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**Student Teacher and Lecturer Perceptions of the Use of Asynchronous  
Discussion Forums, Quizzes and Uploaded Resources for Promoting Critical  
Thinking**

A thesis

submitted in fulfilment

of the requirements for the degree

of

**Doctor of Philosophy in Education**

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by

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THE UNIVERSITY OF  
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*Te Whare Wānanga o Waikato*

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## **Abstract**

This study examined student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking within a pre-service teacher education programme in Tanzania. Critical thinking is necessary both in life in general, and in education in particular. Critical thinking skills and thinking dispositions help people solve their problems, make rational decisions, evaluate information, guide their beliefs and actions, and improve their reasoning skills. While critical thinking skills influence the ability to carry out a thinking task, thinking dispositions may determine which actions should be carried out, the manner in which they should be carried out, and when they should be carried out. This means that critical thinking is influenced by contextual factors such as time, place, intentions, motivations of the thinker, and subject matter under discussion. However, most of the previous studies have tended to measure the two components of critical thinking separately and use different instruments. This way of measuring critical thinking is incompatible with the current conceptualisation of critical thinking, where critical thinking is understood as a set of related cognitive skills and dispositions. Since critical thinking varies over time and in different places, to get a clearer picture of an individual's critical thinking, both critical thinking skills and thinking dispositions need to be measured simultaneously using the same instrument in order to offset the influence of contextual factors.

Learning management systems (LMS) have tools such as asynchronous discussion forums, and quizzes that can promote critical thinking, especially when conscious planning is considered. Since, these tools have the potential for promoting critical thinking, measuring the evidence of critical thinking manifested in those tools is important. Current instruments measuring critical thinking in tasks related to asynchronous discussion forums do not relate thinking skills such as recall, and comprehension, and dispositional factors to critical thinking. Recall, comprehension and dispositional factors need to be measured in asynchronous discussion forums because they influence critical thinking.

This study used sociocultural theory as its theoretical framework. Employing a case study approach, 54 students and 15 lecturers from three public universities in Tanzania participated in a survey. Using sample integration, eight students and six lecturers were selected for focus group discussions and one-to-one interviews. Mixed methods research was used to collect and generate data through surveys, focus group discussions, documentary review, and researcher's reflective journal. While quantitative data were analysed through SPSS 21, qualitative data were analysed through NVivo 10.

Results revealed similarities and differences in critical thinking between students and lecturers, pre-service and in-service student teachers, male and female students, and between younger and older lecturers. The study contributes to knowledge by developing a combined instrument for capturing critical thinking skills and thinking dispositions simultaneously. Another instrument, the RCS-CAIS model is an attempt to show the relationship between critical thinking skills and dispositional factors in tasks related to asynchronous discussion forums. The study contributes to theory by demonstrating that thinking skills are not hierarchical, but are rather overlapping, iterative and multi-directional depending on prevailing circumstances at the time of engaging in a thinking task. Pedagogical and institutional implications of the findings have been discussed. Finally, areas for further research have been suggested.

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## **Dedications**

To my parents,

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## **List of Abbreviations**

CCTDI	California Critical Thinking Disposition Inventory
CCTS	California Critical Thinking Skills
CMS	Course management systems
CT	Critical thinking
DAT	Discussion Analysis Tool
DF	Discussion forum
GV	General views
HCTAES	The Halpern Critical Thinking Assessment Using Everyday Situations
ICT	Information and communications technologies
LMS	Learning management systems
MoEVT	Ministry of Education and Vocational Training
Moodle	Modular Object-Oriented Dynamic Learning Environment
QZ	Quiz
RCS-CAIS	Recall, Comprehension, Socialisation, Clarification, Assessment, Inference and Strategies
RQ	Research Question
UR	Uploaded resources



## **Chapter 1**

### **Introduction to the Research Study**

This study has examined student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes, and uploaded resources for promoting critical thinking within a pre-service teacher education programme. Critical thinking is essential in life in general, and in education in particular. Learning management systems (LMS) have the potential for promoting critical thinking. Since critical thinking is important, there is a need to measure its evidence in tasks related to the use of LMS, because such evidence may help to understand not only about the potential of LMS tools for promoting critical thinking, but also how these tools are used to promote critical thinking.

Several studies have measured the evidence of critical thinking in tasks related to the use of LMS. However, the tendency has been to measure critical thinking skills and critical thinking dispositions using separate instruments and to measure the two components at different times (de Leng, Dolmans, Jöbsis, Muijtjens, & van der Vleuten, 2009; Miri, David, & Uri, 2007; Rimiene, 2002). This way of measuring critical thinking fails to recognise that critical thinking skills and thinking dispositions are related, progressive and context dependent. These components are context dependent because they may vary depending on factors such as time, subject matter, place, intentions or motivations of the thinkers. Such a view of understanding critical thinking is likely to give a false impression of an individual's critical thinking and the process of thinking itself. Current evidence indicates that critical thinking is context dependent (Garrison, Anderson, & Archer, 2000; Moore, 2013; Renaud & Murray, 2008), and is a set of cognitive skills and thinking dispositions. With this in mind, this study developed an instrument and used it to measure both critical thinking skills and thinking dispositions simultaneously in order to offset the influence of contextual factors. This instrument is discussed in Chapter 4, section 4.5.1.

Research studies acknowledge the role of dispositional (social and affective) factors in promoting critical thinking in tasks related to the use of LMS (Bangert, 2008; Garrison et al., 2000; Stein, Wanstreet, Slagle, Trinko, & Lutz, 2013). Similarly, thinking skills such as recall and comprehension of information, ideas or phenomena influence critical thinking (B. Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956; Garver & Roberts, 2013). However, previous studies measuring critical thinking in tasks related to asynchronous discussion forums have not directly related critical thinking to dispositional factors and thinking skills such as recall and comprehension. For a holistic picture of critical thinking in online interactions, dispositional factors, and recall and comprehension need to be considered because they influence critical thinking in online interaction. To that end, this study has developed the RCS-CAIS model to relate critical thinking skills to dispositional factors. The details of the RCS-CAIS model are discussed in Chapter 4, section 4.6.3.

To examine student and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking, the study was guided by three research questions (RQ):

- RQ1. What are student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes, and uploaded resources for promoting critical thinking?
- RQ2. What are student teacher and lecturer perceptions of effective ways of using asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking?
- RQ3. What are the thinking skills and thinking dispositions student teachers displayed in tasks related to asynchronous discussion forums?

This study uses sociocultural theory as its theoretical framework to examine the complex relationship of variables such as student teacher and lecturer perceptions,

critical thinking, and dispositional factors within the context of online learning in higher learning institutions. Sociocultural theory is discussed in Chapter 3.

This chapter has six sections. The first section gives background information to the research problem, followed by the definition of key terms used in the study. The purpose and significance of the study are discussed in sections three and four respectively. The fifth section discusses the delimitation of the study. The final section outlines the overall organisation of the study.

## **1.1 Background to the Research Problem**

This section focuses on general views on critical thinking and LMS, the use of LMS and the promotion of critical thinking in higher learning institutions in Tanzania, the location of the study, and the structure of the education system in Tanzania.

### **1.1.1 General perspectives on critical thinking and LMS**

Critical thinking is cited as one of the major objectives of most types of education (Arend, 2009; Fahy, 2005; Jacob & Sam, 2008; Ku, 2009; M. Lloyd & Bahr, 2010; C. Perkins & Murphy, 2006; Prasad, 2009; Siegel, 2010). It has been found that critical thinking can be promoted through LMS. LMS tools such as asynchronous discussion forums (Alexander, Commander, Greenberg, & Ward, 2010; Arend, 2009; Jacob & Sam, 2008), quizzes (Barnett & Francis, 2012), and uploaded resources (Chua & Bernado, 2011; Littlejohn et al., 2007) have the potential for promoting critical thinking.

Critical thinking constitutes critical thinking skills and thinking dispositions. The two components are interrelated and context dependent. Ku (2009) affirms that critical thinking skills influence the ability to do a thinking task, while thinking dispositions influence the manner in which the thinking task is approached. Other than determining the manner in which a thinking task is performed, dispositions influence actions to be carried out, and when they should be carried out in order to fulfil certain human needs, goals, or desires in a given context and at a given time.

Research shows a positive relationship between critical thinking skills and critical thinking dispositions (Profetto-Mcgrath, 2003; Yang & Chou, 2008). Despite the close relationship between critical thinking skills and thinking dispositions in tackling thinking tasks, research studies examining critical thinking in tasks related to the use of LMS have tended to measure the two components of critical thinking using separate instruments and at separate times (de Leng et al., 2009; Miri et al., 2007; Rimiene, 2002). Since the two components are interrelated and context dependent, they need to be promoted together during the teaching-learning process. Dispositions being temporal, intentional and context dependent, they need to be examined at the same time and through the same instrument as critical thinking skills in order to reveal better an individual's critical thinking. The use of an instrument that captures both critical thinking skills and thinking dispositions may help to offset the influence of time, context and intentions of the thinker when the two components are investigated. A lapse in time and the use of different contexts may give a false picture of the individual's critical thinking because critical thinking changes over time and in different places, and according to intentions or motivations of the thinkers.

In trying to fill the research gaps identified from previous studies, this study examined student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking within a pre-service teacher education programme. An instrument, a survey tool, was developed to capture both critical thinking skills and critical thinking dispositions simultaneously. A detailed discussion of this instrument is presented in Chapter 4, section 4.5.1.

The other issue that has received less attention in studies examining critical thinking in tasks related to asynchronous discussion forums is the exclusion of some thinking skills such as recall and comprehension, and dispositional factors. Traditionally, critical thinking has been related to *higher order thinking* that includes thinking skills such as interpretation, analysis, application, evaluation, synthesis, or manipulation of information (Barnett & Francis, 2012; McLoughlin

& Mynard, 2009; Newmann, 1990). To many authors such as Ijaiya, Alabi, and Fasasi (2011), and Jacob and Sam (2008), critical thinking is synonymous with higher order thinking. Thinking skills such as recall (remembering) and comprehension have been referred to as *lower order thinking* (Lewis & Smith, 1993; Resnick, 1987), or *uncritical thinking* (C. Perkins & Murphy, 2006; Soccio, 2013). According to Soccio (2013), uncritical thinking is accepting or rejecting claims according to momentary impulses, unquestioned loyalties, and unreflective personal biases.

The classification of lower and higher thinking poses several issues. First, there is still confusion in literature because some authors have assigned the same thinking skills into different categories. For example, while authors such as Nentl and Zietlow (2008) treat application as lower order thinking, Barnett and Francis (2012) and McLoughlin and Mynard (2009) consider it as higher order thinking. McLoughlin and Mynard (2009) treat comprehension as higher order thinking, while many authors such as Duron, Limbach, and Waugh (2006) view it as lower order thinking.

Second, since thinking skills are seen as operating in a hierarchy or a linear manner, a value judgment is made about thinking. Some thinking skills are regarded as more important than others. Consequently, in teaching, basic thinking skills have been devalued on the expense of higher order thinking (Booker, 2007). However, from practice, for a learner to be able to analyse, evaluate or synthesise certain concepts or issues, recall and comprehension of such concepts or issues may be needed because these skills seem to operate closely. Thus, recall and comprehension are as important as other thinking skills in promoting critical thinking.

Finally, Newmann (1990) and Lewis and Smith (1993) view higher or lower order thinking as relative because these may depend on factors such as the nature of the task and the individual's intellectual ability. In other words, while the same task may require lower order thinking by one learner, it may require higher order



thinking by another learner. Since thinking skills such as recall, comprehension, analysis, synthesis, evaluation and inference contribute to the promotion of critical thinking, it may seem unnecessary to classify them as either lower or higher. This way of categorising thinking skills is likely to misrepresent an individual's critical thinking and devalue some thinking skills. That there is no consensus in classifying some thinking skills as either lower or higher may make the classification unnecessary.

Dispositions are related to affective and social factors. Posts that are affective or social in nature tend to sustain online interaction amongst community members. Though the interaction amongst online learners is mediated through tools such as computers, online learners project their emotions, moods and motivations as if they are communicating directly with online learners. Thinking skills such as recall, comprehension, analysis and evaluation, and dispositional factors are important when individuals engage in thinking because they influence, and may be influenced by, critical thinking. This view implies that critical thinking can be better understood when a range of thinking skills, including those of recall and comprehension, and dispositional factors are also considered. Thus, C. Perkins and Murphy (2006) have suggested that a better and more balanced picture of the individual's thinking can be achieved when both critical thinking and uncritical thinking (basic skills) are examined. To that end, the second instrument, the *RCS-CAIS model*, was developed to show the relationship between critical thinking skills and dispositional factors in tasks related to asynchronous discussion forums. This instrument is discussed in Chapter 4, section 4.6.3.

There has been an increase in the use of LMS in many higher learning institutions in the world. Promotion of critical thinking has received similar emphasis in many institutions. Higher learning institutions in Tanzania are not an exception. The next section discusses the use of LMS and the promotion of critical thinking in higher learning institutions in Tanzania.

### **1.1.2 Use of LMS and promotion of critical thinking in higher learning institutions in Tanzania**

Many universities in Tanzania have started using LMS such as Moodle and Blackboard in the last few years. The shift from traditional face-to-face teaching to online learning has been accelerated by the known potential benefits offered by LMS. Amongst other benefits, they are provision of a wide range of educational applications and services for lecturers and students (Conde, García, Rodríguez-Conde, Alier, & García-Holgado, 2014; Schoonenboom, 2014); increase in student achievement (Mijatovic, Cudanov, Jednak, & Kadjevich, 2012); flexibility because students can work at their own time and pace (Mayers, 2006); and the promotion of critical thinking, especially when resources are interactive (Saadé, Morin, & Thomas, 2012).

Based on the potential benefits LMS can offer for education, the government of Tanzania has reviewed several educational policies to reflect the integration of LMS into the teaching-learning process and the promotion of critical thinking. For example, *The Tanzania Development Vision 2025* (Planning-Commission, 2002) acknowledges that the promotion of information and communication technologies (ICT) is central to a competitive social and economic transformation. To meet this objective, education as a strategic change agent needs to be “restructured and transformed qualitatively with a focus on promoting creativity and problem-solving” (p. 19). Similar views are reflected in other policy documents. The *Education and Training Policy* (MoEVT, 1995), among other things, emphasises the development and promotion of self-confidence and an inquiring mind. In the *Medium Term Strategic Plan 2012/13-2015/16* of the Ministry of Education and Vocational Training (MoEVT, 2012), one of the objectives is to improve the use of ICT in higher learning institutions.

These educational policy documents also stress the use of LMS as teaching-learning tools and the promotion of critical thinking in other levels of education such as in primary, secondary and in teacher education. For example, one of the

objectives of the *Information and Communication Technology Policy for Basic Education* is the use of LMS for promoting critical thinking (MoEVT, 2007). Since potential employment for some graduates from higher learning institutions can be at primary, secondary or teacher education levels, it is expected that these graduates will use LMS and promote critical thinking during their future teaching career.

A review of the visions and missions of the universities selected for this study, herein and thereafter, referred to as University A, University B, and University C, reflected the integration of LMS into the teaching-learning process and the promotion of critical thinking. For example, in the website of University A, one of the values related to the vision and mission of the university is the use of “ICT in the enhancement of academic delivery and management”. The other value in the same university is the promotion of “academic freedom by upholding the spirit of free and critical thought and enquiry, through the tolerance of a diversity of beliefs and understanding, as well as fostering open exchange of ideas and knowledge amongst the staff and/or students”. According to the visions and missions of these universities, lecturers and students are expected to acknowledge the role of LMS for meeting various purposes including for teaching and learning. This may suggest that they are aware of the potential benefits that can be afforded by LMS. Students and lecturers are also expected to celebrate contesting views. This attitude is essential for promoting critical thinking. However, it has to be noted that having well-formulated visions and missions in university websites or in other policy documents is one thing; putting those visions and missions into practice is a different thing.

Course objectives and learning tasks in Moodle from the selected universities also reflected core values of the visions and missions of the respective universities. For example, some of the course objectives from a course, *Principles of Curriculum Development and Teaching*, for Universities A and B indicated the promotion of critical thinking: “Analyse various issues on curriculum implementation... Carry out evaluation of the curriculum”. Similarly, the learning tasks reflected the same.

Part of the learning tasks from University C in a course entitled *Curriculum Development and Design*, revealed the use of LMS as a teaching-learning tool as the following extract illustrates: “Write [a] proposal to implement an ICT based lesson plan (... how would ICT tools be used in the development of the activities?).” Examples of other objectives and learning tasks are described in Chapter 5, section 5.5.

Several studies have documented the experience of initiation and implementation of LMS in Tanzania. Current studies in Tanzania have mainly focused on students’ perceptions of online learning (Mnyanyi & Mbwette, 2009; Mwalongo, 2011, 2012; Nihuka & Voogt, 2009), and the implementation of LMS in higher learning institutions (Mgendi, 2010; Tedre, Ngumbuke, & Kemppainen, 2010). In these studies, some students were resistant to the use of LMS (Mgendi, 2010; Mnyanyi & Mbwette, 2009), while other students had positive attitudes towards its use (Mwalongo, 2012; Nihuka & Voogt, 2009; Tedre et al., 2010).

From these research studies, several conclusions about the use of LMS and promotion of critical thinking in higher learning institutions in Tanzania can be drawn. First, though the use of LMS in most of the institutions is expanding, it is still in its infant stage. The pace toward institutionalisation of this innovation is likely to vary from one university to another depending on contextual differences in each university. This calls for an investigation of how lecturers and students in various universities use LMS tools for promoting critical thinking.

Second, evidence from government and university policy documents has shown that the use of LMS and the promotion of critical thinking are central in higher learning institutions. This can be interpreted as graduates from these institutions being expected to use LMS tools and promote critical thinking in their future careers. This will include graduates in teacher education programmes. Since some students have revealed negative attitudes towards the use of LMS, such negative attitudes should not be ignored because they may limit students’ use of these LMS tools. Similarly, lecturers are expected to use LMS tools and promote critical

thinking amongst students. This may call for examining student and lecturer perceptions of the use of LMS tools for promoting critical thinking. These perceptions can inform our understanding about student intentions and use of these tools in their future teaching career. In the case of negative attitudes towards the use of LMS tools, intervention measures can be carried out in advance to motivate students use these tools. Understanding lecturers' perceptions may yield information about their pedagogical practices for promoting critical thinking through LMS tools.

Third, though many universities use LMS as teaching-learning tools, from the review of current literature, little is known about student and lecturer perceptions of the use of these tools for promoting critical thinking. Since the use of LMS has been indicated as central for teaching and learning, including the promotion of critical thinking, the use of LMS tools may influence how lecturers teach and how students learn through LMS. Thus, understanding student and lecturer perceptions of the use of LMS tools may yield information on how these tools are used to promote critical thinking.

Finally, none of the studies, even those reviewed elsewhere in this study, have examined student and lecturer perceptions of the use of LMS tools for promoting critical thinking with a focus on both thinking skills and thinking dispositions. Critical thinking skills and thinking dispositions being closely related and context dependent, there is a need to measure these components simultaneously and with the same instrument. Amongst other objectives, this study attempts to achieve this through the use of the survey tool. Previous studies related to measuring the evidence of critical thinking in asynchronous discussion forums have not shown the relationship between critical thinking skills and dispositional factors. With increase in use of LMS in universities, understanding student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking can enrich our knowledge about the potential and use of LMS for promoting critical thinking.

Research studies are carried out in a particular setting with certain research participants. The next sections describe the context where the study was carried out.

### 1.1.3 Location of the study area

This study was carried out in the United Republic of Tanzania; herein referred to as Tanzania. Tanzania is comprised of Tanzania Mainland, and the islands of Unguja, Pemba and Mafia. The country covers a total area of 945,085 square kilometres. Tanzania is located on the eastern part of Africa bordering the Indian Ocean to the east; Malawi, and Mozambique to the south; Zambia to the south west; Democratic Republic of Congo to the west; Uganda, Burundi and Rwanda to the north east; and Kenya to the north (see Figure 1.1 for details).



Figure 1.1. Map of the United Republic of Tanzania

Source: Mazingira – Eco-friendly Safari Adventures, [http://mazingirasafari.com/?page\\_id=684](http://mazingirasafari.com/?page_id=684)

### 1.1.4 Structure of education system in Tanzania

The education system of Tanzania is divided into five levels: two years of pre-primary education (Ages 3-5/6), seven years of primary education (Ages 6/7-13/14), four years of junior secondary education (ordinary level), two years of senior secondary education (advanced level or high school), and three and above years of tertiary education (see Figure 1.2).

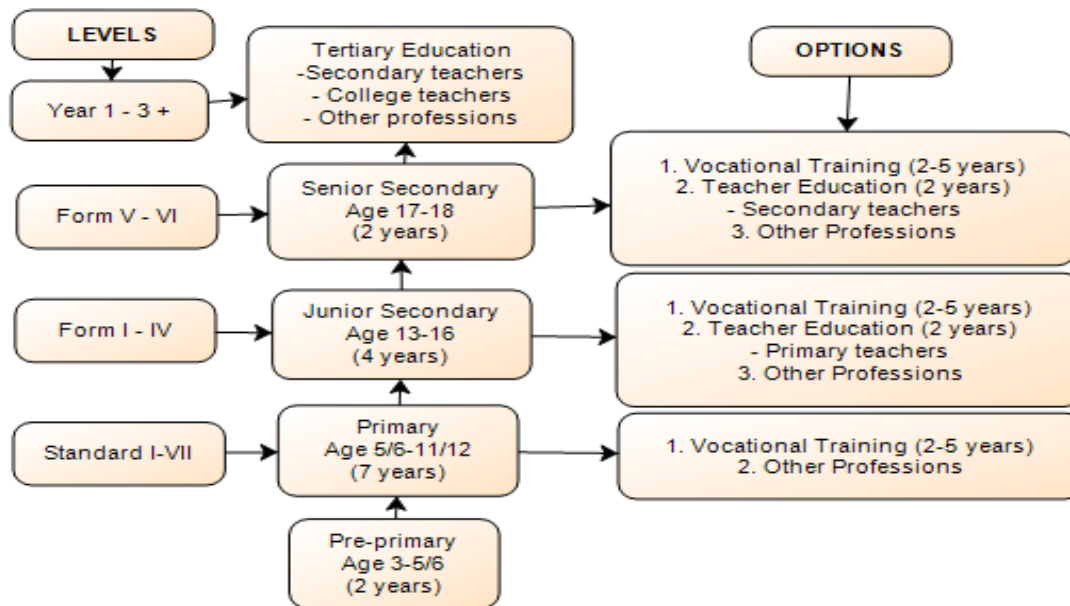


Figure 1.2. The structure of education system in Tanzania

When students graduate from primary education, they have the options of going directly to junior secondary, vocational training or to other professions. Students who graduate from junior secondary schools have four major options to take based on their qualifications: vocational education that lasts from two to five years; teacher training for two years as primary school teachers; going straight to senior secondary school for two years; or opting for other professions. When students graduate from senior secondary education, they can either directly join tertiary education, go to teacher training colleges as secondary school teachers, opt for vocational training, or other professions. Some of the students, who graduate from universities depending on their specialisations, go to teach in secondary schools, particularly as senior secondary school teachers, while others teach in the teacher training colleges, and other students opt for other professions.

The student teachers involved in this study were both pre-service (those who joined the university after graduating from senior secondary school) and in-service (those who joined the university after graduating from senior school and from teacher colleges with a teacher training diploma, and upgraded to qualify in university entry regulations). The study examined how the student teachers and the lecturers used Moodle, a learning management system, to promote critical thinking. The research study was carried out in three public universities: University A, University B, and University C.

Terminology can mean different things at different times and in different places. In order to have a clear and consistent understanding of the terminology, the following section defines the key words that have been used in the study.

## **1.2 Definition of Terms**

The meanings of the terms as used in this study are listed below.

*Critical thinking* refers to a purposeful and reflective recall, comprehension, analysis, synthesis, inference and evaluation of an issue or problem, and the motivation to make rational decisions about that issue or problem.

*Lecturers* are instructors in higher learning institutions.

*Moodle tools* are specific features embedded in Moodle such as asynchronous discussion forums, quizzes, and wikis.

*Student teachers* also referred to as *students* are both pre-service and in-service teachers enrolled in higher learning institutions and engaged in teacher education qualification.

*Perception* is a generic term that refers to beliefs, attitudes and values about learning management systems.



### **1.3 Purpose of the Study**

This study was designed to investigate student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking within a pre-service teacher education programme. The focus was to ascertain the extent to which asynchronous discussion forums, quizzes and uploaded resources were used to promote critical thinking.

### **1.4 Significance of the Study**

This study is significant for pedagogical practices and for research. In the first place, the results of the study are likely to give lecturers insights into how to promote critical thinking through Moodle, a course management system. Furthermore, the findings are expected to lead to deeper understanding of student and lecturer perceptions of Moodle; that, in turn, may determine the nature of professional development lecturers may require for smooth integration of Moodle into the teaching-learning process, particularly for promoting critical thinking. The study advances knowledge on how learning management systems such as Moodle can be used to promote critical thinking amongst students through the use of asynchronous discussion forums, quizzes and uploaded resources.

Other than advancing knowledge on how LMS can be used to promote critical thinking, the study has also developed two instruments. The first instrument, a survey tool, is for examining the participants' critical thinking skills and critical thinking dispositions simultaneously. Previous studies have treated the two components separately (Miri et al., 2007; Rimiene, 2002). Measuring cognitive skills and thinking dispositions simultaneously, is likely to give a better picture of the individual's thinking because the influence of context will be offset as critical thinking changes over time and in different places. The survey tool and its elements can be modified and used in specific subject matter to capture both critical thinking skills and critical thinking dispositions.

Another instrument, the RCS-CAIS model, has been developed to show the relationship between critical thinking and dispositional factors in tasks related to

asynchronous discussion forums. Previous studies have not related critical thinking to recall, comprehension, and dispositional factors in tasks related to asynchronous discussion forums (Corich, 2009; Jacob & Sam, 2008; Leng, 2012). It is expected that the new instrument will give a better understanding of the various critical thinking skills, hence, as C. Perkins and Murphy (2006) argue, giving a better and more balanced picture of the individual's thinking. The RCS-CAIS model can be used as an assessment tool by lecturers and students to ascertain the degree of critical thinking skills and thinking dispositions in tasks related to asynchronous discussion forums.

Stakeholders such as government ministries and other institutions dealing with curriculum planning, design, development and evaluation can benefit from the findings of the study in the course of their work, especially by taking into account how LMS can be used to promote critical thinking. The findings from both student teachers and lecturers may give insights on how LMS can be designed, developed and evaluated in order to promote learning in general, and critical thinking in particular.

Finally, the survey tool and the RCS-CAIS model can be used as research instruments to collect and analyse data related to critical thinking, especially in tasks related to the use of LMS tools.

### **1.5 Delimitation of the Study**

The current study focuses on three of the tools available in Moodle: the asynchronous discussion forums, the quizzes, and the use of uploaded resources. The three Moodle tools were chosen because they were frequently used in the universities selected and they also have the potential for promoting critical thinking as revealed in the literature reviewed. The exclusion of other Moodle tools was mainly due to the low frequency of their use as teaching-learning tools in general, and as tools for promoting critical thinking in particular. For example, although chats are used frequently, their potential for promoting critical thinking is limited because students do not get enough time to digest ideas critically

compared with asynchronous discussion forums, where there is ample time to think critically about the issues at hand.

## **1.6 Organisation of the Study**

The study is divided into seven chapters. Chapter 1 introduces the research study. The focus is on the background to the research problem, definition of key terms, purpose, significance, and the delimitation of the study. The final section outlines the overall organisation of the study.

Chapter 2 reviews literature related to the current study. The first section of the chapter discusses the importance of critical thinking. The second reviews literature related to the concept of critical thinking. The third section focuses on the role of LMS in promoting critical thinking. This section also reviews literature related to student teacher and lecturer perceptions of the use of LMS for promoting critical thinking. Issues related to measuring critical thinking are discussed in sections 4 and 5. The chapter concludes with the strategies that have been devised to address the identified research gaps, followed by a chapter summary.

Chapter 3 discusses sociocultural theory as a theoretical framework used in the study. The first section discusses the concept of sociocultural theory. The second discusses the components of sociocultural theory. The final section discusses the rationale for using sociocultural theory as a theoretical framework in the current study.

The methodology is discussed in Chapter 4. The chapter starts with the discussion of research paradigms. The second section discusses the concept of mixed methods research, its assumptions, history, characteristics, validity and reliability, and the rationale for using mixed methods research. Section 3 discusses the concept of case study design, its characteristics and the rationale for using case study design. Section 4 discusses the sample and sampling procedures. Methods and procedures of data collection, generation and analysis, and their related instruments have been discussed in sections 5 and 6. Thereafter, issues of validity

and reliability are discussed. The final section discusses ethical issues that were taken into account prior to, during, and after conducting the study.

Chapter 5 presents the results. The chapter has five sections. The first section outlines results related to the research context. The second displays survey results of the student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes, and uploaded resources for promoting critical thinking. The third section outlines results related to student teacher and lecturer perceptions of effective ways of using asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking. The fourth section presents findings from technical staff. The final section outlines the evidence of critical thinking from other sources such as asynchronous discussion forums, the course programmes and course tasks.

Discussion of the results is presented in Chapter 6. The first section of the chapter is an overview of the results. The second discusses results related to student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes, and uploaded resources for promoting critical thinking. The third section is a discussion on student teacher and lecturer perceptions of effective ways of using asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking. Students' critical thinking skills and thinking dispositions as displayed in asynchronous discussion forums are discussed in the final section.

Chapter 7 concludes the study. It is divided into five sections. The first section discusses the contribution of the study to practice and theory. The second discusses the implications of the research findings. Section 3 discusses the limitations of the study. Based on the limitations of the study, the fourth section suggests areas for further research, followed by a final concluding remark.

This chapter has discussed the background to the research problem. Definition of key terms used in the study, the purpose and significance of the study have been presented. The chapter has further discussed the delimitation of the study. The

final section of the chapter has presented the overall organisation of the study. The next chapter is a review of literature of key areas highlighted in this chapter.

## **Chapter 2**

### **Literature Review**

The previous chapter has given a brief background to the research study. This chapter reviews research studies related to the use of LMS for promoting critical thinking. Specifically, the first section discusses the importance of critical thinking. The second reviews literature related to the concept of critical thinking with a focus on critical thinking skills and critical thinking dispositions. Learning management system tools such as asynchronous discussion forums and quizzes, and uploaded resources and their potential for promoting critical thinking are reviewed in the third section. This section also reviews student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking. The fourth section discusses general issues related to instruments used to measure critical thinking followed by specific issues of such instruments related to LMS. The final section suggests ways of resolving the issues related to instruments for measuring critical thinking in LMS.

#### **2.1 Importance of Critical Thinking**

Research indicates that promoting critical thinking is the main objective of most types of education (Arend, 2009; Fahy, 2005; Jacob & Sam, 2008; Ku, 2009; M. Lloyd & Bahr, 2010; C. Perkins & Murphy, 2006; Prasad, 2009). Critical thinking helps students reason about social affairs in a rapidly changing world, and make sound social and interpersonal decisions (Ku, 2009). This is necessary in their future career and workplaces (Al-Fadhli & Khalfan, 2009; Duron et al., 2006; Ku, 2009; Miri et al., 2007; Thompson, Martin, Richards, & Branson, 2003). Critical thinking is essential in almost all aspects of life. For students in particular, critical thinking is essential for their successful learning.

Beachboard and Beachboard (2010) and Oriogun (2007) emphasize that it is the mastery of critical thinking that ultimately affects all forms of human communication, in speaking, writing, listening and reading. Since it influences all

forms of human communication, critical thinking is important for achieving goals of holistic education (Rimiene, 2002). The promotion of critical thinking becomes significant not only in education, but also in other forms of human life. Critical thinking seems to have a great spill over effect onto other forms of human interaction.

Critical thinking gives students the opportunity to express their ideas freely, and to challenge other students' ideas as well as their own ideas. This, in turn, enhances their ability to think critically about their knowledge, their actions, and their beliefs (Alexander et al., 2010) as well as to think critically about other people's actions and beliefs. In the digital age, students access more and complex information. In such a maze of information, critical thinking is important because it helps students sort out, analyse, synthesise and evaluate information suitable and necessary to achieve their learning objectives. Thus, critical thinking becomes central not only at a personal level, but also at a societal level.

The benefits of critical thinking highlighted above indicate that critical thinking is desirable at a personal level, a societal level and in almost all levels of education. The desire and importance of critical thinking are expected to drive its promotion in higher learning institutions and in other levels of education. Conscious planning efforts are necessary for promoting critical thinking in higher education and in other levels. However, to realise the potential of critical thinking and to be able to make critical thinking part of the teaching-learning process, a clear conceptualisation of critical thinking is required.

## **2.2 Concept of Critical Thinking**

Critical thinking is an unstable concept because its meaning may vary depending on the context in which the term is used. Moore (2013) affirms that different educationists conceptualise critical thinking differently. In this study, the conceptualisation of critical thinking is based on both critical thinking skills and critical thinking dispositions. This section reviews literature related to the concept

of critical thinking. The section further establishes the relationship between critical thinking skills and critical thinking dispositions.

### **2.2.1 Definition of critical thinking**

Research indicates that there is neither a generally agreed definition of critical thinking nor an accepted model for assessing critical thinking (McLean, 2005). This is the case because critical thinking is dependent on factors such as context and culture (Grosser & Lombard, 2008; Lun, Fischer, & Ward, 2010). It also varies according to professions (Moore, 2013). Since literature offers many definitions of critical thinking, for the purpose of this study, they will be reviewed based on how they capture the two components of critical thinking, namely critical thinking skills and critical thinking dispositions.

#### **2.2.1.1 *Critical thinking as a skill***

Many studies define critical thinking as a cognitive ability. In this view, critical thinking is conceptualised as skills for evaluating one's and other people's beliefs, information, or ideas. Some of the studies have defined critical thinking as:

- “the ability to analyse and evaluate information” (Duron et al., 2006, p. 160).
- “the process by which we test claims and arguments and determine which have merit and which do not” (Ruggiero, 2012, p. 19).
- “a complex, purposive, judgmental higher order reasoning, which is usually devoted to problem solving and decision making” (Ijaiya et al., 2011, p. 3).
- “the skills of correctly evaluating arguments made by others and composing good arguments of your own” (Rainbolt & Dwyer, 2012, p. 5); and
- “the capability to think effectively about the matter in a sustained way” (D. Perkins, 2004, p. 359).



Briefly, from the reviewed literature, critical thinking as an ability includes skills of *interpretation, analysis, evaluation, inference, explanation, and self-regulation* (Facione, 2013). *Interpretation* refers to the comprehension and expression of the meaning or significance of a wide variety of experiences, situations, data, events, judgements, conventions, beliefs, rules, procedures, or criteria. *Analysis* is the identification of the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgement, experiences, reasons, information, or opinions. *Evaluation* is the assessment of the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgement, belief, or opinion; and the assessment of the logical strength of the actual or intended inferential relationships among statements, descriptions, questions or other forms of representation. *Inference* is the identification and securing of elements needed to draw reasonable conclusions. *Explanation* is the stating and justifying of reasoning in terms of the evidential, conceptual, methodological, criteriological, and contextual considerations upon which one's results were based; and presenting one's reasoning in a form of cogent arguments. *Self-regulation* is to self-consciously monitor one's cognitive activities, the elements used in those activities, and the results drawn from those activities, particularly by applying skills in analysis, and evaluation to one's own inferential judgments with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results.

#### **2.2.1.2 *Recall and comprehension***

Many research studies related to critical thinking, including those reviewed above, do not consider thinking skills such as recall (remembering) and comprehension as part of critical thinking. This is not surprising because critical thinking has been viewed as higher order thinking. However, recall and comprehension are also important in promoting critical thinking. Garver and Roberts (2013) define remembering as "the basic foundation of learning that involves the recall of specifics and universals, methods of inquiry and processes, patterns, structures,

and procedures” (p. 49). Comprehension is “the understanding or apprehension such that the individual knows what is being communicated and can make use of the material or idea being communicated without necessarily relating it to other material or seeing its fullest implications” (B. Bloom et al., 1956, p. 204). According to Bloom and his colleagues, thinking skills are in a cumulative hierarchy, where the mastery of the next more complex skills requires the mastery of prior skills. This hierarchical dimension indicates that thinking skills influence critical thinking.

For the purposes of this study therefore, critical thinking skills are self-regulated abilities that help a person recall, comprehend, interpret, analyse, evaluate, and make inferences about information, arguments, beliefs or certain decisions. The concepts of recall and comprehension are further discussed in section 2.5.4.1.

In tasks related to asynchronous discussion forums and in other contexts, recall, comprehension, and other thinking skills, can influence, and be influenced by, dispositional factors.

### ***2.2.1.3 Critical thinking as a disposition***

Disposition is also known as affect. It comprises emotions, mood, inclination and motivation. Miri et al. (2007) define critical thinking disposition as “the motivation, inclination and drive of the learner to involve her/himself in meaningful critical thinking while dealing with thinking about issues, making decisions and/or solving problems” (p. 356). This view indicates that disposition is a voluntary mental process where a person thinks with a motive or motives in mind that may include decision making or problem-solving. To think or not to think about issues becomes a personal choice, and as such it is within the control of the thinker.

*Emotions* are personal feelings derived from one’s current internal status, mood, circumstances, historical context, and external stimuli (Y. Wang, 2009). They comprise physiological, affective, behavioural, and cognitive components (Brave & Nass, 2008). From this definition, it is inferred that emotions are temporal,

intentional, and context dependent. They can be caused by factors that may be internal or external to the person. Issues of time and context are very significant when measuring dispositions. The instruments for measuring dispositions need to take into account issues of time and context because thinking is subject to change depending on time, the social setting, and depending on the motivations and intentions of the thinker.

The major causes of emotions are needs and goals (Brave & Nass, 2008). For example, with reference to Maslow's hierarchy of needs, those of physiological, safety (security), social, esteem, cognitive, aesthetic, self-actualization, and transcendence (Maslow, 1970) will be the major causes of emotions. Needs and goals prompt a person to be involved in performance or action. Wang (2009) adds that emotions are closely related to *desires* and *willingness*. A *desire* is a personal feeling or willingness to possess an object, to conduct an interaction with the external world, or to prepare for an event to happen, while *willingness* is the faculty of conscious, deliberate, and voluntary choice of actions. *Inclination* is part of willingness. This is the tendency of a person to invest effort in thinking the matter through, because of curiosity, personal relevance, or habits of mind (D. Perkins, 2004). Emotions, desires, willingness and inclination can not only influence thinking actions that can be directed towards fulfilling certain needs and goals, but they can also sustain a person's thinking about an issue at a given time and context. Since willingness involves voluntary choice of actions, other than influencing thinking actions, it can also determine the manner in which thinking actions are carried out. Emotions cause mood.

*Mood* is a relatively stable emotional situation (Leontidis & Halatsis, 2009). From this context, it is deduced that mood and emotions are related in that repetitive emotions can be prolonged to moods (Brave & Nass, 2008). Mood lasts longer than emotion. Since mood is related to emotion, it can also influence actions to be carried out in a particular manner. Actions in many cases are influenced by certain motivations that can be directed towards fulfilling human needs, goals, or desires.

Leontidis and Halatsis (2009) define *motivation* as the impetus and encouragement of a person's predisposition to perform activities in a certain way . This view implies that motivation can not only influence thinking actions, but can also determine the manner in which those actions are carried out to fulfil one's needs, goals, or desires.

The review of critical thinking dispositions indicates that the major components of critical thinking dispositions are physiological, affective, behavioural and cognitive. Critical thinking dispositions are motivational, intentional, temporal, voluntary, and context dependent. They are driven by fulfilment of human desires, needs or goals. A person's involvement in a thinking task is voluntary, and therefore, a personal choice. Emotions, desires, willingness or inclination can sustain one's thinking about an issue. When a person is engaged in a thinking task, dispositions influence cognitive actions to be carried out as well as the manner in which such actions are carried out in order to accomplish personal needs, goals, or desires. All these factors indicate the role dispositions play in influencing a person's ability or performance (i.e. to use critical thinking skills). When a person engages in a thinking task, thinking skills and thinking dispositions work together where dispositions initiate and motivate the ability to engage in critical thinking.

#### **2.2.1.4 Summary of critical thinking**

Based on the reviewed definitions of critical thinking, several conclusions can be drawn about critical thinking. First, critical thinking is a complex, purposeful, judgemental, reflective, and self-directed process. Second, the reason people engage in critical thinking is to solve problems, make rational decisions, evaluate information, guide beliefs and actions, and to improve their reasoning skills. This is done to fulfil human desires, needs or goals. This further implies that critical thinking can be taught by targeting aspects that help people accomplish their objectives. Third, critical thinking is context dependent in terms of aspects such as time, place, subject matter, intentions and motivations of the thinker or social setting. For example, a lapse in time, a change in place, subject matter or social

setting are likely to influence the intentions or motivations of the thinker. As a result, ignoring these contexts may misrepresent one's critical thinking. Fourth, critical thinking skills and critical thinking dispositions are related and tend to operate together when a person is engaged in tackling a thinking task. Finally, while critical thinking skills involve self-regulated skills such as recall, comprehension, analysis, synthesis, evaluation, inference, and reflection, thinking dispositions are related to people's emotions, mood, inclination, and motivation in regard to fulfilling certain needs and goals.

Therefore, following the review of definitions of critical thinking, in this study, critical thinking refers to *a purposeful and reflective recall, comprehension, analysis, synthesis, inference and evaluation of an issue or problem, and the motivation to make rational decisions about that issue or problem*. This definition includes both critical thinking skills and critical thinking dispositions. It also includes recall and comprehension that have not been traditionally considered as part of critical thinking. The following section discusses the relationship between critical thinking skills and critical thinking dispositions.

Given the close relationship between critical thinking skills and critical thinking dispositions, a clear picture of critical thinking can be understood when both critical thinking skills and critical thinking dispositions are measured simultaneously. This can be done by measuring the two components using the same instrument in order to offset the influence of time and context.

### **2.2.2 Critical thinking skills and thinking dispositions**

As discussed earlier, critical thinking is composed of interrelated components of critical thinking skills and critical thinking dispositions as indicated in Figure 2.1. Critical thinking skills are known to influence the ability for tackling a thinking task, while critical thinking dispositions influence the actions and the manner in which the actions are carried out (Colucciello, 1997; Ku, 2009; Yang & Chou, 2008). In other words, dispositions influence ability because they can initiate and motivate such ability.

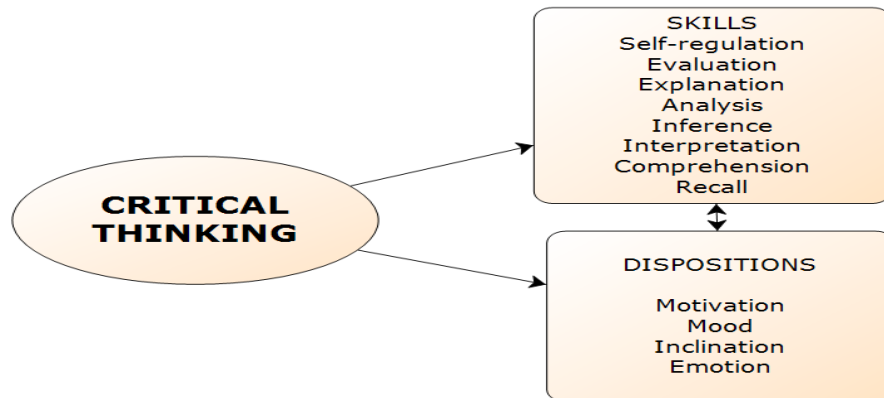


Figure 2.1. Critical thinking as a set of skills and dispositions

Kensinger and Schacter (2008) note that emotions affect memory of an event and the extent to which the event is remembered. Since emotions affect memory, as discussed earlier, they can also determine how a person's thinking is sustained on a given thinking task. Given that emotions are related to motivation and persistence, emotions influence critical thinking (Garrison et al., 2000).

In summary, while critical thinking disposition is non-procedural as its manifestations may vary depending on factors such as the individual's mood, context or motivation, critical thinking skills are procedural. Thinking skills approaches focus on self-awareness and goal-directed thinking where attention and working memory are strategically managed through critical reflection (Moseley et al., 2005). That is, when a person engages in a thinking task, s/he tends to be more aware of the goal for carrying out the thinking task. Since a higher degree of awareness is involved, the person tends to be more focused, systematic, or even persistent in order to achieve the desired goal. Both critical thinking skills and critical thinking dispositions are context dependent. Critical thinking skills influence the ability to do a thinking task, while critical thinking dispositions sustain a person's thinking in the task, determines which actions should be carried out, the manner in which they can be carried out, and when they should be carried out. The degree of perseverance can also vary depending on the nature of the thinking task, the context, and the desires, or goals to be fulfilled.

That both critical thinking skills and critical thinking dispositions can be taught within a given context, suggest conscious planning is essential for promoting them through LMS. Therefore, a better picture of an individual's critical thinking skills and critical thinking dispositions can be understood when examined concurrently in a given context. The interdependent relationship of these components as far as tackling a thinking task is concerned, calls for measuring them simultaneously, and using the same instrument in order to offset the effect of both time and context.

This section has discussed the concept of critical thinking as comprising skills and dispositions. The relationship between critical thinking skills and critical thinking dispositions has been established. Given the advances made in facilitating learning through technology, critical thinking can be promoted through LMS.

Recently there has been high use of LMS by many universities, among other things, by increasing courses offered online. Preference for using LMS rests on the benefits they can offer to users. LMS promote collaboration amongst online community members (Hennessy, 2009; Steel, 2009), autonomous learning, curriculum differentiation (Smeets, 2005), critical thinking, self-reflection (Vaiciuniene & Gedviliene, 2008), and they increase student self-confidence (Sanchez & Hueros, 2010). It is therefore, indispensable to examine how LMS promote the development of critical thinking from the perspectives of the tools embedded in them as well as from the perspectives of students and lecturers.

### **2.3 Development of Critical Thinking in LMS**

Learning management systems are also known as *virtual learning environments* (Aydin & Tirkes, 2010; M. Brown, Paewai, & Suddaby, 2010; Nagi, Suesawaluk, & Vate U-Lan, 2008), *learning platforms* (Aydin & Tirkes, 2010), *online learning environments* (Palmer & Holt, 2009), and *web-based course management systems* (Kumar & Dutta, 2011). Nagi et al. (2008) define “virtual learning environments as computer-based environments that are relatively open systems, allowing interaction and knowledge sharing with other participants and instructors and

providing access to a wide range of resources hosted on the system” (p. 2). The potential of LMS in promoting critical thinking lies in facilitating the sharing of ideas and resources, interaction amongst participants, and the promotion of self-regulated learning. Some LMS are based on the philosophy of constructivism where learners actively and collaboratively create knowledge at the same time acquiring new skills and attitudes. Since constructivism allows learners to collaboratively construct knowledge, it has the potential for making learners autonomous, inquisitive and open-minded.

Examples of well-known learning management systems include both commercial LMS such as WebCT, Blackboard, and Angel; and open sources such as Moodle, Atutor, Joomla, and Sakai. This study has focussed on examining student and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking.

### **2.3.1 Moodle and its tools**

Moodle is one example of a learning management system. It is a web-based course management system (CMS) planned around pedagogical principles of constructivism using the collaborative possibilities of the internet (Kumar & Dutta, 2011). According to Cole and Foster (2007), the term Moodle has two meanings, namely as an acronym for “Modular Object-Oriented Dynamic Learning Environment, and as a verb meaning lazily meandering through something, ... that often leads to insight and creativity” (p. ix). Essentially, Moodle is a learning management system that facilitates collaborative learning.

Moodle was created and developed by Martin Dougiamas, a computer scientist and educator. Its development was influenced by his early education that was gained at distance. His university education, especially in courses related to computer science and education where he was exposed to concepts such as constructivism and constructionism, helped him understand learning and the nature of knowledge (Dougiamas, 1998) and how reading and writing could be used in learning as they involve texts and signs (Dougiamas, 1999). The other



factor for development of Moodle is constant research carried out by Dougiamas on the utility of Moodle from the users' perspectives (Dougiamas, 2000; Dougiamas & Taylor, 2002, 2003).

Moodle has several tools that allow users to upload and share resources (uploading resources), create and edit web pages (wikis), and access forums, chats, quizzes, assignments, databases and grade books. The use of groups in Moodle is likely to facilitate student-centred, project-based, and socio-collaborative learning. Ultimately, Moodle has the potential for enhancing easier management of classrooms, sharing of ideas, and provision of a desirable learning environment. These tools can promote critical thinking especially when lecturers consciously plan teaching-learning tasks that are geared towards promoting critical thinking. In this study, the asynchronous discussion forums, quizzes and the use of uploaded resources are reviewed because of their potential for promoting critical thinking as revealed in literature (Arend, 2009; Barnett & Francis, 2012; Chua & Bernado, 2011; McMahan, 2009; Tsang, 2008; Wilkinson & Barlow, 2010). Such literature has been reviewed in the subsequent sections. Other than the potential for promoting critical thinking, these tools were chosen because they were frequently used by the research participants in the selected universities.

### ***2.3.1.1 Online asynchronous discussion forums***

*Online asynchronous discussion forums* are also known as *online threaded discussions* (Jeong, 2003; Meyer, 2003) and *discussion boards* (Wilkinson & Barlow, 2010). Several contributions to a topic are called a thread. Hewitt (2005) defines a thread as a “hierarchically organized collection of notes in which all notes but one (the note that started the thread) are written as replies to earlier notes” (p. 568). Meyer (2003) characterises threaded discussion forums as:

- focusing on one speaker at a time;
- creating semi-permanent records of a discussion (at least for the duration of the class); and

- not requiring everyone to participate at the same time or to be in the same room (or time zone, geographic region, or nation).

Research indicates that engagement in discussion forums leads to development of new ideas, critical thinking (Wilkinson & Barlow, 2010), and improved student learning (Giacumo, Savenye, & Smith, 2013; McMahan, 2009). Because discussion forums are text based, students think as they formulate and compose postings (Rimiene, 2002). Therefore, there is an inbuilt potential for promotion of critical thinking in using Moodle tools such as online discussion forums, quizzes and uploaded resources.

Well moderated discussion forums have the potential for promoting critical thinking. Arend (2009) and Giacumo et al. (2013) showed that the lecturers' feedback helped to promote critical thinking. Examining the influence of social presence and teaching presence on the quality of online critical inquiry using the Community of Inquiry Model, Bangert (2008) reported that the group assigned in social and teaching presence scored higher in *integration* and *resolution*, the social presence treatment group had a greater percentage of messages coded in *triggering event* than social and teaching group and the control group due to lack of direct instructor engagement. *Triggering event*, *exploration*, *integration* and *resolution* are categories of cognitive presence in the Community of Inquiry Model that was developed by Garrison et al. (2000). They measure levels of critical thinking in online text-based environments. Triggering event is the lowest level, while resolution is the highest level. From the findings above, it is concluded that cognitive presence is dependent on both teaching and social presence. Wilkinson and Barlow (2010) suggest that guided discussion activities and careful moderation of the discussions promote critical thinking. However, Sharpe and Pawlyn (2009) reported that students developed and sustained a student-led community, thus lecturers were sometimes unsure of the role they should take and when they should intervene. Though there is much evidence that students can sustain online discussion on their own, the lecturer's moderation still remains significant in promoting student critical thinking.

LMS can promote student research skills. Such research skills are significant for developing students' critical thinking skills and critical thinking dispositions. Thompson et al. (2003) reported that the use of the discussion forums improved student research and role playing skills. Involvement in research tasks is likely to make students curious. Interaction with colleagues in processes such as evaluating colleagues' comments and their own comments has the potential for promoting open-mindedness and inquisitiveness.

Low levels of critical thinking in asynchronous discussion forums have been related to students' low self-confidence. Wilkinson and Barlow (2010) revealed that 42 per cent of the students admitted that they did not challenge views of their colleagues because they did not have enough confidence to do so (p. 6). Similarly, Jacob and Sam (2008) reported that more postings focused on clarification (38 per cent and assessment (35 per cent). Another similar study is that of McLoughlin and Mynard (2009) that reported that though there was evidence of critical thinking, most of the postings were at the exploration level. These studies indicate that students' level of thinking was low. The level of critical thinking displayed in online discussions can be influenced by the nature of the course, the type of task, and the wording of the initial prompts (McLoughlin & Mynard, 2009). These findings point to the important role of subject-specificity and lecturer moderation in promoting critical thinking in online environments. Given that critical thinking improves over time (Giancarlo & Facione, 2001; Miri et al., 2007), it is imperative to consciously plan the learning tasks so that they make students motivated, self-regulated, and curious to learn.

