	Activity 1511	7	Activity 1515, Resource 1537	2	Activity 1521	7
User 1548	Course	1	Resource 1521	1	Resource 1501	1
User 1549	Activity 1518 Submitted, Resource 1525	3	Activity 1515	16	Activity 1515	1
User 1550	Resource 1516	1	Resource 1521, Activity 1516, Resource 1518, Resource 1521, Resource 1522, Resource 1525	8	Course	1
User 1551	Activity 1515 Submitted	35	Resource 1528	1		
User 1552	Resource 1520	1	Resource 1524, Resource 1525	1	<b>Activity 1520 Submitted</b>	3

### Day 7 to day 9

Name	Day 7		Day 8		Day 9	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502	Activity 1519	1	Activity 1520, Activity 1519, Activity 1501	2	<b>Activity 1515</b>	30
User 1503	Resource 1513, Activity 1503, Resource 1515, Activity 1504, Resource 1518, Resource 1519, Activity 1505	3	Resource 1524, Resource 1525	3	Activity 1519 submitted	4
User 1504	Activity 1515	1	Activity 1502	1	Activity 1502	2
User 1505	Resource 1529, Activity 1509	1	Course	1	Course	1
User 1506						
User 1507	Resource 1528, Resource 1527, Resource 1531	15	Activity 1515	15		
User 1508	Activity 1523	3	Activity 1505, Activity 1507, Activity 1505, Resource 1506	40	Activity 150, Activity 1508	1: 4 mins
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User 1523						
User 1524						

Name	Day 7		Day 8		Day 9	
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Resource 1518, Resource 1520, Resource 1521, Resource 1522, Resource 1524	4	Resource 1524, <b>Activity 1517 Submitted</b> , Activity 1516	10	Courset	1
User 1538						
User 1539	Activity 1506, Resource 1506, Resource 1501, Activity 1502 Submitted, <b>Activity 1503 Submitted</b>	53	<b>Activity 1515 Submitted</b>	28	Activity 1505	2
User 1540	Resource 1520, Resource 1524, Resource 1525	1	Resource 1526e	1	Resource 1525, Resource 1527, Resource 1524	1
User 1541	Course	10	Resource 1528, Resource 1529, Resource 1531, Resource 1534, Resource 1535, Resource 1537, Resource 1538	25	Resource 1537, Resource 1538, Resource 1539	1
User 1542	Resource 1528	1				
User 1543						
User 1544	Activity 1520, Activity 1519, Activity 1518, Activity , Activity 1517, Resource 1526	3	Activity 1515	27	Activity 1515 Submitted	3
User 1545	Activity 1502, Resource 1523, Resource 1526	2	Activity 1501, Resource 1526	4	Resource 1526, <b>Activity 1518 Submitted</b> , Resource 1527	37
User 1546	Course	1	Activity 1515 Submitted	2 Hrs : 08 mins	Activity 1515	1
User 1547	Course	12	Resource 1528	3		
User 1548	Course	1	Activity 1502	1	Course	1
User 1549	Activity 1515	1	Activity 1519	1	Activity 1515	1
User 1550	Activity 15106, Resource 1524, Resource 1525	3	Resource 1528, Resource 1501	2	Resource 5131	2
User 1551						
User 1552	Activity 1520, Activity 1519	4	Resource 1501	6	Activity 1515	6

## Day 10 to day 12

Name	Day 10		Day 11		Day 12	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502	Activity 1515	1	Activity 1515, <b>Activity 1521 submitted</b>	12	Activity 1515, Activity 1521	3
User 1503	Course	1	Activity 1510	1	Activity 1520, Resource 1501, Resource 1513, Resource 1516	5
User 1504	Activity 1502, Activity 1515, Resource 1506	4	Course	1	Resource 1528, Activity 1503	
User 1505						
User 1506	Course	1	System	1	System	1
User 1507						
User 1508	Resource 1528	1	Activity 1524	6	Resource 1529, Resource 1531	2
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User 1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Course	1	Activity 1506	1	Course	1
User 1538						
User 1539	Resource 1537, Resource 1538	2				
User 1540	Resource 1501, Resource 15125, Resource 1527	1	Activity 1501 Submitted	20	Activity 1507	1
User 1541						

Name	Day 10		Day 11		Day 12	
User 1542						
User 1543						
User 1544	Activity 1520, Activity 1519, Activity 521, Activity 1515	2				
User 1545	Resource 1527, Resource 1501, <b>Resource 1506 Posted</b>	5	<b>Resource 1506 Posted</b>	1	Resource 1528, Resource 1529	10
User 1546	Course	1	Course	1	Course	1
User 1547						
User 1548	Resource 1528, Resource 1531	1	<b>Activity 1515 Submitted</b>	20	Activity 1521, Activity 1519, Activity 1517, Activity 1520	1
User 1549	Activity 1515	1	Resource 1527, Resource 1528, Resource 1531, Resource 1534, Resource 1535, Resource 1537	3	Activity 1515	1
User 1550	Resource 1528, Activity 1510	1	Activity 1515 Submitted	25	Activity 1515	1
User 1551						
User 1552	Activity 1515	2				