In some cases, low levels of critical thinking have been associated with students' participation in the discussion forums for the sake of getting grades. For example, in a study by Jacob and Sam (2008), while 64 per cent reported that the forums made them enjoy mathematics, 61 per cent of the students were satisfied because they got grades by participating in the discussion forum. However, Cuadrado-García and Ruiz-Molina (2009), who examined the students' perceptions of Moodle use reported high participation in the courses even when participation did

not contribute to grades. This may indicate that students were curious to learn. Mere participation for the sake of getting grades is not likely to promote critical thinking because what has been learnt can be forgotten immediately after the examinations or tests. Critical thinking can be promoted when students are intrinsically motivated to use the system and when learning is directed towards meeting their learning objectives.

Some students who participate in discussion forums do not make good critiques of colleagues' comments for the fear of spoiling personal relationships. Jeong (2003) examined group interaction and critical thinking in online threaded discussions using the Discussion Analysis Tool (DAT). It was reported that disagreements were rarely posted in response to position statements and arguments, whereas agreements dominated the postings. Furthermore, students rarely responded to arguments with evaluation of the argument's accuracy, validity, and relevancy. From these findings, it can be interpreted that, for the sake of maintaining harmonious relationships, students displayed low levels of critical thinking because they had low self-confidence in critiquing colleagues' ideas. Similarly, they did not care much whether colleagues' arguments were accurate, valid or relevant.

To sum up, asynchronous discussion forums can promote critical thinking because they provide an environment that supports critical thinking. Additionally, critical thinking can be promoted when proper moderation is used. When both students and lecturers are confident enough to use the tools, because they become active and inquisitive, critical thinking can be promoted. The use of learning tasks that are research-based and the interactions amongst students and the lecturers can help in sharing ideas and creating knowledge. Critical thinking is also promoted when the focus is on meeting students' learning objectives through the use of subject-specific and authentic tasks. In such cases, students easily see the application of what they learn to the real life situations they may encounter.

### *2.3.1.2 The quizzes*

The quiz is a tool that can use various types of questions such as multiple choices, short answers, numerical and calculations, matching and essays meant to assess students' learning outcomes. The questions can be randomly generated from a pool of questions. The number of attempts and the grading schemes are determined by the quiz creator.

Ease of use of the quiz tool is likely to motivate students use the tool. Dumova (2012), in a study that involved 395 undergraduate students, using an online survey to determine students' usability of the quizzes, reported that the majority of students perceived the simplicity of interface, quiz navigability, text formatting, use of digital images, and the level of overall comfort as the most important. It was also found that a large number of students believed that the availability of audio presentation of information, such as prompts or directions, was necessary in quizzes. Ease of use of quizzes motivates students to use such tools.

The use of higher order questions and subject-specific content has the potential for promoting critical thinking. Barnett and Francis (2012) used a quasi-experiment where students were assigned in three groups: factual multiple choice questions (47 students), factual essay questions (51 students), and essay higher order questions (49 students). The Watson–Glaser Critical Thinking Appraisal was used during both pre-test and post-test to examine whether quizzes could promote critical thinking. They reported that students who completed questions in essay higher order questions did not score significantly higher in general thinking ability, but performed significantly better than the other two groups. Scores of general critical thinking ability increased significantly across the semester for all participants. The results suggest that though use of essay higher order questions promotes critical thinking, such higher order questions have a minimal impact on promoting general critical thinking ability. These findings support the view that “students' critical thinking skills are more clearly detected with items focusing on specific course content rather than on general issues assumed to be familiar to a student in any discipline” (Renaud & Murray, 2008, p. 91). This calls for

promoting critical thinking through specific subject areas and the use of higher order questions.

The use of quizzes as a tool to promote critical thinking may not necessarily be of great help to every student. Marshall (2008) reported that many students got higher marks, even those who did not participate in taking the multiple choice questions that was part of the learning support. However, from this study, it was evident that 75 per cent of the students who did not use the support lacked basic knowledge of the subject. Depending on the nature of tasks that learners are engaged in, quizzes have the potential for promoting learners' critical thinking. Findings from Dumova (2012) suggest that successful integration of online assessment needs to take into account individual students' needs because a quiz may not necessarily meet the needs of all students. In some cases, quizzes may not be the most appropriate assessment tool.

Students' preparation for the quiz is significant for their performance. Bacdayan (2004) indicates that announced quizzes are more appropriate than pop quizzes. A pop quiz is a quiz administered to students without giving them any prior notice related to doing such a quiz. In announced quizzes, students have enough time to prepare themselves. Lecturers have reported that announced quizzes make classes fun.

Additionally, quizzes have the potential for reducing administrative burdens such as grading and students' punctuality in class. Cluskey, Hodges, and Smith (2006) affirm that quizzes in which grading is automatic tend to reduce the lecturers' workload. When the lecturers' workload has been reduced, lecturers may have enough time to deal with students' issues such as promoting critical thinking. Furthermore, other than increasing students' preparation, warm up quizzes have been reported to increase class punctual attendance and participation (Braun & Sellers, 2012). Besides reducing administrative load, quizzes also need to be prepared in such a way that they aim at promoting critical thinking, because, as this study argues, critical thinking is the essence of learning.

Online quizzes may be vulnerable to cheating, especially if students are unprepared or if necessary measures have not been taken to combat it. Cheating by any means does not lead to learning, let alone to promoting critical thinking because students lose curiosity. The use of web cameras is likely to reduce online cheating during quiz taking (Mirza & Staples, 2010; J. Young, 2013), though it has been reported that it is still possible to cheat in front of a web camera, and that students have been discomforted by web camera invigilation (Mirza & Staples, 2010). By all means cheating needs to be combated because it does not contribute to the learning process, but instead it may just encourage rote learning. Other than using web cameras, students need to be informed in advance about the consequences of cheating including disciplinary actions that can be taken against defaulters.

In summary, when higher order questions and specific subject matter are used, critical thinking is likely to be promoted. The use of quizzes for formative learning rather than for grading purposes may have the potential for promoting critical thinking because the use of quizzes for grading is likely to make students learn for the grades. Each student may have unique needs, therefore, to promote critical thinking; quizzes need to take into account individual needs of the students. Announced quizzes seem to have more potential for promoting critical thinking than pop quizzes because in the former case students will be prepared to take the quizzes. Finally, when cheating is minimised, students are likely to be involved in meaningful learning. The quiz tasks can be accompanied by uploaded resources.

### ***2.3.1.3 Use of uploaded resources***

Through the uploading resources tool, different teaching-learning resources can be uploaded in the system so that students can access them. The resources can be in the form of texts, graphics (drawings, charts, graphs, maps, photos, and animations) or, videos. For easy comprehension by learners, it is suggested that teaching and learning resources must be well-prepared to capture different learning styles of the students.

The use of authentic resources has the potential for promoting critical thinking because they help students see a smooth connection between what they learn and the immediate application of what is learnt in their real life situations. Scholarly articles are typical examples of authentic resources. According to Chua and Bernado (2008), since scholarly articles present the past, the present and future works, they help learners learn past theories, their present applications, and help them to also focus on their own future work. In such cases, students become inquisitive and open-minded as well as creators of knowledge. These are necessary attributes for critical thinking to take place.

The use of a variety of resources increases the degree of interaction between the learners, the learners and the lecturers, and the learners and the content. Such interactivity has the potential for promoting critical thinking. Tsang (2008) emphasizes that the use of hyperlinks, audio and video clips, interactive activities and exercises with immediate feedback can strengthen the learner-content interactivity; and consequently, motivate the learners and also engage their psychomotor, cognitive as well as affective domains. This interactivity can be promoted when resources are easily accessible to students. In a study by Kevin Johnson, Lillis, and Hall (2010), students reported that material in Moodle enhanced their learning and it was easy to access Moodle. The use of a variety of resources facilitates interaction amongst learners. Tasks that engage students' psychomotor, cognitive and affective domains tend to promote holistic learning. Interaction and holistic learning may engage students in complex thinking skills such as analysis, evaluation and synthesis of issues.

In the research, there is less evidence that course content alone can help students excel, become critical reviewers or develop the ability to think and devise new solutions (Chua & Bernado, 2011; Littlejohn et al., 2007). Uploaded resources alone cannot promote critical thinking, there is a need to integrate these resources with authentic tasks or activities that engage students to think critically. Therefore, to promote critical thinking, uploaded resources can be integrated with



asynchronous discussion forums or quizzes. In such cases, students may be involved in complex thinking.

Besides the integration of uploaded resources with other Moodle tools, the use of relevant and subject-specific resources is likely to promote critical thinking because learning how to think is context dependent. Thompson et al. (2003) argue that when students are given the opportunity to discuss and interact online with subject-specific scenario materials they actively participate in their own development in an interactive and dynamic way. This argument supports the view that critical thinking is better fostered when specific subject matter is used (Renaud & Murray, 2008), when the resources are relevant in terms of meeting students' learning outcomes, and when resources are user-friendly.

Uploaded resources can be used as self-evaluation tools to review the content taught during the lecture. Parker and Chao (2007) reported that the lecturers used slides as a resource to review chapters or lectures. Such a review, among other things, could help students evaluate what they learn. Based on the slides provided, students could revise the taught topics, or identify gaps and areas that needed further study. In other words, the slides could facilitate student self-evaluation of the lectures or chapters in terms of their coverage, depth or accuracy of information given. Self-evaluation is significant for promoting critical thinking because learners may have the opportunity to review their strengths and weaknesses. With such awareness, improvement can be made accordingly.

For promoting critical thinking, the uploaded resources need to engage students meaningfully in learning. It has been reported that some students tend to use the uploaded resources to just meet the course requirements rather than to use them to radically improve their learning. Lovatt, Finlayson, and James (2007) revealed that a high frequency of accessing notes was during the time they were posted, study and examination weeks. A higher frequency of accessing the resources during the study and examination weeks can be interpreted as students using the resources for the sake of passing the examinations. Students need to be

encouraged to use the resources not only for course requirements, but for formative learning to promote meaningful learning and critical thinking during classes.

To sum up, uploaded resources have the potential for promoting critical thinking when authentic tasks such as scholarly articles and a variety of resources are used. The integration of uploaded resources with other Moodle tools such as discussion forums and quizzes also has the potential for promoting critical thinking because they are likely to engage students in complex thinking. Relevant and subject-specific resources are likely to promote critical thinking because critical thinking seems to be context dependent. The use of resources for self-evaluation purposes also encourages active learning. When the resources are used to promote meaningful learning rather than learning for the sake of getting grades, students seem to use the resources to radically improve their learning.

The use or non-use of asynchronous discussion forums, quizzes or uploaded resources is mainly influenced by the users' beliefs, attitudes and values. The next section reviews student and lecturer perceptions of LMS for promoting critical thinking.

### **2.3.2 Student and lecturer perceptions of LMS**

Perception is used as a generic term to refer to student teacher and lecturer beliefs, attitudes and values about LMS. Beliefs, attitudes and values are intertwined; hence, it may be difficult to categorically separate them or establish a causal link amongst them. Some previous studies have used the term *beliefs* interchangeably with terms such as *conceptions*, *attitudes*, *implicit* and *personal theories*, and *cognitive maps* (Steel, 2009). In this study, *beliefs* refers to student teachers' and lecturers' thinking and interpretations of their work that involve their feelings, attitudes, experiences and decisions (Sahin, Bullock, & Stables, 2002). From this view, beliefs are part of the human cognitive and affective components; they are tacit in nature and may influence action. Due to the complex and tacit nature of teacher beliefs, they are not readily accessed or understood for their impact on

teachers' pedagogical practices (Steel, 2009), but can be understood by inferring from the teachers' utterances, intentions and actions (Pajares, 1992).

Al-Zaidiyeen, Mei, and Fook (2010) define *attitude* as a "positive or negative emotional reaction toward a specific situation" (p. 213); while Wang (2009) views an attitude as a subjective tendency towards a motivation, an object, a goal, or an action based on an intuitive evaluation of its feasibility. These definitions imply that attitudes are cognitive processes that are temporal, context dependent, and motivational.

A *value* is a deeply held view of what we believe to be important and worthwhile (P. Bloom & Ellis, 2009). This means that values are part of our belief system. Teaching is known to be a value forming act (Brady, 2011; Hsu, 2009). From this perspective, lecturers can influence students' values for the use of LMS as learning tools and as tools for promoting critical thinking. The following sections review literature related to student and lecturer perceptions of LMS for promoting critical thinking.

### **2.3.2.1 Student beliefs, attitudes and values about LMS**

Positive beliefs and proper use of LMS can promote critical thinking. A study by von Kinsky, Ivins, and Gribble (2009) showed that students applied critical thinking skills in writing their weblogs, consequently their critical thinking was improved over time. Similarly, Scott (2008), who examined the potential of online debate for promoting critical thinking, reported that though many students thought that the debates were challenging, they enjoyed the debate process because it was a good tool for working in teams and for promoting critical thinking. Besides promoting interaction amongst members, working in teams and proper use of LMS are likely to promote critical thinking.

Student teacher beliefs are subject to change through training or teaching. Due to training, more than half of the students believed that computers were valuable and versatile sources of information (Dogan, 2010). Additionally, teachers experienced conceptual change in their self-efficacy beliefs after pedagogical training

(Postareff, Lindblom-Ylänne, & Nevgi, 2007). However, Ma, Lai, Williams, and Prejean (2008), in their study of 24 pre-service teachers where mixed methods research was used, showed that pedagogical laboratory training did not have a significant influence on pre-service teacher change in beliefs. It has to be noted that self-efficacy beliefs change slowly; therefore, longer training and a clear focus on what to teach are significant for changing student teacher beliefs. These findings imply that training is significant for changing beliefs. Such training or teaching aimed at changing student beliefs may also involve promotion of critical thinking.

Attitudes are temporal, context-dependent, motivational, and they can be positive or negative. If they are to be changed, the context (time, place, or motive) in which they manifest themselves needs to be taken into account. Attitudes like beliefs influence the use or non-use of LMS as tools for promoting critical thinking.

Research suggests that positive attitudes towards LMS influence the use of LMS as tools for promoting critical thinking. Research by Vaiciuniene and Gedviliene (2008) that involved 17 Lithuanian university students on their attitudes towards Moodle, using a quasi-experiment, found that the experimental group had positive attitudes towards Moodle and enjoyed working in groups, and such activities promoted their critical and reflective thinking. However, Cuadrado-García and Ruiz-Molina (2009) reported that many students agreed that it was difficult to write in an analytical or critical style. Though it may be difficult to inculcate positive attitudes towards the use of LMS for promoting critical thinking, it is possible to promote critical thinking through LMS. The access to LMS in terms of availability and students' skills to use them may motivate students to use LMS.

Experience of computer use promotes positive attitudes towards the use of LMS. Student teachers with prior computer experience tend to have positive attitudes towards ICT use in education (Cavas, Cavas, Karaoglan, & Kislá, 2009; Dogan, 2010; Mwalongo, 2010; Teo, 2008). This is likely to be related to their self-

confidence in technology use (Friedman, Bolick, Berson, & Porfeli, 2009; Teo, 2008). Agbatogun (2010) asserts that computer anxiety directly and indirectly influences student teachers' choice of learning with computers. From these findings, it can be concluded that for critical thinking to be promoted through LMS, students need to have knowledge and skills of, and self-confidence in using LMS as learning tools. This implies that even if students have positive attitudes towards LMS, if they do not have adequate computer skills of using the LMS they may not profit much from online learning.

Learning styles influence student attitudes towards the use of LMS (T. Brown, et al., 2009). Similarly, reflective, sensing, visual and individual learning styles are related to critical thinking (Conceição, 2004; Zhang & Lambert, 2008). This calls for use of online multimedia resources that take into account students' multiple learning styles. Such online tasks can be accompanied by resources in the form of sound, video, text, games, or graphics so as to accommodate auditory, visual or tactile learners. Through the use of online tasks that meet multi-learning styles of the students, critical thinking of the students may be promoted as students have the opportunity to engage in more complex thinking as they use different resources. By using a variety of learning resources, students may be exposed to different ideas or views, especially if such resources are prepared in such a way that they expose students to different points of view. In such cases, they may be required to evaluate and analyse such views and decide, based on their learning styles, which resources can help them learn best. Likewise, they can draw conclusions in relation to the most relevant resources that help them meet their learning objectives. In other words, the use of one type of learning resource may not only limit thinking abilities learners may acquire, but also may discourage them from using such a learning resource, especially if the resource does not match their learning styles.

Teachers' values influence their use of LMS (Brady, 2011; Mugaloglu & Bayram, 2009; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010), especially when they see the value of LMS for helping them solve practical problems. Teaching

has the power of influencing students' values. Teaching that integrates LMS is likely to promote students' critical thinking especially when students believe and value LMS as having such potential and when lecturers consciously infuse critical thinking through their teaching.

Student beliefs, attitudes and values may dictate the use of LMS as teaching-learning tools. The lecturers are amongst the key players for effective implementation of the LMS in education as they have the potential for influencing the beliefs and values in students. It is, therefore, imperative to understand lecturers' perceptions, and how the learning management systems such as Moodle can be used to promote critical thinking.

#### ***2.3.2.2 Lecturer beliefs, attitudes and values in regard to LMS***

Lecturer beliefs can be reflected in their pedagogical practices. However, due to the complexity and tacit nature of these beliefs, it is difficult to readily access or understand their impact on lecturers' pedagogical practices (Steel, 2009). There is also a consistency in lecturer beliefs and their intentions (Norton, Richardson, Hartley, Newstead, & Mayes, 2005). For instance, Torff and Warburton (2005) confirm that teachers who believed in the promotion of critical thinking used high critical thinking activities in their teaching. This finding indicates that critical thinking can be taught. Yang and Chou (2008) affirm that through effective instructional strategies, critical thinking skills and critical thinking dispositions can be taught and cultivated. Additionally, critical thinking needs to be taught explicitly and students have to be given opportunities for practice (Heijltjes, Gog, Leppink, & Paas, 2014). Improvement of students' critical thinking should not be taken as an implicit expectation. Critical thinking objectives need to be made explicit in the courses, and such objectives should also be included in pre-service and in-service training, and in lecturer professional development programmes (Abrami et al., 2008).

Friedman et al. (2009) assert that the frequency and type of technology used by lecturers are influenced by confidence in technology use. However, Steel (2009)

cautions that lecturers' confidence and proficiency in the use of technology do not necessarily lead to technological integration in the teaching-learning process because they may not believe that it is a valuable teaching-learning tool. The lecturers' beliefs that LMS can help them solve practical problems they face, their self-confidence and frequency of use of LMS are likely to influence the use of such LMS as teaching tools as well as tools for promoting critical thinking.

Technology implementation is influenced by the lecturers' knowledge about the curriculum they follow. Such knowledge may help them understand how critical thinking should be incorporated in their teaching. Friedman et al. (2009) assert that familiarity with the curriculum and confidence in technology influence the use of LMS. However, familiarity with the curriculum alone is not enough, especially if it does not insist on promoting core learning objectives such as promoting critical thinking. In such cases, there is a higher possibility that critical thinking will not be promoted even where lecturers are familiar with the curriculum. In Steel's (2009) study, lecturers suggested that the use of technology has to be derived from educational needs and not to be driven by technology *per se*. This view suggests that technology has to be used as a means to an end, not as an end in itself. Additionally, workload may influence the patterns of use and uptake of technology (Steel, 2009). The availability of technology *per se* does not necessarily guarantee its use, but lecturers' beliefs about LMS for solving practical problems, including promoting critical thinking, are likely to make them use LMS. Lecturers will use technology as teaching-learning tool and for promoting critical thinking when they believe that it can simplify their work. Enough time is also required to use LMS. The integration of critical thinking in LMS, and in other contexts needs conscious planning right from the curriculum documents, through the lecturer's lesson plan, to the implementation in the classrooms.

Several factors influence lecturers' attitudes towards the use of learning management systems. Such factors may include resistance to innovation, maintaining the status quo, lack of institutional support (Mitchell & Geva-May,

2009), and ease of use of LMS tools (Schoonenboom, 2014). In a study that investigated instructors' acceptance of LMS, Al-Busaidi and Al-Shihi (2012) found that management support influenced lecturers' actual use of LMS. Institutional support may involve encouraging lecturers to use LMS for promoting critical thinking. Carvalho, Areal, and Silva (2011) suggest that for LMS to be used in a manner that highly enhances student learning, lecturers must be supported to use the available technology tools. Openness to innovation and institutional support may influence lecturers' use of LMS as teaching-learning tools as well as tools for promoting critical thinking.

Institutional challenges are likely to limit the use of LMS as teaching tools and as tools for promoting critical thinking. Bolliger and Wasilik (2009) assert that technology difficulties, inadequate access to technology, and workload tend to decrease lecturer satisfaction and use of technology. The demand to publish as part of promotion limits some lecturers' participation in professional development programmes because they see that such professional development programmes are optional (Postareff et al., 2007). Pursuit of some of the core missions of universities such as research and publication need to be carried out in a manner that does not compromise other core missions such as teaching and learning. Likewise, institutions need to ensure that the teaching load is not detrimental to research and publication. Institutional challenges such as inadequate access to technology, workload and demand to publish are likely to promote negative attitudes towards the use of LMS amongst lecturers. With such negative attitudes, lecturers may not use LMS in general, and for promoting critical thinking, in particular. Hence, to carry out the core missions effectively, institutions need to strike a balance amongst those demands.

Acceptance of technology promotes positive lecturer attitudes towards LMS. It is acceptance of technology that influences lecturers' use of technology (Al-Zaidiyeen et al., 2010; Sanchez & Hueros, 2010; Teo, 2008). In Spotts' (1999) study, it was found that instructional technology use was greatly influenced by lecturers' attitudes rather than by factors such as learners, availability of facilities



and environment. Acceptance may promote positive lecturer attitudes towards the use of LMS and their intentions to use LMS.

Lecturers' values are great determinants of the use or non-use of technology for teaching and learning. Jones, Lindner, Murphy, and Dooley (2002) reported that lecturers who valued the importance of LMS for improving their pedagogical practice and student learning were less opposed to the integration of LMS in the teaching-learning process. Similarly, K. Dooley and Murphy (2001) reported that institutional technological adaptation was influenced by the knowledge, skills, abilities of its lecturers and the value the lecturers attached to the role of technology in teaching and learning. Thus, effective integration of technology may occur when lecturer beliefs and values are congruent with the benefits afforded by LMS. Such lecturers' values for LMS, among other things, may be significant for determining the use of LMS for promoting critical thinking.

Relating human affective attributes to technology, Petrina (2007) stresses that technology and feelings cannot be separated because the use of technology generates feelings that may range from *technophilia* (love of technology) to *technomania* (obsession with technology), *technophobia* (fear of technology), *technocracy* (basic trust in technology), or to *luddism* (basic mistrust of technology) (p. 60). It may, therefore, be reasonable to assume that use or non-use of LMS depends on where the users are on the continuum.

Positive lecturer values for the use of LMS may influence the use of LMS not only as teaching-learning tools in general, but also as tools for promoting critical thinking, especially when conscious planning is taken into account from the outset. In many cases, it has been taken for granted that class attendance, participation in discussion, test taking, and assignment completion alone help students develop critical thinking (Al-Fadhli & Khalfan, 2009). This is not enough to promote critical thinking. Since critical thinking skills can be learnt through instructions (Halpern, 2001; Li, 2009; Marin & Halpern, 2011), purposeful efforts by lecturers to develop critical thinking are necessary because critical thinking

cannot develop by itself. For promoting critical thinking, conscious planning and implementation of teaching-learning tasks in virtual learning environments are vital.

It is evident that not all students who participate in online learning environments have the necessary competence to interact within such learning environments. One of the responsibilities of higher learning institutions is to teach students how to think critically. Some research studies have painted a dark picture on this issue. It has been found that many higher learning institutions fail to encourage students to be reflective and critical thinkers (Corich, 2009), the average college students do not think critically, not all courses include critical thinking (S. Scott, 2008), the lecture method (Duron et al., 2006), and traditional school examinations have tended to focus on retention of content knowledge (Ku, 2009). The promotion of critical thinking may be at risk if conscious effort and planning do not occur to ensure that critical thinking is promoted in higher learning institutions. Universities need to promote positive attitudes towards the use of LMS for promoting critical thinking.

The lecturer and student roles are vital for successful promotion of critical thinking because Moodle or any other learning management system *per se* does not ensure that learning will occur. For critical thinking to take place, both lecturers and students need to think critically (Khojasteh & Smith, 2010). On the one hand, lecturers are expected to be responsible for planning and preparing interactive online teaching-learning tasks that are authentic, that suit student needs and that promote critical thinking. On the other hand, students are expected to be motivated, self-directed, inquisitive and open-minded. Critical thinking needs to feature in those LMS tasks. To that end, knowledge of evidence of critical thinking in LMS becomes mandatory. The following sections discuss issues related to instruments for measuring critical thinking in LMS and suggest ways of resolving such issues.

## 2.4 General Issues in Measuring Critical Thinking

The significant role critical thinking plays in both social and academic life has led to the development of several instruments for measuring it. Despite the existence of these instruments, there are general challenges in measuring this concept. The complexity in measuring critical thinking has been accelerated by the very nature of critical thinking itself. Critical thinking encompasses both critical thinking skills and critical thinking dispositions and is context dependent. That there is neither a universally agreed operational definition of critical thinking (Halpern, 2001; Moore, 2013) nor an agreement on how to measure it brings another challenge. Ku (2009) affirms that critical thinking tests vary in their purpose, format and context. Most of these instruments are not without their limitations. General limitations include measuring critical thinking skills and critical thinking dispositions using separate instruments; and the exclusion of recall and comprehension, especially when measuring the evidence of critical thinking in tasks related to asynchronous discussion forums.

Measuring critical thinking skills and critical thinking dispositions using separate instruments, as stated earlier, seems to assume that critical thinking is context free and static. Consequently, it may be difficult to gain a better picture of one's critical thinking.

The Halpern Critical Thinking Assessment Using Everyday Situations (HCTAES) and the instrument developed by Ennis (1996) try to capture both critical thinking skills and critical thinking dispositions. Most of the other instruments measure critical thinking skills and critical thinking dispositions separately as evidenced by reviewed literature (Miri et al., 2007; Rimiene, 2002). The HCTAES has five categories of skills (verbal reasoning, argument analysis, hypothesis testing, using likelihood and uncertainty, and decision making and problem-solving) and 25 scenario based questions. In each scenario, an open-ended question is complemented by a multiple choice question to capture thinking dispositions and cognitive skills. It is known for being a good instrument for measuring real-world outcomes of critical thinking (H. Butler, 2012). Despite HCTAES capturing both

cognitive skills and thinking dispositions, it measures critical thinking in general contexts. Subject-specific content is not taken care of. Advocates of measuring critical thinking in a general context argue that due to transfer of learning, critical thinking skills gained in one context are expected to be applied in a wide variety of contexts, hence, there is no need for subject specific situations (Halpern, 1998, 2001, 2003; Marin & Halpern, 2011). However, current research indicates that critical thinking is better detected in subject specific contexts (Renaud & Murray, 2008) and learning how to think is domain-specific and context dependent (Garrison et al., 2000).

As an attempt to measure thinking dispositions, Ennis (1996) modified the *Cornell Critical Thinking Test, Level X* by adding open-ended questions to capture thinking dispositions. Students had to give reasons justifying their choices in multiple choice questions. To elicit further interpretations from the students, follow-up interviews were used. Despite the instrument being promising in capturing thinking skills and thinking dispositions, Ennis focused on thinking dispositions only, not on the combination and interaction of thinking skills and thinking dispositions. Similar to HCTAES, the instrument focuses on general thinking skills. As noted earlier, research evidence indicates that critical thinking is better fostered in specific subject matter and context (Garrison et al., 2000; Renaud & Murray, 2008).

The other issue is the exclusion of thinking skills such as recall and comprehension. Recall and comprehension influence critical thinking and *vice versa*. This indicates that these skills are related. For instance, when a person engages in analysis or evaluation of something, recall and comprehension may be needed. The section below discusses challenges that are specifically related to instruments used to measure critical thinking in LMS.

## **2.5 Unresolved Issues in Measuring Critical Thinking in LMS**

For several years, in studies related to LMS, the focus has been on measuring cognitive skills, rather than both critical thinking skills and thinking dispositions.

However, recently the focus has shifted to including both critical thinking skills and critical thinking dispositions (Chan, Ho, & Ku, 2011; Ku, 2009; Ku & Ho, 2010; Mason, 2008; Renaud & Murray, 2008; Saadé et al., 2012). To that end, instruments have been developed to measure either critical thinking skills or critical thinking dispositions in LMS. However, there are some serious issues related to these instruments, if not addressed, may not clearly reveal the individual's critical thinking. They include:

- measuring critical thinking skills and critical thinking dispositions using separate instruments;
- measuring critical thinking skills and critical thinking dispositions at different times;
- using descriptors with multiple interpretations; and
- excluding recall, comprehension and affective or social factors.

The following sections discuss these issues and suggest ways of resolving them.

### **2.5.1 Use of separate instruments**

Based on the research studies reviewed, to the best of my knowledge, currently, there has been no study related to LMS that has tried to capture critical thinking skills and critical thinking dispositions using the same instrument, instead the two components have been measured using separate instruments. For instance, in a study by Miri et al. (2007) on the role of purposeful teaching for promoting critical thinking, the California Critical Thinking Skills Test (CCTS) and California Critical Thinking Disposition Inventory (CCTDI) were used during the pre-test (beginning of the year), post-test (end of the year) and post-post-test (after two years) to measure the cognitive and motivational components of critical thinking. Similarly, to measure cognitive and motivational components of critical thinking, Rimiene (2002) used both CCTS and CCTDI during the pre-tests and post-tests (three months later) for both the experimental and control groups. Additionally, examining whether participants' interactions via an e-learning model

promotes critical thinking, de Leng et al. (2009) used CCTDI to capture critical thinking dispositions during pre-test (first week) and Practical Inquiry Model to measure critical thinking skills during the post-test (third week). The way these studies have approached measuring critical thinking, seem to assume that critical thinking skills and critical thinking dispositions are separable, unrelated, and context free. However, it has to be noted that critical thinking is context dependent. Likewise, critical thinking skills and critical thinking dispositions work together when a person is engaged in a thinking task.

Two of the most commonly used instruments for measuring critical thinking skills and critical thinking dispositions are The California Critical Thinking Skills (CCTS) and The California Critical Thinking Disposition Inventory (CCTDI) respectively. The CCTS consists of 34 multiple choice questions, which aim to measure critical thinking skills in five categories: analysis, evaluation, inference, deductive reasoning and inductive reasoning. However, CCTS focuses only on measuring critical thinking skills. It does not consider subject-specific content knowledge, and excludes critical thinking dispositions.

The CCTDI has seven elements to capture dispositional factors: analyticity, truth-seeking, systematicity, maturity, open-mindedness, inquisitiveness, and self-confidence.

- *Analyticity* refers to the tendency to be cautious, ability to use logic and objective evidence even under difficult problems (Cubukcu, 2006).
- *Truth-seeking* is the ability to make sound and unbiased judgements (Ku & Ho, 2010).
- *Systematicity* is a careful approach in thinking (Ku & Ho, 2010).
- *Maturity* is being judicious in decision-making (Ghadi, Alwi, Bakar, & Talib, 2012). It is also referred to as *maturity of judgement* (Giancarlo & Facione, 2001).

- *Open-mindedness* is tolerance to other points of view and sensitivity to one's own faults (Cubukcu, 2006; Ku & Ho, 2010). It is synonymous to *humility*, that is, openness to feedback, receptivity to new ideas, an ethical stance in ideas and research, and reflectivity (Gardner, Hayes, & Neider, 2007).
- *Inquisitiveness* is enjoyment of thinking (Cubukcu, 2006; Ku & Ho, 2010). It is also referred to as the *quest for knowledge*, that is, the habit of mind that includes the desire for knowledge, the willingness to learn, and the possession of a curious mind (Gardner et al., 2007).
- *Self-confidence* is certainty about one's process of thinking.

Like the CCTS, CCTDI focuses on one of the components of critical thinking, thinking dispositions, and does not address subject-specific content knowledge.

### **2.5.2 Use of only multiple choice questions**

Some of the instruments measuring critical thinking in LMS use only multiple choice questions. Typical examples are the CCTS and CCTDI. In other words, such instruments only measure either critical thinking skills or critical thinking dispositions. In such cases, only convergent thinking is tested. Convergent thinking is where every person is expected to provide the same response (Crisp, 2012). There is a need to have instruments that also test divergent thinking where students may provide different, but acceptable responses to a specific prompt (Kaufman, Plucker, & Baer, 2008). Crisp (2012) argues that instruments that demand divergent thinking give more opportunities to the test takers to justify or explain their reasoning. Therefore, to capture critical thinking, instruments need to take into account both convergent and divergent thinking of the students. This can be done through the use of both multiple choice and open-ended questions where the two types of questions supplement each other.

### 2.5.3 Multiple interpretation of a descriptor

Some instruments that measure critical thinking in LMS tend to have a descriptor that is open to multiple interpretations, and in some cases one descriptor assesses several thinking skills. In such cases, it becomes difficult to capture the exact skill or disposition intended to be measured. In the subsequent paragraphs, some of the instruments used in measuring critical thinking in asynchronous discussion forums are analysed to illustrate this point.

*Quality of Critical Thinking Model* was developed by McLean (2005) for assessing the quality of critical thinking. It has seven criteria and the indicator in each criterion as indicated in Table 2.1.

Table 2.1  
*Quality of Critical Thinking Model*

Criteria	Indicators
Clarity	Is the point the student is trying to make clear? Does it need further elaboration, examples, or illustrations?
Relevance	Is the message focused on the main topic of the conference?
Depth	Does the student's response address the complexities of the question, or is the student working at the surface level? Is the student bringing in a new idea or taking an existing idea into new territory? Is the student advancing the discussion?
Logic	Is the participant demonstrating a logical argument?
Precise	Does the participant elaborate on the main point he or she is making? Has the participant provided the relevant details?
Breadth	Does the participant consider other points of view? Does the participant look at the question in more than one way?
Support	Are the participant's statements supported by references to credible sources or clearly described personal observations?

Source: McLean (2005, p. 10)

The other model developed by McLean (2005) is *Categories of Critical Thinking Model*. It was used to categorise types of critical thinking displayed by students. Only the sample elements of the model are indicated in Table 2.2.



Table 2.2  
*Categories of Critical Thinking Model: Levels One and Two*

	Level one	Level two
I.	Clarification of the thesis, problem, or question	Reformulating/translating Summarizing Questioning Defining terms Identifying and challenging assumptions
II. etc.		etc.

Source: McLean (2005, p. 11)

The two models focus on assessing critical thinking skills. The first criteria in both models seem to assess several processes of critical thinking. For instance, *Clarity* and *Precise* in Table 2.1 seem to assess the same thing (i.e. clarity of ideas) because the indicators demand the students clarify their ideas through elaboration and giving details. The same applies to *Clarification of the thesis, problem, or question* in Table 2.2. The descriptor seems to assess several skills such as comprehension (e.g. definition of terms, paraphrasing, summarising and identifying assumptions), while *Questioning* and *Challenging assumptions* seem to assess thinking skills such as analysis and evaluation.

Another issue with the models is that a criterion has multiple interpretations. For example, according to the author, a low rating in *Logic* in Table 2.1 could mean that the argument the participant presented was not logical or an argument was not presented at all. Similarly, low rating in *Support* could mean that participants were not supporting their statements with evidence or they were supporting them inaccurately. This dual interpretation may be confusing in rating unless each criterion is further sub-classified and given its own code. However, the author acknowledges that the model is time-consuming and suggests focusing on a few criteria *vis-à-vis* all the seven criteria, and coding only a portion of the message.

The third model in the example is the *CAIS Model*. C. Perkins and Murphy (2006) developed the model that was meant to identify and measure individual engagement on online discussion forums. The model has four components: clarification, assessment, inference and strategies.

- *Clarification*: all aspects of stating, clarifying, describing (but not explaining) or defining the issue being discussed.
- *Assessment*: evaluating some aspect of the debate; making judgments on a situation, proposing evidence for an argument or for links with other issues.
- *Inference*: showing connections among ideas; drawing appropriate conclusions by deduction or induction, generalizing, explaining (but not describing), and hypothesizing.
- *Strategies*: proposing, discussing, or evaluating possible actions (p. 301).

Each of the components has several indicators. Table 2.3 presents one of the categories (i.e. Clarification) and its descriptors for analysis.

Table 2.3  
*Model for Identifying Engagement in Critical Thinking*

CLARIFICATION				
All aspects of stating, clarifying, describing (but not explaining) or defining the issue being discussed.				
Proposes an issue for debate.	Analyses, negotiates or discusses the meaning of the issue.	Identifies one or more underlying assumptions in a statement in the discussion.	Identifies relationships among the statements or assumptions.	Defines or criticizes the definition of relevant terms.

Source: C. Perkins and Murphy (2006, p. 301)

The indicator (i.e. Clarification) in Table 2.3 has descriptors that seem to assess several thinking skills: *knowledge* (identification of an issue), *comprehension* (definition of terms), *application* (identification of relationships amongst assumptions), *analysis* (analyses, or discusses the meaning of the issue), and *evaluation* (criticises the definition of relevant terms). The authors coded the posts according to the indicators, not according to each descriptor in each indicator. If more than one thinking skill was identified within an indicator, the passage that appeared most important in that context was coded. Still, this may bring confusion when coding, especially if an indicator has descriptors that assess several

processes of critical thinking. This also calls for subdividing the descriptors and assigning a code to each of the descriptors.

Overall, despite all the given models having some descriptors with multiple interpretations and some having a descriptor assessing several thinking skills; the models address subject-specific contents. They recognise that critical thinking is not domain free and that learning to think is context dependent.

#### 2.5.4 Exclusion of recall, comprehension and dispositional factors

The final issue related to measuring critical thinking in tasks related to asynchronous discussion forums is the exclusion of recall, comprehension and dispositional factors. In asynchronous discussion forums, recall, comprehension, and other thinking skills influence, and are influenced by, dispositional (social and affective) factors. Recall, comprehension and other thinking skills, and dispositional factors influence critical thinking as indicated in Figure 2.2 and discussed in the following sections.

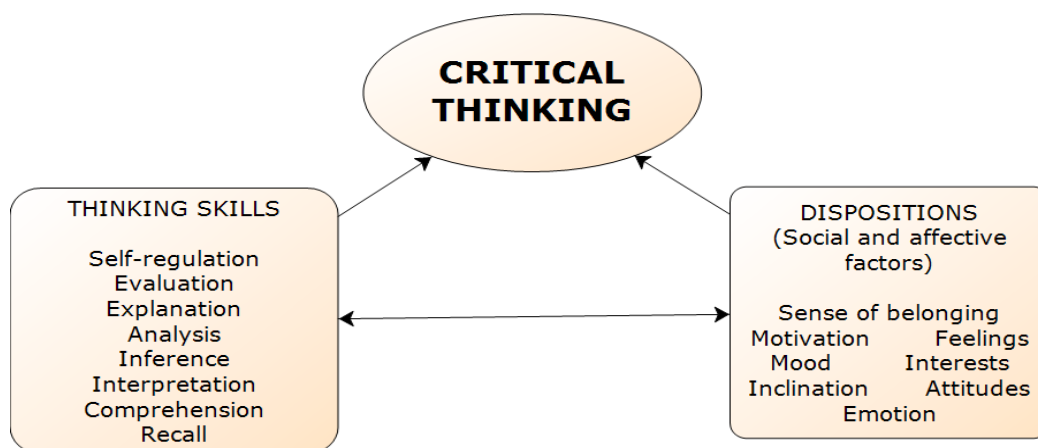


Figure 2.2. Components of critical thinking

##### 2.5.4.1 Recall and comprehension

As discussed earlier, recall and comprehension influence learning in general, and the promotion of critical thinking in particular. Learning takes place in a social setting. Since learning is situated, meaningful learning can be effective particularly when learning is contextualised, when what is learnt can be applied

thereafter in real life situations (Morales, 2010), and when learning is based on learners' prior knowledge and experience (Gauvain, 2005; Sawyer, 2006). Recall and comprehension can form part of the learner's prior knowledge. This view of learning reflects one of the elements of constructivism. Constructivism views learners as active constructors of meaning based on what they learn and from their experiences. Knowledge that is decontextualized, or that seems to lack obvious utility may not help the learner recall, comprehend or use such knowledge in the future. Following this interpretation, the design and implementation of instructional strategies need to take into account both students' thinking and their prior knowledge (Petrina, 2007).

Prior knowledge is also referred to as background knowledge. Background knowledge is what a person already knows about a topic (Marzano, 2004). Background knowledge plays a significant role in the learner's subsequent acquisition and application of such knowledge. Background knowledge determines what and how the learner thinks (Halpern, 2003). It helps to make inferences and decisions of what has been learnt (Pritchard & Woollard, 2010). Other than influencing the subsequent content to be learnt, background knowledge also determines the quality of what is to be learnt.

Besides influencing what and how to think and learn, prior knowledge influences the ability to remember new content or information (Halpern, 2003; Marzano, 2004; Wetzels, Kester, Merrienboer, & Broers, 2011). This is made possible by relating the known to the unknown. However, for students' prior knowledge to promote learning, it needs to be activated, sufficient, appropriate and accurate (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010). Overall, recall, comprehension, and other thinking skills influence critical thinking (Garver & Roberts, 2013; Kidwell, Fisher, Braun, & Swanson, 2013). The operation of thinking skills involves dispositional factors.

#### **2.5.4.2 *Dispositional factors***

Dispositional factors influence and can be influenced by critical thinking skills. In asynchronous discussion forums, dispositional factors may include posts that are off task, affective or social in nature, but such posts have the potential for sustaining interaction amongst online community members. These dispositional factors reflect what Garrison et al. (2000) refer to as social presence. Social presence is the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as “real people” (Garrison et al., 2000, p. 89).

From a sociocultural perspective, human learning, knowing, reasoning, and feeling are viewed as being situated in social and cultural practices (Sutherland, Lindstrom, & Lahn, 2009). In such a context, people around the learner influence how the learner views the world (Ally, 2004; Pritchard & Woollard, 2010), and the tools used influence the progress of the learning process (Pritchard & Woollard, 2010). Since learning is situated, online learning strategies need to help learners contextualise what is learnt as well as promote multi-contextual learning in order to be able to apply what has been learnt in broader contexts (Ally, 2004). Likewise, online tools such as asynchronous discussion forums need to be used effectively to promote learning.

Dispositional factors are important for learning in general, and for promoting critical thinking in particular. Knowledge is constructed in a social context. The social construction of knowledge implies that the social context is an integral part of learning (Illeris, 2007; Lave & Wenger, 2003). Through collaboration, students may support each other and learn from each other. Collaboration is also likely to promote a sense of belonging to an online community. The sense of belonging to the online community is likely to motivate learners’ engagement in the learning tasks. Similarly, contextualised learning may influence students’ active participation because they will be familiar with the learning context.

Dispositional factors play a significant role in promoting critical thinking and in sustaining online learning. Emotional expression such as humour promotes learning; self-disclosure leads to sharing of feeling, attitudes, experience, and interests; and emotions promote critical thinking because they are linked to motivation and persistence (Garrison et al., 2000). Similarly, social presence and teaching presence do promote critical thinking (Bangert, 2008; Stein et al., 2013)

Since interaction through asynchronous discussion forums is based on text messages, such messages help participants understand each other because they contain cues about the sender such as their cultural backgrounds, levels of education, professional experience, attitudes, and sense of humour (Wetzels et al., 2011). Knowledge of other online participants is likely to increase trust and interest in online learning. In the absence of “smiles, eye contact, and other non-verbal means”, open communication in the form of risk-free expression and acknowledging others becomes important for promoting respect, group cohesiveness and sense of belonging (Garrison et al., 2000, p. 100).

Though interaction is mediated by various technological tools such as asynchronous discussions and chats, it is social presence (i.e., dispositional factors) that transforms the human-machine interaction into human-human interaction. In other words, learners psychologically feel that they are interacting with other humans rather than with the machine (e.g., a computer). In the absence of online social presence, such an interaction may not be sustained, let alone even being initiated. To sustain the psychological human-human interaction, a user-friendly interface is significant because it may promote meaningful interaction and learning performance (J. Kim, 2011; Wei, Chen, & Kinshuk, 2012). Such online social presence may minimise high dropout and dissatisfaction of online learners (Kehrwald, 2008) because learning satisfaction and community feeling are increased (J. Kim, 2011; Remesal & Colomina, 2013). All these factors may contribute to sustaining online community members in the learning process. However, regardless of the nature of the interaction (i.e. human-machine or human-human), other factors may influence the nature of such interaction. They

include factors such as learners' motivations and goals, the subject matter being discussed, and the nature of audience in terms of their motives, cultural backgrounds, or educational levels.

Promotion of social presence becomes necessary for maximising online interaction as well as for influencing critical thinking. Several considerations can be taken into account in order to promote social presence. Online learners need to have the ability to send and read social presence cues, interact with each other, and be motivated to participate in online discussions (Wetzels et al., 2011). Learners' trust in both the instructor and their peers is significant for promoting online social presence (Wei et al., 2012). Finally, since interaction is mediated by technological tools, user-friendly interface and rich media are likely to promote social presence (Remesal & Colomina, 2013). Learners' active participation and motivation, a sense of trust, and user-friendly interface are likely to sustain online interaction. Such interaction has the potential for promoting not only their learning, but also critical thinking. Based on the benefits dispositional factors afford to online learners, it is necessary to promote them and measure them in asynchronous discussion forum posts.

Studies related to LMS acknowledge the role of dispositional factors in influencing critical thinking (Bangert, 2008; Garrison et al., 2000; Stein et al., 2013). Though thinking skills such as recall and comprehension, and dispositional factors influence critical thinking, when measuring critical thinking in LMS such elements have not been associated with critical thinking. These elements have been left out during the analysis of the posts generated in asynchronous discussion forums. For example, the study by Corich (2009) and Corich, Kinshuk, and Jeffrey (2011) generated 436 sentences, but 148 sentences were not coded because, according to the authors, they were either social in nature or did not contribute to the discussion. In the study by Jacob and Sam (2008), 119 posts were generated by 48 students; however, some posts (exact number not mentioned) did not receive any code for the reason that they were personal or social in nature, and not part of the discussion and analysis of the problem.

Additionally, Leng (2012) did not code 426 posts (42 per cent) out of a total of 1017 posts because they did not contain evidence of critical thinking. All these studies used the model developed by C. Perkins and Murphy (2006).

It has to be noted that though there may be off task posts in tasks related to asynchronous discussion forums that do not reveal critical thinking directly, such posts are significant because some of them are social in nature and thus, they have the potential for sustaining online interaction (Keshan & Qing, 2009; Mwalongo, 2012). They reveal the affective part of the online community. Similarly, thinking skills such as recall and comprehension indirectly influence critical thinking. These elements are part of the online discourse that leads to critical thinking. Other than making the online community vibrant, motivated, cohesive, and supportive, recall, comprehension and dispositional factors contribute to critical thinking. In this context, critical thinking in online environments needs to be understood and analysed in a holistic manner where all the interactions, including recall, comprehension and dispositional elements, are taken into account. This will help to understand the whole context of online interaction that leads to critical thinking because a better and more balanced picture of an individual's thinking can be better understood when both basic skills and critical thinking are examined (C. Perkins & Murphy, 2006). Recall and comprehension need to be considered because they influence critical thinking. The following section discusses ways of resolving the issues presented above.

## **2.6 Suggested Instruments for Measuring Critical Thinking in LMS**

To address the issues discussed above, two instruments have been developed (see Appendices E and G). The first instrument is in a form of a questionnaire with multiple choice questions where each multiple choice question is supplemented by an open-ended question (details are discussed in section 4.5.1). The use of multiple choice questions is meant to capture thinking skills and the open-ended questions to capture thinking dispositions. An instrument that utilizes both multiple-choice and open-ended responses reflects not only individuals' true critical thinking ability, but it is compatible with the conceptualization of critical



thinking (Ku, 2009). The instrument takes into account both components of critical thinking (i.e. critical thinking skills and critical thinking dispositions), and the influence of time and context because the two components are measured simultaneously, using the same instrument, and therefore, in the same context. Other than capturing critical thinking skills and critical thinking dispositions, the use of both multiple choice and open-ended questions takes care of both convergent and divergent thinking of the research participants.

Measuring critical thinking skills and dispositions simultaneously and using the same instrument has several benefits. First, the open-ended questions probe students' and lecturers' underlying reasoning about a particular disposition. In the absence of such underlying reasoning, it would be difficult to understand what prompts respondents to rate a particular disposition the way they do. Second, giving reasons to justify their choices is a way of determining their actual thinking performance. By comparing the rating and the reason given, a value judgement can be made about an individual's thinking with respect to a certain disposition. That is, it can be judged whether or not the individual is disposed towards critical thinking. The value judgement was adapted from the classifying framework developed by Ennis (1996). Ennis (1996) used "+1", "0" and "-" to indicate evidence of critical thinking disposition, lack of disposition, and no basis to judge, respectively. In this study, phrases *Relevant*, *Unclear*, and *Absent* are used to indicate evidence of disposition, no basis to establish the presence of the disposition, and absence of disposition, respectively. Finally, the open-ended questions give the students and lecturers the opportunity to think of other interpretations of the multiple choice statements. This may help the researcher to understand how the research participants rate the given dispositions.

The second instrument deals with measuring uncritical and critical thinking in tasks related to asynchronous discussion forums (see Appendix R). When measuring critical thinking in tasks related to asynchronous discussion forums, thinking skills such as recall and comprehension, and elements that are affective

or social in nature are considered. The instrument is the RCS-CAIS Model. The model is discussed in greater detail in Chapter 4, section 4.6.3.

This section has reviewed literature related to measuring critical thinking. It has discussed issues related to instruments for measuring critical thinking in general, and those issues specifically related to LMS. The final section has suggested two instruments for measuring critical thinking in LMS. The following section presents a synthesis of issues from the literature review.

## **2.7 Synthesis of Issues from Literature Review**

From the review of literature, several issues can be highlighted. Research indicates that there is a relationship between critical thinking skills and thinking dispositions. In this relationship, critical thinking skills tend to influence the ability to carry out a thinking task, while dispositions can influence the manner in which a thinking task is carried out, what individuals think about, why they engage in thinking, and when they can engage in thinking tasks.

In studies measuring critical thinking in tasks related to the use of LMS, the tendency has been to use separate instruments to measure the two components of critical thinking. Based on the relationship of these components, using separate instruments is likely to give a false picture of an individual's critical thinking.

The reviewed studies show that there is potential for asynchronous discussion forums, quizzes and uploaded resources to promote critical thinking. These tools can promote critical thinking when conscious planning is considered.

Finally, most of the reviewed studies do not consider recall and comprehension to be part of critical thinking. In this traditional view, critical thinking has been regarded as higher order thinking which is not thought to include recall and comprehension. However, in practice, recall and comprehension can be as important as other thinking skills in supporting critical thinking.

## 2.8 Chapter Summary

The importance of critical thinking is well documented and emphasised in literature, but the practice in some higher learning institutions has been discovered that less attention has been paid to promoting critical thinking, as demonstrated by the level of students' critical thinking in the reviewed studies. Course management systems such as Moodle have shown to promote active and collaborative learning through tools such as online asynchronous discussion forums, and quizzes, thereby making students responsible for their own learning. This study examined both student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking within a pre-service teacher education programme. It is from this examination that pedagogical practices related to the use of LMS for promoting critical thinking can be understood. New knowledge generated can help curriculum developers and other stakeholders address some of the issues reported in literature.

Overall, the importance of critical thinking has been discussed followed by literature related to the concept of critical thinking. The third section has discussed learning management systems and their potential for promoting critical thinking with a focus on asynchronous discussion forums, quizzes and the use of uploaded resources. The section also has discussed student teacher and lecturer perceptions of LMS for promoting critical thinking. Issues related to instruments used to measure critical thinking in LMS have been discussed in sections four and five. Finally, the survey instrument for measuring both critical thinking skills and thinking dispositions simultaneously, and the RCS-CAIS model for measuring and showing the relationship between critical thinking, including recall and comprehension, and dispositional factors in tasks related to asynchronous discussion forums have been suggested.

Research studies are guided by theoretical frameworks. This is the subject of the following chapter.

## **Chapter 3**

### **Theoretical Framework of the Study**

Chapter 2 has reviewed literature related to the concept of critical thinking and the role of learning management systems for promoting critical thinking. Specifically, the focus has been on reviewing literature related to student teacher and lecturer perceptions of LMS tools for promoting critical thinking. The study investigated student and lecturer perceptions of the use of Moodle tools for promoting critical thinking. Such an investigation deals with complex, but interrelated concepts. An appropriate framework can be helpful in positioning the perspective of the study on the nature of online learning. To that end, this study uses sociocultural theory as its perspective for understanding the nature of online learning as a social context. Sociocultural theory as a perspective, among other things, helps to link the concepts used in the study to those existing in literature.