Day 13 to day 15

Name	Day 13	Duration	Day 14	Duration	Day 15	Duration
	Resources and Activities		Resources and Activities		Resources and Activities	
User 1501						
User 1502	Activity 1515, Activity 1521, Activity 1521, Activity 1519, <b>Activity 1518 submission</b> , Activity 1517, Activity 1516	7	Activity 1515, Activity 1521	1	Activity 1515	1
User 1503	<b>Activity 1515 submitted</b>	2	Activity 1515	3	Activity 1515	1
User 1504						
User 1505						
User 1506	Resource 1506	2	Activity 1515 submitted	2: 27 mins	Activity 1515	39
User 1507						
User 1508	Resource 1506, Activity 1519, Activity 1505,	60	Activity 1515	2: 04 mins	Activity 1515	3
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User 1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Activity 1517	4	Activity 1518	10	Activity 1518, <b>Resource 1506 Posted</b> , Resource 1501	3
User 1538						
User 1539						

Name	Day 13		Day 14		Day 15	
User 1540	Activity 1519	1	Activity 1511	1	Resource 1501	4
User 1541						
User 1542						
User 1543						
User 1544						
User 1545	Activity 1511, Activity 1519, Activity 1516, Activity 1517, <b>Activity 1518 Submitted</b>	8	Activity 1519	3	Resource 1531, <b>Activity 1520 Submitted</b>	1
User 1546	Activity 1515	17				
User 1547						
User 1548	<b>Activity 1521 Submitted, Activity 1520 Submitted</b>	6	Activity 1521	3		
User 1549	Course	2	Resource 5137, Resource 1538	1		
User 1550	Activity 1515, Activity 1521	27	Activity 1515	1		
User 1551						
User 1552						

Day 16 to day 18

Name	Day 16		Day 17		Day 18	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502	Activity 1515, Activity 1516, Activity 1517, Activity 1518 submitted, Activity 1519, Activity 1521,	4	Activity 1515, <b>Activity 1518 submitted</b>	2	Activity 1515	1
User 1503	Activity 1515	1	Course	1	Resource 1527	1
User 1504						
User 1505						
User 1506	Activity 1515	2	Activity 1515	1	Activity 1515	1
User 1507						
User 1508	Resource 1531	5	Resource 1534, Resource 1535, Resource 1537, Resource 1537, Resource 1538, Resource 1539, Activity 1521,	2	Resource 1538	6
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						

Name	Day 16		Day 17		Day 18	
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	<b>Activity 1503 Submitted</b> , Activity 1505, <b>Activity 1506 Submitted</b>	33	Resource 1524, Resource 1525, Resource 1527, Resource 1501, Activity 1506	1Hr 17 mins	Course	1
User 1538						
User 1539						
User 1540	<b>Activity 1515 Submitted</b>	10	Activity 1515	1	Activity 1515	1
User 1541						
User 1542						
User 1543						
User 1544						
User 1545	Resource 1531, Activity 1516, Activity 1517, <b>Activity 1518 Submitted</b> , Activity 1519, Activity 1520	4	Activity 1516, Activity 1517, Activity 1518, Activity 1519, Activity 1520	2	Activity 1519	1
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						

## Day 19 to day 21

Name	Day 19		Day 20		Day 21	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502						
User 1503	Resource 1531, Resource 1534, Resource 1535, Resource 1537, Activity 1515	7	Activity 1515	2	Activity 1515	2
User 1504						
User 1505						
User 1506	Activity 1515	1	Activity 1515	2	Activity 1515	4
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	<b>Activity 1507 Submitted</b>	16	Course	1	<b>Activity 1508 Submitted</b>	8
User 1538						
User 1539						
User 1540	Activity 1521, Activity 1515, Resource 1501	52	Activity 1515	1	Activity 1515	1
User 1541						



Name	Day 19		Day 20		Day 21	
User 1542						
User 1543						
User 1544						
User 1545	Activity 1503	1	Activity 1515	48	Activity 1515	1
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						

Day 22 to day 24

Name	Day 22		Day 23		Day 24	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502						
User 1503	Activity 1515	1	Activity 1515	1	Activity 1515	1
User 1504						
User 1505						
User 1506						
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Activity 1519, Activity 1518 Submitted, Activity 1517	8	Activity 1511	1	Course	1
User 1538						
User 1539						
User 1540	Activity 1515	1	Activity 1515	1	Activity 1515	1
User 1541						

Name	Day 22		Day 23		Day 24	
User 1542						
User 1543						
User 1544						
User 1545	Activity 1515, Activity 1520, Activity 1521	4	Activity 1515	1	Course	2
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						