This chapter argues for the relevance of sociocultural theory as a perspective of the study about the nature of online learning. The chapter is divided into three sections. The first section is the introduction to sociocultural theory. The second section discusses components of sociocultural theory and their underlying assumptions. The final section discusses the rationale for using sociocultural perspective in the current study.

#### **3.1 Introduction to Sociocultural Theory**

Sociocultural theory was developed by Lev Vygotsky and his colleagues in the 1920s and 1930s with the aim of trying to explain the integration of learning and development in a social, cultural and historical context (Rogoff, 2003; L. Wang, Bruce, & Hughes, 2011). Since then, the theory has been further developed by Lave and Wenger (1991), Rogoff (1990), and Wertsch (1991).

Sociocultural theory consists of several theoretical underpinnings related to learning and knowing. Such theoretical underpinnings include situated learning, distributed cognition, and constructivism (Frank, 2008; Gauvain, 2005; Illeris,

2007; Lave & Wenger, 2003; Petrina, 2007; Sutherland et al., 2009). Both *situated learning* and *distributed cognition* have similar perspectives on learning. They view learning and cognitive development as taking place in a social context. Situated learning emphasises that the learning environment does not only influence learning, but is also an integral part of the learning process itself (Illeris, 2007; Lave & Wenger, 2003). Distributed cognition views human thinking as not centred in the individual, but as distributed across community, environment and artefacts (Petrina, 2007). With reference to *constructivism*, learning occurs due to active participation of the learners in making sense of the world as afforded by the social and cultural setting and prior knowledge (Gauvain, 2005; Karen Johnson, 2009; Sawyer, 2006).

Overall, sociocultural theory deals with how mental functioning is related to cultural, institutional, and historical contexts in terms of the acquisition, organisation and use of knowledge (Gauvain, 2005; Wertsch, 1993, 1998). It further deals with the role of tools in the learning process, especially language as a tool for thinking.

### **3.2 Components of Sociocultural Theory**

Sociocultural theory is based on certain assumptions about learning and knowing. To account for the nature of learning and knowing, sociocultural theory has several components. The components are the view of learning, the social context, history, and tools (artefacts). These components are related to the extent that it becomes difficult to separate them. However, the components and their underlying assumptions have been discussed in the following sections separately for the purpose of clarity.

#### **3.2.1 Sociocultural view of learning**

In the context of sociocultural theory, the *meaning of learning* has a new conception in contrast to a classical view of learning where the focus has been mainly on the individual as an isolated entity. Sociocultural theory views learning as a complex, transformative, and internalisation process that proceeds from the

social, inter-mental plane to the individual's intra-mental plane of understanding (Kumpulainen & Wray, 2004). Through learning, the whole person is transformed. Herrenkohl and Mertl (2010) emphasize that learning involves “whole people fully engaged in creating a life for themselves in them any places where they learn” (p. 14). This view indicates that the acquisition of knowledge, skills and attitudes is not external to the person, but it is rather a result of the person’s interpretation and processing of the sociocultural practices as the person participates in such cultural practices. It further indicates that the individual is intrinsically motivated to learn and perceives the benefits accrued from the learning process. Lastly, learning is viewed as a transformative process of both the individual and the social and cultural practices.

From a sociocultural perspective, learning is viewed as situated, involving the active participation of the learners, collaborative, goal-oriented, dependent on learners’ prior knowledge and experiences, and a transformative process for the individual and the social and cultural practices. Each of these views is discussed in the following sub-sections.

### ***3.2.1.1 Learning is situated***

From a sociocultural perspective, all learning is *situated*. Learning takes place in a social context, and it is an integral part of that social context. The social setting determines learning possibilities and learning processes (Illeris, 2007). Learning takes place as learners interact with the social context and amongst themselves. Human learning, knowing, reasoning, and feelings are situated in social and cultural practices (Sutherland et al., 2009). In other words, since learning takes place in a social context, it is influenced by that social context and meaningful learning partly depends on the learners’ knowledge of the social context.

Learning can take place in physical classrooms or in virtual classrooms (i.e. online). In the case of online learning, the use of LMS and the interaction amongst online community members partly form the social context for learning. To understand such an online learning context, Greeno (2006) suggests that

investigation should not only focus on the individual, but rather on the activity system that includes learners, lecturers, curriculum materials, software tools and the physical environment. The current study investigated student and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking. The LMS is one component of a social context for learning.

### **3.2.1.2 *Learning involves active participation***

Sociocultural theory views the role of the learner as that of *active participation* in the learning process. Participation is manifested through the learners' engagement in social and cultural practices. Active participation is an essential mechanism for the individual's learning and knowing to take place (Sutherland et al., 2009). The process of knowing and learning are inseparable from the social, physical and cultural setting because they are part of the activity of knowing (Kumpulainen & Wray, 2004; Lamy & Hampel, 2007; Lave & Wenger, 2005; Sutherland et al., 2009).

Through participation in the social and cultural practices, knowledge is created and the individual learns. Active participation and knowledge creation, among other things, are influenced by the intrinsic motivation of the individual in becoming a member of the community of practice (Collins, 2006; Lave & Wenger, 2003). Similar to apprenticeship, learning becomes not only part of life, but life itself as learners strive to become members of the community of practice. In a university setting or any other educational setting, for example, learning and the role of the learners are central. To promote learners' active participation, the role of the instructor needs to be that of guiding learners so that they achieve their learning objectives.

### **3.2.1.3 *Learning is collaborative***

From a sociocultural perspective, the role of other members within the social setting is significant for helping others learn. This view is reflected in Vygotsky's *zone of proximal development*. According to this view, learners can successfully

carry out certain tasks on their own, but in some complex tasks they need their colleagues' collaboration. When learners interact with more experienced and more knowledgeable colleagues, they are able to engage in complex thinking and as a result they can independently carry out activities that they would have been unable to carry out if they had worked at their own.

Members the learners collaborate with may determine the nature and timing of their participation in the social and cultural activities (Gauvain, 2005). Through collaboration, individuals learn from each other. This highlights the importance of interdependence amongst individuals in learning or solving any other practical problem. In the context of online learning, the use of tools such as asynchronous discussion forums helps learners share ideas, support each other, and learn from each other.

#### **3.2.1.4 Learning is a goal-oriented activity**

Sociocultural theory acknowledges that learning is a *goal-oriented activity*. This view has been advocated by Vygotsky and colleagues. Leont'ev (1978), for example, stressed that activities cannot exist without their objects (goals). In other words, there is no objectless activity. It is the object that differentiates one activity from another. Activities are motivated by the goals they intend to achieve.

Learning is an essential human activity. For meaningful learning to take place, there is a need to use authentic contexts related to the application of learnt knowledge (Kumpulainen & Wray, 2004). At the same time, learners need to become full participants in sociocultural practices (Lave & Wenger, 2003). Since the activities are directed towards the objects to fulfil certain human needs, the analysis of objects is essential for understanding the subjects both as individuals as well as members of a community. In order to understand the meaning people attach to activities they are engaged in, it is better to understand the objects of those activities and the contexts where they take place. In line with this view, the current study examined the student and lecturer perceptions of the use of



asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking in the context of LMS.

#### **3.2.1.5 *Learning is built on prior knowledge and experiences***

Sociocultural theory advocates that *prior knowledge and experiences* of the learner are important for participation in the cultural and social practices. This is a constructivist orientation. To that end, what is learnt and its application depend on the learner's prior experiences, the sociocultural contexts where learning takes place, and the individual's wants, needs and expectations about the utility of such knowledge (Karen Johnson, 2009). With respect to the use of LMS for promoting critical thinking, for meaningful learning to take place, when planning and implementing online learning, tools, learners, instructors, the social context, and the motivations of learners need to be considered. At the same time, when investigating student and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking; prior knowledge and experiences of the students and lecturers should not be ignored because they have a role to play in their current practices.

#### **3.2.1.6 *Learning is a transformative process***

From a sociocultural perspective, learning is viewed as a *social transformative process*. When community members engage in their shared cultural activities, they, in turn, transform their cultural tools, practices, institutions as well as themselves as individuals (Boreham & Morgan, 2004; Rogoff, 2003). Since learning is a transformative process, it benefits both the individual and the social and cultural practices. Through full participation in the sociocultural practices of a community, learners master the required knowledge and skills that transform them into practitioners (Lave & Wenger, 2003). This kind of learning is holistic because it involves the whole person in terms of taking care of the individual's cognitive, affective and psychomotor domains. The sense of identity as master practitioners (T. Anderson, 2004; Lave & Wenger, 2003) in the community of

practice is likely to motivate individuals' involvement in the learning process in a given social context.

In summary, from a sociocultural perspective, learning is viewed as situated. That is, learning does not take place in a social vacuum. Learning is an active participation of learners in constructing knowledge through their engagement in social and cultural practices. Learning, like any other human activity, is goal-oriented. Prior knowledge and experiences of the learners are significant in determining how an individual participates in social and cultural practices of which learning is part. Finally, learning is a social transformative process where learners gain identity as members of the community of practice. Such membership intrinsically motivates individuals' participation in the social and cultural practices. Likewise, members have the responsibility of transforming the social and cultural practices in their respective contexts. The following section discusses the role of social context in learning.

### **3.2.2 Social context**

Context and culture are responsible for influencing learning and cognitive development. From a sociocultural perspective, mediated actions are inseparable from the social setting in which those actions are carried out (Lave & Wenger, 2003; Wertsch, 1993). All activities, including learning, are integral and inseparable aspects of social practices. Human cognition is not solely located in the individual's head because its development is due to the interaction of the individual with other people, artefacts and events (L. Wang et al., 2011). This view implies that participation in activities in the social context not only influences the learning and cognitive development of the individual, but also the individual's thinking in turn shapes the social practices in a given social context. Rogoff (2003) affirms that "individual and cultural processes are mutually constituting rather than defined separately from each other" (p. 51).

Social activities and practices influence the creation of knowledge. Such knowledge is created as members interact with more knowledgeable members of

the community as well as through the use of cultural tools and symbols (Kumpulainen & Wray, 2004). As people use tools, over time they may improve the tools for better efficiency. For instance, prior to the development of the internet and its related technologies, electronic means of communication were not advanced enough to solve some of the problems of the time; however, with the dawn of the internet and its related technologies, the way people communicate has been revolutionised. From this perspective, knowledge is socially constructed and it is the social context that influences the sort of knowledge to be created depending on the demands of the time. Therefore, knowledge creation is inseparable from the social setting where it is created. Since social practices influence the creation of knowledge, the meaning of such knowledge needs to be interpreted in the context of its creation.

Given the role of social context in influencing learning and cognitive development, and the creation of knowledge, Kumpulainen and Wray (2004) affirm that human mental activities, including learning, can be better understood by investigating such activities within their cultural, historical and institutional contexts. They have to be seen as the interaction between social agents and the physical environment. In the context of using LMS in a university, for example, the students and lecturers need to be studied as part of the LMS environment within a university setting, that is, the micro-setting. At the same time, it has to be remembered that the university also operates within a larger social context or a macro-setting, such as a country. In this case, the social context can be immediate or not immediate. The macro-social setting influences the micro social setting through aspects such as government policies as is the case in education. That is why, in many cases, the micro social setting is likely to mirror the macro social setting.

Social and cultural practices are mediated through tools. The following section discusses the role of tools in learning.

### **3.2.3 Tools**

Human activities such as learning are mediated by artefacts or tools. Culturally constructed materials, signs and symbols mediate human cognition through engagement in social activities where language becomes the medium, mediator and a tool for thinking (Karen Johnson, 2009). In other words, human beings do not indirectly interact with the world, instead tools are used. In an LMS environment, for example, students and lecturers do not interact directly, but they may interact through discussion forums, chats or wikis. In such cases, language and LMS tools can be used as tools for socialisation as well as for thinking.

Physical tools facilitate the development of language through the use of certain concepts related to those tools. From this view, meaning is context dependent because language as a tool for communication is socially shared and the interpretation of meaning has to take into account the social context where such language is used.

Tools are important media for transmitting human experiences from one generation to the next. The structure and how human beings learn to use tools may change how human beings interact with the sociocultural setting (Kaptelinin & Nardi, 2012). For example, as some people specialise in using such tools and some are involved in making them, diffusion of knowledge may occur as members interact. Diffusion of knowledge is likely to improve human activities and human participation in those activities. With reference to online learning, learning experiences can be shared through tools such as asynchronous discussion forums, wikis and chats.

Learning, the social context, and tools are influenced by history. The following section discusses the role of history from a sociocultural perspective.

### **3.2.4 History**

Human conduct, activity and practices are products of history and tools are fundamental mediators of history (Sutherland et al., 2009) because they help to

transmit human experiences from one generation to the next. This implies that social and cultural practices may change over time.

Physical tools and language practices used in a particular social context derive their meaning from predecessors (Karen Johnson, 2009). This partly shows that the meanings and values attached to social practices are a result of history; the form and their use are likely to change from one generation to another as well as from one social context to another. Likewise, those meanings and values have to be understood and interpreted from a historical perspective.

When people engage in sociocultural practices, other than using tools and passing them from one generation to the next, they also improve these practices so that they help in carrying out social activities in a more efficient way. Improvement may involve discarding some of the tools especially if they fail to meet the needs of the time. In the context of online learning, the use of certain tools can be improved based on existing evidence about their usefulness for promoting learning.

Learning and knowledge creation are *dynamic processes*. Learning, teaching and cognitive processes are part of the social and cultural processes, and through participation in the community of practice over time individuals make cultural practices (Kumpulainen & Wray, 2004; Nasir, Rosebery, Warren, & Lee, 2006). The way people learn, teach or think is likely to change over time, depending on social or cultural contexts. From this view, learning is seen as a historical production, transformation, and change of persons (Lave & Wenger, 2003). Learning is shared, it is dependent on history, and changes according to social contexts. Learning also transforms social and cultural practices and the actors (people) in those social practices. Over time, new ways of learning, teaching and thinking can emerge that may challenge, or modify previous ways of doing things. Likewise, meaning is context dependent because it does not reside in the language itself, but has to be interpreted from the context of the social group using that language (Karen Johnson, 2009). This is significant in education because both

learners and instructors are expected to critically assess their practices and be open to new opportunities as afforded by the cultural and social context because learning, teaching and thinking are subject to change over time and from one place to another.

Sociocultural theory helps in understanding the nature of learning in the social context, and the use of tools that mediate learning. This perspective is useful for studying online learning because it helps in seeing the LMS environment as a social context where various tools are used to mediate learning. The following section discusses the rationale for using a sociocultural perspective in the current study.

### **3.3 Rationale for Using Sociocultural Theory**

Sociocultural theory emphasises the role of *context as central for learning*. Learning is viewed as being embedded in the social and cultural context (Boreham & Morgan, 2004; L. Wang et al., 2011; P. Young, 2009; Zuzeviciute & Butrime, 2010). Learning and thinking are developed as individuals interact with other people, objects and events and engage in social activities (Ireson, 2008; Kumpulainen & Wray, 2004; Rogoff, 2003; L. Wang et al., 2011). From this perspective, culture being part of the context shapes the way people communicate, think and learn (P. Young, 2009). In other words, communication, thinking and learning are context dependent. Other than factors such as the ability of the students, context plays a significant role in influencing the development of critical thinking. Being context dependent, communication, thinking and learning are subject to change over time as well as according to social contexts. This view implies that knowledge and skills gained in one context may not necessarily be transferable to another context, unless such knowledge and skills are related to the cultural setting, and teaching involved the use of authentic learning tasks. Through the use of authentic tasks, learners can easily associate what they learn in school to what happens in the real life situations. During the course of relating and applying what they learn in school to other contexts out of school, their critical

thinking is developed because processes such as analysis, evaluation and synthesis of issues may be involved.

Considering the role of context in influencing the use of LMS for promoting critical thinking, the study investigated the whole *activity system* of learning (Greeno, 2006), that included the students, instructors, curriculum resources, and LMS. Online community members were regarded as inseparable from the LMS context. Sociocultural theory helps to situate the use of LMS as a social learning context where students and lecturers display critical thinking through the use of Moodle tools such as asynchronous discussion forums and quizzes. Learning being situated, the understanding of student and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking needs to be viewed from the context of using those tools.

Sociocultural theory acknowledges the role of tools for mediating learning. Unlike face-to-face learning, online learning is mediated through tools such as asynchronous discussion forums, quizzes, chats and wikis. These tools enrich learning, promote human interaction, and reduce social isolation (Zuzeviciute & Butrime, 2010). The use of written discourse influences socio-affective learning (Manca, 2010), and LMS help organise and disseminate information and knowledge (Revilla, 2010). These tools influence learners' cognitive development, the way they learn, the way they communicate and how they relate to each other. Critical thinking is developed as learners reflect and interact with colleagues because learners involve both their thinking skills and thinking dispositions such as emotions. Since learning is mediated through tools in a given social context, the design of LMS needs to take into account the prevailing cultural practices of the time (Mercer & Littleton, 2007; Sawyer, 2006; P. Young, 2009). Sociocultural theory is a suitable perspective because it assists in understanding how students and lecturers used asynchronous discussion forums, quizzes and uploaded resources as mediators to promote critical thinking.

LMS involve the use of language in its symbolic representations such as texts (written words), audios, videos, numbers, maps, or graphics. When language is used as a cultural and psychological tool, it facilitates cognitive development and thoughts (Pritchard & Woollard, 2010). Language further promotes social and communication skills that ultimately may lead to deeper learning, critical thinking and shared social understanding (Manca, 2010). In this case, language is used as a tool for thinking. Since learning through LMS uses language in its different symbolic forms, sociocultural theory is a proper perspective for understanding how people interact, especially through the use of asynchronous discussion forums that are mainly text-based. Through the analysis of such texts, the degree of students' critical thinking can be revealed. This helps to understand how the use of language as a tool for thinking promotes critical thinking in the context of LMS.

For meaningful learning to take place, collaboration is significant. Social collaboration increases thinking because people around the learner may influence how the learner views the world (Pritchard & Woollard, 2010). Collaboratively working on social tasks, people tend to “interthink”, that is, they combine “their intellects in creative ways that may achieve more than the sum of the parts” as they share information, interact or work to solve a certain problem (Mercer & Littleton, 2007, p. 4). Collaboration influences dispositions such as emotions, motivation, and feelings (Manca, 2010; Pritchard & Woollard, 2010) because learners get the opportunity to share their personal experiences. Collaboration has the potential for promoting a sense of belonging in an online learning community. Such collaboration is facilitated through LMS where learners develop understanding and critical awareness of cultural backgrounds of the people they interact with through tools such as computer conferencing (Lamy & Hampel, 2007). Sociocultural theory is an appropriate learning perspective because it helps in understanding how students and lecturers collaborate and use various Moodle tools such as asynchronous discussion forums for promoting critical thinking in an online setting. Interaction helps students and lecturers display their thinking skills



and thinking dispositions, particularly through the way they argue and present arguments in the forums, and the way they support and care about other online members.

Sociocultural theory views learning as a goal-oriented activity where authentic tasks are used to promote meaningful learning. Such authentic tasks can be promoted through the use of LMS where video and computer technology via simulation give the learners real life experiences (Collins, 2006). The use of such authentic tasks gives online community members the opportunity to actively engage in learning. Through such engagement, learners meet their expected learning outcomes. The tasks promote critical thinking skills such as application of what is learnt in class to the outside world. Through the lens of sociocultural theory, student and lecturer use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking can be easily examined. Since learning is goal-directed, sociocultural theory becomes a suitable perspective to use when investigating students' and lecturers' purposes for using LMS in the context of universities. Sociocultural theory emphasises the transformation of the learners as they engage in social practices as well as the transformation of those social and cultural practices. Transformation of learners and the social and cultural practices involve critical thinking skills and dispositions such as motivation to achieve learning goals.

Learners' prior knowledge and experiences are significant for participation in social and cultural practices. Prior experiences of learners help to design learning tasks that relate to the learners' culture (Sawyer, 2006), and prior experiences help learners participate in learning activities, as learners need to have skills to learn in a social environment (Pritchard & Woollard, 2010). Prior experiences also help social co-construction of knowledge (Kumpulainen & Wray, 2004; L. Wang et al., 2011). Learners are more engaged when working with ideas in familiar, rather than in alien, contexts (Lowenthal, 2010). Prior experiences and knowledge of learners help them learn better. Such experiences may involve demonstration of thinking skills such as recall and comprehension of ideas, information and

phenomena. Learners' prior knowledge and experiences are also laden with dispositions that can motivate or demotivate them in a given social learning context. Sociocultural theory helps to explain the importance of prior knowledge and experiences of the learners for active participation in the learning process in a given social learning context.

Overall, sociocultural theory links well the use of LMS as a learning context, the promotion of critical thinking as the goal of learning, and the use of tools such as language, asynchronous discussion forums and quizzes to mediate learning. The use of asynchronous discussion forums, quizzes and uploaded resources in the context of LMS reveals students' and lecturers' critical thinking skills and critical thinking dispositions. The nature of a social learning context such as an LMS, amongst other things, influences the nature of critical thinking that can be promoted. When learners work collaboratively to solve certain problems in a given social context, they display their critical thinking skills because they interthink in the course of solving those problems. Likewise, they display dispositions such as emotions, motivations, and feelings that may be related to achieving certain learning goals.

### **3.4 Chapter Summary**

This chapter has discussed the theoretical framework that underpins this study. Components of sociocultural theory and their underlying assumptions about learning have been discussed. Finally, the rationales for using sociocultural theory as a learning perspective in the context of LMS have been discussed.

In order to understand various concepts of the nature of learning and knowing used in the theoretical framework as well as to address the research questions, specific methodology and methods were employed.



## **Chapter 4**

### **Methodology**

Chapter 3 has discussed sociocultural theory as the perspective used to guide this study. This chapter discusses the methodology in terms of the methods and procedures for generating, collecting and analysing data related to student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes, and uploaded resources for promoting critical thinking. The methodology used in this study is based on certain philosophical assumptions about the nature of knowledge and on how such knowledge can be generated. The chapter begins by broadly discussing these philosophical stances, and then links them to the specific methods and procedures that were used to generate, collect and analyse data.

The first section of the chapter discusses the research paradigms in general. The second section discusses the paradigm used in the study. This section focuses on the concept of mixed methods research and the rationale for using it in the study. The case study design and the rationale for using it are discussed in the third section. The subsequent sections discuss sampling, methods and procedures for generating, collecting and analysing data, and issues of validity and reliability. The final section discusses ethical considerations that were taken into account prior to, during, and after carrying out the study.

#### **4.1 Research Paradigms**

The methodology for studying student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking was guided by philosophical stances that inform what to study, and how to study those perceptions. These philosophical stances that guide research are known as paradigms. The notion of research paradigms was popularized by Thomas Kuhn in *The Structure of Scientific Revolutions* (Kuhn, 1962, 1996). Rubin and Babbie (2011) define a paradigm as a fundamental model or scheme that organizes our observations and makes sense of them (p. 47). Paradigms have basic concepts and ideas that help a particular discipline view the

world or reality (Hesse-Biber & Leavy, 2008). That is, paradigms are lenses through which researchers see the world. Different researchers will take a particular lens to view the world; consequently, different research disciplines will be aligned with different research paradigms. For instance, this study uses an interpretive paradigm. Since paradigms inform what reality to study and how to study that reality, they thus influence the researcher in the processes of collecting, generating and analysing data. This section describes various views of research paradigms, the characteristics of research paradigms, philosophical stances related to research paradigms, and the most dominant types of research paradigms.

Research paradigms have been conceptualised in various ways. R. B. Johnson and Onwuegbuzie (2004) identify four views for understanding research paradigms. They are paradigms as world views, paradigms as epistemological stances, paradigms as shared beliefs amongst members of a specialty area, and paradigms as model examples of research.

- *Paradigms as world views*: the broadest view of research paradigms that includes ways of experiencing and thinking about the world such as beliefs about morals, values, and aesthetics.
- *Paradigms as epistemological stances*: research is viewed as essentially involving epistemological issues about the nature of knowledge and knowing.
- *Paradigms as shared beliefs amongst members of specialty area*: the consensus about research questions that seem meaningful amongst researchers as well as about appropriate procedures for answering those research questions.
- *Paradigms as model examples of research* views paradigms as serving as exemplars on how best research is done in a given research discipline (R. B. Johnson & Onwuegbuzie, 2004).

Research paradigms have certain characteristics. These characteristics are discussed in the next section.

#### **4.1.1 Characteristics of research paradigms**

Despite the existence of competing research paradigms, most of them share some common characteristics. First, paradigms are accepted by researchers active in a certain discipline (Porta & Keating, 2008). Paradigms are then used as mental tools and frames of reference to help researchers active in the field communicate with and understand each other, as well as guide their actions and behaviour (Jonker & Pennink, 2010). Therefore, different research practitioners may adhere to different research paradigms such as positivism, interpretivism, or any other paradigm.

Second, paradigms may gain or lose popularity, but are seldom discarded altogether (Rubin & Babbie, 2011). Kuhn (1996) affirms that they gain their status when they have become more successful than their competitors in solving some problems that are recognized by researchers as acute. To that end, rules and assumptions related to existing facts and observations are changed and revised to accommodate new thinking (Muncey, 2009). That is, a particular paradigm cannot solve all research problems. Likewise, paradigms are not static. This is the case because the nature of knowledge and the ways of knowing of both the natural and social world are subject to change over time and in different places.

Third, there is no paradigm that explains all the facts (Muncey, 2009); but paradigms can guide researchers where to look for the explanations (Rubin & Babbie, 2011). The condition that paradigms are not able to explain all the facts, justifies the presence of several competing paradigms. A competing paradigm emerges when the existing ones fail to account for all the nature of reality at that given time or place.

Fourth, paradigms are flexible in research. For instance, elements of more than one paradigm may be combined in the same study (Rubin & Babbie, 2011). Thus, in research, paradigms may be used to complement each other because no

paradigm is able to account for all facts about the nature of the world or reality. This study uses the elements of interpretive paradigm as well as mixed methods research paradigm.

Finally, paradigms guide research by direct modelling and through abstracted rules (Kuhn, 1996). In this way, a paradigm informs acceptable research methods and techniques in a discipline through the use of *pragmatic examples* (R. B. Johnson & Onwuegbuzie, 2004). Thus, the research design, the methods of data collection, generation and procedures for data analysis need to reflect the paradigm that underpins a given research study.

Different research paradigms are contrasted according to their philosophical stances about the nature of reality. These philosophical stances are reflected in ontology, epistemology, methodology and methods. Below is a brief description of each.

#### **4.1.2 Philosophical stances related to research paradigms**

Different paradigms represent different philosophical stances on the nature of reality and how to observe that reality (Rubin & Babbie, 2011). The methods of data collection and procedures of data analysis are guided by research paradigms; and the research paradigms are guided by philosophical stances based on ontology, epistemology, methodology and methods. The following section describes these philosophical stances.

*Ontology* is related to the existence of a real and objective world (Corbetta, 2003; Gray, 2004; Porta & Keating, 2008). The focus of ontology is on the nature and form of social reality (Corbetta, 2003), and what is studied (Porta & Keating, 2008). In short, it is the general view in which the studied reality is seen through the eyes of researchers.

*Epistemology* is related to the possibility of knowing reality and the forms of knowledge (Porta & Keating, 2008). It focuses on the relationship between the observer and the reality observed (Corbetta, 2003), methods, validity, nature,

sources, limits and scope of knowledge (Jonker & Pennink, 2010). In an interpretive paradigm, for example, the relationship between the observer and the reality observed is close because the researcher is seen as the instrument of data generation, collection and analysis. This relationship influences the way reality is observed and perceived; consequently, it may determine the legitimacy and adequacy of knowledge. Legitimacy and adequacy of knowledge depend on the validity of that knowledge. The validity of knowledge, in turn, is influenced by the knowledge and skills of the researcher, the methods of studying reality, the nature of reality being studied, and sources of knowledge.

*Methodology* deals with the manner in which the research is carried out (Corbetta, 2003; Jonker & Pennink, 2010). In other words, it deals with how reality or the world is observed by the researcher, and includes the instruments and techniques used to acquire knowledge (Porta & Keating, 2008). Hesse-Biber (2010) views methodology as a theoretical bridge that connects the research problem with the research method. Thus, the methodology used to address a certain research question needs to be in line with epistemological beliefs of the researcher about the possibility of knowing reality.

*Methods* and *techniques* are related to the specific steps and actions that need to be executed in a certain order to address a particular research question (Jonker & Pennink, 2010). They involve the instruments or tools for generating, collecting, analysing data and presenting the research findings (Jonker & Pennink, 2010; Leavy & Hesse-Biber, 2008). The methods and techniques used to address a particular research question need to be in agreement with the methodology used.

In summary, the methodology is derived from the researcher's view of the nature of knowledge, i.e. epistemology. It is epistemology that dictates what kinds of knowledge are regarded legitimate and adequate (Bryman, 2008; Gray, 2004). The various methods used to collect, generate and analyse data essentially reflect the researcher's epistemological assumptions. Therefore, research methodology



influences the choice of the research methods; the methodology, in turn, is influenced by the researcher's epistemological stance.

Different paradigms will call for different ways of studying reality. Common paradigms include positivism, interpretivism, and pragmatism. The following section discusses some of the major research paradigms in general, thereafter it focuses in much greater detail on the research paradigm used in the current study.

### **4.1.3 Types of research paradigm**

Divergent views about the nature of reality and how that reality can be observed give rise to different research paradigms. According to Henn, Weinsntein, and Foard (2006), there are two major competing research paradigms, positivism and interpretivism. However, these major paradigms are in a continuum where there are other minor paradigms in between. The subsequent sections discuss the major research paradigms.

#### ***4.1.3.1 Positivism, interpretivism and pragmatism***

This section briefly describes the assumptions underlying positivism, interpretivism, and pragmatism. The description focuses on the salient features of each of the paradigms. *Positivism* was dominant from the 1930s to 1960s (Gray, 2004). Positivism assumes that the world is objective; the validity of knowledge claims is based on observable measurable phenomena; and the social world is similar to the natural world (Gray, 2004; Henn et al., 2006; Muncey, 2009; D. Scott & Usher, 2011). Furthermore, positivism asserts that there is a clear distinction between the subjects (knowers) and objects or the world (D. Scott & Usher, 2011). Positivism tests theory (Henn et al., 2006). Positivism has been associated with the use of quantitative measurements (Henn et al., 2006).

*Interpretivism* is based on the assumptions of multiple social reality (Corbetta, 2003; Hesse-Biber, 2010). Unlike positivism, in interpretivism, theory is emergent (Cohen, Manion, & Morrison, 2007; Henn et al., 2006). The focus is on deeper meanings from the research participants' points of view about the world (Henn et

al., 2006; Rubin & Babbie, 2011). In interpretivism, reality and knowledge are mediated by the research through the interpretation of communication, interaction, and practice of the research participants (Tracy, 2013). Some of the versions of interpretivism lying within the continuum according to Gray (2004) are:

- *Symbolic interactionism* that views human interaction with the world as mediated through the process of meaning-making and interpretation;
- *Phenomenology* that views social reality as grounded in people's experiences of that social reality;
- *Critical inquiry* that views ideas as mediated by power relations in society; and
- *Feminism* views that a person's knowledge is largely determined by the social position that person occupies.

*Pragmatism* is a “transactional research framework that allows for an understanding of knowledge as a function of and for human action, and an understanding of human interaction and communication in thoroughly practical terms” (Biesta & Burbules, 2003, p. 107). It has the following salient characteristics.

First, it assumes that knowledge is based on practical outcomes and on what works, hence, pragmatism (Denscombe, 2010; Fraenkel, Wallen, & Hyun, 2012; Hesse-Biber, 2010). The major concern of pragmatism is not whether there is a single reality or multiple realities, but to discover solutions to the research problems (Lodico, Spaulding, & Voegtler, 2010).

Second, pragmatism acknowledges the value of both quantitative and qualitative approaches as long as they help the researchers discover what they want to know (Feilzer, 2010). Thus, pragmatism sheds light on how the research approaches can be mixed to address the research questions.

Third, pragmatism recognises both the natural and the social worlds. Knowledge is viewed as constructed and based on the reality of the world humans experience

and live (R. B. Johnson & Onwuegbuzie, 2004). Thus, as knowledge is socially constructed, it acknowledges the existence of multiple realities.

Finally, knowledge is provisional. That is, what is true today may not necessarily be true in the future (Denscombe, 2010; Hesse-Biber, 2010) or in another context. This means that knowledge about reality or the nature of the world constantly changes over time and in different places. This view further explains the existence of competing paradigms that tend to emerge when the existing paradigms fail to account for all facts. Thus, for example, further research in the future may falsify today's claimed reality.

This study has used an interpretive paradigm. An interpretive paradigm is suitable because it focuses on understanding participants' experiences and how they make sense of their social world as they interact with it. Participants' experiences and meaning making are context dependent. In this study, students and lecturers interacted through asynchronous discussion forums, quizzes and uploaded resources. Through this interaction, students' and lecturers' promotion of critical thinking was reflected.

Furthermore, an interpretive paradigm is appropriate because it focuses on understanding participants' meaningful actions attached to what they believe and do in a given sociocultural context. Students' and lecturers' use of asynchronous discussion forums, quizzes and uploaded resources provided the context for meaningful actions related to the promotion of critical thinking. This is in line with sociocultural theory where context influences not only what the participants believe, but also what they do (Hammersley, 2013).

The following sections discuss the underlying assumptions of an interpretive paradigm.

#### ***4.1.3.2 Interpretive approach to mixed methods research***

Pragmatism is regarded as the partner philosophy of mixed methods research (Denscombe, 2008; R. B. Johnson & Onwuegbuzie, 2004). However, it should be

noted that pragmatism is not only used by mixed methods research as its philosophy (Denscombe, 2008), there are other paradigms that also use the philosophy of pragmatism. Furthermore, there are many versions of pragmatism (Biesta & Burbules, 2003). Mixed methods research uses the methods and philosophy of pragmatism that help to mix together qualitative and quantitative research approaches.

Hesse-Biber (2010) stresses that the distinction between an interpretive paradigm and a positivist one is not the use of qualitative or quantitative approaches, but rather the ontological and epistemological stance of the researcher. The researcher can use either a qualitative approach, a quantitative approach or a combination of these (Hesse-Biber & Leavy, 2008). Hesse-Biber and Leavy add that the emphasis has to be on the interconnections between epistemology, methodology, and methods.

The view of interpretivism above is in line with pragmatism. Pragmatists do not bother about a single reality or multiple realities; they focus on discovering answers that help solve the research problems (Lodico et al., 2010). Pragmatic researchers propose the combination of quantitative and qualitative methods in creative ways in order to more fully answer the research questions (Lodico et al., 2010). This view of pragmatism of combining research approaches is also advocated by mixed methods research. Gorard and Taylor (2004) stress that completely different methods can have the same research aim. They suggest that the methods are always more powerful when used in combination than in isolation (Gorard & Taylor, 2004). Henn et al. (2006) discuss the benefits of combining methods. Below is a summary of the benefits:

- Each approach has its strengths and weaknesses and each is particularly suitable for a particular context. Thus, a combined methods or multi-strategy research approach helps to compensate for there being no consensus in research;
- Bias in research can be overcome because the investigation focuses on a variety of different angles and perspectives; and

- The combination of methods helps to gain a complete overview of the matter under investigation.

Additionally, an interpretative approach to mixed methods research focuses on understanding how individuals make sense of their social world as they interact with it (Hesse-Biber, 2010). In this case, the interpretation of meaning is dependent on the social context and the ability of the researcher in making sense of those meanings because the researcher is an instrument of data generation, collection and analysis. To gain an in-depth meaning from the research participants, the researcher needs to spend some time observing them in their natural settings (Corbetta, 2003). Thus, interpretivism in mixed methods research is interested in multiple views of social reality (Hesse-Biber, 2010).

Moreover, the focus of the research is on meaningful actions of individuals and the social construction of reality (D. Scott & Usher, 2011). In this case, meaning is socially constructed and such meaning is manifested through the research participants' actions in a given context. Thus, the role of the researcher is to interpret the research participants' actions and the social practices within a given social setting.

Both the researcher and the research participants engage in interpretive practices (D. Scott & Usher, 2011). It is suggested that the best way to learn about people is to be flexible and subjective in terms of approach so that the research participants' world can be seen through their own eyes (Corbetta, 2003; Henn et al., 2006). Also the researcher needs to collaborate with the participants to fully understand what works (Lodico et al., 2010). Thus, the researcher constructs meaning with the research participants.

An interpretive approach to mixed methods research is better understood by viewing its underlying assumptions. Some of its assumptions are in line with mixed methods research. The following section discusses mixed methods research and how it relates to the current study.

## **4.2 Mixed Methods Research**

Mixed methods research is also known as mixed methodology, multi-strategy research, integrated methods, multimethod research, and combined methods (Hesse-Biber, 2010). Despite the existence of these terms, the term currently used is mixed methods research. This section defines mixed methods research and describes the epistemological base of the study. It also traces the historical development of mixed methods research. Characteristics of mixed methods research and the designs used in the current study are discussed. Thereafter, assumptions of mixed methods research, validity and reliability in mixed methods research, and the rationale for using mixed methods research are discussed.

### **4.2.1 Definition of mixed methods research**

Mixed methods research, according to Leech and Onwuegbuzie (2009), is research that involves collecting, analysing, and interpreting quantitative and qualitative data in a single study or in a series of studies that investigate the same underlying phenomenon. The use of both approaches is meant to provide a more comprehensive picture of the research problem in contrast to using only one of the approaches (Ary, Jacobs, & Sorens, 2010; Creswell, 2012; Creswell & Creswell, 2005; Denscombe, 2010). From the definition given above, it is inferred that mixed methods research is based on certain philosophical assumptions about the nature of knowledge and how such knowledge can be generated.

### **4.2.2 Assumptions of mixed methods research**

The following are the assumptions that govern mixed methods research. First, since the nature of reality is complex and layered (Schutz, Chambless, & DeCuir, 2004), mixed methods research uses both qualitative and quantitative approaches in collecting, generating and analysing data within a single study. It is assumed that the examination of a phenomenon using multiple methods is likely to bring a better and more complete picture of that phenomenon (Clark, Creswell, Green, & Shope, 2008; Creswell, 2012; Ridenour & Newman, 2008). Mixed methods research helps the researcher investigate a particular research problem from

different angles and perspectives; collect different types of data; analyse data using different techniques; and interpret the results through multiple lenses (Henn et al., 2006). Mixed methods research involves merging, integrating, linking, or embedding both qualitative and quantitative approaches (Creswell, 2012). The link between the research approaches involves justifying the research design and the appropriateness of using mixed methods research. The use of multiple methods to collect, generate and analyse data is also encouraged in qualitative research, especially when a case study strategy is used (Ellinger, Watkins, & Marsick, 2005; Vennesson, 2008; Yin, 2008, 2011).

Second, using both qualitative and quantitative approaches is meant to generate complementary new insights about the phenomena studied (Teddlie & Sammons, 2010). Thus, mixed methods research helps to offset the weakness of either the qualitative or quantitative approach.

Finally, mixed methods research is problem-driven. The decision to use a mixed methods approach is based on the usefulness of the methods to address the particular research question, issue or problem under investigation (Denscombe, 2010; Fraenkel et al., 2012; Kavanagh, Campbell, Harden, & Thomas, 2012). Mixed methods research is used when there is a need to collect and analyse both qualitative and quantitative data in order to address a particular research question. Thus, it is the research question that calls for the use of a mixed methods research. That is, some research questions can be addressed by either a qualitative or a quantitative approach. In such cases, there will be no need of using mixed methods research. Ridenour and Newman (2008) emphasise that the research problem has to be addressed in a systematic way regardless of the epistemology the researcher holds. This systematic approach of addressing the research question involves:

- Stating the research question and ensuring that it is in harmony with the research purpose;
- Identifying the evidence needed to address the research question and the epistemological assumptions of the evidence needed;

- Designing the research and the nature of evidence;
- Deciding about the source of evidence, the setting, the timing, the measures or lack of measures, and analysis of evidence; and
- Planning to disseminate the findings to the audience.

Mixed methods research, like paradigms, has evolved over time due to the need of using both qualitative and quantitative approaches in addressing certain research problems. Its emergence is not surprising because paradigms do evolve over time, particularly when the existing paradigms cannot account for all research related issues. Mixed methods research has emerged because some of the research problems could not be addressed with either qualitative or quantitative approach alone. The next subsection traces the historical development of mixed methods research from 1930s to the present.

#### **4.2.3 Brief historical development of mixed methods research**

The collection of multiple data in a single study in educational and social science research has been in practice since 1930s (Sieber, 1973). According to Fraenkel et al. (2012), mixed methods research was introduced in the 1950s when researchers had developed an interest in using more than one research method in a single study. For instance, in 1959, Campbell and Fiske measured traits using multiple measures through what they called a *multitrait-multimethod matrix* as a validation process in research.

In 1973, Sieber suggested the integration of in-depth case studies with surveys in a single study (Sieber, 1973). From the 1970s, the term *triangulation* was in use first by Denzin (1978) and then by Jick (1979). The term meant the use of different methods and/or types of data (qualitative or quantitative) to study the same phenomenon within a single study (Creswell, 2012). For instance, Jick (1979) used surveys, semi-structured interviews, observations and archival materials to study anxiety and job insecurity during organizational mergers.

According to Fraenkel et al. (2012), in the 1970s and 1980s, there was total agreement that the two paradigms could not be combined. This period is also



referred to as the paradigm war or paradigm debate (Creswell, 2012). Those who did not advocate that the paradigms could be mixed were called *purists*, those who could adapt the methods based on certain situations were called *situationists*, and those who advocated the integration of the paradigms were called *pragmatists* (Rossman & Wilson, 1985).

The adoption of mixed methods research is a relatively new notion. The most prominent proponents of this approach are Bergman (2008), Bryman (2008), Creswell (2009, 2012), Greene (2007), Gorard and Taylor (2004), Onwuegbuzie and Johnson (2006), Tashakkori and Teddlie (2003, 2008), and Hesse-Biber (2010). Recently, there has been the establishment of journals completely devoted to mixed methods research such as *Journal of Mixed Methods Research* published by Sage, established in 2007; and *The International Journal of Mixed Methods for Applied Business and Policy Research* by Central Queensland University, Australia, established in 2011.

Mixed methods research can be distinguished from either qualitative or quantitative research approaches because of its unique characteristics that focus on blending the two approaches. These characteristics are described in the following section.

#### **4.2.4 Characteristics of mixed methods research**

Mixed methods research has certain characteristics. In the first place, there is use of qualitative and quantitative approaches within a single research project (Clark et al., 2008; Hesse-Biber, 2010; Teddlie & Sammons, 2010). The use of qualitative and quantitative data is during both data collection and data analysis. Thus qualitative and quantitative data can be collected either concurrently or sequentially.

Second, it focuses on the integration of approaches in a meaningful way (Bryman, 2008; Clark et al., 2008; Hesse-Biber, 2010). That is, the integration is done in such a way that each type of data complements the other so as to offset the

weakness of either of the approaches and to gain a big picture of the research problem.

Third, focus is between the priority given to qualitative and quantitative data collection and the reasons for giving such priority (Creswell, 2012). Priority can be given to either qualitative data collection, quantitative data collection or to both. In this study, for example, data collected during the first phase, where a survey was used, both quantitative and qualitative approaches received the same priority because the two approaches complemented each other. During the second phase of data collection more priority was given to a quantitative approach because the results determined the qualitative data that were to be collected thereafter through interviews and documentary reviews.

Finally, it focuses on the sequence in which qualitative and quantitative data are collected. Data can be collected concurrently, sequentially or a combination (Creswell, 2012). In this study, using a survey, both qualitative and quantitative data were collected concurrently, while the collection of qualitative data through interviews that followed the initial interpretation of the survey data used a sequential design.

To conduct mixed methods research, a proper design or designs need to be considered in advance. It is the design that will guide how data are collected and analysed. The following section briefly describes the designs of mixed methods in general, while the section that follows that discusses in greater detail the designs of mixed methods research that were used in this study.

#### **4.2.5 Designs of mixed methods research**

Bryman (2008) defines research design as a framework for collecting and analysing data. Creswell (2012) identifies six mixed methods research designs: convergent, explanatory sequential, exploratory sequential, embedded, transformative, and multiphase.

- *The convergent (parallel or concurrent) mixed methods design.* In this design both qualitative and quantitative data are collected simultaneously, data are merged and the results are used to understand the research problem.
- *An explanatory sequential mixed methods design.* In this case, quantitative data are collected first followed by qualitative data in order to clarify the quantitative results.
- *The exploratory sequential design.* This involves collecting qualitative data first to explore a phenomenon, and then collecting quantitative data to explain relationships found in the qualitative data.
- *The embedded design.* In this design qualitative and quantitative data can be collected simultaneously or sequentially where one form of data supports the other form.
- *The transformative design.* This uses one of the four designs, namely convergent, explanatory, exploratory or embedded whose aim is to address a social issue and ultimately bring change to the targeted social group.
- *Multiphase design.* This design builds on convergent, explanatory, exploratory and embedded designs where a team of researchers examine a research problem through a series of phases or separate studies.

The current study used both concurrent mixed methods design and the explanatory sequential mixed methods design. This section describes these designs with examples to illustrate the manner in which data were collected.

#### **4.2.6 Mixed methods research designs used in the study**

To collect and analyse data, the study used two designs of mixed methods research: concurrent mixed methods design, and explanatory sequential design. Each design is described in the following section.

#### 4.2.6.1 *Concurrent mixed methods design*

Concurrent mixed methods design is also known as convergent, parallel or triangulation design (Creswell, 2012). In this design, both quantitative and qualitative data are collected simultaneously, merged and used to understand the research question (Creswell, 2012). In the study, both quantitative and qualitative data received equal weight as they complemented each other (see Figure 4.1 for details). The rationale for using this design is that one form of data gives strength to offset the weaknesses of the other form (Creswell, 2012; Hesse-Biber, 2010).

In Phase 1, using a survey, both qualitative and quantitative data were collected simultaneously (see Appendices E and H). The respondents were asked to rate responses (quantitative data) and give reasons why they had given such a rating (qualitative data). This was based on the assumption that through merging qualitative and quantitative data, the research problem could be better understood. Reasons given for each rating complemented the rating, helping the researcher understand the thinking dispositions of the research participants. It was also easy to compare the results from the two data sets. For example, it was easy to judge whether the rating a respondent has chosen really reflected the reason that had been given.

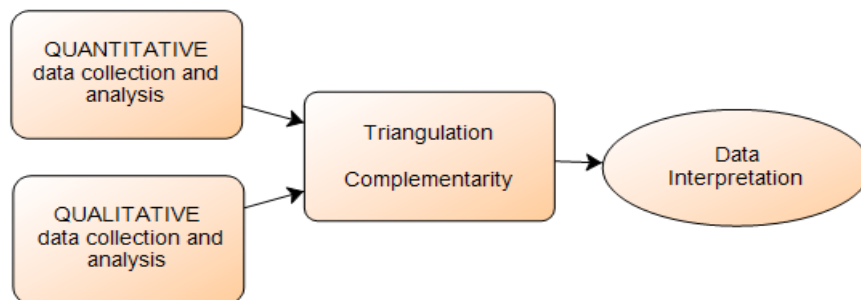


Figure 4.1. Concurrent mixed methods design.

Adapted from Creswell (2012, p. 541).

#### 4.2.6.2 *Explanatory sequential mixed methods design*

Explanatory sequential mixed methods design is synonymous with a two-phase model (Creswell & Clark, 2011). In this design, quantitative data are collected first, then qualitative data. In the current study, more weight was given to

quantitative data as it determined the selection of research participants for the focus group discussion and the type of qualitative data to be collected thereafter from the focus group discussions (see Figure 4.2). The rationale for using this design was to ensure that the qualitative data helped to “refine, extend, or explain the general picture” obtained from quantitative data (Creswell, 2012, p. 542).

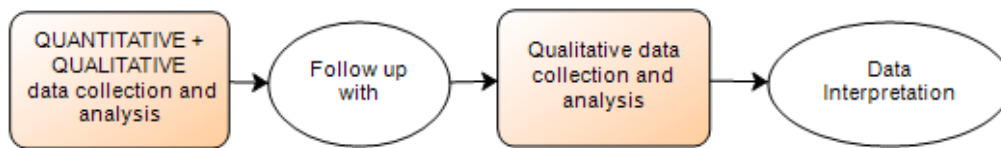


Figure 4.2. Explanatory sequential mixed methods design.

Adapted from Creswell (2012, p. 541).

In Phase 1 of the study, quantitative data were collected through a survey. Based on the results from the survey, Phase 2 followed where qualitative data were collected through focus group discussions and individual interviews as a follow-up to elaborate results from the survey. In this way, the interview data were used to clarify data from the survey.

Having considered the designs of mixed methods research, the following section discusses the issues of validity and reliability in mixed methods research. The discussion centres on ways of validating the robustness of mixed methods research.

#### 4.2.7 Validity and reliability in mixed methods research

The terms validity and reliability are understood differently in quantitative and qualitative research approaches. Giddings and Grant (2009) assert that because there are differences between paradigms, there will be different ways in which to validate mixed methods research. The section begins by briefly describing ways that are used to validate mixed methods research. The ways of validating quantitative and qualitative research approaches are included because mixed methods research can also be validated using qualitative and quantitative research validation measures.

Different frameworks have been suggested to ensure validity and reliability in mixed methods research. According to Dornyei (2011), validation could be based on the rationale for mixing the research approaches, the rationale for using specific mixed methods research designs, and the quality of specific methods used to study the research problem. The other validation frameworks are the *integrative framework* (Tashakkori & Teddlie, 2008; Teddlie & Tashakkori, 2003) and the *legitimation framework* (Onwuegbuzie & Johnson, 2006). These frameworks suggest criteria that can be followed when conducting a mixed methods research in order to ensure its robustness.

Another way of validating mixed methods research is the use of validity and reliability measures of quantitative and qualitative approaches (Ihantola & Kihn, 2011). The following sections discuss ways of validating qualitative and quantitative research approaches.

#### **4.2.7.1 Validity and reliability in quantitative research**

Traditionally, the term validity has been narrowly understood as the *truthfulness* of a measure (Shaughnessy, Zechmeister, & Zechneister, 2012). However, its meaning has been changing over time. Frankel et al. (2012) view validity broadly as the *appropriateness, correctness, meaningfulness, and usefulness* of the specific *inferences* researchers make based on the data they collect. This view includes the whole process of interpreting collected data in a given research. There are different types of validity: content, construct, criterion, internal, and external.

- *Content validity*: the content and format of the instrument (Fraenkel et al., 2012).
- *Construct validity*: the extent to which a measured variable actually measures the conceptual variable that it is designated to measure (Stangor, 2011).
- *Criterion validity*: the extent to which a measuring instrument accurately predicts behaviour or ability in a given area (Jackson, 2010).

- *Internal validity*: the extent to which detected outcome effects are due to the operationalized cause rather than to other rivalling causes (Gruijter & Kamp, 2008); and
- *External validity*: the generalizability of the research findings to different populations, settings and conditions (Shaughnessy et al., 2012).

Reliability refers to the extent to which a measure produces consistent results (Fraenkel et al., 2012; Vennesson, 2008) over time and place. Some of the types of reliability are: instrument, test-retest, and inter-rater.

- *Instrument reliability*: refers to whether an instrument works consistently (Shaughnessy et al., 2012);
- *Test-retest reliability*: the extent to which scores on the same measure, administered at two different times, correlate with each other (Stangor, 2011);
- *Inter-rater reliability*: the extent to which the ratings of one or more judges correlate with each other (Stangor, 2011).

From a quantitative research perspective, validity and reliability are solely based on the instruments used to collect data because reality is seen as objective.

#### **4.2.7.2 Validity and reliability in qualitative research**

As noted earlier, the terms validity and reliability in qualitative research do not have the same meanings as in quantitative research. External validity is equivalent to *transferability* or *fittingness*. Transferability involves use of thick description and multiple cases. Internal validity is equivalent to *credibility* or *authenticity* in qualitative research. Credibility comprises processes such as prolonged and persistent engagement, peer debriefing, member checking, progressive subjectivity, negative case analysis, and triangulation (Mertens, 2010). Reliability in qualitative research is similar to *dependability* or *auditability*. Dependability audit is the process of attesting to the quality and appropriateness of the inquiry process (Mertens, 2010).

There are numerous ways of judging the quality of qualitative research. Some of them are: prolonged engagement in the field, triangulation, peer debriefing, negative case analysis, progressive subjectivity, and rich, thick description.

- *Prolonged engagement in the field* (Cresswell, 2007). Prolonged engagement helps the researcher build rapport with the research participants, learn the culture and check misinformation.
- *Triangulation* of sources, methods, investigators and theories (Cresswell, 2007; Torrance, 2012; Yin, 2011). Triangulation can take many forms such as *inter-coder agreement* where multiple coders analyse the transcripts (Giddings & Grant, 2009), *external audits* where another researcher examines the process and product of the study (Cresswell, 2007), and *member checking (respondent validation)* where feedback is obtained from the research participants in order to clarify any misinterpretation of data that may exist (Steinke, 2004; Torrance, 2012; Yin, 2011).
- *Peer debriefing* involves working with other researchers (Mertens, 2010).
- *Negative case analysis* is used in order to eliminate outliers and exceptions (Hesse-Biber, 2010).
- *Progressive subjectivity* is the process where the researcher monitors her/his developing constructions and documents the process of change throughout the research process (Mertens, 2010). In this study, the researcher's reflective journal was used to document the research process.
- *Rich, thick description* is used to help the reader judge the transferability of the research findings (Lodico et al., 2010).

Inferring from the reviewed literature, reality in qualitative research is socially constructed. Furthermore, the researcher is seen as an instrument of data collection and analysis (Stake, 2010). That is why validation in qualitative research goes beyond instruments. Other considerations include the researcher, the research participants and other experts in the researched area.



Although various ways of validating mixed methods research have been suggested, the debate on validating mixed methods research seems to be on-going because the list of validation is not so far exhaustive. The following section discusses the rationale for using mixed methods research in the current study.

#### **4.2.8 Rationale for using mixed methods research**

There are three major reasons for using mixed methods research in the current study. The first is complementarity. In complementarity, different approaches are used to measure different aspects of the same phenomenon, hence, the findings from one of the approaches are used to elaborate, illustrate, enhance or clarify the results from another approach (Ary et al., 2010; Creswell & Creswell, 2005; Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). In this study, the preliminary analysis of survey data helped to develop questions for follow-up interviews with the research participants and the review of documents. The aim was to elicit more clarification from the research participants based on their responses from the survey.

The second rationale for using mixed methods research is to triangulate findings. Triangulation refers to comparing results between the quantitative and qualitative approaches (Onwuegbuzie et al., 2009; Onwuegbuzie, Slate, Lech, & Collins, 2007) based on sources of data, methods, and respondent validation (Torrance, 2012). In this case, using the survey, the answers from the Likert scale (quantitative data) were compared with the reasons corresponding to each of the scales (qualitative data). Likewise, the responses from the survey were compared with the responses given in interviews. This was done in order to clarify and explain the relationships between variables.

Finally, mixed methods research was used to explore the relationships between variables in greater detail. For instance, one of the purposes in the interviews was to collect more information about why the research participants rated a particular Moodle tool higher or lower. In this case, the rating could be compared with the reasons given to support the rating.

### **4.3 Case Study Design**

The study employed a case study design. Case study was used not as a unit of analysis, but as a research strategy to collect and generate data. In this sense, case study is viewed as a systematic collection of information about a person, group, or community; a social setting; or an event in order to gain insight into its functioning (Schreiber & Asner-Self, 2011, p. 12). The focus was on examining a few people, topics, issues, programmes, or a few instances of a phenomenon in their natural setting (Blatter, 2008; Crowe et al., 2011; Hays, 2004). A few phenomena were selected so that they could be studied in-depth. Since phenomena were studied in their natural setting, the researcher had no control over the research participants as is the case with other research designs such as experiments.

The process of collecting data involved “a coherent set of methods, techniques and procedures for generating and analysing the research material” (Verschuren, 2003, p. 122). These methods of generating and collecting data involved surveys, interviews, and documentary reviews. Several methods were used to collect data to ensure that the phenomena were revealed and understood through multiple lenses. The types of data collected were both qualitative and quantitative.

The purpose of using a case study was to gain a detailed picture of the phenomena (Bryman, 1989; Vennesson, 2008; Verschuren, 2003) in terms of their functioning (Crowe et al., 2011; Marczyk, DeMatteo, & Festinger, 2005; Yin, 2008). The case study also helped to capture a holistic picture and characteristics of real-life events (Schreiber & Asner-Self, 2011), conditions, relationships (Yin, 2008), and processes occurring in that particular instance (Denscombe, 2010; Timmons & Cairns, 2010). In some cases, the case study helped to shed light on a larger class of cases (Gerring, 2007). The next section defines a case study, describes its characteristics, and gives the rationale for using case study design.

### **4.3.1 Definition of a case study**

There are several definitions of case study from literature; however, most of them share some common characteristics. They include: an in-depth description and analysis of a phenomenon or phenomena (Blatter, 2008; Bryman, 2008; Gerring, 2007; Murray & Beglar, 2009; Shaughnessy et al., 2012). The selection of one or few instances of a particular phenomenon (Blatter, 2008; Murray & Beglar, 2009; Shaughnessy et al., 2012); and the study is done in a real context (Blatter, 2008; Shaughnessy et al., 2012; Yin, 2011). Thus, based on the reviewed definitions, a case study is defined as a systematic, in-depth study of a phenomenon (phenomena) in its (their) natural setting.

### **4.3.2 Characteristics of case study research**

Several features characterize a case study design. In the first place, the case study uses a variety of methods for collecting data (Murray & Beglar, 2009; Schreiber & Asner-Self, 2011; Yin, 2011). This is in line with mixed methods research. It is the use of multiple sources of data that can invite multiple interpretations of the phenomena studied. Since reality is relative and dependent on perspective, phenomena are understood much better when several methods of data collection and generation are used.

Second, it involves in-depth analysis of the phenomenon (Blatter, 2008; Marczyk et al., 2005; Murray & Beglar, 2009; Shaughnessy et al., 2012). In-depth analysis helps to gain a complete picture of the phenomenon. This also involves taking a longer time to study the phenomena.

Third, in a case study, data collection takes into account the case within its context (Willig, 2013). That is, data collection, generation and analysis consider how the phenomenon is related to its environment.

Finally, a single person, a few people, or a few instances are studied (Blatter, 2008; L. Dooley, 2002; Gerring, 2007; Marczyk et al., 2005; Murray & Beglar,

2009; Shaughnessy et al., 2012; Yin, 2011). The selection of a single person, a few people or a few instances helps to study the phenomena in-depth.

### **4.3.3 Rationale for using case study approach**

A case study approach was preferred for several reasons. First, it uses emergent data collection where data collected at one point determine subsequent data to be collected (L. Dooley, 2002). This is also in line with mixed methods research, especially when a sequential design is used. For instance, in this study, the preliminary data analysis from the survey was used to design questions for focus group discussions and one-to-one interviews. Additionally, the analysis of data collected from a particular interview could be used to determine data to be collected for the next interview.

Second, it is suitable to address the ‘how’, ‘what’ and ‘why’ questions (Ellinger et al., 2005; Woodside, 2010). In this way, a complete picture of a phenomenon is understood through the interplay of many variables (Ellinger et al., 2005) especially in terms of their relationships and the processes involved within a given setting. The research questions in this study sought answers related to student teacher and lecturer perceptions of the use of Moodle tools for promoting critical thinking (what); and how Moodle tools were used to promote critical thinking (how and why).

Third, the case study provides a unique context that helps to understand and interpret the phenomena more clearly (Jackson, 2009; Schreiber & Asner-Self, 2011). Since meaning is constructed by research participants in a given social setting, such meaning can be better understood with reference to the context in which it has been generated. The use of Moodle tools provided a clear context for understanding how such tools promoted critical thinking in online learning because the understanding of reality is subject to variance from place to place and from time to time.

Finally, since the study was not meant to manipulate the behaviour of research participants as is the case with experiments, the case study was a suitable strategy

because the focus of the study was to get the perceptions of the research participants with respect to their use of the learning management systems for promoting critical thinking. The perceptions were inferred from the research participants through scrutiny of their actions, feelings, or intentions.

Three cases located in three different universities were selected. The following section describes the sampling procedures.

#### **4.4 Sampling**

The sampling of the research participants was purposive. Purposive sampling is also known as non-random sampling (Fraenkel et al., 2012). In purposive sampling, the researchers select a relatively small sample based on prior information about that sample in order to collect the rich data needed (Adler & Clark, 2011; Denscombe, 2010; Fraenkel et al., 2012). Purposive sampling was used in this study because the selected sample (see its characteristics in 4.4.2) was ideal for the collection of rich data needed to address the research questions. The following sections describe demographic information of the research participants, and sample selection that was done in two phases: Phase 1 and Phase 2.

##### **4.4.1 Demographic information**

A total of 54 students were involved in the survey, 16 (29.6 per cent) females and 34 (63.0 per cent) males, and 4 (7.4 per cent) did not report their gender. Twenty seven (50 per cent) were pre-service and 17 (31.5 per cent) in-service teachers, while 10 (18.5 per cent) did not indicate their status of being pre-service or in-service (see Table 4.1). The age of pre-service teachers ranged from 21 to 26 years, while that of in-service teachers ranged from 27 to 47 years.

Table 4.1  
*Number of Student Teachers Involved in the Survey*

Pre-service or In-service	Gender	University			Total
		A	B	C	
Pre-service	Male	17	2		19
	Female	5	3		8
In-service	Male	3	2	5	10
	Female	3	0	4	7
Non-response		7	0	3	10
Grand Total	Male	20	4	5	29
	Female	8	3	4	15
		35	7	12	54

The age range of the students was from 21 to 47 with a mean age of 28.10, while 7 did not indicate their age (see Figure 4.3 for details). Thirty five students (64.8 per cent) were from University A, 7 (13 per cent) from University B, and 12 (22.2 per cent) from University C.

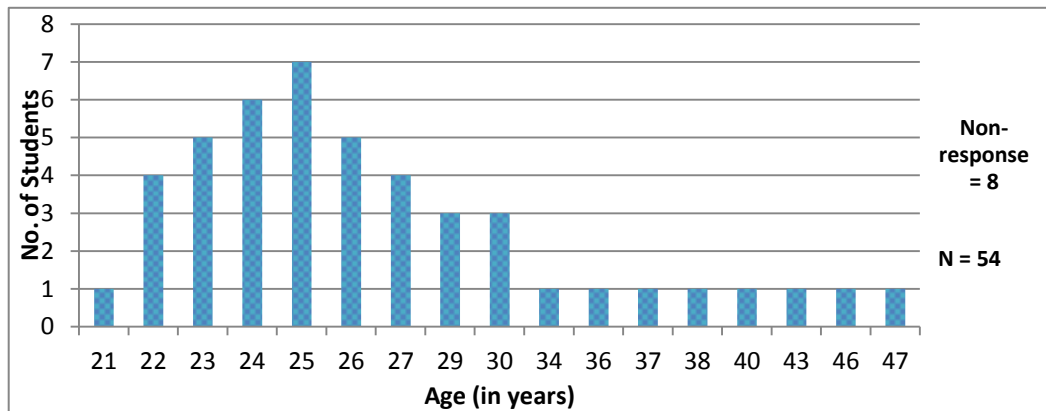


Figure 4.3. Number of students and their age

The interviews involved eight students (3 female and 5 male), four from University A, three from University B, and one from University C (see Table 4.2 for details).

Table 4.2  
*Number of Students Interviewed: By University and Gender*

University	Gender		Total
	Male	Female	
University A	4	0	4
University B	1	2	3
University C	0	1	1
Total	5	3	8

Fifteen (15) lecturers completed the questionnaire, two females and 13 males. Their age range was from 27 to 54 years, with a mean age of 38.3 (see Figure 4.4).

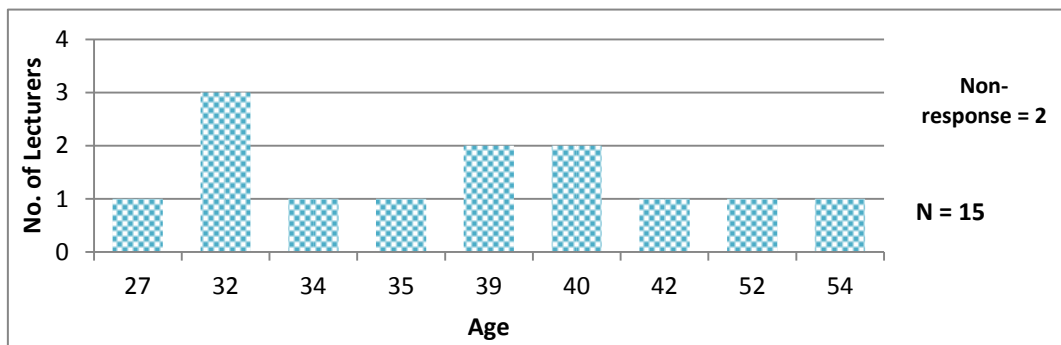


Figure 4.4. Lecturers involved in the survey by age.

Their teaching experience at the university ranged from 2 to 22 years, with the mean of 6 years (see Figure 4.5). Two lecturers did not indicate their age and teaching experience.

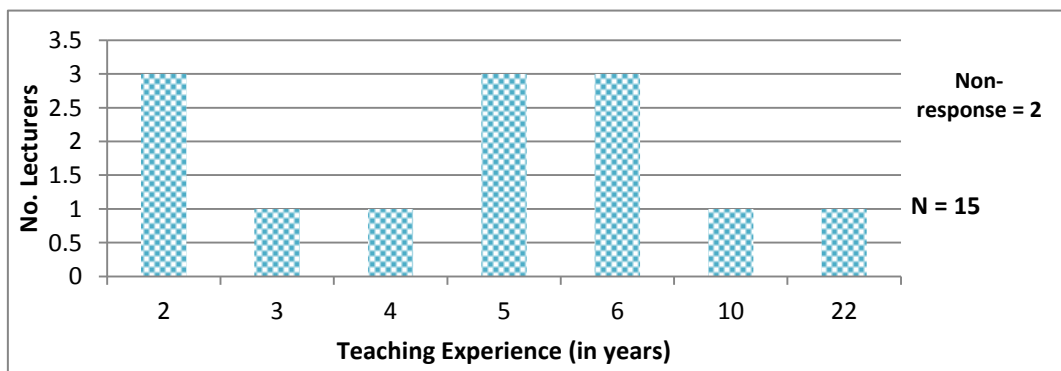


Figure 4.5. Lecturers' teaching experience at the university.

Six lecturers (2 female and 4 male) participated in the interviews (see Table 4.3 for details).

Table 4.3  
*Interviewed Lecturers: By University and Gender*

University	Gender		Total
	Male	Female	
University A	1	1	2
University B	3	0	3
University C	0	1	1
Total	4	2	6

#### 4.4.2 Phase 1: Selection of research sites and participants

Phase 1 involved the selection of research sites and research participants. Also in this phase, research participants were accessed. The details of the selection of the research sites and the participants, the access of the research participants, and their involvement in the survey are described in this section.

In Phase 1, three universities were selected. To maintain anonymity and confidentiality, these universities throughout the report are referred to as *University A*, *University B* and *University C*. The selection of the universities was based on three main factors: they were public universities because all public universities follow a similar curriculum; they dealt with the preparation of teachers; and used Moodle as a teaching-learning tool. The reason for selecting three universities was to highlight the unique ways in which Moodle was integrated into each of the universities.

The student teacher selection was based on the following criteria. Participation was open to all students in each of the three universities who took a compulsory pedagogy course related to curriculum design and development. The contents of the selected pedagogy course that they studied were similar in the three universities though there were variations in naming the course in each of the institutions. For instance, in University A and University B, it was called *Principles of Curriculum Development and Teaching*; and *Curriculum Development and Design* in University C. The University used Moodle as a learning tool; and the students were in a teacher preparation programme. The selection of the lecturers was based on their teaching that pedagogy course, using



Moodle as a teaching-learning tool, and being involved in a teacher preparation programme.

The research participants were accessed through the invitation letters sent to their respective universities (see Appendices A and C). The invitation letters indicated their participation in the survey would be followed by focus group discussions for few selected research participants. The students who were willing to participate in the follow-up focus group discussions indicated their willingness by giving their contact details in the informed consent form for the surveys, while the lecturers indicated their willingness by sending an email to the researcher as their survey was online based (see Appendices F and H for students and lecturers respectively). Prior to commencing data collection, the researcher was introduced to the coordinators of the learning management systems in the respective universities. Therefore, to gain an additional perspective, the coordinators of LMS were interviewed as well.

The participants were involved in completing survey questionnaires (see Appendices E and H). Students and lecturers completed different questionnaires. The student teachers completed a paper-based questionnaire while the lecturers' questionnaires were administered online through SurveyMonkey (see [www.surveymonkey.com](http://www.surveymonkey.com)). Prior to completing the questionnaires, informed consent was sought and obtained from each participant (see Appendices F and G for students and lecturers respectively).

#### **4.4.3 Phase 2: Research participants for focus group interviews**

In Phase 2, students and lecturers, willing to participate in focus group discussions were selected from each of the universities. This section describes how the research participants for the focus group interviews were selected, and their involvement in the interviews.

In the informed consent forms for the surveys, students willing to participate in Phase 2 of the study were asked to provide their contact details for further communication (see the last section of Appendix F). The lecturers indicated their

willingness to participate in the focus group discussion by sending their contact details to the researcher's e-mail address because their survey was online based through SurveyMonkey (see end of Appendix H). The target was to have seven students from each institution and at least three lecturers from each university so as to accommodate as many views as possible. However, this was not the case. Eight students from University B volunteered for the focus group discussion, but only four of them turned up for the actual focus group discussion. Four students volunteered from University A, but three participated in the interview; and from University C, three students volunteered, but only one turned up for the focus group discussion. In short, a total of eight (8) students, four from University A, three from University B and one from University C participated in the focus group discussion or one-to-one interview.

Six lecturers volunteered to be interviewed: two from University A, three from University B, and one from University C.

The research participants were involved in the interviews. The duration of interviews ranged from half an hour (0:30:00 minutes) to about one and quarter hours (1:25:41 hours).

#### **4.5 Methods of Data Collection and Instruments**

According to Cohen et al. (2007), the term methods refers to a range of approaches used to gather data that are used as a basis for inference and interpretation, for explanation and prediction of the findings. To triangulate data and accommodate multiple perspectives of data interpretation, multiple ways of data collection were used. This study used a survey, focus group discussions, a review of data generated from selected courses in Moodle, the course syllabi, and the reflective journal of the researcher. The following sections describe each method of data collection and the respective instruments used as well as the data analysis procedures.

### **4.5.1 Surveys**

This study used a cross sectional survey. In a cross sectional survey, data are collected at a particular point in time (Cohen et al., 2007; Creswell, 2012; Fraenkel et al., 2012). There are several reasons for using a survey. First, this study deals with assessing student teachers' and lecturers' beliefs, values and attitudes. Such attributes can be better captured through surveys (Creswell, 2012; Denscombe, 2010). Second, surveys help to collect considerable data quickly and with less cost (Denscombe, 2010). Third, the focus of the study is on patterns of activity within groups or categories of people, and such aspects can be achieved through surveys (Denscombe, 2010). Surveys are flexible in allowing different types of questions, such as open-ended or closed-ended, or Likert scales to be used in one survey (Ali & Jaafar, 2010; Arend, 2009). With the use of different types of questions, surveys help to capture different aspects of the research participants such as their thoughts, opinions, attitudes, behaviour, or feelings (Creswell, 2012; Shaughnessy et al., 2012).

Questionnaires, as indicated in Appendices E and H, were used for students and lecturers respectively. The next sections describe the process of developing, piloting, revising, and administering questionnaires.

#### ***4.5.1.1 Questionnaire development***

The questionnaires were developed to explore student teacher and lecturer perceptions of the use of Moodle tools for promoting critical thinking. Specifically, the questions focused on the student teachers' and lecturers' beliefs, attitudes towards and values for Moodle tools for promoting critical thinking. Some of the questionnaire items were modified from the literature reviewed (Teo, 2008). Some of the items were reversed in order to reduce agreement bias.

The student questionnaire was divided into three sections. The first section addressed student teachers' perceptions of Moodle tools, namely the discussion forums, quizzes, and the use of uploaded resources, through a series of statements covering the following thinking dispositions: analyticity, truth-seeking,

systematicity, maturity, open-mindedness, inquisitiveness and self-confidence. The questions were in a Likert scale ranging from 1 to 4 (i.e. Strongly Disagree to Strongly Agree), followed by a blank space for each question where the reason(s) for their choice was to be stated (see Appendix E). Although, according to Cohen, et al. (2007), open questions may lead to irrelevant and redundant information, in this study, information gathered from open questions was useful as it helped to glean the students' motivations for rating the statements, and the reasons given helped to evaluate their quality of thinking. Research indicates that multiple choice and open-ended questions measure different aspects of critical thinking (Ku, 2009; Ozuru, Briner, Kurby, & McNamara, 2013). In line with this view, by rating the statements, the critical thinking skills of students and lecturers were identified; while, by stating the reasons in the open-ended questions, their inclination and desire to think (thinking dispositions) and the quality of reasons given could be assessed. This was purposefully done to capture critical thinking skills as well as critical thinking dispositions at the same time, and using the same instrument. Other than critical thinking skills and critical thinking dispositions working together, they are context dependent. That is, they vary over time and in different places.

A four-point scale was used to avoid the neutral item. Literature indicates that there is tendency in many respondents to take a neutral position (Cohen et al., 2007; Jackson, 2009). However, it is recognised that such a decision might have forced some respondents to lean on one of the side, that is, Disagree or Agree as there was no option for neutral responses.

The second section was about student teachers' demographic information (gender, age, university, pre-service or in-service, and if in-service teachers, number of years in teaching). Respondents had to tick the correct response. These questions helped to sort the responses of the research respondents for further analysis, especially for comparison purposes. The last section was an open-ended question to capture other views related to Moodle.

The lecturers' questionnaire (see Appendix H) was divided into three parts. The first two covered demographic information and lecturers' perceptions that were examined through a series of statements that were to be rated. The statements covered the discussion forums, quizzes, the use of uploaded resources and general views. The final part was an open-ended question to capture lecturers' additional views related to Moodle as a teaching-learning tool.

Both questionnaires were reviewed by two experts. These were lecturers specialising in educational measurement and evaluation at a university. Thus, because of their expertise in the area of educational measurement and evaluation, it was thought necessary to acquire their reviews of the questionnaires. Based on the reviewers' suggestions, some statements were rephrased to increase comprehensibility and an open-ended question that demanded respondents to name other Moodle tools they had used was omitted as it could not help in the analysis of data in the current study. When the review was completed, the students' questionnaires were piloted.

#### ***4.5.1.2 Questionnaire piloting and reviewing***

When the experts' reviews had been incorporated, the student questionnaires were piloted with students from a university that was not involved in the study. The pilot survey was significant because as well as helping to examine questionnaire items in context, it also helped to get participants' views about the questionnaire items (Gideon, 2012). Ten students volunteered to participate in the pilot survey. The survey was conducted in a face-to-face mode, where the sampled students completed the questionnaires. After completing the questionnaires, there was a discussion with the participants. The researcher asked them about the comprehensibility of the questionnaire items and about the time required to complete a questionnaire. Participants felt that the questionnaire items were comprehensible and it could take about 15 minutes to 30 minutes to complete the survey. The final discussion focused on whether they felt that there was anything else relevant that could be added. They suggested that blogs and wikis could be

omitted because from their experience, these tools were not used in the selected university.

This process of piloting the survey helped to clarify several issues. First, it helped to check for the questionnaire's comprehensibility in terms of clarity of instructions, questions, words and choices. It also helped to determine how long the sampled respondents took to complete the survey. Finally, the process helped to omit questionnaire items related to blogs and wikis.

After piloting the survey, the researcher coded the data. The coded data were analysed to see whether responses were related to the research questions. It was found that most of the responses were related to the research questions.

The lecturers' questionnaires were not piloted, because the questionnaire items were similar to those of students and only differed in terms of perspective. For example, item 1 related to the discussion forum in Appendix E (for students) is similar to item 2a in Appendix H (for lecturers). As the two questionnaires were essentially the same apart from being posed in a student or lecturer perspective and the students and lecturers had engaged in the same activities, piloting with students was considered sufficient to establish the suitability of the questionnaire design.

After being piloted, the student teachers' questionnaires were reviewed by the researcher. Some Moodle tools such as wikis and blogs were omitted after learning that they were not used as teaching-learning tools in most of the courses. Though blogs were used by some of the students, they were not embedded in the Moodle platform. The review of the lecturers' questionnaires involved omitting items related to blogs and wikis as many students had indicated that they did not use such tools in Moodle platform, but some students used them in other online environments.

#### **4.5.1.3 Questionnaire administration**

The student teachers' questionnaires were administered in a face-to-face environment with the hope of maximizing return rates. The researcher requested the lecturers whose courses were researched to spare some time during their lecture hours to administer the questionnaires (for details see Appendix Q). The lecturers were also present during the questionnaire administration so that they could help to collect those questionnaires. The researcher orally explained the purpose of the study, rights of the research participants in the study and about signing the informed consent document. In all the three universities, most of the students requested to submit the questionnaires during the next lecture hour. In such cases, the questionnaires were collected by the lecturer concerned and later given to the researcher. In some cases, some of the questionnaires were collected on the spot.

The lecturers' survey was administered online through SurveyMonkey accessed through [www.surveymonkey.com](http://www.surveymonkey.com) (see questionnaire in Appendix H). The link to the survey was sent to the mailing lists of the academic staff in the respective universities. The online method was preferred because it was difficult to physically administer paper-based questionnaires to each member of the academic staff as it was difficult to get them in one place, in contrast to students. The online survey was also preferred because it is cost effective in terms of reducing travel, postage, venue arrangement, data entry, and data could be gathered quickly (Denscombe, 2010).

To ensure a high rate of questionnaire return, the students and lecturers were informed in advance about the study via invitation letters sent to their respective universities (see Appendices A and C). The lecturers were reminded thrice through the same mailing list the survey was sent, while the students were reminded about returning the questionnaires by their respective lecturers several times during the lecture hours.

#### **4.5.1.4 Response bias and response return rate**

*Response bias* is a state where individuals who respond to a survey differ significantly from those who are invited to participate, but do not respond (Menachemi, 2011). Some researchers tend to assume that high response rates are free from response bias. However, high response rates can still be prone to response bias if there is a significant difference in the results between early respondents and later respondents (Creswell, 2012; Lahaut et al., 2003; Menachemi, 2011). Likewise, a low response rate can be free from response bias if there is no significant difference between early returners and late returners (Creswell, 2012; Lahaut et al., 2003).

*Wave analysis* was used to check for response bias. It is a procedure where the researcher groups the returned questionnaires by intervals, such as weekly, and checks to see whether the answers to selected questions change over time (Creswell, 2012). In this case, early returners and late returners were compared in order to estimate non-response bias where the late returners were taken as close to non-response (Lahaut et al., 2003). In this study, the researcher checked the results of some of the returned questionnaires at varying intervals to detect any degree of potential response bias. It was noted that there was no significant difference in terms of the answers given to most of the selected questions in the survey between early, middle and late respondents. This indicates that there was no potential response bias. Thus, it can be inferred that data collected were valid and reliable.

A *response return rate* is the percentage of questionnaires that participants return to the researcher (Creswell, 2012, p. 390). Forty six (46) questionnaires were given to students from University A, with 35 (76%) returned; 10 to University B, with seven (70%) returned; and 20 questionnaires to University C, with 12 (60%) returned. From the courses listed in the learning management systems, the target sample of lecturers who taught pedagogy courses related to curriculum design and development was about 26 for all three universities. Out of 26 lecturers, 15 (58%) responded to the survey.



#### 4.5.1.5 Reliability of instruments

Huck (2012) defines instrument reliability as the consistency across the parts of a measuring instrument, with the “parts” being individual questions or subsets of questions (p. 71). Internal consistency reliability of the questionnaires was calculated using Cronbach’s alpha (represented as  $\alpha$ ). Cronbach’s alpha was used because it is suitable when test items have more than two alternatives (Gravetter & Forzano, 2012). The questionnaire items had four alternatives: Strongly Disagree, Disagree, Agree, and Strongly Agree. Cronbach’s alpha is calculated using the following formula:

$$\text{Cronbach's alpha} = \frac{k}{(k - 1)} \left( 1 - \frac{\sum \text{var}(i)}{\text{var}(\text{sum})} \right) \quad (1)$$

Where  $k$  is the number of items,  $\text{var}(i)$  is the variance of an item, and  $\text{var}(\text{sum})$  is the variance of the totals for each participant (Hinton, 2005).

Cronbach’s alpha values range from 0 to 1.00, where a higher value indicates a higher degree of internal consistency.

The students’ instrument consisted of 26 items with 54 participants and Cronbach’s alpha was 0.899. The lecturers’ instrument consisted of 24 items with 15 participants and its Cronbach’s alpha was 0.778 as indicated in Table 4.4. According to Tavakol and Dennick (2011), acceptable values of alpha range from 0.70 to 0.95.

Table 4.4  
SPSS 21 Output of the Instruments’ Internal Consistency Reliability

Cronbach’s Alpha	N of Items	Cronbach’s Alpha	N of Items
.899	26	.778	24
Students’ instrument		Lecturers’ instrument	

The preliminary analysis of the survey was used as a follow-up through the focus group discussions with both the students and lecturers. The following section discusses details related to the focus group discussions and interviews.

#### 4.5.2 Focus group discussions and interviews

A total of 16 (11 male; 5 female) research participants were interviewed. There were eight students, six lecturers and two technical staff. Out of the eight students, four were from University A, three from University B, and one from University C. With lecturers, two were from University A, three from University B and one from University C (see Table 4.5 for further details).

Table 4.5  
*Students and Lecturers Interviewed: By University and Gender*

University	Gender		Total
	Male	Female	
University A	5	2	7
University B	5	1	6
University C	1	2	3
Total	11	5	16

The following section describes the groups of people involved in the interviews. The groups are students, lecturers and technical staff from the respective universities.

##### 4.5.2.1 *Students' focus group discussions*

To discover the perceptions of the selected student teachers, focus group interviews were used as they enabled the student teachers to articulate their perceptions of the Moodle tools they used for promoting critical thinking. The focus group discussion was used because it is an efficient method of collecting data from multiple participants (Onwuegbuzie et al., 2009) and the research participants shared similar knowledge about the research topic (Morgan, 2008; Zucker, 2009). Most of the questions for the discussion emerged from the analysis of the questionnaires and from the researcher's personal observations. Specifically, the questions focused on the role of Moodle tools, namely online discussion forums, quizzes and uploaded resources, for promoting critical thinking. To that end, guiding questions were developed (see Appendix I). The questions explored students' experience of using a particular Moodle tool, the potential characteristics of such a tool for promoting critical thinking, how they would use such a tool as teachers in the future, the challenges they encountered or

may encounter when using the tool, and how they dealt/would deal with such challenges.

Two focus group discussions were conducted; one with four students from University A, the other with two students from University B. Two interviews with students from University B and University C were on a one-to-one basis as other participants did not arrive for the focus group discussion. The focus group discussions and interviews were audio-taped. The focus group discussions and individual interviews were audio-taped and transcribed verbatim by the researcher for analysis.

#### **4.5.2.2 *Interviews with lecturers***

Interviews with lecturers were carried out on a one-to-one basis. Based on their scheduled timings, it was difficult to meet them as a group for the interviews. Six lecturers were interviewed: two from University A, three from University B and one from University C.

Guiding questions were developed for the interviews (see Appendix K). The questions focused on the discussion forums, quizzes and the use of uploaded resources. To explore the lecturers' perceptions of Moodle tools for promoting critical thinking, the questions focused on how lecturers used those tools for teaching-learning purposes, effective ways of using the tools for promoting critical thinking, challenges they encountered when using the tools and how they dealt with such challenges. The interviews were audio-taped and transcribed verbatim for analysis.

#### **4.5.2.3 *Interviews with technical staff***

Two technical staff were interviewed. One of them coordinated the LMS in Universities A and B, and the other was from University C. They were interviewed to gain additional perspectives on the use of Moodle as a teaching-learning tool. Technical staff greatly influence the use of Moodle as a teaching-learning tool in a number of ways. Some of the ways are:

- training lecturers and students on the use of Moodle;
- in some cases, determining the layout and type of resources to be uploaded into Moodle;
- dealing with immediate technical issues such as retrieving lost passwords for students and lecturers; and
- helping students access certain resources in the system.

Seeing the potential role technical staff had in the use of Moodle, the researcher decided to interview them. The interview questions focused on their responsibilities as coordinators of the LMS, technical support given to lecturers and students, tools in Moodle that they thought had the potential for promoting critical thinking, and training policies in their respective universities (see Appendix M for details). Therefore, responses from the questions above partly helped to address the research questions, especially on the technical staff's role of ensuring that lecturers and students used Moodle for teaching-learning purposes.

#### **4.5.3 Review of documents**

The course syllabi and the learning and assessment tasks in Moodle were reviewed to ascertain the inclusion or exclusion of critical thinking. Permission to access such data was sought and gained (see Appendices O and P). First, the course contents of the selected Moodle mediated courses were read word for word. Among other things, the focus was on either the inclusion or exclusion of critical thinking components in the courses; and how the learning outcomes through tasks or activities reflected critical thinking components throughout the course. To be able to access such data in Moodle, the researcher was given guest account access to the relevant Moodle courses.

Second, the learning tasks in the selected courses were reviewed. In this case, online-generated data from the discussion forums, and other tasks (assignments) were reviewed. The questions related to the assignments were examined to ascertain the incorporation or non-incorporation of critical thinking. A task was judged as having critical thinking elements if it involved processes such as recall, comprehension, analysis, evaluation, synthesis, inference or decision-making.

The discussion forums from Moodle were saved in a text format. From this format it was easy to delete all the identities of the participants to maintain anonymity. Each post was put in its own paragraph and was numbered. Putting each post in its own paragraph helped to analyse the posts as each post was taken as a unit of analysis. The numbering of the posts helped to ascertain the total number of the posts and to manage them. However, at a later stage, posts of each student were grouped to trace the nature of individual thinking that was exhibited over a four week period. Then the posts (students' posts; and lecturers' questions and comments) were read word for word and analysed using the RCS-CAIS Model (see Appendix R and the section on data analysis). The examination of the lecturers' questions and comments were significant as they prompted the generation of responses by students. Thus, the extent to which the responses were critical or uncritical partly could depend on the nature of the questions, comments, or prompts the lecturers posed.

#### **4.5.4 Reflective journal**

The researcher kept a reflective journal that captured daily reflections on the research process and the major observations of the day. The journal entries included aspects such as what went well, what needed improvement, and the schedule for the next data collection process. It also included documentation of other research processes.

#### **4.6 Data Analysis**

Quantitative data from the survey and the classified asynchronous discussion forum posts were analysed through SPSS version 21. In this case, results were presented in percentages and frequencies. Qualitative data from focus group discussions, one-to-one interviews, and responses from open-ended questions in the survey were analysed using NVivo 10.

The next sections describe the analysis of data collected from the survey, focus group discussions and one-to-one interviews, and Moodle tools.

#### **4.6.1 Questionnaire data**

The questionnaire data related to the Likert scale were analysed using a Statistical Package for Social Sciences (SPSS version 21). Descriptive statistics were used. The results were displayed in the forms of frequencies and percentages. Qualitative data generated from the reasons stated in the Likert scale and from open-ended questions were analysed using NVivo 10 to generate themes related to the research questions. The two types of data were analysed separately, but results were presented side by side. The use of both quantitative and qualitative data in the survey helped to correlate the findings between the two types of data as well as complementing each other. That is, the statistical data (ratings) were compared with the reasons given for each rating so as to ascertain the reasons behind choosing a particular rating level. To that end, a classifying framework adapted from Ennis (1996) was developed. A reason given was classified as *Relevant*, *Unclear* or *Absent*. A reason that indicated the presence of disposition in question was classified as Relevant. A reason that either begged the question, or used words difficult to evaluate the reason such as “To some extent”, or “Somehow” was categorised as Unclear. A reason where students categorically stated that they lacked a given disposition or the reason given was irrelevant to the question was marked as Absent. It would have been impossible to collect such views if only one approach was used.

#### **4.6.2 Focus group discussion and interview data**

The transcribed qualitative data from the focus group discussions, and one-to-one interviews were analysed using NVivo 10. The texts were read word for word to gather themes related to the research questions. Inter-rater reliability and inter-rater agreement were calculated to determine the degree of agreement between two coders. The section below defines an inter-rater reliability and inter-rater agreement, and describes how the agreement was reached.

#### 4.6.2.1 *Inter-rater agreement of interview data*

One of the transcribed interviews was inter-coded to determine inter-rater reliability and inter-rater agreement. Both measures were used because inter-rater agreement does not take into account agreements that may occur by chance. Inter-rater reliability (interobserver reliability) is the degree to which independent observers show agreement in their observations (Passer, 2014). Inter-rater agreement is a measure of consistency that assesses the agreement of observations made by two or more raters or judges (Jackson, 2009). It is calculated using the following formula:

$$\text{Inter - rater Agreement} = \frac{\text{Number of Agreements}}{\text{Number of Possible Agreements}} \times 100 \quad (2)$$

To establish inter-rater agreement, one of the transcribed interviews was coded by two different researchers. The transcribed interview from Student 07 was chosen because it had more nodes than the other transcribed interviews of students. One of the researchers coded the interview using NVivo 10 while the other researcher used the *comment* option in *Microsoft Word 2010*. The inter-coder agreement is displayed in Table 4.6. The table shows the names of nodes, the coders (AM & AK), the frequency of codes for each coder, and the inter-coder agreement.

Table 4.6  
*Inter-rater Coding for Interview Data for Student 07*

S/No	Node Name	Coders & No. of Codes		Coder Agreement
		Coder AM	Coder AK	
1.	Discussion forum – Application, role or use	4	4	1
2.	Discussion forum – Challenges	2	2	1
3.	Discussion forum – Characteristics for promoting critical thinking	6	5	0
4.	General challenges related to Moodle	2	2	1
5.	General recommendations related to Moodle	3	3	1
6.	Feedback – Prefer both online and face-to-face	1	1	1
7.	Feedback – Prefer face-to-face	1	1	1
8.	Feedback – Prefer online	1	1	1
9.	Support – Pedagogical support given to lecturers	2	2	1
10.	Support – Technical support given to lecturers	2	1	0
11.	Quiz – Application, role or use	3	3	1
12.	Quiz – Challenges	2	2	1
13.	Quiz – Characteristics for promoting critical thinking	3	3	1
14.	Quiz feedback – Prefer computer-based (online)	1	1	1
15.	Uploaded resources – Application, role or use	2	2	1
16.	Uploaded resources – Challenges	1	1	1
17.	Uploaded resources – Characteristics for promoting critical thinking	1	1	1
18.	Uploaded resources – Recommendations	2	2	1

Note: Coder agreement (1= agreement; 0 = no agreement)

The data of the two coders were entered in SPSS 21 where both the inter-rater agreement (using percentages) and inter-rater reliability (using Cohen's Kappa coefficient) were calculated. The use of the latter was an attempt to correct agreement that may occur by chance. Cohen's Kappa was computed using the following formula:

$$Cohen's\ Kappa\ (\kappa) = \frac{PA - PC}{1 - PC} \times 100 \quad (3)$$

Where PA is observed percent agreements, and PC is percent agreement expected from chance.



The inter-rater agreement was 88.9 per cent as displayed in Table 4.7. Jackson (2009, p. 69) considers that a 90 per cent agreement as fairly high, while a 40 per cent is low.

Table 4.7  
*SPSS 21 Output of Inter-coder Agreement for Student 07*

		Frequency	Percent	
			Valid	Cumulative
	.00	16	88.9	88.9
Valid	1.00	2	11.1	100.0
	Total	18	100.0	

Cohen's Kappa coefficient was 0.843 as indicated in Table 4.8. Thus, this inter-rater reliability indicates that the inter-coder agreement is almost perfect based on the interpretation given by Hewitt (2005) where 0.61 – 0.80, and 0.81 – 0.99 indicate substantial agreement and almost perfect agreement respectively.

Table 4.8  
*Inter-rater Reliability for Coded Interview for Student 07*

		Value	Asymp. Std. Error <sup>a</sup>	Approx. T <sup>b</sup>	Approx. Sig.
Measure of Agreement	Kappa	.843	.100	6.031	.000
N of Valid Cases		18			

Notes: a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.

Having seen that both the inter-rater agreement and the inter-rater reliability were high, the rest of the interviews were coded by the researcher.

### 4.6.3 The RCS-CAIS model

Data from Moodle tools, namely the discussion forum posts, were analysed using the RCS-CAIS Model to ascertain students' critical thinking skills and thinking dispositions. The model was developed specifically for measuring critical thinking in tasks related to asynchronous discussion forums. It was developed based on existing literature (B. Bloom et al., 1956; C. Perkins & Murphy, 2006). The model was tested on 104 posts generated by 12 students and one lecturer in an

asynchronous discussion forum from University B. The results have been outlined in Chapter 5 (see in Figure 5.23, section 5.5.1).

#### ***4.6.3.1 Rationale for developing the RCS-CAIS model***

Three major reasons led to the development of the RCS-CAIS model. First, in the current review of literature, recall, comprehension and dispositional factors have not been related to critical thinking, especially in studies related to asynchronous discussion forums. From practice, it is known that recall, comprehension and other thinking skills, and dispositional factors influence critical thinking. These thinking skills and dispositional factors do influence critical thinking. To give a balanced picture of an individual's critical thinking, C. Perkins and Murphy (2006) had suggested that basic skills should be measured along with critical thinking. However, since then, to the best of my knowledge of the literature reviewed, there has been no study related to asynchronous discussion forums that has attempted to include recall and comprehension as part of critical thinking. The existing models related to the asynchronous discussion forums capture only what has been traditionally regarded as higher order thinking. By doing so, they exclude recall, comprehension, and dispositional factors. As discussed earlier in Chapter 2, when measuring critical thinking in LMS, elements not directly related to the traditional view of critical thinking have been excluded from the analysis for several reasons, such as being social in nature (Corich, 2009; Corich et al., 2011; Jacob & Sam, 2008; Leng, 2012).

The second rationale is to test the model and see how it works in measuring critical thinking skills, including recall and comprehension, and dispositional factors in tasks related to asynchronous discussion forums.

The final rationale is to invite a conversational discourse on measuring critical thinking in tasks related to asynchronous discussion forums and see how the model works in other contexts. These contexts may include learning management systems other than Moodle, or outside LMS.

#### 4.6.3.2 *Procedures for developing the model*

Several aspects were considered when developing the model. One of the considerations was the review of literature related to models on critical thinking in tasks related to asynchronous discussion forums. Review of current literature indicates that measurement of critical thinking in asynchronous discussion forums does not take into account recall and comprehension. The focus has been on thinking skills such as analysis, synthesis, inference, and evaluation. For example, clarification, assessment, inference and strategies (C. Perkins & Murphy, 2006), and CCTS (Facione, 1990, 2013) support this argument.

After reviewing the literature, the identification of the items for critical thinking was considered. The components of the model are based on existing literature, mainly on Bloom's taxonomy (B. Bloom et al., 1956) and clarification, assessment, inference and strategies model (C. Perkins & Murphy, 2006).

The RCS-CAIS model has two components: *recall, comprehension, and socialisation*, and *clarification, assessment, inference and strategies*. RCS is an acronym for recall, comprehension, and socialisation (denotes dispositional factors). CAIS stands for clarification, assessment, inference and strategies. These components influence and are influenced by dispositional factors.

*Recall, comprehension, and socialisation (RCS)*. The wording of the indicators in the model was determined by the context of asynchronous discussion forums. Below are the descriptors of the elements.

- *Recall (remembering)*: The post indicates recall of ideas, materials, or phenomena related to the discussion.
- *Comprehension*: The post gives examples, summarises, or classifies the issue or idea under discussion, but it does not relate to other issues or ideas.
- *Socialisation*: It denotes posts that are affective or social in nature and have the potential for sustaining online discussion.

In practice, recall, comprehension, and dispositions influence critical thinking.

*Clarification, assessment, inference and strategies (CAIS)*. CAIS has four elements: clarification, assessment, inference and strategies. The descriptors of each element are given below.

- *Clarification*: The post analyses and discusses the issue precisely and clearly.
- *Assessment*: The post indicates relevant gathered information and makes value judgement based on the given situation.
- *Inference*: The post makes generalisations and arrives at rational conclusions.
- *Strategies*: The post proposes a solution(s) to a given issue (problem).

Recall, comprehension and dispositional factors influence and are influenced by critical thinking. This relationship is indicated in Figure 4.7. At a micro-level, the individual's thinking is influenced by thinking skills such as recall, comprehension, analysis, assessment, inference, and strategies, and by dispositional factors. At the macro-level, other than the thinking skills, the individual's thinking is influenced by institutional culture and sociocultural factors. Institutional factors may include the nature of the teaching-learning process; while sociocultural factors include all ways of life within a sociocultural context.

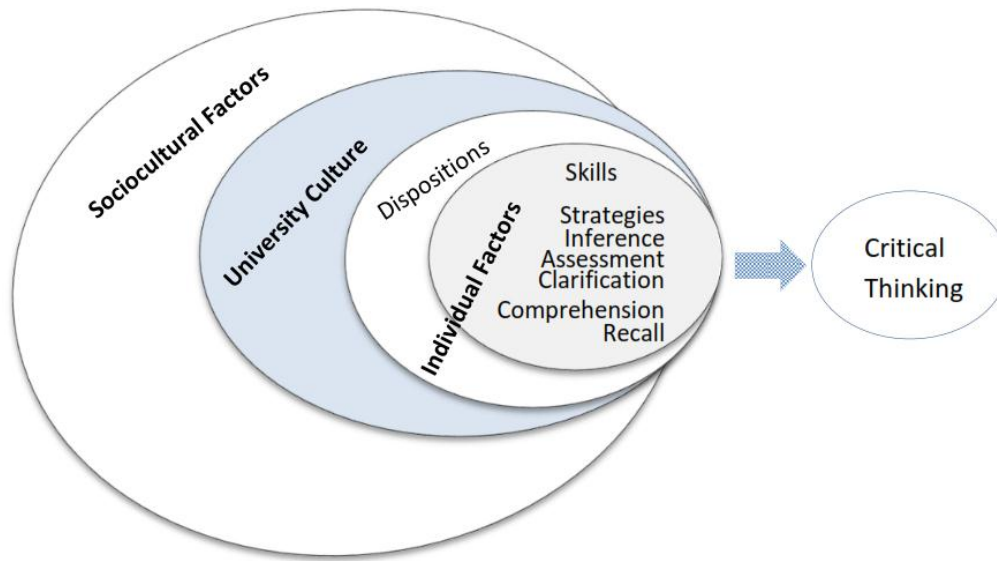


Figure 4.6. Components that influence critical thinking

Figure 4.6 indicates the complexity of critical thinking. The nature of critical thinking is influenced by individual, institutional and sociocultural factors.

#### 4.6.3.3 *Coding and analysis of the posts*

The post was taken as a unit of analysis. It was considered that when a student or the lecturer posts something on the discussion forum, it is meant to represent a complete idea of the author of the post. The other reason for taking the post as the unit of analysis was that the levels of thinking are closely related to the extent that a post may have several thinking skills.

Using NVivo 10, each post was classified either into categories of recall, comprehension, socialisation, clarification, assessment, inference or strategies. The post with multiple classifications was coded to the category it fully met the criteria of that category. The coding criteria are indicated in Appendix R.

The classified posts were then analysed using quantitative descriptive statistical techniques via SPSS 21, where results were displayed in the form of frequencies and percentages. This process formed what is known as data transformation (Gruijter & Kamp, 2008). Consequently, the extent to which student teachers displayed thinking skills and thinking disposition in online posts was manifested

as each post fell into any of the categories of thinking skills. The results are presented in Chapter 5, section 5.5.1 and in Figure 5.23.

Though the model can be used to measure critical thinking for responses generated in tasks related to asynchronous discussion forums, it can also be used in non-online environments.

#### 4.6.3.4 *Inter-rater agreement of the coded posts*

Posts generated from Moodle by one of the universities were coded by two different researchers in order to ascertain the degree of inter-coder agreement and inter-rater reliability. The inter-coder agreements are shown in Table 4.9.

Table 4.9  
The Coding Agreement of Discussion Forum Posts

Item	Coder A.M	Coder I.M	Coding Agreement
Knowledge	3	3	1
Comprehension	8	8	1
Application	3	3	1
Clarification	42	41	0
Assessment	23	21	0
Inference	20	20	1
Strategies	4	4	1

Note: Coding agreement (1 = agreement; 0 = no agreement)

Using SPSS 21, the inter-coder agreements was calculated. It was 71.4 per cent as displayed in Table 4.10. This also indicates a relatively high agreement between the two coders.

Table 4.10  
SPSS 21 Output of Inter-coder Agreements for Posts

		Frequency	Valid Percent	Cumulative Percent
Valid	.00	5	71.4	71.4
	1.00	1	14.3	85.7
	2.00	1	14.3	100.0
	Total	7	100.0	

Cohen's Kappa value was 0.667 as indicated in Table 4.11. This indicates that there is a high agreement between the two coders.

Table 4.11  
*Inter-rater Reliability for Discussion Forum Posts*

		Value	Asymp. Std. Error <sup>a</sup>	Approx. T <sup>b</sup>	Approx. Sig.
Measure of Agreement	Kappa	.667	.174	4.802	.000
N of Valid Cases		7			

Notes: a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.

Discussed below is a summary of the process of data collection and analysis.

#### **4.7 Summary of Data Collection and Analysis Procedures**

Figure 4.8 summarises the process of data collection and data analysis. Through the survey questionnaire, quantitative and qualitative data were collected concurrently, but analysed separately. This formed the first part of data integration process where the interpretation of both qualitative and quantitative data helped to identify data to be collected in the follow-up stage. Focus group interviews, one-to-one interviews, and the review of documents were part of the follow-up to the survey. At this stage, only qualitative data were collected. From the follow-up data collection process, themes related to the research questions were generated. Following the generation of themes, quantitative and qualitative data analyses were integrated where the results were presented by themes. Quantitative and qualitative data were presented side by side. Qualitative survey data were quantitized into frequencies based on the dispositions, namely analyticity, systematicity, truth-seeking, maturity, open-mindedness, inquisitiveness, and self-confidence. Discussion forum data were categorised according to the RCS-CAIS model. The final data analysis was an iterative process where the quantitative and qualitative data initially collected through the survey were related to the follow-up qualitative data in order to re-interpret data (i.e. compare, complement the findings or find new existing patterns of responses). At this stage, the final conclusions were drawn based on the various sources of data.

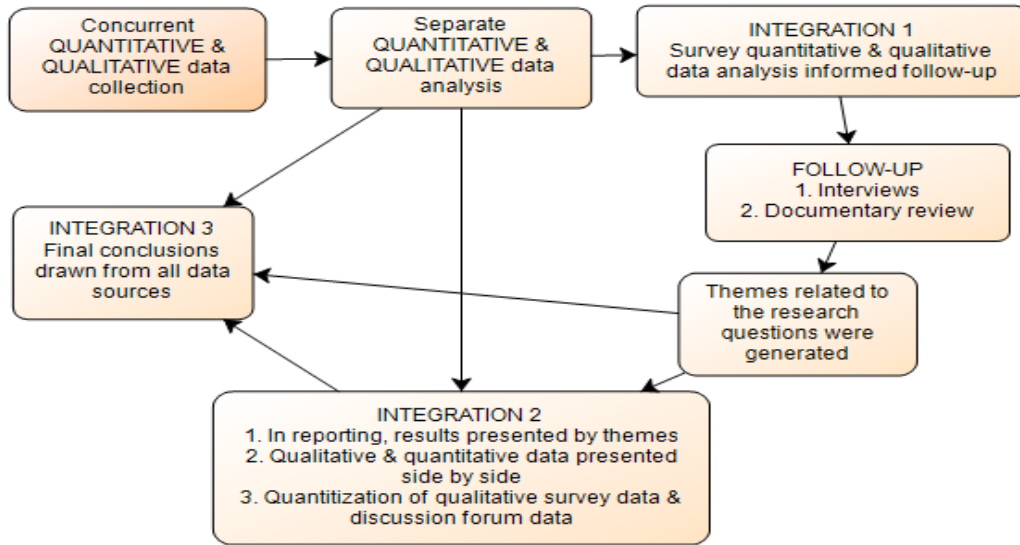


Figure 4.7. Data collection and analysis process

Validity and reliability are very significant for judging the robustness of a research study. In this study, validity and reliability were also taken into account. The following section describes how validity and reliability were ensured in the current study.

#### 4.8 Validity and Reliability

Several considerations were taken into account to ensure validity and reliability in the current research study. In the first place, the study utilised triangulation. Triangulation involved the use of different data sources such as surveys, interviews, researcher's reflective journal, course syllabi and data generated from the asynchronous discussion forums. There was also use of multi-methods to collect and generate data: surveys, interviews, and documentary reviews. Member checking was used where the research participants had the opportunity to review the transcribed interview data to ascertain the degree of correctness.