Day 25 to day 27

Name	Day 25		Day 26		Day 27	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502						
User 1503	Activity 1515	1	Activity 1515	1	Activity 1515	1
User 1504						
User 1505						
User 1506						
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Activity 1520 Submitted	8	Activity 1516	3	Activity 1510	2
User 1538						
User 1539						
User 1540						
User 1541						

Name	Day 25		Day 26		Day 27	
User 1542						
User 1543						
User 1544						
User 1545	Resource 1539, Resource 1501, Activity 1502, Activity 1503, Activity 1504, Activity 1505, Activity 1515	21	Activity 1515, Activity 1519, Activity 1520	9	Activity 1515t	1
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						

Day 28 to day 30

Name	Day 28		Day 29		Day 30	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502						
User 1503	Activity 1515	1	Activity 1515	1	Resource 1537	1
User 1504						
User 1505						
User 1506						
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Activity 1510, Resource 1528, Resource 1531	41	Resource 1501	1	Activity 1515 Submitted	8
User 1538						
User 1539						
User 1540						
User 1541						

Name	Day 28		Day 29		Day 30	
User 1542						
User 1543						
User 1544						
User 1545	Activity 1515, Activity 1503, Activity 1504, Activity 1505, Activity 1502, <b>Resource 1506 Posted</b> , Resource 1501	5				
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						

Day 31 to day 33

Name	Day 31		Day 32		Day 33	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502						
User 1503						1
User 1504						
User 1505						
User 1506						
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Activity 1515	1	Activity 1515	1	Activity 1515	1
User 1538						
User 1539						
User 1540						
User 1541						

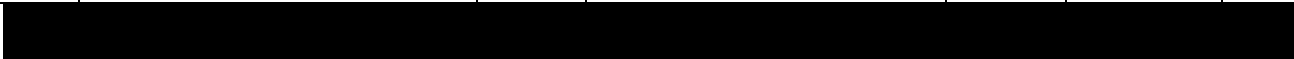


Name	Day 31		Day 32		Day 33	
User 1542						
User 1543						
User 1544						
User 1545						
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						

Day 34 to day 36

Name	Day 34		Day 35		Day 36	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502						
User 1503						
User 1504						
User 1505						
User 1506						
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Activity 1515	1	Activity 1515, Activity 1521	4	Activity 1515, Activity 1521 Submitted	2
User 1538						
User 1539						
User 1540						
User 1541						

Name	Day 34		Day 35		Day 36	
User 1542						
User 1543						
User 1544						
User 1545						
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						



Day 37 to day 39

Name	Day 37	Duration	Day 38	Duration	Day 39	Duration
	Resources and Activities		Resources and Activities		Resources and Activities	
User 1501						
User 1502						
User 1503						
User 1504						
User 1505						
User 1506						
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Activity 1521	1	Activity 1521, Activity 1519	1 Hr 01 min	Activity 1519, Resource 1534, Resource, 1535, Resource 1536, Resource 1537, Resource 1538,	8

Name	Day 37		Day 38		Day 39	
					Resource 1539	
User 1538						
User 1539						
User 1540						
User 1541						
User 1542						
User 1543						
User 1544						
User 1545		5				
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						

Day 40 to day 42

Name	Day 40		Day 41		Day 42	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502						
User 1503						
User 1504						
User 1505						
User 1506						
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Course	1	Resource 1501, Resource 1506	6	Course	1
User 1538						
User 1539						
User 1540						
User 1541						

Name	Day 40		Day 41		Day 42	
User 1542						
User 1543						
User 1544						
User 1545		5				
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						

Day 43 to day 45

Name	Day 43		Day 44		Day 45	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502						
User 1503						
User 1504						
User 1505						
User 1506						
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Resource 1357	1	Course	1	Course	1
User 1538						
User 1539						
User 1540						
User 1541						



Name	Day 43		Day 44		Day 45	
User 1542						
User 1543						
User 1544						
User 1545						
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						

Day 46 to day 48

Name	Day 46		Day 47		Day 48	
	Resources and Activities	Duration	Resources and Activities	Duration	Resources and Activities	Duration
User 1501						
User 1502						
User 1503						
User 1504						
User 1505						
User 1506						
User 1507						
User 1508						
User 1509						
User 1510						
User 1511						
User 1512						
User 1513						
User 1514						
User 1515						
User 1516						
User 1517						
User 1518						
User 1519						
User 1520						
User 1521						
User 1522						
User1523						
User 1524						
User 1525						
User 1526						
User 1527						
User 1528						
User 1529						
User 1530						
User 1531						
User 1532						
User 1533						
User 1534						
User 1535						
User 1536						
User 1537	Course	1	Course	1	Course	1
User 1538						
User 1539						
User 1540						
User 1541						

Name	Day 46		Day 47		Day 48	
User 1542						
User 1543						
User 1544						
User 1545						
User 1546						
User 1547						
User 1548						
User 1549						
User 1550						
User 1551						
User 1552						