Second, *inter-coder agreement* and *inter-rater reliability* were considered. In this case the transcribed interviews and downloaded discussion forums were coded by the researcher and by other experts in the area so as to ascertain the degree of inter-rater agreement and inter-rater reliability. The details of inter-rater agreements for the transcribed interview have been discussed in section 4.6.2.1;



while the inter-rater agreement for the coded discussion forum posts have been described in section 4.6.3.4.

Third, the internal consistency reliability of the instruments (questionnaires) was taken into account. The internal reliability using Cronbach's alpha were 0.899 and 0.779 for students' and lecturers' questionnaires respectively (see details in section 4.5.1.54.5.1.5).

Finally, the study used *sample integration*. This is the process of involving the same research participants in both the quantitative and qualitative components of data collection and generation. The research participants who were involved in the interviews in Phase 2 were selected from the survey respondents from Phase 1. After completing the questionnaires in Phase 1, the student teachers willing to participate in Phase 2 of the study that involved interviews provided their contact details in the informed consent form for the survey, while lecturers indicated their willingness to participate in Phase 2 by sending their contact details to the researcher via email because their survey was done online. In this case, some research participants were involved in both the survey and in the interviews.

Issues related to ethics were taken into account before, during and after data generation and collection processes. The subsequent section describes the ethical considerations that were taken into account.

#### **4.9 Ethical Considerations**

Several ethical considerations were taken into account prior to, during, and after conducting this study. They include: obtaining permission from gatekeepers, rights, and anonymity of research participants and their institutions, member checking and confidentiality of participants' data, and conflict of interest. Each item and its supporting evidence are given and discussed in the following sections.

#### **4.9.1 Obtaining permission**

Invitation letters were sent to the respective universities where research was to be carried out. The invitation letters, *inter alia*, stated voluntary participation of the research participants, the right to withdraw from the study if they wished to do so, their anonymity and confidentiality of their information (for details, see Appendices A and C). Based on the invitation letters sent to the respective universities, permission letters were given to the researcher to conduct research in the institutions. The letters, among other things, stated the research participants required to be involved in the study and the duration of the research period (for details see Appendices B and D).

#### **4.9.2 Participants' rights and anonymity**

Research participants' rights received prime consideration. Their participation in the study was voluntary. They had the rights to withdraw from the study at any stage if they wished to do so. They had the right to decline to have part of their information reported if they did not wish it to appear in the published report. These details are indicated in the invitation letters (Appendices A and C) and informed consent forms (Appendices F, G, J, L, N and P). Furthermore, the purpose of the study was communicated to the institutions and the respective research participants throughout the research period (for details see Appendices A, C, F, G, J, L, N and P). Additionally, the research participants were orally told the purpose of the study prior to engaging in any research task. Also, before engaging in any research task, the research participants signed an informed consent that, among other things, stated their voluntary participation, their rights, and their anonymity (see Appendices F, G, J, L, N and P).

To safeguard the identity of the research participants and their institutions, and their data; their names and the names of their institutions have been kept anonymous in reporting. Transcribed data do not bear names of either the research participants or their institutions, instead pseudonyms have been used such as *University A*, *Student 01* or *Lecturer 10*. Finally, information given by the

research participants was not shared with any persons other than the research supervisors.

#### **4.9.3 Member checking and confidentiality of participants' data**

Transcribed interview data were sent to research participants via their e-mail for member checking to ascertain the degree of correctness. They had the opportunity to correct information or decline such information appearing in the report within two weeks after receiving the transcribed data. Some of the research participants' verification of information was via e-mail, while others verified the information in person after meeting the researcher. Two of them did not verify the information within the given period. It was assumed that they agreed with such information. Finally, they will have access to the summary of the findings once the study is concluded.

The questionnaire and the focus group data are securely locked in the researcher's cabinet. They will be securely locked for at least five years, thereafter the questionnaires and transcribed data will be destroyed, and the recorded data will be erased. Additionally, transcribed data do not bear either names of the research participants or their institutions, instead pseudonyms are used.

To avoid inconvenience, the researcher adjusted his timing according to the participants' schedules. Information for the meetings with the research participants was circulated in advance so that the research participants' scheduled activities were not disrupted. Access to students' and lecturers' data in Moodle was sought and granted; and such data are password protected in the researcher's laptop and are only used for the purpose of this research study.

#### **4.9.4 Conflict of interest**

Some of the data were collected from the university where the researcher works. For the time the study was conducted, the researcher was on a study leave. Thus, being on a study leave, the researcher was not involved in any kind of teaching. Furthermore, being one of the academic members of staff, students would feel

obliged to participate in the study. To overcome such feelings, students were categorically told that their participation in the study was voluntary and their refusal to participate in the study could not have any negative effect academically or socially.

#### **4.10 Chapter Summary**

The first section of this chapter has discussed research paradigms with a focus on their characteristics, types, and the assumptions underlying each paradigm. The second section has discussed mixed methods research with an emphasis on its meaning, brief history, characteristics, designs, and the rationale for using mixed methods research. Along with defining a case study, the third section has discussed the characteristics and the rationale for using case study approach. The sampling procedures have been discussed in the fourth section. Methods of data collection and generation, namely surveys, interviews, review of data generated from Moodle and the researcher's reflective journal; and procedures and instruments for data analysis have been discussed in the fifth and sixth sections respectively. The final section has discussed ethical considerations that were taken into account prior to, during, and after carrying out the study.

Employing methodology and methods discussed in this chapter, results related to the research questions were obtained. This is the focus of the next chapter. The results have been presented according to the themes related to the research questions.



## **Chapter 5**

### **Results**

Chapter 4 has discussed the methods and procedures for collecting, generating and analysing data. This chapter presents the results from these data. The results are organised into themes based on the research questions. Representative quotations and examples have been used to illustrate points made.

This chapter is divided into five sections. The first section describes the demographic information of the research participants. Section two addresses student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking. The third section reports results related to student teacher and lecturer perceptions of the effective ways of using asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking. The fourth section presents results from technical staff. The final section outlines results related to student teachers' critical thinking skills in tasks related to asynchronous discussion forum posts, and other evidence of critical thinking from the course syllabi and the learning tasks in Moodle.

#### **5.1 Demographic Information**

A summary of demographic information of the research participants involved in the study is illustrated in Table 5.1. Details of the participants have been discussed in Chapter 4, in section 4.4.1. Further details have been illustrated in Tables 4.1, 4.2 and 4.3, and Figures 4.3, 4.4 and 4.5.

Table 5.1  
*Number of Research Participants: By Universities*

Involvement	Research Participants	Universities			Total
		A	B	C	
Survey	Students	35	7	12	54
	Lecturers	5	8	2	15
Interviews	Students	4	3	1	8
	Lecturers	2	3	1	6
	Technical Staff		1	1	2
Total		46	22	17	85

The following sections present the results according to the themes reflected in the research questions.

## **5.2 Student and Lecturer Perceptions of the Use of Moodle Tools**

The first research question examined student teacher and lecturer perceptions of the use of the discussion forums, quizzes and uploaded resources for promoting critical thinking. This research question generated both quantitative and qualitative data. For comparison and complementarity purposes both quantitative and qualitative results have been presented side by side. In the following subsection student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking are summarised.

### **5.2.1 A summary of student and lecturer responses**

Critical thinking skills and dispositions related to systematicity, maturity and analyticity were ranked higher by both student teachers and lecturers. The lowest ranked critical thinking skills and dispositions for student teachers was inquisitiveness, while for lecturers it was self-confidence (see Table 5.2).

Table 5.2  
*Students' and Lecturers' Average Responses by Disposition*

Dispositions	Students' responses (%)		Lecturers' responses (%)	
	Disagree	Agree	Disagree	Agree
Analyticity	19.6	80.4	23.0	77.0
Truth-seeking	32.9	67.1	24.4	75.6
Systematicity	15.8	84.2	16.7	83.3
Maturity	14.2	85.8	14.9	85.1
Open-mindedness	32.9	67.1	26.6	73.4
Inquisitiveness	37.6	62.4	26.8	73.2
Self-confidence	23.5	76.5	66.6	33.4

Notes: The average percentages were calculated after reversing negatively worded items in the questionnaires. For students' responses, N = 54; and lecturers' responses, N = 15.

### 5.2.2 Student teacher perceptions of the use of Moodle tools

The student teachers responded to 26 statements related to critical thinking skills and thinking dispositions (see Appendix E). They rated the statements, then gave reasons for the rating. Rating the statements mainly captured their thinking skills, while the open-ended responses mainly captured thinking dispositions. However, in some cases, rating the statements could also capture thinking dispositions. Open-ended responses also captured thinking skills because such responses could indicate the thinking skills participants used to justify their choices. The statements examined critical thinking skills and dispositions related to analyticity, truth-seeking, systematicity, maturity, open-mindedness, inquisitiveness and self-confidence based on the known thinking dispositions in literature. The summary of the findings is presented in Figure 5.1.



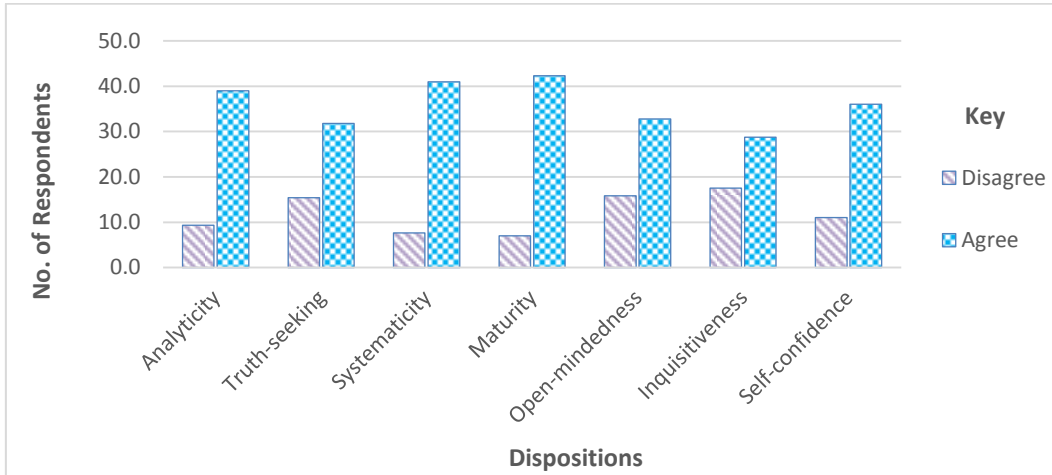


Figure 5.1. Average number of students' rating by dispositions (N = 54)

Notes: This average was calculated after reversing negatively worded items in the questionnaires.

From the given statements, students gave a total of 611 reasons to justify their rating choices. Out of 611 reasons, 530 reasons were classified as relevant to the given dispositions, 53 were unclear, and 28 reasons were either irrelevant to the respective dispositions or students felt that they lacked such dispositions. The summary of the reasons is presented in Figure 5.2.

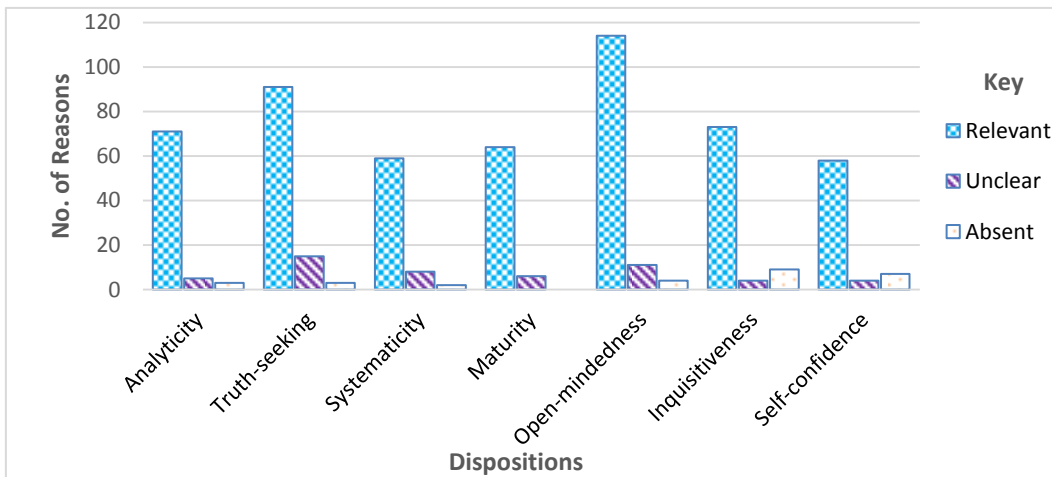


Figure 5.2. Classification of the number of reasons given by students for each disposition (N = 611)

The statements from the questionnaires (see Appendix E) have been grouped according to their related dispositions. Each statement has been given a code based on the Moodle tool it refers to. For example, *DF1* refers to the discussion

forum, statement number 1. The following sections present statements related to thinking skills and thinking disposition, indicates the overall rating for each statement followed by the number of reasons given to each thinking skill and disposition to support the rating. Out of 611 reasons given by students, only representative reasons have been selected to justify the points made.

**5.2.2.1 Analyticity**

The statements related to analyticity are given in Table 5.3. The findings from each statement are described below.

Table 5.3  
*Students' Dispositions Related to Analyticity*

Code	Statement
DF1	Through the discussion forum I am able to analyse issues being discussed.
QZ1	In many cases I guess the answers to the quiz questions.
UR1	The teaching-learning resources such as notes or videos uploaded on Moodle helped me analyse issues discussed during the course.

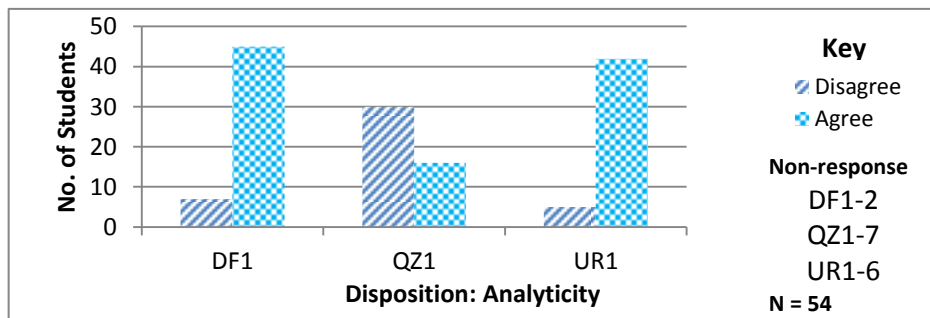


Figure 5.3. Disagreement and agreement rating in analyticity.

Figure 5.3 summarises the rating related to analyticity. A total of 79 reasons were given, where 71 were relevant, five were unclear and three did not indicate any disposition. Most of the students (89.4%) felt that uploaded resources helped them analyse various issues related to the course. Resources helped students analyse issues related to the course because of their relevance to the course and their proper format.

It was relevant to our course. (Survey, Student 04)

The notes were very helpful and relevant to what was taught in class. (Survey, Student 34)

They are key resources during the course. (Survey, Student 45)

Because in most cases uploaded resources on Moodle are clear, thus help me in analysing issues. (Survey, Student 30)

To some of the students the uploaded resources complemented lectures as indicated in the following representative extracts:

This is true because I may not understand during the class but Moodle helps. (Survey, Student 13)

Some of the things were not pointed during the lecture. (Survey, Student 19)

It makes easier to get notes even if I couldn't attend the lecture. (Survey, Student 33)

Most of the students (86.5%) perceived that tasks related to the discussion forums helped them analyse issues related to their courses. Their perceptions of being able to analyse issues were attributed to the interaction they had with colleagues as well as with the lecturers. The following are typical responses reflecting this view:

Through various comments and observations from my fellow students and the lecturer's response I can analyze the topic/issues we are discussing. (Survey, Student 45)

I gain a lot of views and opinions from other students. (Survey, Student 04)

Various contributions from my colleagues help me to analyse issues. (Survey, Student 44).

Some students believed that their ability to analyse issues was due to the relevance of issues being discussed.

Because most of the issues discussed related to our academic and social life, hence I have enough knowledge to give analysis of issues. (Survey, Student 34)

Most of the issues discussed are analysable, academic and social. (Survey, Student 37)

A larger percentage of the students (65.2%) believed that they did not guess when attempting quizzes. One of the major reasons for not guessing during the quiz tasks was that students were well prepared about those tasks.

I cannot guess the answer when I [am] prepared well unless if I have no idea of that thing. (Survey, Student 08)

I do quizzes after going through the Moodle notes and discussions with colleagues. (Survey, Student 11)

Because often I am sure and I am able to answer the quiz questions, thus there is no need to guess the answers. (Survey, Student 30)

The other reason for not guessing when attempting quizzes was that the contents of the quizzes were familiar because they were related to what they had been taught.

Most of the quizzes I attempted were related to what I was taught in class and what I read from the literature. (Survey, Student 37)

In a quiz I do not guess the answers; I always answer what I have learnt in the class. (Survey, Student 53)

However, some of them (34.8%) admitted to have guessed answers in the quizzes in some cases. One of the reasons for guessing was that students had no idea about the questions.

Not that much, it happens only [if] I have no clear answer among the options. (Survey, Student 45)

The other reason for guessing answers was due to limited time given for attempting the quizzes, and due to students' slow speed in using the computers.

Because of time limitation and slow speed (Survey, Student 07)

Sometimes, yes because of the limited time offered compared to time [available] (Survey, Student 19)

The following section presents results related to truth-seeking.

#### **5.2.2.2 *Truth-seeking***

Statements related to the dispositions of truth-seeking are given in Table 5.4 and results are summarised in Figure 5.4.

Table 5.4

*Students' Dispositions Related to Truth-seeking*

Code	Statement
DF2	In the discussion forum, I can judge how good or bad my colleagues' comments are.
QZ2	In a quiz I can judge how good or bad the questions are.
QZ7	The computer feedback I get from the quiz is more helpful than the feedback given by the lecturers.
UR2	The resources did not help me achieve the objectives of the course.
GV6	Overall, Moodle has greatly improved my learning.

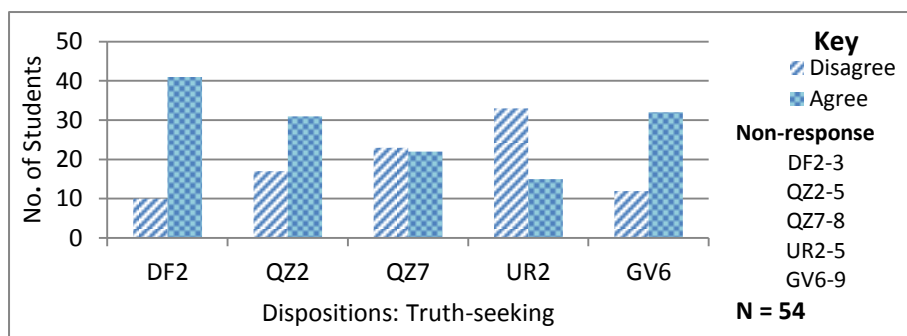


Figure 5.4. Disagreement and agreement rating in truth-seeking.

Overall, 109 reasons were given, where 91 were relevant, 15 were unclear, and three indicated absence of dispositions. Most of the students (80.4%) believed that they were able to evaluate the usefulness of the comments made by their colleagues in the discussion forums. They felt that they were able to give the value judgement because they were challenged by their colleagues as they interacted with them.

Other students challenge to my comments. (Survey, Student 04)

Yes, because I can read and submit some correct idea for them to correct their work. (Survey, Student 13)

This is because of the interaction I have with my friends. So it becomes easy to judge them. (Survey, Student 17)

The other reason for students' ability to evaluate the usefulness of colleagues' comments was because evidence was given to support arguments and the views were based on multiple perspectives.

People will sometimes argue the idea with strong reasons. (Survey, Student 19)

Every time one comments, I can sense from the way one packs his words and see whether the comments are good or bad. (Survey, Student 34)

You can get different views which can help to judge which is good or bad. (Survey, Student 25)

Most of the students (72.7%) believed that Moodle improved their learning because they got useful learning resources. As a result, 68.8 per cent reported that Moodle helped them achieve the objectives of the course.

Through getting resources such as notes, problem solving, discussions and quizzes. (Survey, Student 11)

Yes, due to easy way of getting materials. (Survey, Student 14)

This is because I can solve my difficulties, get materials and learn more through Moodle. (Survey, Student 17)

It helped me on taking some notes etc. (Survey, Student 06)

They helped me a lot since they acted as supplements to what I already knew. (Survey, Student 34)

A larger percentage of the students (64.6%) felt that they were able to evaluate the usefulness of the quiz questions because they were relevant to their courses.

It helps the learners to have experiences on how the question can come. (Survey, Student 14)

By studying the content of the lesson. (Survey, Student 15)

By looking whether or not they encourage critical thinking. (Survey, Student 31)

YES, I can judge how good or bad the questions are depending on the subject area covered and the learning outcomes expected. (Survey, Student 53).

However, there was no significant difference in the number of disagreement and agreement between online-based feedback and face-to-face based feedback (51.1 and 48.9% respectively), especially in quizzes accounting for the difference of only 2.2 per cent.

The next section outlines results related to systematicity.

### 5.2.2.3 *Systematicity*

Table 5.5 contains the statements related to systematicity.

Table 5.5  
*Students' Dispositions Related to Systematicity*

Code	Statement
DF3	Using the discussion forum, I am able to generalise about issues being discussed and make logical conclusions.
QZ3	The quizzes help me think and present my ideas logically.
UR3	The resources helped me draw conclusions about issues related to the course.

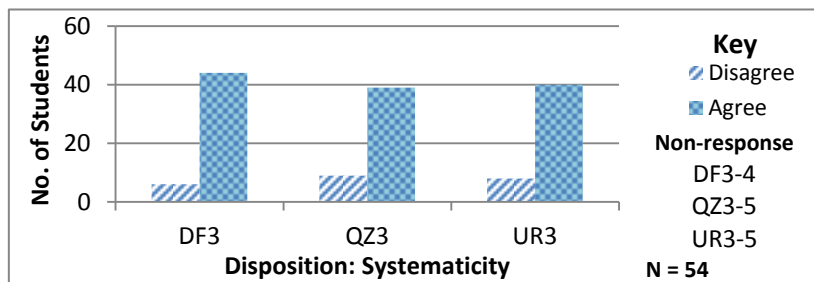


Figure 5.5. Disagreement and agreement rating in systematicity.

A total of 69 reasons were given, where 59 were relevant, eight were unclear, and two lacked dispositions. Figure 5.5 indicates that most of the students (88.0%) were of the view that the tasks related to the discussion forums helped them draw conclusions about issues discussed in their respective courses because in such tasks they could compare their views with their colleagues' views.

Due to the fact that I will be able to make comparisons with others views. (Survey, Student 04)

Because I can pass through different issues from different colleagues. (Survey, Student 11)

I have got varieties of information from learning Moodle which make me perform better in discussion. (Survey, Student 32)

During the discussion I can know the content and the truth about the discussion topic. (Survey, Student 31)

Most of the students (83.3%) felt that the uploaded resources in Moodle helped them in their respective courses.

Because of solving different problems related to my studies. (Survey, Student 17)

Often uploaded resources contain clear and well elaborated illustrations which help me draw conclusions. (Survey, Student 30)

You are exposed to a variety of resources. (Survey, Student 42)

They are key resources during the course. (Survey, Student 45)

Most of the students (81.3%) believed that quizzes helped them present their ideas logically because quizzes made them think critically.

It makes me active in thinking capacity. (Survey, Student 08)

Because I take time to think and analyse my ideas properly. (Survey, Student 17)

When the questions needed me to explain in my own words. (Survey, Student 19)

Because quizzes expand my knowledge, thus they help me to present my ideas logically. (Survey, Student 30)

Quizzes are logically constructed and need high thinking. (Survey, Student 31)

As stated earlier, they cause students to think deeply and critically, hence, logical results. (Survey, Student 37)

The following section presents results related to maturity.

#### 5.2.2.4 *Maturity*

Statements about maturity are shown in Table 5.6, results are summarised in Figure 5.6.

Table 5.6  
*Students' Dispositions Related to Maturity*

Code	Statement
DF4	Through the discussion forum I am able to suggest for solutions about the problems or issues being discussed.
QZ4	The tasks in a quiz help me solve problems related to what we learn.
UR4	The resources helped me solve problems relate to the course.



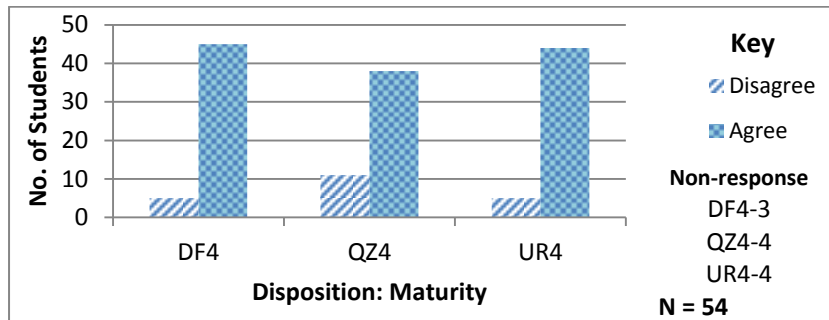


Figure 5.6. Disagreement and agreement rating in maturity.

Seventy (70) reasons were given where 64 were relevant and six were unclear. Most of the students (90.0%) believed that the tasks related to the discussion forums helped them suggest solutions about issues being discussed. This objective was reached because the discussion forums helped them freely express their views as illustrated in the following extracts:

I am freely arranging my views privately. (Survey, Student 06)

Because in Moodle, students irrespective of their individual differences have equal chance of suggesting anything they think is logical. (Survey, Student 34)

It gives me a room for that and I can express my suggested solutions to the problems or issues under discussion. (Survey, Student 45)

Sometimes the issue is more complicated as it needs specialists to be involved, but I should suggest my own solution. (Survey, Student 19)

A larger percentage of students (89.6%) believed that uploaded resources in Moodle helped them solve problems related to the course because the resources were relevant.

The uploaded resources always relate to the course, thus help me to solve problems related to the course. (Survey, Student 30)

Similarly, they felt that the resources helped them engage in problem-solving because the resources came from different sources and there were a variety of such resources, as the following representative quotes indicate:

Yes, it is possible because through it you come across with a lot of information from that it give you a wide choice to suggest best solution about the problem that you have discussed. (Survey, Student 47)

Right variety resource related to course which am learning help me realize various difficulties facing me and making clear understanding for further evaluation. (Survey, Student 54)

Due to different resources distributed. (Survey, Student 06)

Ideas are given from various sources. (Survey, Student 23)

Also a large number of students (77.6 %) felt that the quizzes helped them achieve course objectives because the tasks were related to the course.

Due to the fact that questions were related to what the teacher taught. (Survey, Student 04)

This is because most of the tasks in quizzes relate to what we learn, that's why they help me solve problems related to what we learn. (Survey, Student 30)

I get experience of solving problems related to the quizzes. (Survey, Student 11)

The next section presents results related to open-mindedness.

#### **5.2.2.5 *Open-mindedness***

Statements related to open-mindedness are in Table 5.7, and the summary of results is presented in Figure 5.7.

Table 5.7  
*Students' Dispositions Related to Open-mindedness*

Code	Statement
DF5	I feel bad when I realise that I have made an error after posting my comments in the discussion forum.
DF6	Through the discussion forum I learn a lot from my colleagues.
QZ5	I feel bad when I realise that I have made an error after attempting a quiz.
GV4	When I believe in something, I always stick to my ideas even if there is evidence against what I believe.
GV5	I find it difficult to tolerate my colleagues' ideas especially when they contradict my own beliefs.

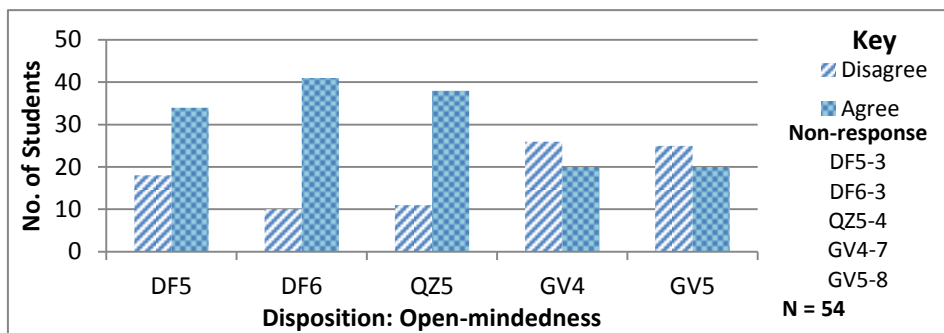


Figure 5.7. Disagreement and agreement rating in open-mindedness.

Out of 129 reasons given, 114 were relevant, 11 were unclear, and four lacked dispositions. As shown in Figure 5.7, most of the students (80.4%) felt that they had high level of open-mindedness, especially on learning from other students during the discussion forum sessions because colleagues brought divergent views.

Because everyone comes with his/her views I learn a lot from them. (Survey, Student 08)

Because of the notes and different views I get from them. (Survey, Student 17)

Most with different people and of course they added many things in my experience. (Survey, Student 19)

There are different views from different colleagues. (Survey, Student 25)

When I read other people's views I get to know things that I had no knowledge of. (Survey, Student 34)

Yes, colleagues come up with a lot some of them I have not yet thought about or was not expecting to learn on myself. (Survey, Student 45)

The other reason was that issues discussed were related to the course.

We always discuss issues related to our areas of specialisation and the shared courses. (Survey, Student 37)

A higher percentage of students also believed to have a higher degree of self-correction attitudes in tasks related to quizzes (77.6%) as well as in the discussion forums (64.7%). To some students, self-correction was important because errors could negatively affect their grades.

Due to the fact that we had questions that carry part of our course. (Survey, Student 04)

Failure brings no hope in university academic progress. (Survey, Student 06)

Because I'll lose marks if any. (Survey, Student 11)

I can understand that I fail the quiz. (Survey, Student 25)

I must feel bad because my score will be poor/low due to the errors I have made. (Survey, Student 30)

Other students felt that making errors was an opportunity for learning.

Learning is about trial and error. (Survey, Student 31)

Learning through mistakes helps me to search for new ideas and knowledge. (Survey, Student 53)

No one laughs at another while all are students and we learn from each other. (Survey, Student 19)

Mistake is part of learning. (Survey, Student 26)

Some students felt that in some cases, errors were unintentional and there was no opportunity to correct them after submitting, especially in quizzes.

Because I have not intended to make an error but to answer correctly. (Survey, Student 08)

Because sometimes when I am doing the quiz and send it to the teacher it becomes difficult to correct it once sent. (Survey, Student 17)

To some students, a higher degree of self-correction was important because errors could mislead other students.

I can feel bad because one can agree with that bad idea I suggest. (Survey, Student 36)

It's because I can mislead my friends in their studies. (Survey, Student 52)

Students also felt that a sense of perfection was important in the various tasks they did. Such perfection, among other things, could be achieved through proofreading the answers before posting them because failure to do that could undermine their self-esteem.

Before posting, I as a student, edit and re-edit so that the work becomes error free. (Survey, Student 41)

Proof-reading is essential for smart guys. (Survey, Student 42)

I feel bad because it will be seen by everyone that I have done mistakes or an error in the discussion forum. (Survey, Student 30)

It shows that I am weak. (Survey, Student 38)

Sometimes I feel too shameful because the error that I have made sometimes may distort the general idea in the discussion and sometimes I think that my fellow may see me as shallow. (Survey, Student 47)

Any incorrect or fallacy argument made in the forum can lead participant into poor involvement into the discussion and loses his or her confidence and feel fear to contribute any more for further discussion. (Survey, Student 54)

About 56.6 per cent of the students felt that they could not accommodate other students' ideas even when there was evidence against what they believed; and 55.6 per cent could not tolerate colleagues' ideas, especially when they contradicted their own beliefs. There were several reasons for not changing their views. Some students felt that evidence given by colleagues was not empirical.

No research no right to speak. (Survey, Student 16)

Evidences are a scientific way I have to consult. (Survey, Student 23)

In some cases, they felt that evidence was not given at all.

They criticise me with no evidence. (Survey, Student 33)

Some students believed that they had evidence to support what they believed.

If, I too, have evidence for what I support, I am a person my stand cannot be shaken by superficially supported evidence/proof. (Survey, Student 37)

I always trust what I know. I'm not a man driven by other people's view even if null. (Survey, Student 34)

To some students, sticking to what they believed was a sign of stability that could promote personal growth.

Stability makes a person to grow. (Survey, Student 42)

It is confidence. (Survey, Student 41)

The following section outlines results related to inquisitiveness.

**5.2.2.6 Inquisitiveness**

Table 5.8 shows the statements related to inquisitiveness; the findings of each statement are indicated in Figure 5.8.

Table 5.8  
*Students' Dispositions Related to Inquisitiveness*

Code	Statement
DF7	If it were not for getting course grades, I would not bother participating in any activity related to the discussion forum.
QZ6	If it were not for getting course grades, I would not bother participating in any activity related to the quizzes.
GV1	I think I will enjoy teaching students using Moodle or any other learning management system during my future career.
GV3	I would not take a job if I knew it involved working with computers.

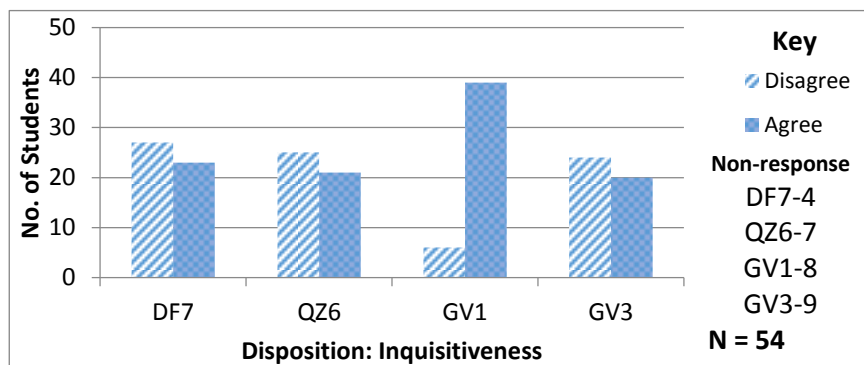


Figure 5.8. Disagreement and agreement ratings for inquisitiveness.

A total number of 86 reasons were given, where 73 were relevant, four were unclear, and nine lacked dispositions. Most of the students (86.7%) felt that they had a high expectation of using learning management systems as teaching-

learning tools in their future career because such tools simplify the teachers' work.

Simply it simplifies work. (Survey, Student 04)

It eases [simplifies] the teaching and resources availability. (Survey, Student 11)

This is because Moodle will facilitate teaching-learning process more easily during my future career. (Survey, Student 30)

The other reason for using LMS in their future career was that the students felt that they had the ability to use LMS and LMS have the potential for promoting independent learning.

Because I have got a lot of experiences and it is more advanced. (Survey, Student 14).

I have enough knowledge on how to use a computer and I know how important they are. (Survey, Student 34)

Moodle has taken away the phobia I had and myth people told me about computers. (Survey, Student 37)

It helps students to learn different things at their own time. (Survey, Student 36)

Fewer than half of the students believed that they participated in the discussion forums (46.0%) and quizzes (45.7%) just for the sake of getting grades.

Always we used to feel about assignments and tests. (Survey, Student 33)

If there is not for grade no one can participate on that. (Survey, Student 47)

Because it covered part of the course work. (Survey, Student 04)

More than half of the students (54.5%) felt that they would take a job if they knew that it involved working with computers because computers have become part of their lives.

Is unavoidable in today's world. (Survey, Student 11)

Computer is everything in these days, if you are far from it you're nothing. (Survey, Student 19)

Because I am a computer literate, I can't fear my job which involves working with computers. (Survey, Student 30)

Because we are at the century of technology, so I will be so happy to use computers in my office. (Survey, Student 04)

However, 45.5 per cent of the students believed that they would not take a job if they knew that it involved working with computers because of their inadequate competencies in using LMS.

Moodle to me is so confusing. (Survey, Student 41)

I did as it was instructed. (Survey, Student 18)

There was no significant difference between students who used the quiz tool for the sake of grades and for the sake of learning (45.7 and 54.3% respectively).

The next section presents results related to self-confidence.

### 5.2.2.7 Self-confidence

The statements related to self-confidence are indicated in Table 5.9, and the findings for each of the statements are shown in Figure 5.9.

Table 5.9  
*Students' Dispositions Related to Self-confidence*

Code	Statement
DF8	I believe that the discussion forum helps me express my views more confidently than I would do in a face-to-face discussion.
QZ8	I believe that quizzes help me express my views more confidently than I would do in a face-to-face environment.
GV2	I feel comfortable correcting my colleagues' arguments in an online environment than in a face-to-face environment.



Figure 5.9. Disagreement and agreement rating in self-confidence.

Overall, 69 reasons were given, where 58 were relevant, four were unclear, and seven lacked dispositions. Most of the students felt that they were confident about



using the discussion forums and quizzes as tools to confidently express their views (81.3%, 76.6%) as well as in giving online feedback to their colleagues (71.7%) when in a face-to-face environment. They felt that they were confident because the tools helped them express their views freely.

Because there is freedom of expressing your views without any interference from any person. (Survey, Student 6)

Yes, because I become lonely when I do these activities, therefore, I feel free. (Survey, Student 14)

Because I feel comfortable to express what I know more than I could do while in face to face. (Survey, S17)

There will be no disturbance, hence, easy to write and arrange ideas logically. (Survey, Student 31)

Furthermore, some students felt that the tools helped them organise their ideas logically.

Yes, discussion forum helps to organise one's ideas and express more clearly than face to face. (Survey, Student 41)

Through the use of the discussion forums they felt that they could avoid physical confrontation especially in correcting colleagues' arguments.

As I have no enough confidence to stand in front of people, that was my ground to express all of my ideas. (Survey, Student 19)

There will be no strong reaction towards me. (Survey, Student 19)

Avoid biases. (Survey, Student 42)

This is because in face-to-face discussion, I cannot participate well in expressing my views may be due to inferiority complex, shyness and so forth. (Survey, Student 30)

Some students believed that the use of the discussion forums could increase participation, especially in large classes.

In addition, large-enrolment classes often suffer from a lack of student participation. Online discussion forums provide these classes with a tool through which conversations may take place more fluidly than in a lecture hall of 100 students. (Survey, Student 53)

In summary, the highest rated dispositions were maturity (85.8%) and systematicity (84.2%), followed by analyticity (80.4%), self-confidence (76.5%),

truth-seeking (67.1%) and open-mindedness (67.1%). Inquisitiveness (62.4%) was lowly rated. The following section describes the differences in rating based on gender, pre-service and in-service teachers, and universities.

#### 5.2.2.8 Differences in rating amongst students

The results revealed students' differences in rating especially in terms of gender, pre-service and in-service teachers, and universities. Male students felt they had slightly higher tendencies in analyticity (85%), truth-seeking (72.6%), systematicity (90%) and maturity (91.2%) than female students (75.6%, 59.8%, 78.3%, and 82.9% respectively) as indicated in Figure 5.10. Further details are seen in Appendix T. In truth-seeking, for example, most male students felt that it was easier to evaluate the usefulness of Moodle and quiz questions in improving their learning than female students.

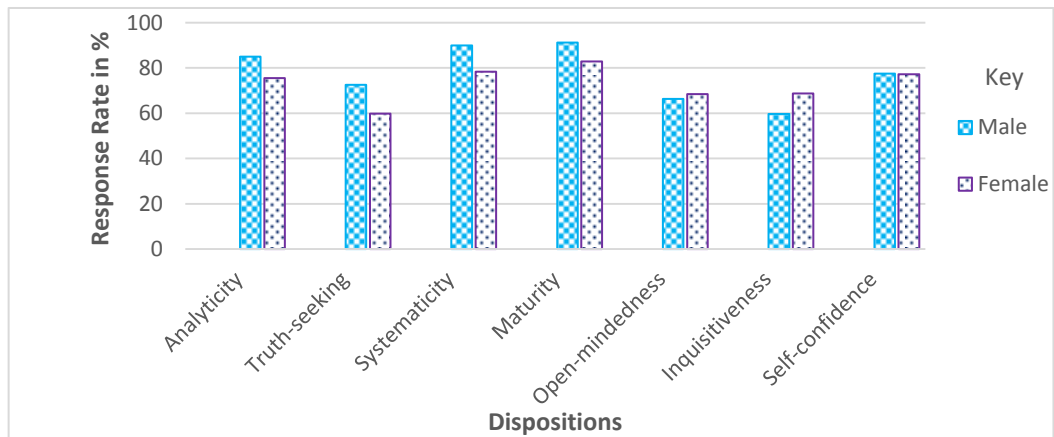


Figure 5.10. Rating differences between male and female students (N = 54).

Female students believed that they had higher critical thinking skills and tendencies related to open-mindedness (68.4%) and inquisitiveness (68.8%) than male students (66.3 and 59.6% respectively). With respect to open-mindedness, more female students felt that they could accommodate other colleagues' ideas even when such ideas contradicted their beliefs than was the case with male students. Most male students believed that they participated in the tasks related to the discussion forums for the sake of getting grades and indicated disliking a job if they knew that it involved working with computers.

Most in-service student teachers believed that they had higher critical thinking skills and tendencies of analyticity (90.8%), open-mindedness (73.6%), inquisitiveness (75%), and truth-seeking (71.1%) than pre-service student teachers. The ratings for pre-service teachers were 78 per cent, 62.8 per cent, 58.2 per cent and 65.7 per cent for analyticity, open-mindedness, inquisitiveness and truth-seeking respectively, as indicated in Figure 5.11. Further details are indicated in Appendix U.

In open-mindedness, for instance, most pre-service teachers felt that they were insensitive to their own faults in tasks related to the discussion forums. They tended to stick to what they believed even if there was evidence against what they believed, and they were intolerant of colleagues' views, especially when such views contradicted their own beliefs.

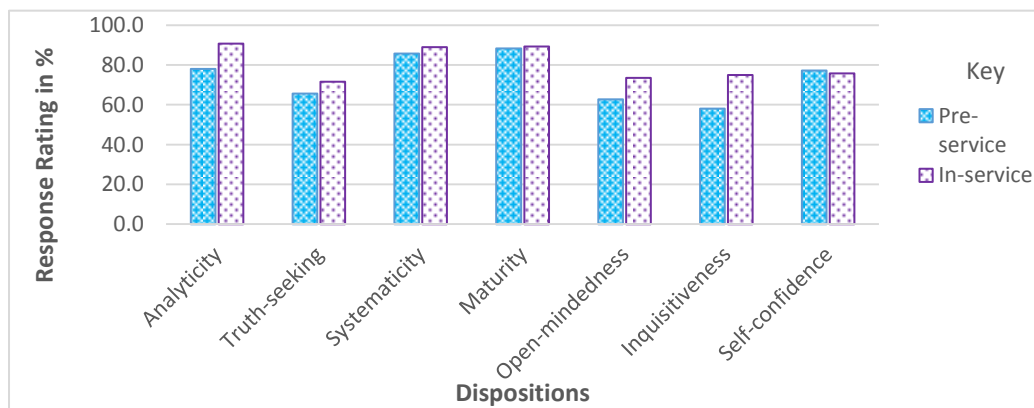


Figure 5.11. Rating differences between pre-service and in-service teachers (N = 54).

With reference to inquisitiveness, more pre-service teachers than in-service teachers believed that they participated in the quizzes and the discussion forums for the sake of getting grades. Furthermore, more pre-service teachers than the in-service teachers felt that they disliked a job that involved working with computers. In truth-seeking, more in-service teachers than pre-service teachers believed that they could easily evaluate the benefits of resources uploaded in Moodle and the usefulness of Moodle in improving their learning. However, while more than half of the number of pre-service teachers preferred online-based

feedback in tasks related to quizzes, more than half of the number of in-service teachers preferred face-to-face feedback.

Universities differed in truth-seeking, inquisitiveness, analyticity, and self-confidence as indicated in Figure 5.12. Further details are seen in Appendix V.

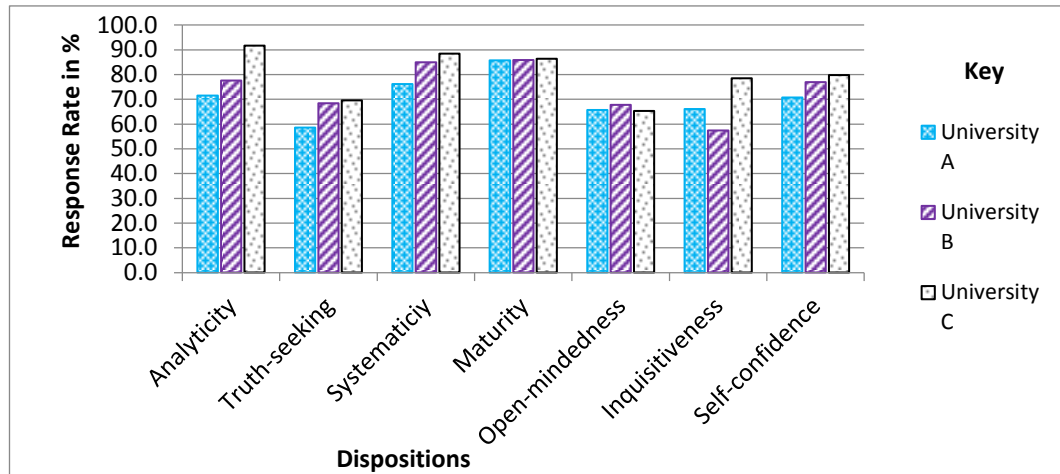


Figure 5.12. Students' rating differences by universities (N = 54).

Students from Universities B (68.4%) and C (69.6%) believed that they had higher critical thinking skills and tendencies related to truth-seeking than students from University A (58.6%). For instance, students from Universities B and C could evaluate the usefulness of colleagues' comments in the discussion forums and how Moodle had improved their overall learning than did students from University A.

Most of the students from University B (76.9%) and University C (80%) felt that they had slightly higher self-confidence than students from University A (70.6%). For instance, students from Universities B and C felt that online quizzes helped them express their ideas more confidently in online environment than in face-to-face environments.

Students from University C believed that they had higher critical thinking skills and tendencies related to analyticity (91.7%) and inquisitiveness (78.5%) than students from University A (71.4 and 66.1%) and University B (77.6 and 57.4%)

respectively. For example, a larger number of students from Universities A and B admitted to having used the discussion forums for the sake of getting grades. Likewise, a larger number of students from Universities A and B indicated they would dislike a job if it involved working with computers than students from University C.

When using Moodle tools, students indicated challenges they encountered. The following section outlines those challenges.

#### **5.2.2.9 Challenges related to the use of Moodle tools**

Learning management systems can be used as tools for promoting critical thinking. However, students felt that several factors limited the efficient utilisation of Moodle. It was reported that computers were not sufficient relative to the number of students.

I do not have [a] computer so I face difficult to pay money in internet centres. (Survey, Student 16)

... I suggest that each institution provides enough computers for each student to access, rather than the few, inadequate ones being used by a lot of students. (Survey, Student 34)

The programme is good, but the number of computers in our university is very limited. (Survey, Student 38)

For students to learn comfortably using Moodle, the college has to bring a number of computers related to the number of students. (Survey, Student 39)

The second challenge reported was inadequate computer skills amongst students.

It is very good in the whole process of learning, but most of us find it difficult due to the poor experience on computer use. (Survey, Student 06)

It helps to get proper materials, but sometimes very complicated for those who are not experienced with it. (Survey, Student 28)

The final challenge identified was the in-built technical issues within Moodle itself. Among other things, the issues included difficult configuration in Windows Vista, no direct option for uploading discussion forums, lack of drawing tools and

lack of integration with other learning management systems. The following extracts reflect these challenges.

Configuration is very difficult in Window Vista and Windows 7 Platform. Also the system administrators forget to include uploading Discussion Forum for courses. This brings problems to the learners. (Survey, Student 42)

It does not support drawing/no drawing tools. (Survey, Student 44)

However this technology have some shortcomings:- \* Difficulty carrying out a distributed management model with multiple schools and departments. \* Inefficient use of space in the user interface. (Survey, Student 53)

To fully utilise Moodle, they suggested that Moodle had to be integrated into every course, be part of course assessment and the teaching-learning resources in Moodle have to be updated frequently, because knowledge is not static.

The system should not be for a certain subject, but to all courses. (Survey, Student 23)

It is still in a low usage to me because most of our courses don't use Moodle for learning. (Survey, Student 10)

Moodle has become an important tool and forum for students' discussion on various issues whether related to our academic life or social life and should be integrated in the students' assessment mode not only in few courses, but in all courses. (Survey, Student 37)

The reading resources which are located in Moodle should be updated frequently to meet the current and relevant information... (Survey, Student 12)

Improve more teaching and clarification of lesson by teaching the current and useful topics which we will be going to apply for our students. Outdated topics should be left because they do not relate to us as teachers of Tanzania. (Survey, Student 15)

Overall, most of the students believed that Moodle had the potential for promoting critical thinking. The following section discusses the lecturer perceptions of Moodle tools for promoting critical thinking.

### **5.2.3 Lecturer perceptions of the use of Moodle tools**

Lecturers responded to 24 items related to critical thinking dispositions as well as critical thinking skills. The items were related to the use in Moodle of discussion

forums, the quizzes, uploaded resources and general tools. They rated statements related to thinking skills and dispositions and gave reasons to support their rating. As stated earlier, rating the statements mainly tapped thinking skills, while open-ended responses mainly tapped thinking dispositions. In some cases, rating the statements could reflect thinking dispositions, while open-ended responses could also reflect the thinking skills participants used to justify the choices they made. The statements examined dispositions related to analyticity, truth-seeking, systematicity, maturity, open-mindedness, inquisitiveness and self-confidence. Figure 5.13 summarises the findings related to those dispositions. Further details can be seen in Appendix W.

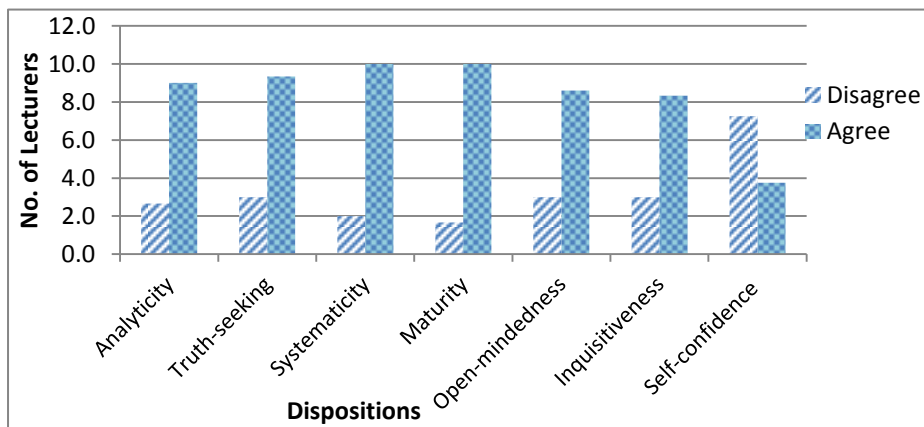


Figure 5.13. Average number of lecturers by dispositions (N = 15)

Notes. The average was calculated after reversing negatively worded items in the questionnaires.

A total of 107 reasons were given by 15 lecturers. Based on the classification, out of 107 reasons, 88 were relevant to the given dispositions, six were unclear, while 13 indicated absence of dispositions. A summary is given in Figure 5.14.

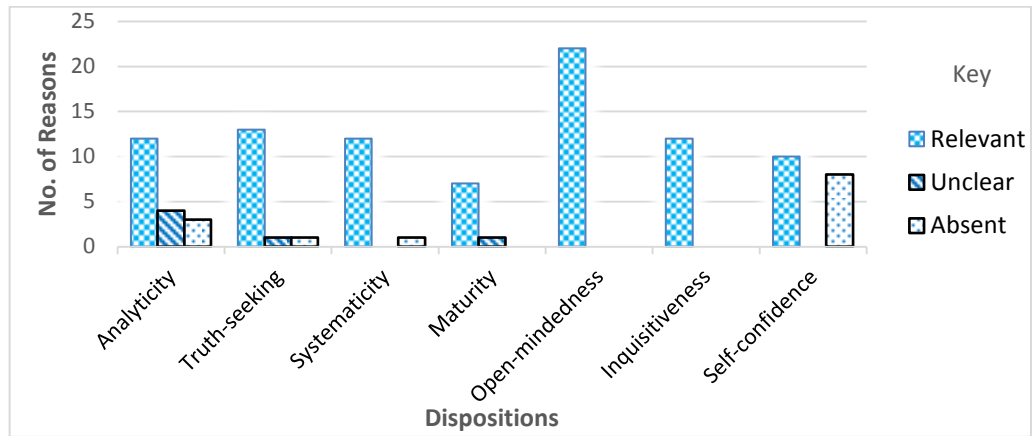


Figure 5.14. Classification of the number of reasons given by lecturers for each disposition (N = 107)

The following sections present results related to various dispositions. Out of 107 reasons given, a few have been selected to illustrate points presented.

### 5.2.3.1 Analyticity

Table 5.10 indicates statements related to analyticity. The findings for this disposition are summarised in Figure 5.15.

Table 5.10  
*Lecturers' Dispositions Related to Analyticity*

Code	Statement
DF1	When I use the discussion forum with my students, I make sure that it helps them analyse issues being discussed.
QZ1	When I make a quiz I make sure that it prevents students from guessing the answers.
UR1	When I upload the teaching-learning resources such as notes, articles or videos on Moodle I make sure that they help students analyse issues discussed during the course.



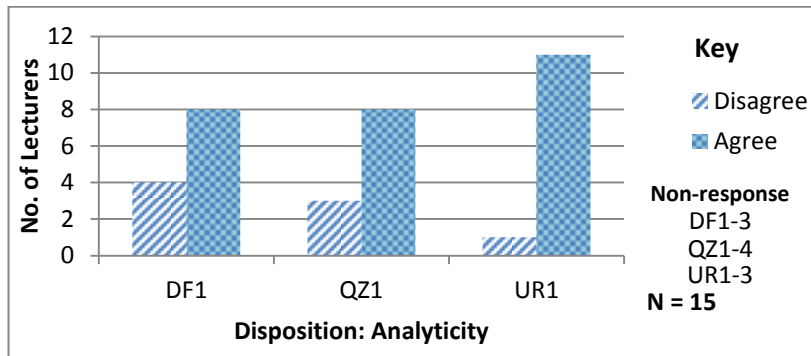


Figure 5.15. Disagreement and agreement rating in analyticity.

A total of 19 reasons were given, where 12 were relevant, four were unclear, and three lacked dispositions. Most of the lecturers (73.3%) felt that they had a high level of analyticity, especially on using the uploaded resources. They indicated that they made sure the uploaded resources were relevant to the students.

Sure, any material uploaded should be of importance to a learner. (Survey, Lecturer 05)

If I don't upload that which helps students, learning would not take place. (Survey, Lecturer 13)

About half of the lecturers (53.3%) also believed that they had a high level of analyticity in the tasks related to the discussion forums and quizzes. They believed that the discussion forums helped them sustain interaction with the students and amongst students themselves.

Through discussion I interact with students and among students themselves rather than leaving them individually. (Survey, Lecturer 03)

With discussion forum, it enables me to clarify points not understood. (Survey, Lecturer 05)

I agree because I normally challenge them by giving alternative ideas so that they think broadly and more analytic. (Survey, Lecturer 11)

They felt that their analysis was important when preparing quizzes because they could prevent cheating.

Sure, when I make quiz I make sure that it prevents from guessing the answers. Students prefer cheating! (Survey, Lecturer 05)

I make sure that I ask challenging questions. (Survey, Lecturer 11)

However, there were some lecturers who felt that they had low critical thinking skills and tendencies related to analyticity especially in tasks related to the discussion forums and quizzes (26.7 and 20.0% respectively).

The next section presents results related to truth-seeking.

### 5.2.3.2 Truth-seeking

Statements related to truth-seeking are shown in Table 5.11 and Figure 5.16 summarises the findings for this disposition.

Table 5.11  
Lecturers' Dispositions Related to Truth-seeking

Code	Statement
FD2	Through the discussion forum, I can judge how logical or illogical the students' comments are.
QZ2	When I compose a quiz I can judge how logical or illogical the questions are.
GV5	Overall, Moodle has greatly improved my teaching.

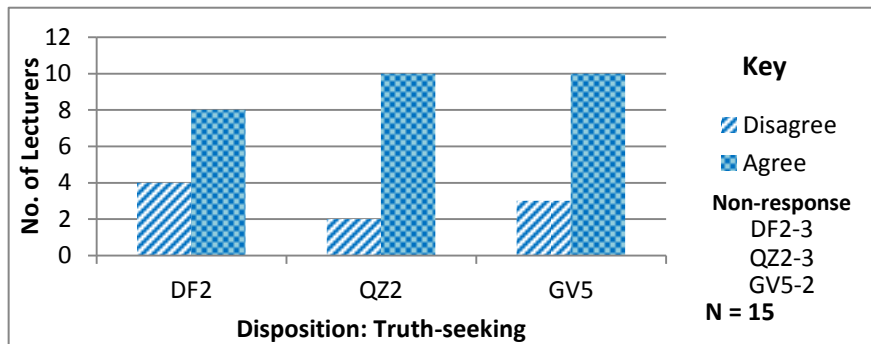


Figure 5.16. Disagreement and agreement rating in truth-seeking

In truth-seeking, 15 reasons were given, where 13 were relevant, one was unclear, and one lacked disposition. Most of the lecturers (66.7%) believed they had a high level of critical thinking skills and disposition related to truth-seeking, especially in evaluating how useful Moodle had been in improving their teaching as well as on evaluating questions when they composed quizzes. They believed that such processes helped them prepare tasks that could achieve students' expected learning outcomes.

The reason why a quiz is given is not to test students how much they remember but how they are ready to apply what they have learnt. For

that matter whatever quiz is given must be in the perimeters of what they have learnt. (Survey, Lecturer 10)

Logical questions inevitably call for critical thinking and logical presentation of ideas. (Survey, Lecturer 13)

Though about half of the lecturers (53.3%) felt that they could evaluate students' comments in the discussion forums, still 26.7 per cent believed that they were not able to evaluate them.

### 5.2.3.3 Systematicity

Table 5.12 indicates statements related to systematicity, while Figure 5.17 summarises the findings for this disposition.

Table 5.12  
Lecturers' Dispositions Related to Systematicity

Code	Statement
DF3	When I use the discussion forum, I make sure that it helps students generalise about issues being discussed and make logical conclusions.
QZ3	When I compose a quiz I make sure that it helps students think and present their ideas logically.
UR2	When I upload the resources on Moodle I make sure that they help students draw conclusions about issues related to the course.

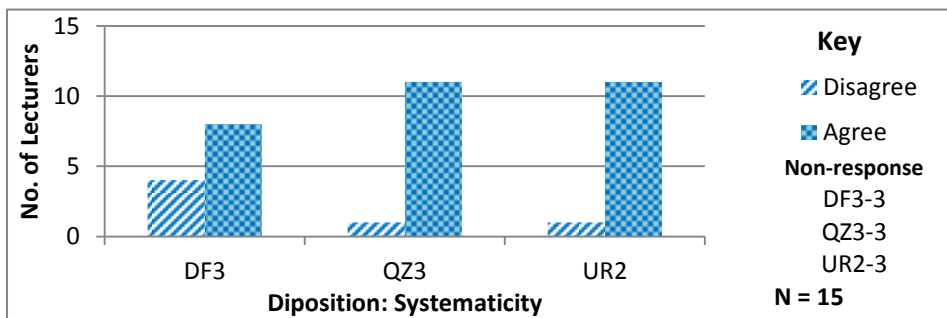


Figure 5.17. Disagreement and agreement rating in systematicity.

Thirteen (13) reasons were given, where 12 were relevant and one lacked disposition. Most of the lecturers felt that they had higher critical thinking skills and dispositions related to systematicity especially when preparing quizzes (73.3%) as well as when preparing teaching-learning resources to be uploaded in Moodle (73.3%). This process, they believed, helped them assess students'

expected learning outcomes and the relevance of the teaching-learning resources used.

It is logical and educationally sound to test what learners have learn rather than testing on content never taught. (Survey, Lecturer 11)

Sure, any material uploaded should be of importance to a learner. (Survey, Lecturer 05)

The materials should be as relevant to the course content as possible, otherwise it is better than not having them in. (Survey, Lecturer 13)

Though about half of the lecturers (53.3%) believed that they ensured the promotion of systematicity when preparing the tasks related to the discussion forums, 26.7 per cent did not take this into account. This low level, *inter alia*, was perhaps due to lecturers' inadequate computer skills.

I have little skills to conduct the programme. Even those who introduced the course are not competent, how should I be competent? It is a new programme in Tanzania. (Survey, Lecturer 04)

The following section presents results related to maturity.

#### 5.2.3.4 *Maturity*

Statements related to maturity are indicated in Table 5.13, and the findings for this disposition are summarised in Figure 5.18.

Table 5.13  
*Lecturers' Dispositions Related to Maturity*

Code	Statement
DF4	When I use the discussion forum I ensure that students are able to suggest for solutions about the problems or issues posed.
QZ4	When I compose a quiz I make sure that the tasks in a quiz help students solve problems related to what they learn.
UR3	When I upload the resources on Moodle I make sure they help students solve problems related to the course.

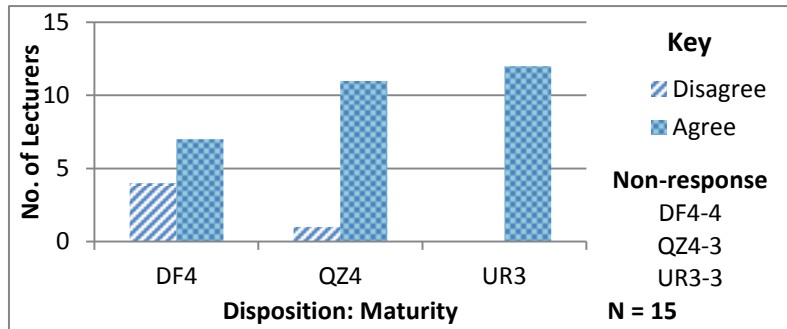


Figure 5.18. Disagreement and agreement rating in maturity.

A total of eight reasons were given for maturity, where one of them was unclear. The highest level of solving problems related to the courses was displayed on the nature of resources lecturers uploaded in Moodle. All the respondents (80%) who attempted this item agreed with the statement, indicating that they believed that the resources were important for any significant learning.

That is the essence of any significant learning. (Survey, Lecturer 13)

More than half of the lecturers (73.3%) believed that when they prepared quizzes they ensured that they helped students solve problems related to the respective courses.

That is the focus, it helps students solve problems related to what they learn. (Survey, Lecturer 05)

However, it was indicated that Moodle *per se* cannot ensure learning; it is the lecturers' expertise that can help students use Moodle to deal with issues related to the course as illustrated below.

Yes, all of these depend on the expertise of the teacher, not Moodle as a system of interaction. (Survey, Lecturer 15)

While 46.7 per cent of the lecturers felt that they ensured that the discussion forums were used to solve some of the problems related to their respective courses, 26.7 per cent stated that they ignored the inclusion of problem-solving in the discussion forums.

5.2.3.5 *Open-mindedness*

Table 5.14 shows statements related to open-mindedness, while the summary of the findings for this disposition are indicated in Figure 5.19.

Table 5.14  
*Lecturers' Dispositions Related to Open-mindedness*

Code	Statement
DF5	I feel bad when I realise that I have made an error after posting an issue or problem for discussion in the discussion forum
DF6	Through the discussion forum I learn a lot from my students
QZ5	I feel bad when I realise that I have made an error after posting a quiz
GV3	When I believe on something, I always stick to my ideas even if there is evidence against what I believe
GV4	I find it difficult to tolerate my students' ideas especially when they contradict my own beliefs

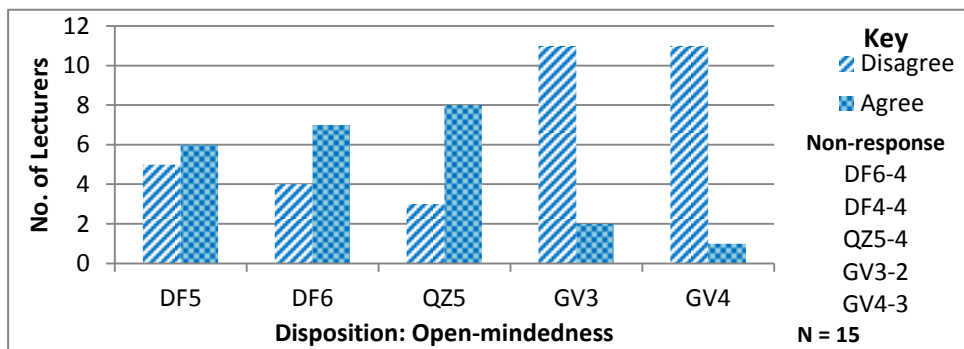


Figure 5.19. Disagreement and agreement rating in open-mindedness.

In open-mindedness, 22 reasons were given and all of them were relevant to the respective dispositions. Most lecturers (91%) believed that they were open to other people's ideas, especially when there was evidence against what they had believed. Most of them (83%) felt that they were open to new ideas, even when such ideas contradicted their beliefs.

I don't agree with number a [GV3], b [GV4] because nobody is perfect except God. So, I am always ready to learn new things. I sometimes use my student to learn things that I'm ignorant about them. (Survey, Lecturer 05)

The ideas I hold may not be based on dependable sources. It is always good to be open-minded and also let students teach you something the probably you never knew. (Survey, Lecturer 10)

Not at all, I am liberal and ready to take new ideas, and that is why I took my materials to Moodle - open source, for everyone to see, read and challenge with evidence - apparently my students appreciate. (Survey, Lecturer 13)

Furthermore, 60 per cent of lecturers believed that through the discussion forums they learnt from students.

Also, it is true that, through discussion forum I learn a lot of things from my students. At the university it is give and take. (Survey, Lecturer 05)

Yes, the discussion forum is yet an opportunity for me to learn from students because each has an experience that may be different from the other one. (Survey, Lecturer 10)

I also get new Ideas from them. (Survey, Lecturer 11)

However, some lecturers (40%) felt that they had low critical thinking skills and tendencies related to open-mindedness. Such lecturers did not seem to be more concerned with the inconveniences they might have caused by making errors in the discussion forums. They were relaxed because they thought there was still room to make such corrections.

Regarding to item 'DF5', one does not need to feel so bad because you can always re-communicate to correct the error. (Survey, Lecturer 15)

A higher percentage of the lecturers (70%) believed that they were sensitive to their own errors or mistakes, especially in tasks related to quizzes because they believed that lack of such sensitivity could mislead students.

I realise that I have misled my students. (Survey, Lecturer 03)

In general, there was no significant difference in the number of disagreement and agreement in self-correction in tasks related to the discussion forum (33.3 and 40.0% respectively) with only 6.7 per cent accounting for the difference.

### **5.2.3.6 *Inquisitiveness***

In Table 5.15 are the statements related to inquisitiveness. Figure 5.20 summarises the findings of each the statements.

Table 5.15  
Lecturers' Dispositions Related to Inquisitiveness

Code	Statement
DF7	If it were not for conforming to the university requirements, I would not bother using the discussion forum as a teaching-learning tool.
QZ6	If it were not for confirming with university requirements, I would not bother using the quiz tool in Moodle as a teaching-learning tool.
GV1	I enjoy teaching students using Moodle.

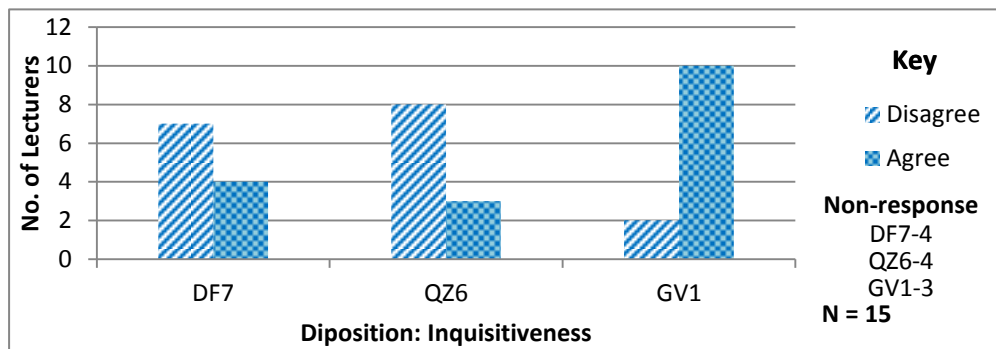


Figure 5.20. Disagreement and agreement rating in inquisitiveness.

A total of 12 reasons were given and all of them were relevant to the respective dispositions. More than half of the lecturers (66.7%) felt that they enjoyed using Moodle as a teaching-learning tool because they believed that it helped students get a variety of learning resources and it was flexible.

I enjoy teaching my student using Moodle because they can have access to different materials that will help them understand the subject like: video, music, ... (Survey, Lecturer 05)

Students do not trouble me for lecture notes, seminar questions, I don't have to make all announcements in class, I make students more independent as they can interact with materials in their own pace and speed whenever wherever, students gain confidence that they are in the right track. (Survey, Lecturer 13)

I enjoy teaching students using Moodle because of its flexibility. (Survey, Lecturer 11)

Furthermore, quizzes were used because of the flexibility of Moodle as illustrated below.

It is not the case, anywhere (office) if facilities are available; anyone can use Moodle in teaching. (Survey, Lecturer 05).



Though a larger number of lecturers felt that they used tools such as the discussion forums (46.7%) and quizzes (53.3%) because of their intrinsic motivations, some of them felt that they used the discussion forum (26.7%) and quizzes (20.0%) because Moodle use was a requirement in their respective universities.

### 5.2.3.7 *Self-confidence*

Statements related to self-confidence are shown in Table 5.16, while the findings are summarised in Figure 5.21.

Table 5.16  
*Lecturers' Dispositions Related to Self-confidence*

Code	Statement
DF8	I believe that the discussion forum helps me teach certain concepts or topics more confidently than I would do in a face-to-face environment.
QZ7	I prefer giving online quiz feedback to my students to face-to-face feedback.
QZ8	I believe that online quizzes help me measure students' learning outcomes more confidently than I would do in a paper based quiz.
GV2	I feel comfortable correcting my students' comments in an online environment than in a face-to-face environment.

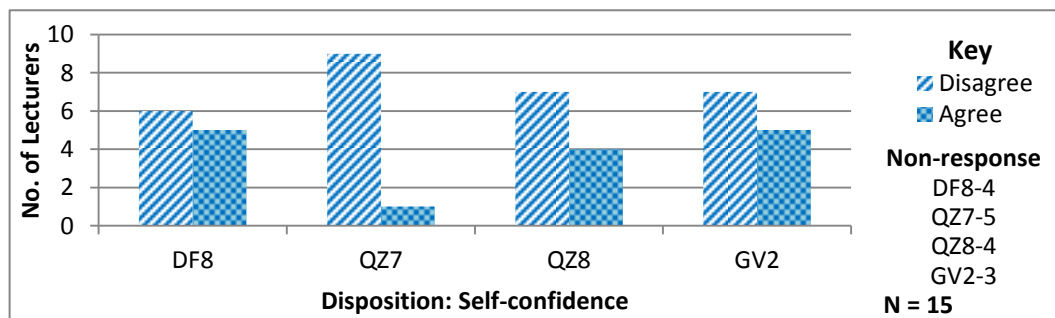


Figure 5.21. Disagreement and agreement rating in self-confidence.

In self-confidence, 18 reasons were given, where 10 were relevant and eight lacked dispositions. Most of the lecturers believed that they had less self-confidence in using Moodle, particularly as an assessment tool especially through tasks related to quizzes in giving feedback (60.0%) and measuring students' learning outcomes (46.7%) because they could quickly respond to students' immediate concerns through face-to-face environments.

I like giving feedback face to face as I can notice whether my student got me or not. With feedback, I don't prefer online. (Survey, Lecturer 05)

Face to face feedback would be much better because it helps me to get the feel of my students and respond quickly to their queries. (Survey, Lecturer 11)

Moodle discussion fora are only a substitute of conventional face-to-face and as such it is not possible to surpass actual face-to-face environment! Besides, Moodle is constrained and dependent on some conditions which are readily available in actual face-to-face. (Survey, Lecturer 15)

Not very confident with the way they undertake their quizzes. They might be referring to books or any documents in course of responding to the questions. (Survey, Lecturer 11)

A reasonable number of lecturers (46.7%) felt that they were less self-confident correcting online students' comments, partly because they were not satisfied with the accessibility of computers for students.

I enjoy so much the idea of teaching using Moodle but the problem is on its accessibility to students who do not have even the basic skills of operating a computer, hence my first attempt failed! (Survey, Lecturer 09)

Some of the lecturers (40%) believed that they had less self-confidence for using the discussion forums to teach certain concepts because they believed that online discussions could not surpass face-to-face discussions.

Discussion forums have nothing to do with confidence rather than the mastery of the subject matter. (Survey, Lecturer 03)

Despite the fact that the discussion forum is very important, this does not obliterate the paramount importance of face-to-face sessions because face-to-face makes the discussion more vivid and real. (Survey, Lecturer 10)

However, some of them believed that they had self-confidence in using the discussion forums to teach certain concepts (33.3%), in correcting online students' comments (33.3%) and in using the quiz to measure students' learning outcomes (26.7%). In general, most of the lecturers felt that they had less self-confidence on the use of Moodle tools as they preferred the use of a face-to-face form of assessment to the online-based one.

Overall, lecturers displayed high dispositions in maturity (85.1%) and systematicity (83.3%), followed by analyticity (77.0%), truth-seeking (75.6%), open-mindedness (73.4%) and inquisitiveness (73.2%). Self-confidence (33.4%) had the lowest (see Table 5.2 for comparisons between students' responses and those of lecturers' responses). Lecturers' dispositions were different according to age and university teaching experience.

### 5.2.3.8 Differences by age and university teaching experience

Younger lecturers aged between 27 and 39 with university teaching experience between two and five years displayed higher critical thinking skills and tendencies related to analyticity (80.2%), open-mindedness (79.9%), and inquisitiveness (76.2%) than did lecturers aged 40 years and above, with teaching experience from 6 to 22 years. Older lecturers had 66.7 per cent, 53.3 per cent and 61.1 per cent in analyticity, open-mindedness and inquisitiveness respectively as indicated in Figure 5.22.

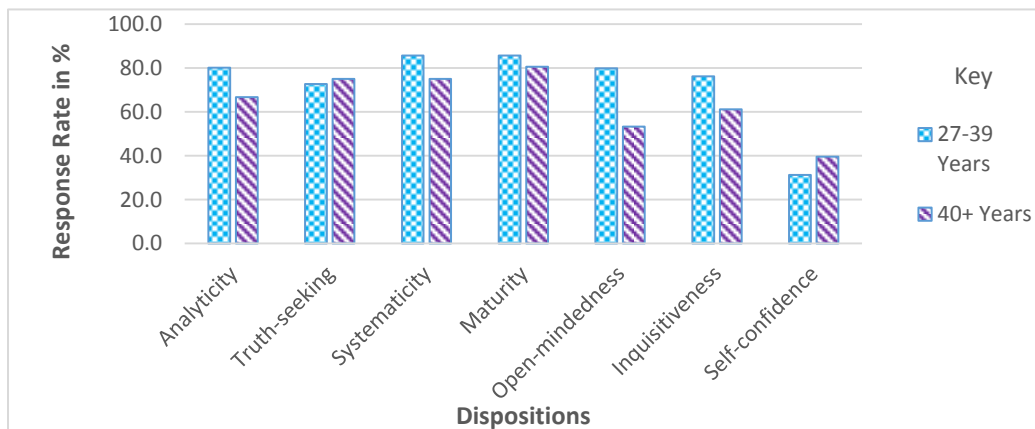


Figure 5.22. Lecturers' rating differences by age (N = 15)

Though generally all lecturers felt that they had low self-confidence in using LMS for teaching-learning purposes, lecturers aged 40 and above felt they had slightly higher self-confidence (39.6%) than younger lecturers (31.2%).

Lecturers indicated they had encountered several challenges when using Moodle. These challenges could limit maximum utilisation of Moodle as a teaching-learning tool. The next section presents the challenges.

### 5.2.3.9 *Challenges related to the use of Moodle tools*

Lecturers felt that there were challenges that limited the use of Moodle tools for teaching and learning including promotion of critical thinking. It was reported that there was inadequate institutional support especially in motivating lecturers to use Moodle as a teaching and learning tool.

The use of Moodle will remain elusive if the college management does not see into it that there are efforts to ensure students and teachers can access the internet and the computers for the courses! (Survey, Lecturer 09)

... despite sensitization and training, no plans were put in place to ensure that trained teachers began using Moodle. Having only a handful of teachers using Moodle is a sign of slackness and lack of recognition and insensitivity of administrators insofar as Moodle is concerned. Hence, it is mainly one's internal drive that would drive one to include Moodle in his/her teaching. (Survey, Lecturer 13)

The other challenge is limited computer skills amongst some lecturers as well as students.

Also, instructors who are compelled to use Moodle especially for online programmes are not adequately trained on how to use it effectively. (Survey, Lecturer 01)

I have little skills to conduct the programme. (Survey, Lecturer 04)

I enjoy so much the idea of teaching using Moodle, but the problem is on its accessibility to students who do not have even the basic skills of operating a computer, hence my first attempt failed! (Survey, Lecturer 09)

Furthermore, limited numbers of computers prevented the use of Moodle tools.

Teaching resources are limited particularly computers. (Survey, Lecturer 03)

The problem with many places is availability of these facilities. (Survey, Lecturer 05)

Finally, internet connectivity was also one of the limiting factors for maximum utilisation of Moodle.

Internet connectivity failure is one of the limiting factors. (Survey, Lecturer 03)

Although I haven't used it, is only because of the slowness of our network problems. (Survey, Lecturer 12)

The following section presents results related to student and lecturer perceptions of the effective ways of using Moodle tools for promoting critical thinking.

### **5.3 Effective Ways of Using Moodle Tools to Promote Critical Thinking**

The second research question examined student and lecturer perceptions of effective ways of using the discussion forums, quizzes and uploaded resources for promoting critical thinking. Both students and lecturers suggested ways that they thought were effective for promoting critical thinking when using the selected Moodle tools.

#### **5.3.1 Student teacher perceptions**

Students suggested effective ways for promoting critical thinking when using asynchronous discussion forums, quizzes, and uploaded resources. Typical responses reflecting their perceptions have been presented to illustrate these ways.

##### ***5.3.1.1 Using discussion forums to promote critical thinking***

Most of the students believed that the discussion forums had the potential for promoting critical thinking when they were given the opportunity to express their ideas freely during discussions. It was in such cases that they could discover different views from different participants. Freedom of expression could potentially lead to active learning.

In the discussion forum every student can express his views more freely. It is one of the best ways to express ideas because a person will be free to express his views. The discussion forum accommodates ideas from different students; therefore, it is something much better because you get different ideas from different people. (Interview, Student 03)

It allows students to actively engage themselves in learning. It gives students a wider opportunity to discuss their own ideas. (Interview, Student 08)

A student learns and can give comments about something that has been described by another student or teacher. If one student starts the discussion then another student contributes. In this way there is sharing of ideas. (Interview, Student 05)

Since online discussion forums take place in the absence of the lecturers, most of the students had the view that feedback had to be given immediately. Immediate feedback could help students correct their mistakes.

Once you give a question, students should be able to display the answers. In the sense that they should know that in this question I have got it wrong and its answer ought to be this and that. (Interview, Student 02)

When I give a task to students I prefer giving the feedback immediately so that the student knows what s/he has got. (Interview, Student 03)

However, most of the students interviewed seemed to suggest that there is no major difference between online feedback and face-to-face feedback as the following quotes illustrate:

We have individual differences. If I am corrected before a group I may feel bad, but when I am corrected online, I read the comments and see where I had gone wrong. Though, that would also be possible in face-to-face environment that I ought to do this and that. (Interview, Student 02)

Both are good, but it depends on the nature of the task. For example, if it is a quiz, assignment or submitting a document online, the lecturer can give feedback on a discussion forum. Such feedback will be addressing many issues students face. If a particular student has some problems, the lecturer can personally respond to that particular student through the system, but is also good during face-to-face sessions the lecturer to address such problems. (Interview, Student 07)

Students believed that discussion forum tasks could promote critical thinking if challenging tasks and tasks that encouraged students to participate actively were used.

It should have things that prompt learners to think and respond to something. (Interview, Student 07)

You may have a question that demands the use of your own experience. The experience can be job related, but at some point is a general experience. You need to sit down and think. For example, the way you think about the tasks, and come up with solutions. So you will have to think. Therefore, you think beyond the given task. (Interview, Student 08)

Furthermore, students felt that discussions need to be effectively moderated to be able to promote critical thinking. Moderation had the potential for making students more focused on the respective tasks.

But if the forum is moderated by the teacher, it will be good because the teacher will be able to guide students who put their own things and show their biases. (Interview, Student 07)

The lecturer will be monitoring on the students' progress. For example, so and so is logged on and is working on a particular task. In that way, the lecturer can see what students are doing and can also alert them in case the lecturer realises that corrections are needed. But when we work alone, there is no feedback, it becomes a problem. (Interview, Students 02)

It was also argued that critical thinking could be promoted when the discussion forum tasks were authentic and integrated with course grades. In such cases, students' participation was likely to be encouraged.

It should focus on political, economic, social as well as academic issues. It should focus on all the aspects in life. (Interview, Student 05)

They should have value to the course work and be related to the key components of that course. (Interview, Student 07)

In summary, students felt that effective ways for promoting critical thinking through discussion forums are encouraging freedom of expression, and giving immediate feedback. Other ways are effectively moderating the discussion forums, and using challenging and authentic tasks. The following subsection describes effective ways for promoting critical thinking in quizzes.

### ***5.3.1.2 Using quizzes to promote critical thinking***

Students believed that one of the effective ways for promoting critical thinking through quizzes is to ensure that cheating is discouraged. This could be done in a

number of ways. First by limiting the time the quiz is active. Students felt that the more the time the quiz is active, the more the chances for cheating.

But if time span of a quiz is three, four or five days, even if I was not there when someone was doing the quiz, they will tell me questions in the quiz. (Interview, Student 01)

If the quiz is limited to a given time, let say from 12:10 to 12:30, this can reduce cheating, but we need to have enough computers. (Interview, Student 03)

In considering time, when the lecturer composes the questions should also consider the amount of time to be taken to answer the questions. (Interview, Student 06)

The second way suggested for discouraging cheating was by shuffling questions. The quiz tool has the option of shuffling both the stem of the question and the distracters related to that stem. Students acknowledged that shuffling questions was likely to encourage meaningful learning.

The questions were shuffled to prevent cheating. It thus encouraged understanding. So you answer what you understand, not copying from your neighbour because he/she has put A or B. In that case, it encourages thinking. (Interview, Student 02)

The fact that questions were shuffled made us creative, no cramming, but encouraged understanding. (Interview, Student 03)

Second, the questions should be random. For example, the questions for Asha should be arranged differently from John's questions. (Interview, Student 05)

Finally, to discourage cheating, it was suggested that each student should have different questions.

Because every student is known by the system, so each student should be given specific questions. This will prevent cheating. If each student has different questions, there will be effectiveness in assessing students' outcomes, as opposed to doing the same questions, though the questions change positions. (Interview, Student 04)

Third, if possible the teacher can use different questions for each student. (Interview, Student 05)

Students had the view that immediate feedback in quizzes was important for promoting critical thinking because it helped them address their immediate concerns.



The quiz should also give feedback so that you can understand your strength or weakness. (Interview, Student 01)

The Moodle system of giving feedback immediately is much better than the paper based feedback because immediately after submitting you get the feedback. (Interview, Student 03)

At the same time, Moodle shows you that what you had missed, the correct answer is this. Therefore it encourages. It is good. (Interview, Student 04)

Once you have submitted it, it gives you immediate feedback. You get answers to incorrect questions. (Interview, Student 07)

For critical thinking to be promoted, students had the view that different types of questions such as multiple, open-ended, and essays should be used. Different types of questions were likely to help assess the different thinking skills of the students.

The questions should not only be limited to objective ones.... In many of our quizzes, the questions are objective. Objective questions are good, but sometimes they may limit one's thinking. I believe that a student will answer every question even if s/he doesn't know the answer. Questions in Moodle should also involve application, not objective questions all the time. (Interview, Student 03)

Instead of having a quiz where essay questions are attempted, some quizzes can have multiple choice questions. (Interview, Student 07)

Students also felt that the integration of different Moodle tools had the potential for promoting critical thinking. For example, the quiz tasks could be accompanied by reading an article. The integration of different Moodle tools was likely to encourage students' engagement in thinking skills such as evaluation, analysis and synthesis.

... if you search for different material or do any assignment you will be using Bloom's Taxonomy. You can evaluate. The lecturer can use evaluation. The students too can involve Bloom's taxonomy through evaluation, analysis, synthesis or comprehension because Moodle is like any other media for learning and teaching purposes. (Interview, Students 05)

It helps because when you search for materials to get answers you will be involving higher order thinking. (Interview, Student 06)

Students believed that quiz tasks could promote critical thinking if they were related to students' prior knowledge. Prior knowledge was likely to help students respond easily to questions given and engage in the tasks.

It can promote higher order thinking because to be able to respond to the questions you need to have knowledge about what you do. If you are not knowledgeable, you will not be able to answer the quiz effectively. (Interview, Student 04)

But, if you don't understand the task that means you don't understand the whole assignment. If you get something new that you don't understand, the task will be difficult. (Interview, Student 08)

Another way of motivating students' participation was the inclusion of grades in Moodle tasks.

You are given a quiz, at the end you are told that it was just for practice. We need to be guided in advance. In that case, I think we will move forward. (Interview, Student 01)

For us students, we want to see the marks in the continuous assessment. In one of the courses we did, we attempted the quiz. Later on, we came to know that the quiz was only for practice. It discourages to some extent to go on using the system. Why should I waste my time? Some students thought that it was just a waste of time. (Interview, Students 02)

In short, suggested effective ways of using quizzes for promoting critical thinking were discouraging cheating; and giving immediate feedback to the students. Integrating different Moodle tools in various tasks was likely to help students develop thinking skills. Quizzes needed to take into account prior knowledge of the students in order to engage them in the tasks. The following sub-section describes effective ways of using uploaded resources for promoting critical thinking.

### ***5.3.1.3 Using uploaded resources to promote critical thinking***

Students believed that uploaded resources had the potential for promoting critical thinking when a variety of resources were used. The use of a variety of resources could broaden students' understanding and expose them to different views of authors.

We need a variety of resources because when you compare resources from different writers you can expand your ideas. (Interview, Student 03)

As a teacher, you need to interact with different resources. (Interview, Student 01)

Additionally, the lecturer should put extra material other than the notes related to what has been taught. For example, the lecturer can indicate further readings. If possible they should put links. So you can download and read that resource. This will increase students' understanding. (Interview, Student 04)

There should be abstracts and the links to the article. So based on the abstract, you can decide to click on the link related to the article. There should also be links to other extra abstracts related to that topic. (Interview, Student 07)

It was further believed that for such resources to promote critical thinking students ought to read them critically.

In the same way, the notes should not be seen as sacred books. (Interview, Student 03)

Not every given resource is complete in itself. You need to read it and go beyond that. (Interview, Student 08)

Since knowledge production is not static, students felt that up-to-date resources should be used because they were likely to promote critical thinking by exposing students to new ideas.

The time you prepared the notes, maybe there were no new ideas, but after sometime, you need to update your notes. (Interview, Student 01)

When the lecturer puts resources in Moodle [they] should make sure that they are up-to-date. They should be reviewed over time because what you have written today may be reviewed after reading other books. The lecturer should be up-to-date. The resources should not remain as they are. We know that knowledge is not static. (Interview, Student 04)

Furthermore, students felt that critical thinking could be promoted when uploaded resources were integrated with other Moodle tools. For instance, quizzes and discussion forums could be accompanied with certain resources to achieve given learning outcomes.

For teaching-learning purposes, at least at the end of each topic, there should be questions to measure students' learning outcomes. (Interview, Student 01)

The resources that accompany tasks as you read them; they demand the reader to go beyond what is written. This author talks about this, what about the other author? Even the resources themselves promote higher order thinking. (Interview, Student 08)

Students believed that proper learning took place when resources used were authentic and related to the course. In such cases, students were likely to be engaged in meaningful learning; hence, the potential for promoting critical thinking.

When we use Moodle, we use computers. The computers are teaching media. The teaching media that we use should show the real situation. For example, photographs should be attached. (Interview, Student 03)

The material should be realistic ... Moodle should be fed with enough materials. During a lecture you may not understand everything; there are some things you can get out of the lecture room without understanding them. Once enough resources are fed in Moodle, you can read them to expand what you got in the lecture. (Interview, Student 02)

In my view, the materials should be related to the lecture the teacher had taught. There should be a relationship between what the teacher has taught and what is uploaded in Moodle. (Interview, Student 05)

Critical thinking can be promoted when students interact with the resources. For resources to benefit the learners, students felt that such uploaded resources needed to be user-friendly in terms of their layout, amount of information and readability.

They were in a good format. (Interview, Student 04)

The materials should be written in a form of a summary so that a student does not get tired reading them. They should be summarised and the student will understand them. (Interview, Student 06)

Students cautioned that resources could be in a user-friendly format, but if the culture of using soft copies was not inculcated into students such resources could not be fully utilised.

For Moodle to be more successful, students should have the culture of using soft copies [rather] than hard copies. Some students find it very difficult to use soft copies. Some of the students printed materials

from Moodle and gave their friends, hence, had no need to visit Moodle again. (Interview, Student 03)

If you download the soft copy you will need to print it. Students may fail to access. For instance, a student doesn't have a laptop or computer for reading the soft copy. (Interview, Student 04)

Uploaded resources had the potential for promoting critical thinking when a variety of them were used so as to accommodate different perspectives. Up-to-date resources had the potential for promoting critical thinking because knowledge changes over time. The integration of different Moodle tools had the potential for promoting critical thinking because students would have the opportunity for relating ideas. The use of authentic resources could engage students in meaningful learning. Resources in a user-friendly format could increase the degree of interactivity between the students and resources.

Students also expressed the challenges they faced when using Moodle. Such challenges could limit the promotion of critical thinking. The following section describes those challenges.

#### ***5.3.1.4 Challenges related to use of Moodle tools***

Four main challenges were identified as limiting the use of Moodle. One of them is inadequate computer skills amongst students.

The skills to access the material is necessary, but we have limited skills. (Interview, Student 02)

This technology has been recently introduced, and some of us are still new to it. (Interview, Student 03)

Another problem, many students did not have enough computer knowledge, so it was difficult to interact with Moodle because many of us didn't have enough computer knowledge. (Interview, Student 05)

Limited computer skills could lead to computer phobia. Student teachers suggested that such phobia could be reduced by constant use of computers.

The most important thing for us students is to interact with the system. The more you interact with it, the more it becomes user-friendly to you. (Interview, Student 07)

Moodle is good if the learner knows how to use it. It is good.  
(Interview, Student 08)

The other challenge was the limited number of computers in the institutions and amongst students.

We were given tasks involving using Moodle, but you find that students with laptops are few ... (Interview, Student 04)

In our case, many students don't have computers, so this was a problem. (Interview, Student 05)

Another challenge is inadequate number of computers. (Interview, Student 06)

Computer access is another problem. (Interview, Student 07)

Unreliable internet connectivity and power supply were other challenges.

The main challenge is internet connectivity. The other challenge is that of power supply. (Interview, Student 07)

... the internet in the computer lab is too slow and you have been given a limited time. So it becomes difficult to do something successfully.  
(Interview, Student 04)

A student can use it, if there is reliable power supply and resources.  
(Interview, Student 08)

Another [problem] student may fail to submit the work, or there may be power interruption. (Interview, Student 05)

The main challenges reported were inadequate computer skills amongst students, limited number of computers, unreliable internet connectivity and constant interruption of power supply.

Lecturers also suggested effective ways of using the discussion forums, the quizzes and uploaded resources for promoting critical thinking.

### **5.3.2 Lecturer perceptions**

This section describes effective ways of using the discussion forums, quizzes and uploaded resources for promoting critical thinking. Lecturers' quotes representing their thinking have been included to illustrate the points made.

### 5.3.2.1 *Using discussion forums to promote critical thinking*

Lecturers believed that the discussion forums had the potential for promoting critical thinking when the tasks used were challenging, and encouraged independent learning.

The lecturer should read and pose provoking questions to students based on what they learn at a particular time. (Interview, Lecturer 01)

The basic thing is the nature of questions or the nature of activity the teacher prepares for the students. The nature of questions the teacher initiates can block or can promote higher order thinking. So the issue is not students. Students act upon instructions. The sort of questions the teacher prepares is very important. You can prepare a student for rote learning using the discussion forum. (Interview, Lecturer 05)

It was also felt that the lecturer's moderation in the discussion forum was paramount for promoting critical thinking. Among other things, moderation was likely to make students more focused on the task.

On the course of the discussion, the lecturer can intervene to give some directions. Sometimes they might be discussing something, but may be wrong. The lecturer should get in to assist. (Interview, Lecturer 02)

If you raise or give students a task that demands them to evaluate, for example, they will respond accordingly. It can promote higher order thinking only if the lecturer focuses the discussion to such higher levels. (Interview, Lecturer 04)

In a discussion forum, you discuss with the students on a particular topic. The students participate and the lecturer is there to guide them. (Interview, Lecturer 03)

Though the lecturers' moderation was seen as central, it was reported that discussion forums could be initiated by either the lecturer or students.

The discussion forums are not necessarily initiated by the lecturers; even amongst them they can start the discussion. (Interview, Lecturer 02)

Any of them can initiate the discussion at any time. The student can initiate something, and the teacher can recommend for discussion and designate it. It is the best way to interact between the teacher and the students, and among the students themselves. (Interview, Lecturer 05)

It was also believed that engagement in the discussion forum could be promoted by a high degree of interactivity between the lecturer and students, as well as amongst students. It was in such deep interactions critical thinking could be promoted.

When people discuss, the thinking capacity and ability to give arguments are expanded. (Interview, Lecturer 01)

It helps the student to interact with the lecturer as well as with other students. (Interview, Lecturer 04)

As they discuss, they are also engaged in higher level of thinking. They are not restricted to what the teacher has said; they apply higher order learning. (Interview, Lecturer 05)

A high degree of interactivity between the lecturers and students, as well as amongst students could be promoted when careful planning of the learning tasks is considered.

To be able to promote critical thinking, people need to sit down and think and incorporate it in online learning. (Interview, Lecturer 02)

If the teacher is not keen enough may not get what he wants to get from the students. Therefore, careful planning is important, number of students and the nature of feedback. (Interview, Lecturer 05)

Lecturers believed that freedom of expression stimulated critical thinking because students had the opportunity to share ideas.

The students get the opportunity to express their views. So it stimulates higher order thinking. (Interview, Lecturer 04)

They are free to give their own views based on their learning experience. Giving them time to give their views, in a free manner, that is, in a liberal way; it means they are able to gauge themselves how they develop their progress of learning. (Interview, Lecturer 05)

Among other things, lecturers felt that freedom of expression could be promoted when lecturers had built good rapport with their students and used high quality questions.

The most basic thing is the activity the teacher prepares; the rapport the teacher creates when teaching students using the different tools. If you have a good rapport; good quality questions, you will get a good stuff; but if you put garbage, you will get garbage. (Interview, Lecturer 05)



The use of authentic tasks in the discussion forums had the potential for promoting critical thinking, especially when the tasks were directly related to achieving certain learning outcomes.

The questions should be educational, not all the issues. It should be related to the tasks students are involved in. (Interview, Lecturer 01)

It is good in the sense that you can evaluate students' understanding of something beyond what you simply taught in the class by letting them give out their ideas. (Interview, Lecturer 05)

Briefly, lecturers felt that effective ways for using the discussion forums for promoting critical thinking included the use of challenging tasks that encourage independent learning. Proper moderation of the discussions, and high interactivity between students and the lecturers as well amongst students themselves had the potential for promoting critical thinking. The use of authentic tasks and a high degree of freedom of expression were also reported to be important for promoting critical thinking. The next section describes effective ways of using quizzes to promote critical thinking.

### **5.3.2.2 *Using quizzes to promote critical thinking***

Lecturers believed that critical thinking could be promoted when different tools in Moodle were integrated to achieve a particular learning objective. For instance, issues discussed in the discussion forum could be part of the quiz so as to assess the effectiveness of the discussion forums, or a quiz may be based on a particular reading (article or document).

The quizzes can go together with the discussion forum. What you have been discussing, I know in many cases in the discussion forum, you discuss one issue, but you can come up with more than one solution. Among those solutions, you can come up with the best options... Based on that then, to be able to assess students' understanding, you can make questions based on those discussions. (Interview, Lecturer 02)

The materials should be accompanied by questions. (Interview, Lecturer 04)

Students will come back to attempt the questions, they go back to read the notes, and then coming back to the quiz. That way allows students

to be independent learners. Students who go online are expected to be independent learners. (Interview, Lecturer 05)

Also they can be given many reading materials where they will be required to synthesise all that they have read within a page. They are expected to use their own words. (Interview, Lecturer 01)

The duration of the quiz and time set when the quiz was open were significant for promoting critical thinking or limiting it. It was suggested that time duration had to be proportional to the nature and number of questions. This could also help to discourage cheating. The time the quiz was active could allow flexibility to the students to do the quiz, especially in universities where there were not enough computers to accommodate all the students at the same time.

The fact that it is timed, the student has to struggle to work on the quiz according to the time you have set, but the quiz demands the lecturer to have many questions. (Interview, Lecturer 02)

You give them a limit. Let's say, after a given time it must be submitted. (Interview, Lecturer 03)

We need to be flexible somehow. When I was preparing the quizzes, I thought about all these things. I know, students can be involved in cheating. I thought I should be flexible enough. I gave them 48 hours to do the quiz. It was open from midnight and closed automatically after two days. The quiz was to be done within 10 minutes. So they had prior knowledge about the duration of the quiz. Cheating was not possible because the questions were different. (Interview, Lecturer 05)

The other way suggested for discouraging cheating was to shuffle questions and ensure that each student did his/her own questions. This entails the lecturer needing to have a larger bank of questions.

You can shuffle the questions. For example, to one student the first question is the fifth to another student. (Interview, Lecturer 02)

You know, the tool jumbles questions. Question 1 for this student will not necessarily be the same question to the other student. It shuffles the questions. Students who are used to cramming question numbers, once they are in the system, they see a different question. (Interview, Lecturer 05)

It was felt that challenging questions and thought-provoking distracters could promote critical thinking. In such cases, lecturers believed that students would be able to analyse and evaluate alternatives and finally choose the correct response.

Furthermore, to broaden students' thinking, it was suggested that closed questions had to be minimal or avoided.

You have to think clearly. You need to have distracters that will clearly discriminate. For a student to understand that the answer is A, B or True or False, s/he needs to have a clear set of mind. (Interview, Lecturer 05)

What I have seen in many quizzes is the use of multiple choice questions. What is needed is that the options should not differ much from each other. This makes a student think critically. (Interview, Lecturer 02)

I think is to make sure that you set questions that demand the students to use higher order thinking. You need to set questions that test higher cognitive abilities. (Interview, Lecturer 04)

Lecturers believed that timely feedback helped students make improvements in the tasks at hand.

Using the quiz as a lecturer, you can give tasks to students and be able to give immediate feedback to students about the task you have given. By doing so, I think it facilitates learning. (Interview, Lecturer 03)

So feedback is very important. The challenge is for the teacher to be able to maintain interaction with the students. (Interview, Lecturer 05)

Most of the lecturers interviewed appeared to believe that online feedback is similar to face-to-face feedback. However, they felt that certain situations may call for the use of any of the feedback types or a combination.

Classroom comments sometimes help those students who don't frequently visit Moodle. If you have many students, it may be difficult to ensure that everybody visits Moodle. Therefore, we need to have both types of feedback – online as well as verbal feedback. (Interview, Lecturer 05)

It was also felt that the quiz could promote critical thinking if the questions were prepared with students' psychology in mind. The use of clear language was likely to help students understand the learning tasks.

You also need to consider the nature of the students you have, not in the manner of compromising standard, but what do they really understand? Focus on the lines that you think your students will be able to learn. We need to think about students. We want to create a community of learning; we don't want to create enemies. We want to make them good learners, as good learners as possible. So we need to

assist them when it comes to learning. When we prepare the quiz, we need to think of the psychology of the students.....

We should not use the language of the professor. I am not saying the language should be too low, but it should help the students to get the concept. (Interview, Lecturer 05)

Lecturers felt that quizzes had the potential for promoting critical thinking when they were integrated with other different Moodle tools. Likewise, when quizzes were prepared and administered in a manner that discouraged cheating, there was a likelihood of promoting critical thinking. The use of challenging questions, offering immediate feedback, and use of clear language were likely to promote critical thinking.

### **5.3.2.3 *Using uploaded resources to promote critical thinking***

Lecturers believed that the use of a variety of teaching-learning resources that motivated students had the potential for promoting critical thinking. Extra resources could be obtained through external links. Such resources were likely to make students independent learners.

The student is not limited to the provided resources. They can search for extra materials. We have a lot of reading materials, other than the ones that accompany a given task. (Interview, Lecturer 01)

It depends on the nature of the materials, if they demand a student to use higher order thinking. But if you give students materials that can remind them something, those will not necessarily promote higher order thinking. (Interview, Lecturer 04)

The material should be attractive enough to allow students [to] become independent learners. ... Again you can have links to the websites, the link to a map, the link toward appendices supporting those items. (Interview, Lecturer 05)

Lecturers felt that the integration of the uploaded resources with other Moodle tools had the potential for promoting critical thinking. Such integration was likely to give students the opportunity to engage in evaluation and analysis of issues given.

You give the students the materials, but at the end you leave a question that makes them think. The question can then demand them to evaluate, or critically analyse something. (Interview, Lecturer 04)

The resources that accompany the tasks give students the opportunity to widely read. The student reads as many articles as she/he can. (Interview, Lecturer 01)

Lecturers believed that use of resources that involved multiple senses had the potential for promoting critical thinking. It is through the use of different senses that students would be able to maximise their learning.

The videos can be sent to online students so that they can see how the lecturer uses the tools. (Interview, Lecturer 02)

The content has to be interactive enough to engage multiple sensory organs. So it should not only be text, it should include other formats, tables, drawings, diagrams, illustrations should be there because the software has the facility for drawings including charts, pictures. (Interview, Lecturer 05)

This is the best tool for promoting higher order thinking because during uploading you need to upload relevant materials that facilitate higher order thinking. (Interview, Lecturer 02)

It was further believed that language used had to be clear so that students would be able to comprehend the given tasks.

Some articles are good and easy to read. Some are too philosophical; hence, it may be difficult to understand them. (Interview, Lecturer 01)

The language has to be simple to the ear of the student as if it is spoken about something. (Interview, Lecturer 05)

Briefly, lecturers believed that the use of a variety of resources and the integration of different Moodle tools were likely to promote critical thinking. Resources that involved multiple senses of the students had the potential for promoting critical thinking. The use of clear language was reported as one of the key characteristic features for resources to promote critical thinking.

The use of Moodle tools had challenges. Such challenges could limit effective utilisation of Moodle tools. The following section describes the challenges related to the use of Moodle tools.

#### **5.3.2.4 Challenges related to the use of Moodle tools**

Unreliable internet connectivity was one of the major challenges reported.

There are technical challenges. For example, you may plan that I will do *a*, *b* and *c*, but when you reach the office you realise that there is no internet connection. (Interview, Lecturer 01)

In our institution, for example, the internet is not stable. (Interview, Lecturer 03)

The main challenge that I see, especially to our students, many of them don't have frequent access to the internet. (Interview, Lecturer 04)

This is linked to sluggish internet connectivity in our place. In some cases, students would have done things fast, but the internet speed slows their pace. (Interview, Lecturer 05)

Another challenge was limited institutional support for encouraging the integration of LMS into the teaching-learning process. However, what seems promising is the change in attitude of some of the old lecturers towards the use of LMS as time goes by.

The institution leaves the programme to go by itself as if teachers are angels. This is bad. The institution should backup the programme. (Interview, Lecturer 05)

We, young people need to pioneer the changes. We need to come together and see how we can solve the problem. For an old lecturer, who was taught through the slide rule, it may be difficult to convince him that you can teach a student who is 100 kilometres or so away. ... When we started, there were more challenges, but up to now lecturers are beginning to accept, especially old professors. (Interview, Lecturer 02)

One of the challenges was inadequate computer skills amongst students and lecturers.

From my experience, not all students have good computer skills. (Interview, Lecturer 03)

My knowledge of using this platform is not that good. I get some problems. In some cases, I seek support from LMS coordinators to help me upload the quizzes. (Interview, Lecturer 04)

The learning management system is good for a computer literate person. (Interview, Lecturer 01)

Due to inadequate computer skills, some lecturers were not able to facilitate online courses well, as the following quote illustrates.

It is also seen that once materials are in Moodle, it is Moodle itself. That is not the case. If the teachers themselves cannot use well the tools, they will not be able to help students use them. ...

Many teachers face a lot of problems in facilitating online courses if they have not experienced being online as students. To be good facilitators of online courses, they should, themselves, have experience as students in an online environment. (Interview, Lecturer 06)

Finally, it was reported that technology was not fully integrated into the teaching-learning process. This limited use of technology, among other things, was due to uncertainty about technology. This, in turn, kept lecturers in their comfort zone where they resorted to maintaining their *status quo*.

There is still fear for technology. You happen to see a student who fears even to hold the mouse. (Interview, Lecturer 05)

Some lecturers don't use online learning. That is resistance for change, but as time goes on all these challenges will end. (Interview, Lecturer 02)

The challenges reported were related to unreliable internet connectivity, inadequate institutional support, limited computer skills, and uncertainty about using technology. The following section describes findings related to technical staff.

## **5.4 Results from Technical Staff**

Results from technical staff are related to their support to students and lecturers, their perceptions of Moodle tools for promoting critical thinking, and the challenges related to the use of Moodle.

### **5.4.1 Support given to students and lecturers**

The support given to lecturers and students was mainly technical, although pedagogical support was given as well. The technical staff indicated that they offered pedagogical and technical support to lecturers in areas such as uploading resources to the system, formatting the resources to suit e-learning, registering students and lecturers in the system, and retrieving students' or lecturers' lost passwords.

We help teachers to be able to summarise and upload content in the system. We also help them on the format of the materials that are supposed to be in the web. (Interview, Technical Staff, University C)

I also help them to create content. Some lecturers may want to use Moodle, but cannot create content, we guide them on creating the content and also help them to upload the content. (Interview, Technical Staff, Universities A and B)

I register lecturers in the system. Furthermore, I help lecturers to register their students in the various courses. (Interview, Technical Staff, Universities A and B)

In many cases students forget their passwords and user names. (Interview, Technical Staff, Universities A and B)

It was also reported that they provided training to lecturers on the use of the learning management systems.

We usually have workshops and conduct different training for teachers on the nature of resources that is supposed to be part of the e-learning. (Interview, Technical Staff, University C)

They also encouraged lecturers to use Moodle tools for teaching purposes.

So in many cases, we encourage teachers to encourage their students to use the discussion forum. (Interview, Technical Staff, University C)

Lecturers from University C were more motivated to use the learning management system than lecturers from Universities A and B. For instance, there were mechanisms in place to motivate them. The lecturers were appraised twice a year on the use of the system. Furthermore, there was an e-learning competition where best e-learning courses received prizes ranging from cash to iPads.

Currently, teachers are being appraised on the use of ICT twice a year. ... So they need to state how they have been using the system for teaching.... The first winner gets a laptop, the second and third winners get iPads. (Interview, Technical Staff, University C)

They also oriented students on the use of Moodle.

New students are oriented to the system especially on how to access materials from Moodle. (Interview, Technical Staff, University C)

The first week of the orientation, they are taught computer basics based on common tasks using computers. They are also introduced to LMS. (Interview, Technical Staff, Universities A and B)



The support to both lecturers and students was given frequently and they had support systems in place to address the issue through emails, help desks, and phone calls.

The support is available during working hours, five days a week. (Interview, Technical Staff, Universities A and B)

We have the office called E-learning Help Desk. In the office we have extension telephone numbers. So if a teacher wants our support will call us. ... Depending on the nature of the problem the teachers has posed; one of the staff can go to the teacher's office to give support. (Interview, Technical Staff, University C)

We have staff in the Help Desk whose job is to support lecturers' immediate demands. (Interview, Technical Staff, Universities A and B)

#### **5.4.2 Potential of Moodle tools for promoting critical thinking**

Both the technical staff believed that, if used properly, Moodle tools have the potential for promoting critical thinking.

The way Moodle was made is for promoting higher order thinking. It is not just a depository of materials, it is meant to be collaborative where people can share knowledge. The lecturers' role is to have tasks that make students think. (Interview, Technical Staff, Universities A and B)

Our students are far spread in different parts of the country. They discussion their own issues, they share experiences using the discussion forums; by doing so, they increase their understanding capacity in various issues. (Interview, Technical Staff, University C)

The following section describes challenges reported by technical staff.

#### **5.4.3 Challenges related to the use of Moodle**

The main challenges were related to limited computers, the attitudes of some lecturers towards the use of Moodle as a teaching-learning tool, and inadequate computer skills amongst lecturers and students.

One of the problems is that some teachers lack ICT basic skills. ... What prevents many old teachers to embrace e-learning is partly their limited ICT knowledge. (Interview, Technical Staff, University C)

Students are very interested in Moodle. .... For teachers, in many cases we follow them to encourage the use of Moodle, but with students, it

is the opposite; they follow us. Students are the ones that initiate the requests. (Interview, Technical Staff, Universities A and B)

The other challenge, especially for Universities A and B, was lack of a strong mechanism in place to ensure that lecturers used ICT for teaching-learning purposes.

Once such a policy is in place, it is likely to motivate lecturers to use the system. There are some lecturers who respond well to that. Some of them are changing gradually. We believe that with time things will be good. (Interview, Technical Staff, Universities A and B)

We have the e-learning policy. It recognises teachers who use Moodle by rewarding them. (Interview, Technical Staff, University C)

This section has reported results related to technical and pedagogical support given to lecturers and students, the frequency and mode of support. Results relating to the perceptions of technical staff about the potential for Moodle tools to promote critical thinking have been presented also. Finally, the challenges related to the use of Moodle have been described. The next section reports the evidence of critical thinking from the documents reviewed.

## **5.5 Evidence of Critical Thinking from Other Sources**

This section describes evidence of critical thinking from documents reviewed such as the discussion forums, course syllabi, and learning tasks in Moodle. The evidence of critical thinking in asynchronous discussion forum posts was measured using the RCS-CAIS model. The inclusion of critical thinking in the course syllabi and learning tasks in Moodle was based on whether the syllabi and tasks had processes related to recall, comprehension application, analysis, synthesis, evaluation or inference.

### **5.5.1 Students' uncritical and critical thinking in the forums**

This section reports the evidence of critical thinking skills as displayed in the discussion forums. The posts were categorised according to the RCS-CAIS Model. The task was taken from University A.

As teachers to be of English as a Second language, which teaching-learning approach(es) would you use? Why would you use such an approach or approaches?

Note:

1. Give your comments as many times as you can.
2. Your participation will be graded. (Assessment task, University A, Unit 6: Teaching approaches)

*Clarification* had the highest frequency (40%), followed by *assessment* (22%) and *inference* (19%), while *recall* (3%), *strategies* (4%) *socialisation* (5%) and *comprehension* (7%) had lower frequencies as shown in Figure 5.23.

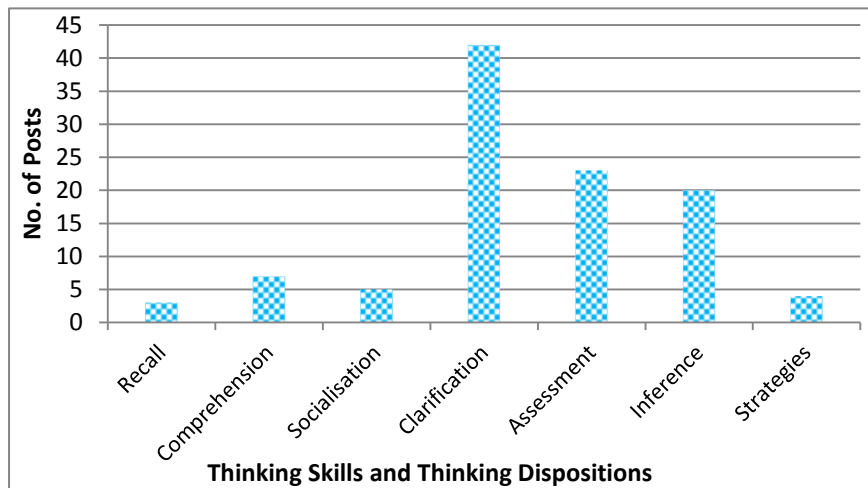


Figure 5.23. Critical thinking skills and thinking dispositions in the discussion forum (N = 104)

The posts indicated that critical thinking is not linear, but rather it is an iterative process. The following extracts from the discussion forums illustrate the iterative nature of thinking. In brackets are the levels of the thinking skills.

As a teacher-to-be of English as a second language, I would like to use the Task Based Approach. [*Recall*] This approach makes the learner active whereby learners are not taught language in advance, but they are given a communicative task to prepare. So the teacher is there just to direct them in fulfilling that task. [*Assessment*] I like it because, it discourages spoon feeding to students. [*Recall*]

Peer assessment is useful [*Recall*] because it gives confidence to a student who is being assessed by fellow students; rather than being assessed by a group of tutors. [*Assessment*] And it is useless where student are in conflicts and friendship, they will not look at what is presented. [*Assessment*] So the tutor or lecturer should also assess on his own by comparing the peer assessment and his. [*Strategies*] So the

tutor is the one to have a final say. [*Recall*] (Discussion forum posts, University A)

The other evidence of critical thinking was manifested from the course syllabi, and learning and assessment tasks in Moodle.

### **5.5.2 Evidence of critical thinking from course syllabi**

This section examines the existence or non-existence of critical thinking in the course syllabi. Two course syllabi for the selected programmes were examined. Universities A and B share the same syllabus because University A is a constituent college of University B. The syllabi indicated inclusion of critical thinking aspects as part of the curricula. Below are course objectives from universities A, B and C:

By the end of the course, you will be able to:

1. Demonstrate an understanding of curriculum concepts, theories and issues;
2. State educational objectives at an appropriate level of generality;
3. Design units of instruction based on modern approaches to curriculum development;
4. Describe how various psychological, societal and subject matter factors influence curriculum development;
5. Demonstrate mastery of basic concepts, and principles of curriculum evaluation;
6. Construct and use a selection of assessment instruments. (Course objectives, University A and University B)

By the end of the course, the trainees should be able to:

- Describe different curriculum concepts, theories and issues;
- Describe curriculum development process;
- Plan and develop a relevant curriculum to fit a particular context;
- Analyse various issues on curriculum implementation;
- Carry out evaluation of the curriculum. (Course objectives, University C)

### **5.5.3 Evidence of critical thinking from course tasks**

Evidence of use or non-use of critical thinking was examined in all the tasks given during the course such as assignments and questions for the discussion forums. The lecturers reported that the teaching-learning tasks they used promoted critical thinking, as most of them could accommodate divergent thinking.

Each assignment will have for example, an article to read. We also read the articles so that we can see if answers given by the students are related to the article. The answers accommodate divergent thinking. (Interview, Lecturer 01)

Below are some of the examples taken from the course tasks:

Explain the various ways through which test results could be used to improve teaching and learning in any subject of your choice. Post your discussion on the discussion forum labelled Activity 6.1. (Assessment task, University B, Unit 6.1: Assessing students and evaluating the curriculum)

**Task: ICT Based Lesson Plan**

1. Choose a particular curriculum area where you see feasible implementation of a lesson plan that makes intensive use of ICT.
2. Assuming you have decision power to implement the lesson plan in a number of schools, reflect on the following questions:
  - Would you prefer to use commercial software or special/customised software?
  - Would your plan include the use of web pages or e-mail?
  - Would you plan a policy for the safety of the students accessing the internet?
  - What assessment practices could be used to evaluate the learning process?

**Expected Product**

Written proposal to implement an ICT based lesson plan (students' course or level, teaching topic/s, expected learning outcomes, how would ICT tools be used in the development of the activities). The description of the proposal should be given. (Assessment task, University C, Module 3: Designing teaching and learning materials)

Lecturers believed that the tasks were authentic and contextualised. For example, students could design something. In such tasks, students could display their thinking skills. The lecturers' views corroborated the actual tasks examined in Moodle.

The students have been given different models of curriculum integration; the task requires them to come up with their own models of curriculum integration. (Interview, Lecturer 01)

Using the concept based curriculum design, prepare a study unit on a topic of your choice. The study unit should indicate the following main ideas:

- Concepts, generalisations, or conclusions
- Relevance of the topic
- Learning outcomes
- Strategies, resources and activities. (Assessment task, University B, Unit 3.2: Examining the concept based approach curriculum)

**Task: Curriculum integration**

Read the worksheet “Possible schemata for curriculum integration”.

**Expected product**

Propose another scheme for curriculum integration. You can search for a different example in the 5 schemes discussed in the paper, or you can select one different that fits your context. Explain the reasons for your choice in a few lines. (Assessment task, University C, Module 5: Curriculum design approaches and models)

There was evidence of use of tasks that integrated different Moodle tools. For example, resources (articles/documents) were accompanied by questions.

If you look at my modules, you will realise that at the end of each module, there is a question students have to attempt. In one of the modules I had asked them: ‘Do you think that curriculum and syllabus are synonymous?’ Do they mean the same? So you give them such a question. Such a question makes students think hard because they need to know what is curriculum and what is syllabus, then they have to weigh them to see if they are the same thing or they are different. Here the students will have to evaluate and make judgment. (Interview, Lecturer 04)

Students from University C were given the opportunity to evaluate each of the units covered. Below is part of the evaluation task from University C. This unit evaluation covered areas related relevance, reflective thinking, interactivity, tutor support, peer support, and interpretation of the unit. Only the area related to reflective thinking has been presented to illustrate the point.

Table 5.17  
*Part of a Unit Evaluation Tool from University C*

The purpose of this survey is to help us understand how well the online delivery of this unit enabled you to learn.					
Each one of the 24 statements below asks about your experience in this unit.					
There are no 'right' or 'wrong' answers; we are interested only in your opinion. Please be assured that your responses will be treated with a high degree of confidentiality, and will not affect your assessment.					
Your carefully considered responses will help us improve the way this unit is presented online in the future.					
<b>Reflective Thinking</b>					
Responses	Almost Never	Seldom	Sometimes	Often	Almost Always
In this online unit ...					
5. I think critically about how I learn.	●	●	●	●	●
6. I think critically about my own ideas.	●	●	●	●	●
7. I think critically about other students' ideas.	●	●	●	●	●
8. I think critically about ideas in the readings.	●	●	●	●	●

The course syllabi and the tasks in Moodle showed evidence of inclusion of critical thinking.

## 5.6 Summary of Findings

The first research question examined student teacher and lecturer perceptions of the use of discussion forums, quizzes and uploaded resources for promoting critical thinking. In general, most of the students felt that they had a high level of critical thinking skills and dispositions related to maturity, systematicity, analyticity and self-confidence. While more male students believed that they had higher critical thinking skills and tendencies related to analyticity, truth-seeking, systematicity and maturity than female students; female students felt that they had higher tendencies related to open-mindedness and inquisitiveness. The beliefs of most in-service teachers related to analyticity, open-mindedness, inquisitiveness and truth-seeking were higher than those of the pre-service teachers. The beliefs of most students from University C were higher than those from Universities A and B. The beliefs of students from University B were higher than those from University A, especially in analyticity, truth-seeking, open-mindedness, systematicity, and self-confidence. In inquisitiveness, the beliefs of students from University A were higher than those from University B. Critical thinking skills

and tendencies related to maturity and open-mindedness were relatively similar in all the three Universities.

Most of the lecturers felt that they had higher critical thinking skills and tendencies related to systematicity, maturity, truth-seeking and analyticity. However, most of the lecturers believed that they had low self-confidence in using Moodle tools, especially for assessment purposes. Younger lecturers aged between 27 and 39 believed they had higher critical thinking skills and tendencies related to analyticity, open-mindedness, and inquisitiveness than did lecturers aged 40 and above. However, though all lecturers believed they had low self-confidence; lecturers aged 40 and above had slightly higher self-confidence than lecturers aged between 27 and 39.

The second research question examined student teacher and lecturer perceptions of the effective ways of using the discussion forums, quizzes and uploaded resources for promoting critical thinking. The ways suggested by students were similar to those suggested by lecturers. For the discussion forums to be able to promote critical thinking, both students and lecturers believed that immediate feedback, freedom of expression, moderation of the discussions and use of authentic tasks were paramount. Discouraging cheating in quizzes through time limits, shuffling questions and giving different questions to each student were amongst the ways suggested for promoting critical thinking. Giving immediate feedback and integrating different Moodle tools were also significant suggestions for promoting critical thinking. The use of a variety of resources accompanied by authentic tasks, and use of user-friendly resources were believed as having the potential for promoting critical thinking when using uploaded resources.

The final research question focused on the evidence of critical thinking in the asynchronous discussion forum posts, course syllabi, and other learning tasks in Moodle. An examination of the learning tasks in the asynchronous discussion forum posts revealed critical thinking, though most of the posts fell into the category of *clarification*. A slightly higher number of posts also fell into



categories of *assessment* and *inference*. The objectives of the course syllabi in all the three universities incorporated elements of critical thinking. Other learning tasks in Moodle also had evidence of the application of critical thinking.

Research results become more meaningful when discussed and interpreted in context. The following chapter discusses these results. The results are organised and discussed according to the themes related to the research questions.

## **Chapter 6**

### **Discussion of Results**

The purpose of this study was to examine student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking within a pre-service teacher education programme. Chapter 5 has presented the results related to the three main research questions. This chapter discusses the findings from these results.

The chapter is divided into four sections. The overview of the results has been described in the first section. The second discusses the results related to student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking. Section three discusses student and lecturer perceptions of effective ways of using the discussion forums, quizzes and uploaded resources for promoting critical thinking. Student teachers' critical thinking skills and thinking dispositions as displayed in asynchronous discussion forum posts are discussed in the final section.

#### **6.1 Overview of Results**

The first research question examined student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking within a pre-service teacher education programme. Both students and lecturers perceived that Moodle tools highly promoted their critical thinking skills and dispositions related to maturity, systematicity and analyticity. Students believed that Moodle tools promoted less of their critical thinking skills and dispositions related to inquisitiveness, and lecturers perceived that some of the LMS tools promoted less of their dispositions related to self-confidence. Male students believed that they had higher critical thinking skills and dispositions related to truth-seeking, while female students felt that they had higher critical thinking skills and dispositions related to open-mindedness. More in-service student teachers than pre-service teachers felt that LMS tools promoted

their critical thinking skills and dispositions related to open-mindedness, truth-seeking and inquisitiveness. Students from University C believed that they had higher critical thinking skills and dispositions related to inquisitiveness than students from Universities A and B.

With reference to the second research question that investigated student teacher and lecturer perceptions of effective ways of using the discussion forums, quizzes and uploaded resources for promoting critical thinking, those ways suggested by students were in many cases, similar to those suggested by lecturers. Both groups agreed that giving immediate feedback, using authentic tasks, and integrating different Moodle tools were important for promoting critical thinking. Other effective ways for promoting critical thinking in the discussion forums were proper moderation and encouraging freedom of expression. For quizzes, they suggested different ways of discouraging cheating. They further suggested that the use of varied resources and user-friendly format had the potential for promoting critical thinking.

The final research question examined students' critical thinking skills and thinking disposition in tasks related to discussion forums. Most of the posts fell into the category of *clarification* followed by those in *assessment* and *inference*. Categories of *recall* and *strategies* had fewer posts. These results indicate that most of the students felt that they were able to discuss and analyse the given issues clearly. While fewer students felt that they were able to propose solutions to given issues, some students also felt that they had low critical thinking.

## **6.2 Student and Lecturer Perceptions of the Discussion Forums, Quizzes and Uploaded Resources for Promoting Critical Thinking**

The first research question examined student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking. In some cases, both critical thinking skills and thinking dispositions have been presented together because results showed that they are connected. Sections 1 to 3 discuss students' and lecturers' high rating of

critical thinking skills and dispositions. Sections 4 and 5 discuss students' and lecturers' low rating of critical thinking skills and dispositions. Sections 6 and 7 discuss results related to students' critical thinking skills and dispositions by gender. The eighth, ninth and tenth sections discuss differences between pre-service and in-service teachers in critical thinking skills and dispositions. Sections 11 and 12 discuss the differences in critical thinking skills and dispositions amongst universities. Section 13 discusses lecturers' differences in critical thinking skills and dispositions by age and experience. The final section discusses the benefits of using a combined instrument for measuring critical thinking skills and critical thinking dispositions simultaneously.

Both student teachers and lecturers perceived that the discussion forums, quizzes and uploaded resources greatly promoted their critical thinking skills and dispositions related to systematicity, maturity and analyticity.

### **6.2.1 Students' and lecturers' high rating of inference and systematicity**

Inference and systematicity refer to the skills and dispositions of being organised and focused in thinking so as to be able to make logical conclusions. Higher inference and higher tendencies related to systematicity show that student teachers and lectures perceived that Moodle tools helped them draw reasonable conclusions and achieve higher tendencies of being organised and focused in their inquiry process. In other words, students and lecturers believed that asynchronous discussion forums, quizzes and uploaded resources helped them approach different learning tasks logically. Inference and systematicity were manifested in content delivery and in assessment tasks. These areas are discussed in the following sections.

#### **6.2.1.1 *Inference and systematicity in content delivery***

The results suggest that inference and tendencies related to systematicity, among other things, can be promoted when students are involved actively in interaction with colleagues and with the lecturers. This view is supported by lecturers' survey

data, where 66.7 per cent indicated that during planning and teaching, they ensured that tasks in Moodle helped students make logical conclusions. In the survey, Lecturer 11 illustrates: “[I] agree because it [the discussion forum] helps them to share ideas and reach consensus and I normally synthesize their ideas at the end so that they can draw conclusion.” Student survey data also revealed that 88 per cent of the students felt that Moodle tools helped them to be organised and focused, when they interacted with colleagues and with the lecturers. A typical comment is made by Student 08 as noted from the survey extract: “I take views from them [students] and generalise them to get strong points.” This comment is further supported by Student 13: “Through reading their comments I can get general information for making logical sequence on my conclusion.” Given these interactions, the findings suggest that most of the students were willing to get different views from colleagues and they learned from them.

Since students were aware that their comments would be read by other students, they articulated their arguments in a clear and logical manner, so that they could be understood by colleagues. From the survey data, Student 47 illustrates the worry some students would have when they made errors in the discussion forums: “Sometime I feel too ashamed because the error that I have made, sometime may distort the general idea in the discussion ....” This view suggests that when students share their ideas with colleagues through interaction in the discussion forums, prevailing circumstances may encourage them to be logical when presenting those ideas for the fear of being embarrassed by colleagues. These findings show that dispositional factors may influence the nature of conversations and the degree of critical thinking in asynchronous discussion forums.

Additionally, well-structured delivery of the subject matter may promote critical thinking skills and tendencies related to systematicity. Lecturers’ interviews exemplified how lecturers were systematic and organised when planning and delivering online learning tasks. This view is supported by Lecturer 06: “Many students would prefer entering Moodle through their emails. They will be able to see the tasks in a chronological order. You can systematically see the postings and

when they were posted.” As discussed earlier, lecturers’ systematic planning and delivery of the learning tasks are also likely to have influenced students’ tendencies for being organised and focused.

The results also suggest that critical thinking skills and dispositions related to systematicity can be promoted when clear, well-elaborated and varied resources and challenging tasks are used. With reference to the nature of uploaded resources, in the survey, Student 30 comments: “Often uploaded resources contain clear and well elaborated illustrations which help me draw conclusions.” In such cases, students are likely to have better organisation and planning when they engage in those tasks because they can follow the tasks and resources with ease.

#### ***6.2.1.2 Inference and systematicity in assessment tasks***

Promotion of inference and systematicity were also revealed from both course objectives and the assessment tasks in Moodle. For example, one of the course objectives from University B is: “Plan and develop a relevant curriculum to fit a particular context.” Another example is from an assessment task from University A: “As teachers to-be of English as a Second Language, which teaching-learning approach(es) would you use? Why would you use such an approach or approaches?” Both the course objectives and the assessment tasks intend to promote students’ critical thinking skills and dispositions of being focused, organised and systematic, so that they can draw logical conclusions about the tasks. Additionally, from the assessment tasks, students are expected to demonstrate their critical thinking skills through the use of objective evidence to support their arguments. In this way, students are expected to argue their case with evidence. This can be done through contrasting, relating and analysing arguments. These processes are likely to help students arrive at logical conclusions.

The highest rating for systematicity contradicts some previous studies (Cubukcu, 2006; Ozkahraman & Yildirim, 2012; Rimiene, 2002). In all these studies, students had relatively low average scores in systematicity. Possible reasons for

the difference in the results between these studies and the current study could be attributed to several factors. One of the differences could be due to the nature of the instruments used to collect, generate and analyse data. All three studies used California Critical Thinking Disposition Inventory, while in this study a different instrument was used. Second, the sample size in these studies was relatively larger (400, 323 and 227 respectively); while in the current study the sample was smaller, 54 students. Finally, the study by Rimiene (2002) was an experiment. Experimental studies are likely to have different results from those carried out in real classrooms. In experimental studies, participants' behaviours tend to be manipulated. Thus, research participants may not behave similarly to how they behave in a natural setting.

Students' active interaction with colleagues, lecturers, and the learning material has the potential for promoting thinking skills and dispositions related to systematicity. Active interaction during the learning process is also reflected in sociocultural theory. According to sociocultural theory, human cognition is a result of the interaction of the individual with other members within a social setting where mediating artefacts help to promote the interaction and enrich learning (L. Wang et al., 2011; Zuzeviciute & Butrime, 2010). In the current case, active interaction amongst students and with the lecturers was promoted and enriched by the mediating tools: asynchronous discussion forums, quizzes and uploaded resources. Students collaborated through these tools. Through collaboration, students have the opportunity to share ideas and support other students.

The findings extend our understanding that some programmes can be effective in developing critical thinking skills and dispositions related to systematicity, especially when both students and the lecturers are actively engaged in meaningful interaction. Though the critical thinking programme conducted by Rimiene (2002) involved elements of active interaction, such as cooperative learning, conversations, discussions, and debates within three months, students displayed relatively low average scores in systematicity. The findings could

suggest that the duration of three months may be too short to develop systematicity. Systematicity, like other elements of critical thinking, may require a longer time to develop (Giancarlo & Facione, 2001; Miri et al., 2007).

### ***6.2.1.3 Significance of student and lecturer perceptions of inference and systematicity***

Our understanding of student and lecturer perceptions of Moodle tools for promoting critical thinking is significant in the teaching-learning process. Since the findings have revealed that most of the students believed that Moodle tools promoted their critical thinking skills and tendencies related to systematicity, it can be inferred that most of the students were motivated to use Moodle tools and benefitted from these tools. Knowledge of students' perceptions may help to predict their attitudes towards the use of these tools in their future study or teaching career. Additionally, their perceptions may enlighten lecturers on the proper mechanisms that can be put in place to sustain their motivation for using Moodle tools for promoting critical thinking.

Results have indicated how lecturers promoted students' critical thinking skills and tendencies related to systematicity through active interaction amongst students and with the lecturers, and through proper planning of learning tasks. Our knowledge of lecturers' perceptions of inference and systematicity can help understand how they made students focused and organised during the learning process. Since these tasks and learning strategies helped students develop their critical thinking skills and dispositions related to systematicity, they can be considered as good pedagogical practices. These findings inform us of the benefits of using proper resources, tasks and strategies during teaching to help meet expected student learning outcomes.

Likewise, our knowledge of lecturers' perceptions of Moodle tools for promoting critical thinking can help address some of the issues related to their professional development, especially for smooth integration of Moodle tools for promoting critical thinking. Though the results revealed that lecturers perceived that they



successfully promoted critical thinking skills and dispositions related to systematicity, there is room for further pedagogical improvement. One of the ways of improving lecturers' pedagogy is through sharing their experiences as Lecturer 06 illustrated in one of the interviews: "... sharing of experiences will help other teachers learn a lot from those experiences." Such pedagogical improvement can take different forms: attending training in areas they want to improve; or learning from their pedagogical practices and improving accordingly. Similarly, lecturers from other universities can learn from some of the good pedagogical practices that have been revealed through this study.

In conclusion, active interaction with colleagues, the lecturer and the resources seems to help students to become more organised, plan better and to be more careful about the tasks at hand. The use of clear, relevant and varied resources and challenging tasks also has the potential for making students organised and careful. Lecturers can promote critical thinking skills and dispositions related to systematicity through proper and careful planning of learning tasks, because such planning helps both lecturers and students to be systematic, organised and focused when working on those tasks. Knowledge of student and lecturer perceptions of critical thinking skills and tendencies related to systematicity may inform the nature of the teaching-learning process and how Moodle tools can be integrated to promote critical thinking.

### **6.2.2 Students' and lecturers' high rating of decision-making and maturity of judgement**

Maturity of judgement denotes critical thinking skills and dispositions related to decision-making or problem-solving. A higher rating in decision-making skills and tendencies related to maturity suggests that both students and lecturers believed that asynchronous discussion forums, quizzes and uploaded resources helped them make rational decisions and solve problems related to the learning tasks. Maturity of judgement was reflected in both course delivery and assessment tasks.

### **6.2.2.1** *Decision-making and maturity in course delivery*

The results suggest that encouraging freedom of expression, and using relevant and varied tasks and resources have the potential for promoting students' critical thinking skills and dispositions related to maturity of judgement as evidenced from both students' and lecturers' survey. From the survey data, about 90 per cent of the students believed that when freedom of expression is encouraged, and when relevant and varied tasks and resources are used, decision-making skills and maturity of judgement can be promoted. A comment from Student 34 captures the role of freedom of expression: "... in Moodle, students irrespective of their individual differences have equal chance of suggesting anything they think is logical." With reference to the relevance of uploaded resources, Student 30 affirms as revealed from the survey data: "The uploaded resources always relate to the course, thus help me to solve problems related to the course." In such cases, other than the opportunity to express their views, students may be exposed to different ideas and different ways of approaching the given tasks. With such exposure, students are expected to scrutinise different views and options, and ultimately make rational decisions.

More than 73 per cent of the lecturers believed that they ensured that the learning tasks through the discussion forums, quizzes and uploaded resources promoted students' problem-solving skills when freedom of expression was encouraged. A good example of this is illustrated from the survey data by Lecturer 03: "I make sure that students are free to provide suggestions on issues posed." When students give their views freely, they are likely to be more curious because, in such cases, they may not necessarily focus on what they think the lecturers want to hear. When tasks are not properly planned and implemented, some students are likely to respond to those tasks based on their understanding of the lecturers' priorities. In such circumstances, freedom of expression and curious learning are unlikely to be promoted.

Student and lecturer interview data suggest that thought-provoking tasks and careful planning of learning tasks are likely to promote critical thinking skills and

dispositions related to maturity of judgement. For instance, students revealed in their interviews that Moodle tasks helped them think critically and make rational decisions when working in different learning tasks. They added that thought-provoking tasks helped them think and devise strategies to solve problems related to the learning tasks as illustrated by Student 08: “A task that makes you think before giving the answers. It makes you think, come up with strategies and solve the problem.” When such thought-provoking tasks are given, students may be engaged in different critical thinking skills such as evaluation, synthesis, analysis and making inferences.

Lecturers indicated in their interviews that when preparing tasks in Moodle, they were cognisant of ensuring that such tasks helped students become independent decision makers. This view is reflected in the comments made by Lecturer 05:

When they [students] work on their own, they are independent. They are free to give their own views based on their learning experience. Giving them time to give their views, in a free manner, that is, in a liberal way; it means they are able to gauge themselves how they develop their progress of learning.

Decision-making skills may be enhanced when students are given the opportunity to analyse, evaluate and synthesise issues in a liberal environment. Therefore, students are likely to arrive at well-thought-out decisions.

#### **6.2.2.2 *Decision-making and maturity of judgement in assessment tasks***

Student and lecturer beliefs that Moodle tools promoted decision-making skills and tendencies related to maturity were reflected in both course objectives and assessment tasks in Moodle. The following extract from the course objective in Moodle from University A illustrates this: “Design units of instruction based on modern approaches to curriculum development.” Similarly, maturity of judgement is reflected from one of assessment tasks from University B: “Read the worksheet ‘*Possible schemata for curriculum integration*’. Propose another scheme for curriculum integration.” From the course objective and the assessment task, problem-solving and decision-making skills and their related tendencies are expected to be developed when students are engaged in mental problem-solving

tasks that may involve designing something new. Since the expected learning outcome is based on what is already known, the task partly illustrates how students' prior knowledge and experience need to be integrated to achieve the expected learning outcomes. Such learning tasks have their applications in real life situations, because in such cases, people are expected to demonstrate mastery of problem-solving or decision-making skills.

Students' and lecturers' high rating of maturity of judgement is supported by Profetto-McGrath (2003) where Baccalaureate nursing students in Canada had a relatively higher average score in maturity of judgement. With reference to freedom of expression, Chen and Jang (2010) stress that online instructors need to "create an open, interactive, and learner-centred atmosphere for students to freely express their feelings, thoughts, and concerns" in order to better understand students' needs and support them (p. 750). For students to be able to express their views freely and to be involved in rational decision-making processes, active participation of the students in the learning tasks is required. From a sociocultural perspective, active participation promotes meaningful learning (Sutherland et al., 2009).

Though previous studies have reported that critical thinking, including critical thinking skills and tendencies related to maturity of judgement, can be developed over a long period of time (Miri et al., 2007; Profetto-Mcgrath, 2003; Wilkinson & Barlow, 2010), the findings from the current study suggest that it may not necessarily take that long, especially when freedom of expression is encouraged, and relevant and varied tasks and resources are used. These learning situations tend to expose students to different views where students are expected to make rational choices. The research was carried out when the research participants were in their second year. Despite this short period, students believed that they had developed problem-solving and decision-making skills through the use of Moodle tools. Such tasks are likely to accelerate the development of both critical thinking skills and dispositions related to maturity of judgement.

### **6.2.2.3     *Significance of student and lecturer perceptions of decision-making and maturity of judgement***

The results have shown that students felt that when freedom of expression was encouraged, and when varied tasks and resources were used in Moodle, their decision-making skills and tendencies related to maturity of judgment were promoted. Since students saw the potential of Moodle tools in promoting their critical thinking skills and dispositions related to maturity, these students are likely to have valued and used Moodle tools to achieve those critical thinking skills. This positive attitude towards Moodle tools for promoting decision-making skills and maturity of judgement may also influence their beliefs, actions and intentions of using these tools in their future study or teaching career. Thus, knowledge of students' perceptions of critical thinking skills and dispositions related to maturity of judgment may help to predict their use or non-use of these tools in the future. A response to using LMS in their future career, a survey extract from Student 30 illustrates this: "Because I am a computer literate, I can't fear my job which involves working with computers." A contrasting view is shown by Student 41 in the survey: "Moodle to me is so confusing." Student 30 is likely to use LMS now and in the future because of self-confidence about using computers, while Student 41 seems to have negative attitude towards the use of LMS. Having this knowledge in mind, intervention measures can be taken to help address some of the issues that may limit students from using Moodle tools for promoting critical thinking.

The results have further revealed that lecturers' careful planning and implementation of learning tasks were significant for promoting students' decision-making skills and tendencies related to maturity of judgement. Our understanding of lecturers' perceptions of critical thinking skills and tendencies related to maturity of judgment may help to inform lecturers' pedagogical practices related to the promotion of critical thinking through Moodle tools. This is also significant in understanding how the lecturers used Moodle tools and some teaching strategies to promote critical thinking. From these perceptions, we can

understand which teaching-learning approaches and combination of online tools are suitable for promoting critical thinking skills and tendencies related to maturity of judgement.

From the perceptions of students and lecturers discussed above, it can be concluded that the asynchronous discussion forums, uploaded resources and quizzes have the potential for promoting students' independent decision-making and problem-solving skills and dispositions. This can be achieved when relevant and varied tasks and resources are used, and when freedom of expression is encouraged during the teaching-learning process. Therefore, student and lecturer perceptions are important because they may inform us about the integration of Moodle tools into promoting critical thinking skills and tendencies related to maturity of judgement.

### **6.2.3 Students' and lecturers' high rating of analysis and analyticity**

Analysis and analyticity refer to the critical thinking skills and dispositions of using logic and objective evidence, and being careful. Higher rating of critical thinking skills and dispositions related to analysis indicate that students and lecturers perceived that Moodle tools helped them acquire analytical skills and tendencies of being careful, logical and objective. Student and lecturer perceptions of analysis were manifested during online course delivery and from the assessment tasks.

#### **6.2.3.1 Analysis in course delivery**

The results reveal that active interaction amongst students and with the lecturers, and the relevance of the issues discussed are likely to promote analysis and analyticity. These factors also motivate students to use Moodle tools. From the survey data, about 86.5 per cent of the students felt that their ability to analyse issues was facilitated by active interaction they had with colleagues and with the lecturers. This is demonstrated by Student 31: "The lecturer provides explanations and relevant examples." They further believed that the relevance of the issues being discussed motivated their participation in the discussion forums. Student 34

reflected in the survey: “Because most of the issues discussed related to our academic and social life, hence, I have enough knowledge to give analysis of issues.” By being motivated and using these tools, students’ critical thinking skills and dispositions related to analysis are likely to be promoted.

Students’ survey results corroborate those of lecturers’ survey. About 80 per cent of the lecturers believed that to promote critical thinking skills and tendencies related to analysis, they ensured that the uploaded resources were relevant to the students. This view is supported by Lecturer 13: “The materials should be as relevant to the course content as possible; otherwise it is better not having them in.” Lecturers further indicated that the discussion forums helped to sustain interaction amongst students and with the lecturers when analysing issues. A good example is shown by survey extract from Lecturer 11: “Moodle is very [a] enjoyable teaching tool because of its flexibility. One can interact with the instructor, students and the materials any time and at any place.” Overall, the results reveal that active interaction is important for sustaining students’ motivation in the tasks and in promoting critical thinking skills and dispositions related to analysis.

The results further reveal that a higher degree of preparedness reduces cheating in examinations and tests. Students reported that they were not involved in cheating when they were properly prepared for those tests or examinations. In the survey, Student 08 notes: “I cannot guess the answer when I [am] prepared well unless if I have no idea of that thing.” From these results it can be inferred that preparedness is likely to increase students’ self-confidence in learning in general, and in examinations in particular. When students have such confidence in themselves, cheating is likely to be reduced because students think confidently about the tasks. As a result, students are likely to become more analytical because when students are involved in cheating, they do not use their critical thinking skills such as analysis, evaluation, synthesis or inference.

Students' and lecturers' interview data suggest that the use of relevant and challenging tasks that demanded skills to analyse, synthesise or evaluate issues help students become analytical. For instance, in one of the interviews, Student 07 argued that "It [the discussion forum] should have things that prompt learners to think and respond to something." A similar view is given by Lecturer 05: "The most basic thing is the activity the teacher prepares; ... If you have a good rapport; good quality questions, you will get a good stuff; but if you put garbage, you will get garbage." This view indicates the importance of lecturers' conscious planning of the learning tasks that aim at meeting students' expected learning outcomes.

While students felt that cheating could be minimised through a higher degree of preparation for the tests and examinations, to lecturers, being analytical when preparing quizzes was significant because they could address issues related to cheating. The following interview extract from Lecturer 02 clarifies the idea: "The quiz is good because the way it is made in the system, initially I was thinking that a student may cheat, but that is not possible. You can shuffle the questions." Careful planning of the tasks is likely to combat some of the students' malpractices such as cheating. Through careful planning of the learning tasks, lecturers can anticipate students' bad intentions and can address these issues accordingly.

### **6.2.3.2 *Analysis in assessment tasks***

Critical thinking skills and tendencies related to analysis were also reflected in both course objectives and assessment tasks in Moodle. One of the course objectives from University C illustrates this: "Analyse various issues on curriculum implementation." Similarly, one of the assessment tasks from University A addresses issues of analysis: "Choose one syllabus or course outline and try to answer the following questions: ... Are the suggested methods and techniques capable of developing an independent, creative and self-reliant learner? Post your ideas on the discussion forum." Both the course objective and assessment task have the potential for promoting critical thinking skills and



dispositions related to analysis. From the given assessment task, students are expected to scrutinise the syllabus and evaluate whether the suggested methods and techniques are relevant, realistic, necessary, and able to promote holistic learning. By engaging in such tasks, students' critical thinking skills and dispositions related to analysis can be promoted.

The results from the students' and lecturers' surveys and interviews suggest that the use of subject specific tasks and content are likely to promote analyticity because students will be familiar with the content. This view is illustrated by interview data from Lecturer 02: "The issues of proper use of the discussion forums, quizzes, and materials should be relevant to the topics." In the survey, Student 37 comments on the relevance of the subject matter: "We always discuss issues related to our areas of specialisation and the shared courses." There is evidence that learning how to think is context dependent (Garrison, Anderson, & Archer, 2001; Renaud & Murray, 2008). From a sociocultural perspective, specific subject matter may be related to the situated nature of learning, where learning takes place in a cultural context as learners engage in social and cultural practices (Sutherland et al., 2009). This view implies that learners engage in domains related to their social and cultural practices. Since learning will be centred on known social and cultural practices, learners' participation is likely to be more active and meaningful. Therefore, the mastery and relevance of the subject matter may be interpreted based on the context of the social and cultural practices of the learners.

From a pedagogical point of view, the use of relevant, challenging and clear learning resources and tasks is likely to promote critical thinking skills and dispositions related to analysis. When the resources and tasks are clear, students are likely to engage in those tasks with ease. Clarity also implies the use of clear language. Since language is a thinking tool, the use of clear language has the potential for promoting clear thinking. On the use of clear language, Lecturer 05 suggests: "When we prepare the quiz, we need to think of the psychology of the students. We should not use the language of the professor." The issue of language

is very significant in the Tanzanian context, because the medium of instruction is English, a foreign language.

Similarly, interaction amongst students and with lecturers is significant as it helps sharing of ideas. This view is reflected in the survey by Student 13: “I always participate and share and express my opinions.” A similar view is expressed by Student 30 in the survey: “... it helps me to share ideas, and skills from different sources in my learning. Thus, Moodle as a learning tool, is very crucial in my learning process.” Through interaction, students have the opportunity to share, analyse and evaluate ideas. From a sociocultural perspective, collaboration helps students share ideas, support each other, and learn from each other.

### ***6.2.3.3 Significance of student and lecturer perceptions of analysis and analyticity***

Student and lecturer perceptions of the use of Moodle tools for promoting critical thinking skills and dispositions related to analysis are significant for understanding how the tools are used. Student and lecturer perceptions have revealed that active interaction, use of relevant resources and a higher degree of preparedness promoted students’ critical thinking skills and dispositions related to analysis. Knowledge about these perceptions can help to understand how Moodle tools were used to promote critical thinking skills and dispositions related to analysis. Other lecturers can use insights gained from students and lecturers from this study to use Moodle tools to promote critical thinking skills and dispositions related to analysis in their respective higher learning institutions.

Results have revealed that students were motivated to use Moodle tools because of active interaction and the relevance of issues discussed. These perceptions inform us about students’ values, attitudes and beliefs about those tools for promoting critical thinking skills and tendencies related to analysis. Since teaching is a value forming act, there is a likelihood that teachers may pass on certain aspects that they think that are useful for teaching and learning to their future students. For example, in the survey, Student 37 affirms: “Moodle has

equipped me with literacy that I longed for few years ago. I would like my students to acquire the same.” This student appears to have positive attitude towards Moodle tools and is willing to use them with his students during his future teaching career. However, these future teachers need to be critical enough about their pedagogical practices, because what is currently seen as the best pedagogical practice may be seen as the worst pedagogical practice in the future. Both lecturers and students need to improve their pedagogical practices with time because knowledge changes over time and in different places.

In summary, the use of clear and relevant resources, meaningful interaction with colleagues and with the lecturers, self-confidence on learning tasks, and the use of specific subject matter have the potential for promoting critical thinking skills and tendencies related to analyticity. Therefore, through understanding student and lecturer perceptions, proper curricula and learning tasks that promote critical thinking can be planned, implemented and evaluated.

Most of the students felt that they had low tendencies related to inquisitiveness. The reasons related to this perception are discussed in the next sections.

#### **6.2.4 Students’ low rating of inquisitiveness**

Inquisitiveness is related to the desire for learning, the willingness to learn and the possession of a curious mind (Gardner et al., 2007). Most of the student teachers perceived that they had low tendencies related to inquisitiveness. This indicates that some of the students displayed low intellectual curiosity and tended to learn things when their immediate application was apparent (Giancarlo & Facione, 2001). In other words, these students seemed to have inadequate “hunger or eagerness for reliable information” (Facione, 2013, p. 10) because some of them took part in Moodle tasks for the sake of getting grades. The classification of reasons partly reflected students’ low inquisitiveness. Out of 86 reasons given, 73 were relevant, and nine stated clearly that students lacked critical thinking skills and dispositions related to inquisitiveness. To some students, low inquisitiveness was reflected by participating in Moodle tasks for the sake of getting grades,

disliking future jobs related to using LMS, and having less self-motivation to use Moodle tools for learning purposes. These issues are discussed in the following sections.

#### **6.2.4.1 *Learning for grades***

The results of survey and interview data demonstrated that some of the students valued grades more than the learning process. The students' survey, for example, indicated that about 46 per cent of the students participated in Moodle tasks for the sake of getting grades. One of the major reasons for using Moodle for the sake of course grades was that getting higher grades at the university was important. This view is supported in the survey by Student 47 who categorically stated: "If there is [If it were] not for grade no one can participate on that." This view may give clues to the nature of assessment tasks given by some lecturers. Inferring from perceptions of some of the students about learning for grades, it can be suggested that some of the assessment practices encouraged students to focus on grades rather than on the learning process.

From the interviews, most of the students wanted the inclusion of grades in Moodle tasks as a motivator for them to learn. For example, all the four students interviewed from University A insisted on the inclusion of grades in almost every task in Moodle, as the following interview extract from Student 02 illustrates:

In one of the courses we did, we attempted the quiz. Later on, we came to know that the quiz was only for practice. It discourages to some extent to go on using the system. Why should I waste my time? Some students thought that it was just a waste of time... It shouldn't be just for practice. It should have an added value to my continuous assessment report.

Preference for grades for their own sake may be detrimental to learning in general, and to students' intellectual curiosity in particular. Students' attitudes need to be changed so that they can see assessment as an integral part of learning, not as a separate product that is unrelated to learning. Likewise, lecturers need to carry out assessment practices in such a manner that they are part of the formative

learning process. The attitude towards valuing grades for their own sake compromises the purpose for learning and the learning process itself.

#### **6.2.4.2 *Attitudes towards LMS related careers***

The results also suggest that 45.5 per cent of students disliked taking a future job if it involved the use of LMS. One of the reasons for disliking LMS related careers was that Moodle was confusing. Other reasons were due to institutional challenges such as limited number of computers, limited computer skills amongst students, and slow internet connection. Since these students were expected to be future teachers, negative attitudes towards the use of Moodle tools for promoting their intellectual curiosity could also affect their future use of LMS as teaching-learning tools. Thus, knowledge of students' perceptions is vital as it can help address such concerns so that students cultivate positive attitudes towards Moodle tools for promoting intellectual curiosity.

The results have revealed that some students had negative attitudes towards Moodle tools because of institutional challenges. These results show that students may need to take some training on the use of Moodle and LMS in general, so that they benefit from these tools. This also informs respective institutions of the need to address the challenges identified so that students may use Moodle tools smoothly for promoting critical thinking.

#### **6.2.4.3 *Less motivation to use Moodle tools for learning***

The results suggest that some of the students were less motivated to use Moodle as a learning tool. Some of the students reported that they participated in Moodle tasks by just doing what they were instructed to do as illustrated by Student 18 in the survey: "I did as it was instructed." These results suggest that these students were either less motivated to learn in general, or were less motivated to use Moodle tools for promoting critical thinking.

Motivation is central for learning. Low motivation to learn is likely to reduce students' intellectual curiosity. Students may also not engage actively in tasks

when their motivation is low. This situation, may call for lecturers to use authentic learning tasks that can help learners see the application of what they learn to their real life situations. On using the discussion forum to cover issues related to students' lives, in one of the interviews, Student 05 suggested that "It should focus on political, economic, social as well as academic issues." Since some students tended to value the outcomes of learning more than the learning process itself, the use of authentic tasks and resources is likely to help students see the benefits beyond the classroom of what they learn. This may help students value both the learning processes and the outcomes of learning.

Research indicates mixed results in tendencies related to inquisitiveness. Wang (2008), who investigated the factors that encourage student interaction and collaboration in computer mediated communication tasks in a web-based course, reported that many students admitted that they would not have posted many messages if they were not assessed. Similarly, Kibble (2007) revealed that in the absence of course grades, the quiz participation rate could have been low. These studies suggest that students had low motivation to learn, consequently, they were less curious to learn.

However, in other studies, tendencies related to inquisitiveness had the highest average score. Higher inquisitiveness was related to motivation of learning English as Taiwanese students discussed with the English native speaker (Chiu, 2011); students' perceptions that challenges were opportunities for learning (Wangenstein, Johansson, Bjorkstrom, & Nordstrom, 2010); and students' curiosity and pursuit of knowledge (Profetto-Mcgrath, 2003). In these studies, it can be inferred that motivation to learn was likely to have led to higher inquisitiveness. Similarly, Cuadrado-García and Ruiz-Molina (2009) who analysed student perceptions of an online based project that used the Moodle platform, reported a high participation of students in the course though their participation was not graded. This could be interpreted as students being motivated to learn, hence, having higher tendencies related to inquisitiveness. Xie and Ke (2011) reported that highly motivated students demonstrated high

cognitive engagement, and that intrinsic motivation predicted students' participation rate as well as their learning process.

Based on the findings from the current study, students who used Moodle for the sake of getting grades and disliked future careers that involved the use of LMS seemed to believe that Moodle tools were ineffective in facilitating their inquisitiveness. As a result, the students seemed to be less motivated to learn to use this tool. Less motivation to use Moodle tools for learning is likely to have made them develop negative attitudes towards LMS use even in their future careers. Thus, the level of students' motivation can partly account for the difference between the current study and the reviewed studies.

From sociocultural theory, intrinsic motivation to learn is partly influenced by active participation of learners in the social and cultural practices whose ultimate purpose is to become *master practitioners* in the community of practice (T. Anderson, 2004; Lave & Wenger, 2003). To such motivated students, learning is not only part of life, but is life itself.

#### **6.2.4.4 Significance of student perceptions of inquisitiveness**

Since some students studied for the sake of getting grades, knowledge of students' perceptions may help to motivate them to use Moodle tools not only for grades, but also for promoting critical thinking.

The understanding of students' perceptions, especially the attitude towards valuing grades more than the learning process, could partly reflect the nature of assessment practices of some lecturers. Assessment practices are likely to have influenced students to learn for the sake of grades. These perceptions, among other things, call for change in assessment practices. Assessment needs to be carried out in such a way that it is part of formative learning. This practice is likely to make students value both the outcomes and processes of learning. These findings suggest how lecturers' assessment practices can be tailored to benefit students and sustain students' learning process.

Since it is known that some students had low motivation to use Moodle tools for promoting critical thinking, this view may suggest that such students had negative attitudes towards Moodle tools. It can also be inferred that Moodle tools did not help such students achieve their expected learning objectives. Therefore, knowledge of students' perceptions of Moodle tools is significant because it can help lecturers devise mechanisms to motivate such students to use the tools for promoting critical thinking.

In conclusion, critical thinking skills and dispositions related to inquisitiveness can be promoted when students are curious and intrinsically motivated to learn. Such motivation can be sustained by using authentic learning tasks that help learners see the application of those tasks in their daily lives. Understanding students' perceptions of the use of Moodle tools for promoting critical thinking skills and dispositions related to inquisitiveness can help lecturers plan learning tasks that can motivate students. Motivation to use Moodle tools is significant for successful student learning, including the promotion of critical thinking. Understanding of students' perceptions about the use of LMS can also help to address some of the assessment practices that may obscure the promotion of critical thinking skills and dispositions related to inquisitiveness.

#### **6.2.5 Lecturers' perceptions of self-confidence**

Self-confidence refers to lecturers' beliefs and intentions of using LMS tools for promoting critical thinking. Although most of the lecturers perceived themselves to have higher critical thinking skills and tendencies related to systematicity, analyticity and maturity, most of them believed that they had lower tendencies related to self-confidence, especially in using Moodle tools for assessment purposes. This means that most of the lecturers did not have enough trust to use asynchronous discussion forums, quizzes and uploaded resources for assessment purposes. Lecturers' low self-confidence was also reflected in the classified reasons. For instance, out of 18 reasons given, eight stated that the lecturers lacked self-confidence in using Moodle tools for assessment purposes. Most of the lecturers preferred face-to-face assessment to online-based assessment.



### **6.2.5.1 Preference of face-to-face assessment**

The results from both the survey and interview show that most of the lecturers preferred a face-to-face mode of assessment to an online mode. For instance, 90.0 per cent of the lecturers preferred face-to-face feedback to online feedback in quiz assessment tasks, while 58.3 per cent felt uncomfortable correcting students' errors in an online environment. One of the reasons for the preference of face-to-face feedback was that it was easier to notice students' concerns as expressed by Lecturer 05 in the survey: "I like giving feedback face-to-face as I can notice whether my student got me or not." Also online cheating worried some of the lecturers as demonstrated by survey data from Lecturer 11: "Not very confident with the way they undertake their quizzes. They might be referring to books or any documents in [the] course of responding to the questions."

Other reasons for the preference of face-to-face feedback were related to contextual challenges such as inadequate computer skills amongst students, low internet connection speed and large class sizes. These challenges were also reported in lecturers' interviews. As Lecturer 01 explains: "There are technical challenges. For example, you may plan that I will do a, b and c, but when you reach the office, you realise that there is no internet connection." These results suggest that institutional challenges can lower lecturers' self-confidence. With such low self-confidence, lecturers are unlikely to use Moodle tools for learning purposes, let alone for promoting critical thinking. For smooth integration of Moodle into the teaching-learning process, institutional challenges need to be addressed, and lecturers need to be empowered to use Moodle tools for assessment purposes. Lecturers can be given training that focuses on minimising online cheating, because it seems to be a major challenge amongst many lecturers.

With reference to lecturers' low self-confidence in using Moodle tools, students' interview and survey data revealed that some students felt that some Moodle tasks were ineffective in promoting their learning outcomes because there was no feedback from the lecturers. Survey data from Student 13 provides a good example: "Sometimes we never got feedback from our lecturers." Among other

considerations, self-confidence helps lecturers perform their roles as teachers well, including the mastery of the subject matter. Khoo, Forret, and Cowie (2010) argue that to successfully develop an online learning community, lecturers need to adopt four important roles:

- *Pedagogical*: initiate strategies to promote quality learning interactions;
- *Managerial*: engage in organisational, procedural and administrative tasks;
- *Social*: promote a friendly, social and welcoming environment for student learning; and
- *Technological*: use web-based technology competently and support online students to achieve their learning outcomes.

In short, lecturers need to learn how to use technology, engage in critical reflection about content delivery, and know the benefits of using technology and their roles (Sachs, 2014).

For effective integration of Moodle tools for teaching-learning purposes, institutional challenges such as inadequate computer skills amongst students and lecturers and low internet connection speed need to be addressed. During one of the interview sessions, Student 03 suggested that "... for it [Moodle integration] to be successful, students should have necessary skills to use the computers." Adequate computer skills amongst students are likely to motivate them use Moodle smoothly as a learning tool.

#### **6.2.5.2 *Mastery of the subject matter***

Results suggest that lecturers believed that the mastery of the subject matter was the most significant in teaching. This view is supported by survey data from Lecturer 03: "Discussion forums have nothing to do with confidence rather than the mastery of the subject matter." This view seems to suggest that the mastery of other areas such as pedagogical content knowledge may be seen as insignificant by such lecturers. This assertion appears to cast some doubts on lecturers' pedagogical awareness in general, and online teaching in particular. Self-confidence is necessary for lecturers to be able to teach well either in online or in

a face-to-face environment. When lecturers are less self-confident when teaching, students may not be motivated to learn because they are likely to develop a sense of mistrust in their teachers.

Lecturers need to understand that the mastery of the subject matter alone is not a sufficient condition for teaching well in either an online or a face-to-face environment. Other aspects such as pedagogical content knowledge are also significant. Pedagogical content knowledge is useful in determining how lecturers teach. In other words, what is needed from the lecturers is good pedagogy.

### **6.2.5.3     *Significance of lecturer perceptions of self-confidence***

Understanding lecturer perceptions of the use of Moodle tools is significant in terms of pedagogy, research and lecturers' professional development. Lecturers' perceptions may help understand how lecturers used Moodle tools and the challenges they faced when using those tools. Inferring from views of some of the students, it appears that some lecturers did not reflect much about their teaching. For example, some of them did not plan to get feedback from students about their teaching. Getting student feedback would have helped lecturers address some of the issues such as giving feedback to Moodle tasks. Lecturers can learn from their pedagogical practices by taking into account student feedback. Such practices may help lecturers develop professionally.

From lecturers' perceptions of low self-confidence in using Moodle tools for assessment purposes, training or an action research can be carried out to motivate lecturers to increase their pedagogical awareness and knowledge in using these tools for assessment purposes. The focus has to be on areas where they need improvement. For instance, through such training, lecturers can be familiarised with different ways of using Moodle tools for assessment purposes. This could also include different ways of discouraging online cheating such as shuffling questions and distractors within the questions or making sure that each student does completely different questions. Similarly, lecturers can learn from best

practices from other institutions that successfully integrate LMS tools into learning in general, and into assessment purposes in particular.

Based on these perceptions, respective institutions can plan ways to motivate lecturers' use of Moodle tools for assessment. Motivating lecturers to use Moodle tools could include making LMS integration part of every course as LMS tools have the potential for promoting critical thinking. The other form of motivation could be involving lecturers in professional training on the use of Moodle tools especially for assessment purposes. Lecturers can also be encouraged to constantly use Moodle tools. Through training, constant use of Moodle tools and changing their epistemological beliefs about the nature of teaching and learning, lecturers are likely to gain some self-confidence in using Moodle tools for assessment purposes.

Overall, the results suggest that Moodle tools were not used effectively for assessment purposes. Sociocultural theory acknowledges the role of tools for mediating learning. LMS tools facilitate communication, collaboration, knowledge creation (Zuzeviciute & Butrime, 2010), and provide authentic learning contexts through the use of computer simulations (Collins, 2006). The low self-confidence of lecturers in using LMS tools for assessment purposes may obscure their seeing the potential of such tools in mediating learning. This implies that online learning may be impaired when lecturers are not confident enough to use LMS tools for teaching in general, and for promoting critical thinking in particular.

Since the use of Moodle tools such as asynchronous discussion forums, quizzes and uploaded resources have the potential for promoting critical thinking, lecturers' low self-confidence in using them is likely to limit the potential of such tools for promoting critical thinking amongst students. Given the potential of LMS tools for promoting critical thinking, lecturers need to be encouraged to use these tools confidently during their teaching. By understanding lecturers' perceptions related to their pedagogical awareness and knowledge in using

Moodle tools for assessment purposes, professional development programmes can be developed to address some of their pedagogical issues.

Students' critical thinking skills and critical thinking dispositions differed by gender. Male students perceived themselves to have higher critical thinking skills and dispositions related to truth-seeking than female students, while female students believed themselves to have higher critical thinking skills and dispositions related to open-mindedness than male students.

### **6.2.6 Male students' high rating of evaluation and truth-seeking**

Evaluation and truth-seeking are critical thinking skills and dispositions related to making rational and unbiased judgements. Male students' perceptions of themselves were quite higher in evaluation and truth-seeking, while female students' perceptions of themselves were lower. These differences are discussed in the following sections.

#### **6.2.6.1 Valuing Moodle tools**

The results suggest that most male students felt that they were able to evaluate the usefulness of Moodle tools for meeting their learning objectives. From the survey data, about 86.2 per cent of male students appreciated the benefits of Moodle tools for achieving their expected learning outcomes. A good example is from the survey by Student 30: "Because many things I found in Moodle which improved my learning." About 53.8 per cent of female students felt that Moodle tools did not help them achieve their learning objectives. This was the case because resources were "too shallow" and "it [Moodle] based on the teachers' interests" as illustrated from the survey data by Student 04 and Student 14 respectively. In addition, some of the female students indicated that they faced problems in accessing Moodle tasks due to low internet connection and limited computers on campus. These views may suggest that some female students had negative attitude towards Moodle. Challenges and negative attitudes towards Moodle may have stopped some female students from using and seeing the usefulness of Moodle tools for meeting their learning objectives. Overall, more female students

attributed their ineffective use of Moodle tools to institutional challenges than was the case with male students.

The findings corroborate other studies that have found that male students tend to have higher critical thinking dispositions related to truth-seeking than female students (Cubukcu, 2006; Leach & Good, 2011). These studies used CCTDI and CCTS respectively. Higher truth-seeking for male students is likely to be associated with their confidence in valuing and using Moodle tools for meeting their learning objectives. However, using CCTDI, Giancarlo and Facione (2001) found that there was no difference in terms of gender as truth-seeking mean scores of the pre-test and post-test (within an interval of four years) for both female and male students were below average. This appears to suggest that truth-seeking is a difficult habit of mind to develop and that it may take a long time to be developed.

However, the perceptions of some female students that the uploaded resources were shallow, is in contrast to what was observed in Moodle. A scrutiny of uploaded resources from all the three universities revealed that the resources were authentic and relevant to the respective units or topics. For example, they included scholarly articles and other curriculum related documents from different countries. Additionally, course objectives of all the three universities included carrying out an evaluation of curriculum as indicated from University C: “Carry out evaluation of the curriculum.” The assessment task from University B illustrates the inclusion of skills related to evaluation:

After reading the references that have been suggested in this unit, do you think that computer mediated education is relevant for Tanzania? Please, share your views with one of your colleagues in this course by using the discussion board labelled Activity 4.1 and comment on at least one contribution of your colleagues.

From the assessment task illustrated, students are expected to be able to evaluate the usefulness of computer mediated learning in the Tanzanian context, as well as evaluate colleagues’ comments in the discussion forums. Evaluation of colleagues’ comments has the potential for promoting collaboration amongst students and giving them the opportunity to learn from each other. Thus, based on

such learning tasks, students can develop skills to evaluate colleagues' ideas and challenge their own ideas.

Students are likely to see the value of Moodle tools for meeting their learning objectives when they are confident that the tools help them achieve such expected learning outcomes. However, inadequate skills and abilities to evaluate the usefulness of Moodle tools do not necessarily mean that the tools are not useful. Evaluation and tendencies related to truth-seeking seem to be better developed over a long period of time (Giancarlo & Facione, 2001). This could be a possible reason why some female students felt that they could not confidently articulate the usefulness of Moodle tools for meeting their expected learning objectives. Probably, over time, they would be able to see the usefulness of such tools.

#### ***6.2.6.2 Significance of student perceptions of truth-seeking***

From a pedagogical perspective, when preparing learning tasks in LMS, lecturers need to make explicit the learning outcomes the tasks intend to achieve. By doing so, students may benefit from the tasks and be able to evaluate the usefulness of those tasks. Making learning outcomes explicit and moderating discussion forums are likely to make students more focused on the learning tasks as Lecturer 02 suggests: "In the course of the discussion, the lecturer can intervene to give some directions." Student perceptions broaden our understanding about the differences in critical thinking skills and tendencies related to truth-seeking that may exist between female and male students. From such perceptions, lecturers may change their pedagogical practices so that both female and male students benefit from Moodle tools for promoting critical thinking skills and tendencies related to truth-seeking.

Furthermore, perceptions of some female students highlight how institutional challenges can limit the use of Moodle tools. For smooth integration of Moodle as a teaching-learning tool, institutions need to address such challenges. For example, more access to computers on campus and faster internet connection

speed are likely to motivate students to use Moodle tools and help them see the value of those tools.

However, it is surprising to find that some female students felt that the uploaded resources were shallow and useless when a scrutiny of those resources revealed completely the opposite. This tendency may suggest that some female students were either not keen enough in evaluating those uploaded resources or they had negative attitudes towards such resources. With such negative attitudes towards Moodle tools, may be, they did not use the tools. If they did not use the tools, they could be unable to see the value of the tools in meeting their learning outcomes. However, these contradictory perceptions of some of the female students in evaluating the usefulness of uploaded resources in Moodle may call for further research. Such research, among other things, may help to understand differences in evaluating learning resources amongst male and female students.

In conclusion, the findings suggest that perceptions of the value of Moodle tools can differ according to gender. With such understanding, lecturers need to be cautious of this difference and address it accordingly during their teaching. This could involve using resources that seem to appeal to the senses of both male and female students. Institutional challenges are likely to discourage some students from using Moodle tools for promoting critical thinking. When such challenges are prevalent, some students are likely to develop negative attitudes towards the use of Moodle tools.

#### **6.2.7 Female students' high rating of open-mindedness**

Open-mindedness is a disposition related to sensitivity to one's mistakes and receptivity to new ideas. Most of the female students perceived that Moodle tools promoted their reflective skills and tendencies related to open-mindedness more highly than was the case with male students.



### 6.2.7.1 *Curious learning*

The results suggest that 71.4 per cent of female students were ready to learn from colleagues and from their own mistakes, while most male students seemed to be unwilling to learn from colleagues and from their own mistakes as reflected in the survey and interview data. Survey evidence indicated that 50.0 per cent of male students were reluctant to learn from others and from their own mistakes for several reasons. First, they believed that evidence given by other students was not empirical as suggested by survey data from Student 23: “Evidences are a scientific way I have to consult.” Hence, there was no reason to believe other students’ views if such ideas were not based on scientific evidence. Second, they indicated that they always trusted what they knew. This view is reflected in survey data from Student 34: “I always trust what I know. I’m not a man driven by other people’s view[s] even if null.” Finally, they thought that sticking to what they believed was a sign of stability and self-confidence as illustrated by Student 42 and Student 41 respectively from the survey data: “Stability makes a person to grow.”; “It is confidence.” These reasons suggest that most male students were unreflective of their own practices and not open to other students’ points of view. This low tendency towards open-mindedness amongst male students can be partly associated with their low tendency towards inquisitiveness because some male students also felt themselves to be less inquisitive. People with low tendencies related to inquisitiveness tend to have low tendencies towards open-mindedness.

Tendencies of open-mindedness amongst female students were also reflected from interview data. An interview extract from Student 07 is a good example of open-mindedness: “The student can come up with different ideas that are different from the teacher. So the teacher needs to be tolerant to different views.” This student suggests that as students are expected to be open to colleagues’ ideas, likewise the lecturers need to be open-minded to students’ views.

Assessment tasks in Moodle also revealed inclusion of critical thinking skills and dispositions related to open-mindedness as illustrated from University A. In one

of the assessment tasks, students are expected to use examples and criteria of stating instructional objectives to compose instructional objectives and “Comment on ... colleagues' contribution.” From this assessment task, other than evaluating students' application skills related to formulating learning objectives, the task has the potential for promoting collaboration amongst students as they comment on each other's posts. Reading and evaluating colleagues' posts may help students be open to other students' views. When students are open to colleagues' points of view, they can also re-examine their own views.

Several studies reveal that female students tend to have higher critical thinking dispositions related to open-mindedness than male students (Cubukcu, 2006; Genc, 2008; Giancarlo & Facione, 2001; Walsh & Hardy, 1999). Since women tend to be more socially sensitive, more aware of others' needs, and more focused on harmony than men who tend to be more dominant, self-confident and independent (Fischer, 2011); this tendency could possibly explain why female students were more open-minded than male students.

However, Gefen, Geri, and Paravastu (2009) reported that male students tended to refer more to posts contributed by males, while female students referred more to the posts contributed by female students. This could indicate that both female and male students had a lower tendency of open-mindedness towards the other gender. However, that the topics for discussion were initiated by the lecturers as part of the weekly units could have influenced this pattern of interaction. Probably, if the discussions were student initiated, the pattern of interaction would have been different as students may have discussed topics that they felt were most interesting and important to them. Other than the interest and importance of the topics for the discussions, students' competence in the chosen topics can influence their degree of interaction (Quinton & Allen, 2014). Furthermore, though Gefen et al. (2009) indicate the sample of students and the number of courses involved (233 students in 27 online courses in a university), they do not indicate the country where the study was carried out. This information could partly help to give some clues on gender relationships in such a sociocultural setting.

Culture appears to be the best *teacher* in learning how to think. Cultural practices greatly influence how, what, when and why people may be involved in thinking. However, culture can also be the worst teacher as it can inhibit the promotion of some critical thinking skills and dispositions. For example, the tendencies of most male students of being over-confident in what they believed and tending to neglect other students' views is a reflection of some of the cultural practices. In Tanzania, over the years, most men have tended to take domineering roles. Since these male students have grown up in such a cultural setting, they are likely to have picked up such cultural practices. That is why the domineering tendencies are also reflected in some of the male students.

These findings reflect sociocultural theory. According to sociocultural theory, knowing, reasoning and feelings are situated in sociocultural practices (Sutherland et al., 2009), and context and culture influence learning and other cognitive processes (Kumpulainen & Wray, 2004). Student perceptions can be better understood by relating them to the sociocultural contexts where they originate. The social context is not only significant for active participation of learners during the learning process, but is also an integral part of learning. In other words, culture is likely to shape students' and lecturers' thinking; in turn, their thinking may shape the sociocultural practices in a given cultural setting. Findings from this study suggest that when investigating critical thinking skills and critical thinking dispositions, the culture of the research participants needs to be taken into account.

#### **6.2.7.2    *Significance of student perceptions of open-mindedness***

Student perceptions of critical thinking skills and dispositions related to open-mindedness are important for lecturers and for students. From these perceptions, lecturers may change their pedagogical practices so as to address the disparities between male and female students. Lecturers can infuse reflective thinking in the learning tasks so that students are given the opportunity to evaluate their own practices. Lecturers can also use tasks that help students learn from other students

by considering other students' points of view. Debating activities could make students open to and appreciative of other students' points of view. Jagger (2013) affirms that debates tend to promote affective learning. Affective learning is likely to make students open-minded. Being open to other students' points of view does not necessarily mean agreeing with such views, but rather acknowledging the existence of such views and reflecting how they may relate to one's own views.

Students also need to recognise that their ideas may be different from colleagues' ideas. Since human beings are different, they also think differently, among other things, due to their cultural settings, motivations or the subject matter being discussed. Thus, they need to acknowledge other students' ideas. Acknowledging other students views has to be seen as an acceptable practice. With this attitude, most of the male students are likely to be open-minded. When they are open-minded, they are likely to appreciate other students' ideas, learn from such ideas, and reassess their ideas.

In summary, low critical thinking skills and tendencies related to open-mindedness in male students was partly related to their culture that made some of them unreflective. These cultural practices are likely to have blurred the perception of value by most male students to be gained from learning from other students and from their own mistakes. These perceptions are useful for lecturers because they can help them tailor their pedagogical practices to address issues related to open-mindedness.

There were differences in critical thinking skills and critical thinking dispositions between in-service and pre-service teachers. Results indicate that in-service teachers believed that the discussion forums, quizzes and uploaded resources promoted their critical thinking skills and dispositions related to open-mindedness, truth-seeking, and inquisitiveness more than was the case with pre-service teachers.

## **6.2.8 Pre-service teachers' perceptions of open-mindedness**

The results suggest that some of the pre-service teachers did not believe that Moodle tools promoted their tendencies towards open-mindedness. This was in contrast to most in-service teachers who felt themselves that they had higher open-mindedness than did pre-service teachers.

### **6.2.8.1 Pre-service teachers' open-mindedness**

From survey results, 42.3 per cent of pre-service student teachers found it difficult to accommodate other students' ideas even when there was evidence against what they believed. Additionally, 48.1 per cent could not tolerate colleagues' ideas, particularly when such ideas contradicted their own beliefs. One of the reasons for most pre-service teachers being reluctant to accept other students' points of view was that they believed that evidence given by colleagues was not empirical. The other reason was that, in some cases, evidence was not given at all. A good example of this is seen in one of the survey extracts from Student 33: "They criticise me with no evidence." In some cases, they indicated that since they had evidence to support what they believed, there was no reason to accommodate other students' views. This view is illustrated in the survey by Student 37: "If, I too, have evidence for what I support, I am a person my stand cannot be shaken by superficially supported evidence/proof." Some pre-service student teachers believed that maintaining the position they held was a sign of stability and self-confidence that could ultimately promote their personal growth. These results suggest that some of the pre-service teachers were reluctant to learn from each other and from their own mistakes. These students were less reflective. These are tendencies that need to be discouraged because they limit the learning process.

Pre-service teachers being less reflective and open-minded than in-service teachers could be attributed to several reasons. One of the possible reasons for low open-mindedness could be related to the degree of exposure to teacher education. In-service teachers had gone through teacher training where, it could be argued inquisitiveness, open-mindedness, and collaborative learning are encouraged. Pre-

service teachers, being graduates fresh from high school, could be less disposed towards these attributes. Furthermore, all the in-service teachers in Tanzania who join the universities must have upgraded their training to the extent of meeting university entry qualifications. Some of the qualification criteria are a good pass in the teaching diploma, their teaching experiences and their abilities to benefit and complete successfully university studies. These students tend to be fewer in number. That these teachers have decided to develop professionally may suggest that other than being motivated to learn, they also seem to be open-minded. That is, they have reflected about their teaching career and realised that they need to upgrade it. This tendency could suggest that in-service teachers are reflective and open-minded.

Despite low critical thinking skills and dispositions related to open-mindedness amongst pre-service teachers, evidence from assessment tasks in Moodle indicated the promotion of reflective skills and tendencies related to open-mindedness as one of the tasks from University B illustrates:

From what you have learned in this unit, which strategies, if applied well, are likely to achieve the higher order skills and competencies? Support your answer with reasons. Please, share your views with one of your colleagues in this course by using the discussion board labelled Activity 4.2 and comment on at least one contribution of your colleagues.

In this task, for example, students are expected to demonstrate reflective skills based on what they have learnt. Their thinking has to be supported with objective evidence. Furthermore, the task has the potential for making students open-minded, especially by sharing their views with colleagues and commenting on colleagues' ideas. It is expected that by sharing ideas with colleagues, critically reading colleagues' comments, and giving comments on colleagues' posts, students are likely to learn from other students and may appreciate other students' ideas. Consequently, such students may change their beliefs based on colleagues' comments. Survey data from Student 17 reflect this view: "... I am open to hear the views of others. And when they are good I do drop my beliefs." This is the

essence of collaboration where students are expected to learn from each other and be critical of their own perspectives.

From sociocultural theory, when people work collaboratively they interthink to solve certain problems (Mercer & Littleton, 2007). Working and thinking collaboratively seem to bring better results than if each person works individually. Accommodating other people's views and learning from them is essential for collaborative thinking and for promoting open-mindedness.

Pre-service teachers' less reflective and open-minded tendencies may partly mirror the nature of examinations and the teaching-learning processes in secondary schools. In Tanzania, the final examinations for the secondary level are centralised under the National Examinations Council of Tanzania. Students' progress to the next level is mainly dependent on higher examination passes. While such a tendency may influence students to focus on grades, it also may influence teachers to teach for examinations. The teachers' success may be judged on the number of their students who pass. Consequently, this kind of education system has tended to encourage rote learning amongst many students, and *surface level*, examination-oriented teaching.

Learning being examination oriented is likely to put less emphasis on tendencies related to open-mindedness. The focus on examinations seems to make some learners individualistic. This kind of learner may not value other people's points of view as long as such views contradict their own beliefs. One of the problems with most examinations is only measuring individual effort, rather than also including collaborative effort. Part of the examination could also include collaborative tasks. In such tasks, since a group is going to be graded; students may be encouraged to work together, to share ideas and to learn from other students.

### **6.2.8.2**     *Significance of student perceptions of open-mindedness*

Based on students' perceptions, lecturers may devise teaching-learning tasks that promote students' open-minded attitudes. Such tasks may include personal reflections in each task as well as tasks that encourage students to share ideas in the discussion forums. Through such tasks, most of the pre-service students are likely to value the contributions of other students as well as re-examine their own beliefs.

Likewise, the students' perceptions call for re-examining the teaching-learning process in secondary schools because pre-service students are a direct product of the secondary schools. These students are likely to have acquired habits related to being less open-minded from their previous learning experiences at the secondary school. Tendencies related to open-mindedness need to be developed from the secondary school level so that when students are at the university they will become more reflective of their own biases and of other people's ideas. Therefore, being reflective of one's biases and considerate of other people's points of view are proper habits of the mind that need to be cherished for promoting critical thinking.

In summary, some of the pre-service teachers were less reflective. Such tendencies may be attributed to the nature of examinations that tend to be individualistic. The secondary schools also seem to be responsible for failing to cultivate some of the proper habits of the mind such as open-mindedness. There is a need to incorporate some group tasks in examinations. These tasks are likely to help students share ideas.

### **6.2.9**     **Pre-service teachers' perceptions of evaluation and truth-seeking**

Some of the pre-service teachers perceived that Moodle tools did not promote their evaluation skills and tendencies related to truth-seeking.



### **6.2.9.1** *Less value to Moodle tools*

These results suggest that some of the pre-service teachers either attached little importance to the usefulness of uploaded resources and to Moodle in general, for achieving their course objectives, or they did not benefit significantly from Moodle tools. About 40.7 per cent of the pre-service teachers felt that they did not see the benefits of resources uploaded in Moodle, while 34.6 per cent did not see the overall usefulness of Moodle for improving their learning. The reasons for believing that the resources and Moodle in general were less beneficial to them were that in some cases there was no feedback given to some of the online tasks. In some cases where feedback was given, it was not as elaborate as the face-to-face feedback. The other reason was that some of the tasks in Moodle were “based on the teachers’ interests” as noted by Student 04 from the survey data. Challenges related to lack of feedback in some tasks, less detailed feedback and some tasks being of less interest to students could have led to the belief that Moodle tools were not helpful in promoting their tendencies related to truth-seeking.

The exposure of in-service teachers to teacher education prior to joining the university could partly account for their higher truth-seeking. Examining pre-service and in-service teachers’ instructional decision-making in technology integration, Greenhow, Dexter, and Hughes (2008) found that pre-service teachers’ rationales were superficial, uncritical, and depended more on student and classroom related facts, while those of in-service teachers provided more detailed reasoning behind the answers and had a critical view of the school context. This was mainly due to their extensive teaching experience.

Of the pre-service teachers, 54.2 per cent preferred online based feedback to face-to-face feedback, while 53.3 per cent of in-service teachers preferred face-to-face feedback. Several reasons could account for the differences. First, some of the in-service teachers thought that face-to-face feedback was more immediate than online feedback as survey data from Student 41 indicates: “I want to get

immediate feedback through observation [facial].” “For some pre-service teachers, online feedback increased their confidence. These views are evidenced from survey data by Student 19: “As I have not enough confidence to stand in front of people that was my ground to express all of my ideas.” For some students online feedback helped them avoid possible physical confrontation with colleagues as noted by Student 09: “There will be no strong reaction towards me.” These findings suggest that experienced teachers were not worried about giving their views in a face-to-face environment, which was not the case for inexperienced pre-service teachers. Since the online environment made the pre-service teachers physically invisible from their colleagues, they were motivated to express their views confidently. Thus, online feedback may be also useful to less confident and shy students because such students may find it difficult to express their views in front of other students.

Second, age could be one of the factors. Younger people tend to be more active users of technology. Most of the pre-service teachers were relatively younger (21 to 26 years) than in-service teachers (27 to 47 years). This finding is consistent with Cavas et al. (2009), who examined the attitudes of Turkish science teachers towards information and communication technologies (ICT) in education. They reported that younger teachers had more positive attitudes towards the use of ICT than older teachers.

Third, most of the in-service teachers were taught mainly face-to-face during their school time, unlike most of the pre-service teachers who have grown up with the technology and were probably taught with it. This view may suggest that pre-service teachers were more familiar with the technology than in-service teachers.

Finally, challenges reported (from survey and interview data) related to using Moodle, such as issues of power disruption, and computer skills may have discouraged some of the in-service teachers from preferring online based-feedback. These challenges need to be addressed. One of the ways of improving computer skills is suggested by Student 01 in an interview: “For a person to

successfully use Moodle and other computer programmes, should be trained in using computers.” Another technical issue related to Moodle was noted in the survey data by one of the in-service teachers, Student 44: “It does not support drawing/no drawing tools.” These challenges may have discouraged some of the students from using LMS tools for learning.

#### **6.2.9.2     *Significance of student perceptions of truth-seeking***

Pre-service teachers’ perceptions of believing that some Moodle tools did not help them achieve their learning outcomes are significant for lecturers’ pedagogical practices. They imply that lecturers need to ensure that feedback related to learning tasks is given to students. Additionally, such feedback needs to be elaborate and corrective so that students can address their concerns.

That some pre-service teachers felt that some of the tasks were not of interest to them, calls for lecturers to involve students during planning, implementing and evaluating those learning tasks so as to capture their interest. For example, students could be involved in the design of tasks and in the evaluation of the lessons. Based on lesson evaluation, lecturers may address issues identified by the students. This practice is likely to motivate students and increase their sense of ownership of their learning.

Since some pre-service teachers could not see many benefits in using Moodle tools for achieving their learning objectives, the challenges that limited them need to be addressed. If such challenges are not addressed, students are likely to be discouraged and may not see the need for using these tools. Students need to be motivated so that they see the benefits of Moodle tools for promoting critical thinking skills and tendencies related to truth-seeking.

Also, institutions need to ensure that some of the challenges that limit students’ use of Moodle tools are addressed. Institutions can also plan some professional development for lecturers, especially on giving online feedback to students.

In summary, most of the pre-service teachers believed that uploaded resources and Moodle in general did not help them much in achieving their learning objectives. Challenges such as lack of feedback in some online tasks are likely to have discouraged some of the students from using Moodle tools. However, while most of the pre-service teachers preferred online feedback to face-to-face feedback, in-service teachers preferred face-to-face feedback. Students' perceptions will inform their attitudes towards Moodle tools. For lecturers, knowledge of these perceptions may help them improve their pedagogical practices so that students can benefit from the learning tasks. They also give information on the nature of professional development lecturers may need to integrate smoothly Moodle tools for promoting critical thinking.

#### **6.2.10 Pre-service teachers' perceptions of inquisitiveness**

More pre-service teachers than in-service teachers perceived that Moodle tools promoted less their critical thinking skills and dispositions related to inquisitiveness.

##### ***6.2.10.1 Pre-service teachers' low rating of inquisitiveness***

In the survey, 54.2 per cent of pre-service teachers participated in the quizzes, and 48.1 per cent in the discussion forums for the sake of getting grades. One of the reasons for this tendency was to get a good pass, as survey data from Student 06 demonstrates: "Failure brings no hope in university academic progress." Learning for the sake of grades is not a good practice because students' curiosity tends to be limited. For example, students may focus their attention mainly on areas where they think that they are likely to be tested.

Similarly, 53.8 per cent of pre-service teachers disliked future jobs if they involved working with LMS. Teaching in many cases involves the use of LMS. These findings suggest that these students are unlikely to use technological tools such as computers during their teaching. To address some of the issues related to the use of LMS, Student 06 suggests: "All students must be taught how to use Moodle in order to make them to be [sic] aware of what Moodle deals with." The

negative attitudes of some pre-service teachers towards the use of LMS need to be addressed. Lecturers may design learning tasks that motivate students to use LMS. Such tasks may help them see the value of LMS tools for learning in general, and for promoting critical thinking in particular.

Several reasons could explain the differences between pre-service teachers and in-service teachers, in terms of their tendencies related to inquisitiveness. First, students' survey data indicated that some of the pre-service teachers had a negative attitude towards the use of Moodle tools. The attitude of some students of disliking working with computers is likely to influence the use of technology in their future career as teachers. Trushell and Byrne (2013) affirm that students who rarely use technology to communicate or search for study materials are likely not to engage purposefully in online learning. One of the ways for cultivating a positive attitude towards technology use, as Falloon (2011) suggests, is to give students the opportunity to learn about the technology before they can use it.

Second, in-service teachers seem to be more curious to learn than pre-service teachers. This can partly be explained by in-service teachers having upgraded from their previous qualifications to the point of meeting university entry criteria. Student teachers who join the university as in-service teachers did not qualify for direct entry to the university. After working as teachers for some years, based on their diploma qualification, teaching experience, or any other related qualification, they may apply to join the university through the mature entry programme as part of their professional development. Such teachers, who decide to upgrade their qualifications, appear to be self-motivated to learn not for grades, but for their professional development.

Third, given that education is certificate-oriented, where a student's success is judged mainly based on examination performance, certification is likely to make some students pay more attention to grades than to curious learning. Research indicates that online discussions increase student participation when participation is required, graded (Hamann, Pollock, & Wilson, 2012), and when students are

assigned specific roles, are carefully monitored and rewarded for their online contribution (Griffith, 2009). In addition, Lovatt et al. (2007) reported that a high frequency of accessing notes and quizzes was during the time they were posted, the study week, and examination week. From all these cases, it can be inferred that most of the students learned for grades.

Finally, low inquisitiveness of pre-service teachers is related to their low open-mindedness. Inquisitiveness is closely related to open-mindedness (Giancarlo & Facione, 2001). In this relationship, inquisitive people tend to be more open-minded.

From a sociocultural perspective, learners' prior experiences, among other things, tend to influence their participation or non-participation in the learning activities (Karen Johnson, 2009; Pritchard & Woollard, 2010). Fear of using LMS in their future careers could be partly related to their bad experiences of using those LMS. Thus, pre-service teachers need to be encouraged to use available technologies such as LMS. They need to be encouraged to use them even in their future careers, because LMS have the potential for not only promoting their critical thinking, but also for simplifying their teaching job. Through LMS, students can access some useful resources for their teaching. To achieve this, lecturers need to motivate students to use LMS not for the sake of getting grades, but for their professional development and for promoting critical thinking.

#### ***6.2.10.2 Significance of student perceptions of inquisitiveness***

Our understanding of student perceptions of critical thinking skills and dispositions related to inquisitiveness partly shows how institutional challenges can limit the integration of Moodle tools for promoting critical thinking. Therefore, such challenges need to be addressed before they can do more harm to students in particular, and to education system in general.

These findings also enlighten our understanding about some of the educational practices such as certification and how they can limit the promotion of

inquisitiveness, if not carried out properly. Certification makes some students focus on grades, rather than on learning. Examinations need to be part of the formative learning process.

The results reveal the significant role of motivation in learning. Respective institutions can find ways to address the challenges they face, in order to motivate students and lecturers. Likewise, lecturers can devise strategies to motivate student use of LMS tools. It is important to address these issues because they are likely to influence student teachers' use of Moodle tools for promoting critical thinking.

In summary, most pre-service teachers felt that Moodle tools promoted their critical thinking skills and dispositions related to inquisitiveness less. Some of them focused on grades and were discouraged from taking any future job that involved the use of LMS. Knowledge of student and lecturer perceptions helps to shed light on how some institutional challenges may limit learning. Student and lecturer perceptions show the importance of motivation as well as how some educational practices, such as certification, can negatively influence the way students learn.

Student teachers' critical thinking skills and dispositions were also different according to universities. More students from Universities B and C than students from University A believed that Moodle tools promoted more their critical thinking skills and dispositions related to truth-seeking. A higher proportion of students from University C than students from Universities A and B felt that Moodle tools promoted more their critical thinking skills and dispositions related to inquisitiveness.

#### **6.2.11 High rating of evaluation and truth-seeking from Universities B and C**

Higher rating of critical thinking skills and dispositions related to truth-seeking from students from Universities B and C indicate that these students valued the

usefulness of colleagues' comments in the discussion forums and the overall usefulness of Moodle tools for meeting their learning objectives. Most of the students from University A rated colleagues' comments, and Moodle in general, less highly in promoting their evaluation skills and truth-seeking.

The results suggest that students from Universities B and C benefited more from Moodle tools than students from University A. For instance, about 42.9 per cent of students from University A felt that the uploaded resources and Moodle in general did not help them achieve their learning objectives. These views give clues on the nature of resources that were uploaded in Moodle and how students used them. Student 03 from University B, in the interview, suggests how to use uploaded resources and the need to have varied resources in order to promote critical thinking: "... the notes should not be seen as sacred books. We need a variety of resources because when you compare resources from different writers you can expand your ideas." This view suggests that uploaded resources need to be read critically and lecturers need to ensure that the resources promote different critical thinking skills. The success of students from Universities B and C in using these resources could be attributed to the cultural practices of using resources critically. Uploaded resources, such as scholarly articles, may be meaningful to students, amongst other things, when they are relevant and comprehensible, and when they are critically read.

#### ***6.2.11.1 Differences amongst universities in truth-seeking***

Several reasons could account for low critical thinking skills and tendencies related to truth-seeking for students from University A. First, analysis of learning tasks in Moodle revealed that the frequency of use of the discussion forums for University A was low compared to the other two Universities. From one of the interviews, Student 07 from University B stresses the benefit of using LMS frequently: "The most important thing, for us students, is to interact with the system. The more you interact with it, the more it becomes user friendly to you."



Her view is in line with previous research that the frequency of technology use increases confidence in technology use (Friedman et al., 2009; Teo, 2008).

Second, interview data from students, lecturers and the technical staff revealed challenges such as limited computers on campus, slow internet connection speed, students' limited computer skills, and a shorter orientation to Moodle that was only done during the orientation week. Technical staff from University C states how slow internet connection speed can demotivate students to use LMS: "If the internet is very slow, some students think that getting into the system is wasting their time." Challenges such as internet connectivity tend to limit the use of technology (Falloon, 2012; Ward, Peters, & Shelley, 2010). Likewise, prior computer experience tends to influence positive attitudes towards technology use (Cavas et al., 2009; Dogan, 2010; Mwalongo, 2010; Sun, Tsai, Finger, Chen, & Yeh, 2008; Teo, 2008).

Third, there was no incentive policy for lecturers who integrated Moodle into their teaching in University A, as had been the case for University C. From the interviews, lecturers revealed that there was limited institutional support in University A. For example, Lecturer 05 remarked: "The institution leaves the programme to go by itself as if teachers are angels. This is bad." Limited institutional support could also discourage even those lecturers who started integrating Moodle into their teaching. However, the case was different for University C, where lecturers, who integrated LMS in their courses, were rewarded as technical staff from University C illustrates: "We have the e-learning policy. It recognises teachers who use Moodle by rewarding them." The rewards are in terms of moral and material support such as being given iPads, annual staff appraisal and promotion. Institutional support tends to motivate lecturers' use of LMS for teaching-learning purposes (Al-Busaidi & Al-Shihi, 2012; Cook, Ley, Crawford, & Warner, 2009).

Finally, Universities B and C had a tendency to allow students to evaluate almost every unit or topic covered. A critical observation of Moodle content did not

reveal opportunities for students from University A to evaluate units covered. That kind of evaluation has the potential for improving the course because students get the opportunity to air their views. This is one of the ways of involving students in the teaching-learning process. When students are involved in planning and evaluating the learning tasks, they are likely to be motivated to learn. This evaluation exercise also improves students' critical thinking, especially skills related to evaluation.

From a sociocultural perspective, these findings suggest that the social and cultural context for University A discouraged learning, as manifested by the challenges discussed above. As a result, students from this university were likely to have placed less value on the role of Moodle tools for promoting their critical thinking. Likewise, some lecturers seemed to be less motivated to use LMS for teaching and for promoting critical thinking.

#### ***6.2.11.2 Significance of student perceptions of truth-seeking***

The findings show how learning can be compromised, especially when institutional challenges that limit learning are not addressed. Such challenges may affect not only how students learn, but also the quality of programmes the universities offer. Our understanding of student perceptions is important because such knowledge can help to address the challenges, among other things, by ensuring that students study in a good learning environment.

The frequency of use of Moodle tools is also significant because other than motivating the users, it also increases the self-confidence of the users and their computer skills. Because of frequent access to and use of, Moodle tools, students from Universities B and C appreciated the tools for meeting their learning outcomes. Therefore, access to LMS tools is not enough; the tools need to be used frequently.

Teaching being a value forming act, lecturers are likely to influence students' attitudes towards the use of LMS for promoting critical thinking. When lecturers

are demotivated, chances are that they may not integrate Moodle tools into their teaching because they may have negative attitudes towards LMS. This attitude may be passed on to students. When students have also picked up the habit, they may not integrate LMS into their future teaching career. Since LMS tools have the potential for promoting critical thinking, respective institutions need to put mechanisms in place to motivate lecturers' and students' use of these tools.

In summary, students from Universities B and C felt that Moodle tools promoted their critical thinking skills and dispositions related to truth-seeking more than was the case with students from University A. The success in using Moodle tools for Universities B and C was mainly related to the frequency of use of LMS, having fewer institutional challenges when compared to University A, incentives to motivate the use of LMS, and involvement of students in evaluating courses. Understanding student and lecturer perceptions may help to inform how institutional cultural practices related to technology use can influence how students learn with technology and how lecturers teach with technology. Similarly, these perceptions help to understand the importance of motivating both students and lecturers in using LMS tools for promoting critical thinking.

#### **6.2.12 Low rating of inquisitiveness from Universities A and B**

More students from Universities A and B felt that they had lower critical thinking skills and dispositions related to inquisitiveness than did students from University C. This section discusses factors that might have led to the differences in perception of critical thinking skills and dispositions related to inquisitiveness between Universities A and B, and University C.

##### ***6.2.12.1 Differences between universities in inquisitiveness***

First, survey results revealed that 42.9 per cent of students from University A and 57.6 per cent from University B used Moodle tools mainly for getting grades as indicated in the previous sections. Preference for grades may suggest that some of the students were not motivated to use Moodle as a learning tool.

Second, about 50 per cent of students from University A, and 48.4 per cent from University B tended to dislike future jobs related to the use of LMS. Survey data from Student 41 reveals that Moodle was “Too complicated to access.” The reasons for believing that Moodle tools promoted their critical thinking skills and dispositions related to inquisitiveness less were related to challenges such as slow internet connection, fewer computers on campus, and their inadequate computer skills. These challenges are likely to have made them develop negative attitudes towards the use of Moodle tools.

Third, observation of the course tasks in Moodle for University C indicated that the discussion forums and quizzes were used rarely for grading purposes, but were rather used as formative learning tools. Survey data from Student 23 justifies the point: “Learning is not for getting grades only, but even general life experiences.” The focus on learning for gaining general life experience is likely to have motivated these students to become curious. The inclusion of assessment for Universities A and B is likely to have motivated some of the students from these universities to use Moodle tools for the immediate outcome (grades), while having less focus on curious learning. This assertion is further supported by students’ interview data from University A, where all of the four students interviewed said that the inclusion of grades in Moodle tasks motivated students to use such tools. In such cases, some of the students seemed to learn not for getting general life experiences, but they learned for school. This attitude defeats the very purpose of learning. The focus on grades alone is likely to limit students’ curiosity. Students’ attitudes towards grades need to be changed. Students need to be encouraged to value and use Moodle tools not only for grades, but also for promoting critical thinking and other life skills. Promotion of critical thinking, amongst other factors, may be facilitated through interaction amongst students and with the lecturers.

Sociocultural theory acknowledges that knowledge, values and attitudes develop through interaction with other people and that such interaction increases thinking (Pritchard & Woollard, 2010). Though students from Universities A and B

interacted through Moodle tools, the findings reveal that these mediating tools were not used productively to promote critical thinking skills and dispositions related to inquisitiveness. Promotion of inquisitiveness was limited because some students focused mainly on immediate outcomes and had negative attitudes towards the use of LMS. Change in attitudes towards the use of LMS is likely to motivate students use these tools. With increase in motivation, students are likely to become curious to use LMS for promoting inquisitiveness. However, for these changes to take place, a culture that encourages and values thinking in schools as well as in other contexts is necessary for instilling such positive attitudes (Ritchhart & Perkins, 2005).

#### ***6.2.12.2 Significance of student perceptions of inquisitiveness***

These findings reveal how institutional challenges can affect learning in general, and the use of Moodle tools for promoting critical thinking skills and dispositions related to inquisitiveness in particular. For smooth integration of these tools for promoting critical thinking, institutions need to address the challenges and instil a culture of using LMS. One of the interview extracts from Student 04 illustrates the influence of culture: “Culture makes what a person is. If students are aware of the technology it becomes easy to visit Moodle.” The cultural practices of valuing LMS are likely to motivate students to use the tools for promoting critical thinking.

In summary, more students from Universities A and B felt that they had lower critical thinking skills and dispositions related to inquisitiveness than students from University C. Institutional challenges tend to limit the use of Moodle tools for promoting critical thinking. Our knowledge of student and lecturer perceptions inform us about the use of Moodle tools and how institutional challenges can limit the use of these tools for promoting critical thinking.

Lecturers’ differences in critical thinking skills and dispositions were related to their age and teaching experience at the university. The subsequent section discusses these differences.

### **6.2.13 Lecturers' dispositions by age and experience**

There was a major difference in terms of lecturers' perceptions of Moodle tools for promoting critical thinking skills and dispositions. These differences were between lectures aged between 27 and 39, with teaching experience between two and five years, and those aged 40 years and above, with teaching experience between six and 22 years. A higher percent of younger lecturers believed that they had higher critical thinking skills and dispositions related to open-mindedness, inquisitiveness and analyticity than did older lecturers.

#### ***6.2.13.1 Differences between younger and older lecturers***

Several reasons could account for the differences between younger and older lecturers in critical thinking skills and dispositions related to open-mindedness, inquisitiveness, and analyticity. One of the possible reasons could be the attitudes towards the use of LMS. For example, four (out of 6) lecturers interviewed hinted that old lecturers were reluctant to use Moodle for teaching purposes and tended to discourage other lecturers from using Moodle in their respective universities. These results are supported by interview data from one of the technical staff from University C: "So some old teachers don't use Moodle for fear of revealing their weakness about the technology. Some old teachers even discourage the use of Moodle as opposed to young teachers." This view seems to suggest that to some of the older lecturers the attempt to use LMS was like washing their dirty linen in public. However, what is worse is discouraging other lecturers who seemed to be potential early adopters of the innovation. Research indicates that younger lecturers tend to use technology more frequently than older lecturers (Meyer & Xu, 2009; van der Kaay & Young, 2012). Similarly, S. Lloyd, Byrne, and McCoy (2012) reported that older lecturers (45-60 years) gave a higher rating to institutional barriers in using LMS than did younger lecturers.

Another reason could be the frequency of use of Moodle as a teaching tool and as an assessment tool. Some of the older lecturers showed reluctance in using tools such as quizzes for assessment purposes due to fear of cheating in an online

environment. They were not so comfortable with online assessment as feedback was not immediate, real and vivid. This view is evidenced by survey data from Lecturer 10: “face-to-face [feedback] makes the discussion more vivid and real.” Other lecturers thought that it was easier to correct students in a face-to-face rather than in an online environment as affirmed by Lecturer 09 from the survey data: “... due to language problem, it is easier to correct students' comments face-to-face where they can explain themselves better than in writing.”

Finally, administrative support could have influenced low critical thinking skills and dispositions related to open-mindedness, inquisitiveness and analyticity amongst older lecturers. Most of the top administrative posts in the universities surveyed were held by old professors who are likely to have paid less attention to technological innovations as they seemed to be satisfied with the status quo. This was reflected in interview data, particularly as reported by younger lecturers, who indicated that some of the old lecturers seemed not to promote the integration of Moodle into teaching. The views of Lecturer 02, one of the younger lecturers give some clues on negative attitudes of some of the older lecturers towards the use of new technology: “For an old lecturer, who was taught through the slide rule, it may be difficult to convince him [or her] that you can teach a student who is 100 kilometres or so away.”

Institutional support is needed to promote learning innovation. The results suggest that such support was missing in universities such as University A. From interview data, Lecturer 05 complains about poor institutional support for University A: “Using Moodle or not using it, there is no institutional reward. There is no motivation, there is no promotion.”

Some lecturers tend to believe more in the ways they have been doing things rather than on trying to experiment with new ideas. This may be due to fear of failure. When lecturers venture into innovation, they need to be encouraged to be risk takers. However, such innovation can be easily adopted in a culture that values risk taking. Failures need to be taken as opportunities for learning.

However, the results that younger lecturers seem to have higher inclination towards LMS use than older lecturers contradict Ruleman (2013) where there was an increase in online time for each successive age group, with the exception of 61 years and above who used less time online than younger lecturers. This finding seems to suggest that young people are not necessarily the most active users of technology.

#### ***6.2.13.2 Significance of lecturer perceptions of LMS tools***

Lecturers' perceptions show the differences in perceptions that may exist between younger and older lecturers. Such perceptions may help to identify lecturers' professional development needs.

The perceptions also identify cultural practices within institutions that tend to influence the way things are done in such social contexts. The social context may influence some lecturers to keep maintaining their status quo due to fear of failure as a result of adopting innovations. In such social contexts, the results show that risk taking behaviours need to be encouraged amongst lecturers and there should be institutional rewards to lecturers who venture into innovations in their teaching.

In spite of the challenges discussed, there are signs of hope from these universities because many lecturers seem to have developed more positive attitudes towards LMS over time. This view has been reflected in lecturers' and technical staff's interview data. For example, Lecturer 02 comments: "When we started, there were more challenges, but up to now lecturers are beginning to accept, especially old professors." These are good signs because even those who were seen as non-adopters or laggards in the innovation are beginning to embrace the use of LMS in their teaching.

With reference to lecturers' perceptions, results have revealed differences in perceptions of Moodle tools for promoting critical thinking between younger and older lecturers. A higher percent of younger lecturers believed that they had higher critical thinking skills and dispositions related to open-mindedness,



inquisitiveness and analyticity than did the older lecturers. These tendencies, among other things, seem to be influenced by cultural practices within those learning institutions. However, over time, many lecturers seem to be developing positive attitudes towards LMS.

The first research question examined student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes, and uploaded resources for promoting critical thinking. Conclusions about this research question have been drawn because of the ability of the survey tool to capture both critical thinking skills and thinking dispositions simultaneously. The next section discusses the benefits of using a combined instrument for capturing both critical thinking skills and thinking dispositions simultaneously.

#### **6.2.14 Benefits of a combined instrument**

Using a combined instrument has several benefits. It enables capture of both critical thinking skills and thinking dispositions simultaneously. In addition to simultaneous measurement, the instrument helps to probe research participants' underlying reasons. It promotes divergent thinking and helps to determine the willingness and motivation of the research participants to think. Finally, the survey tool helps to collect and generate both qualitative and quantitative data.

##### ***6.2.14.1 Capturing both critical thinking skills and thinking dispositions***

The survey instrument has been able to capture both critical thinking skills and thinking dispositions simultaneously. In some previous studies, critical thinking skills and thinking dispositions have been measured separately and using different instruments. This can be seen in studies by Miri et al. (2007) and Rimiene (2002). Simultaneous measurement of critical thinking skills and thinking dispositions, through the survey tool in the current study, helped to offset the influence of contextual factors such as time, and the intentions and motivations of the thinkers because people's critical thinking may change according to these factors. These contextual factors tend to influence the manner of thinking, reasons for engaging

in thinking, when to engage in thinking, and what to think about. As demonstrated in this study, the quality of thinking and the level of engagement in thinking also depend on these contextual factors.

Critical thinking skills and critical thinking dispositions operate together when a person engages in a thinking task. While critical thinking skills influence the ability of the thinker to carry out a thinking task, critical thinking dispositions influence what, why, when and how actions are carried out. The reasons, time and the manner for carrying out actions can then influence the degree of persistence with which a person engages in the thinking task, in order to fulfil certain goals or desires. The survey tool allowed the research participants to rate statements and to give reasons to justify the choices they had made. The research participants' underlying reasons were gained through responses they gave to support ratings of the items. In this case, the participants applied critical thinking and displayed their dispositions through their willingness to justify their choices and the nature of their justifications. Since most of the reasons given were related to most of the rated statements, it can be concluded that the research participants were disposed to think and engaged in critical thinking. Through this process, they were able to display both their critical thinking skills and thinking dispositions. Since the instrument managed to capture the two components simultaneously, it revealed a clearer picture of an individual's critical thinking. In measuring critical thinking, the context is important not only because it influences what an individual thinks about, but because it also influences how, and why an individual thinks.

Most previous instruments measure critical thinking skills and critical thinking dispositions separately. For instance, California Critical Thinking Disposition Inventory (CCTDI) focuses on critical thinking dispositions, while instruments such as California Critical Thinking Skills (CCTS), Quality of Critical Thinking Model, and Ennis-Weir Critical Thinking Essay Test deal with critical thinking skills. Since they measure the two components of critical thinking separately, the relationship between those components is not shown. The Halpern Critical Thinking Assessment Using Everyday Situations (HCTAES) and the modified

*Cornell Critical Thinking Test, Level X* by Ennis (1996) attempt to measure both critical thinking skills and critical thinking dispositions at the same time. However, both of them measure critical thinking in general contexts. For example, with reference to HCTAES, *verbal reasoning* focuses on skills needed to comprehend and defend against persuasive techniques embedded in everyday language. Similarly, *likelihood and uncertainty* target correct use of probability and likelihood in everyday decision-making. Research evidence shows that learning how to think is better fostered when subject specific matter is used (Garrison et al., 2000; Renaud & Murray, 2008). The focus on everyday situations in HCTAES may not be suitable in all cultures, subject matter, and contexts. What is considered as an everyday situation, everyday language, or everyday decision-making in one culture or a specific subject matter may be a different thing in another culture or subject matter. This, in turn, may influence the nature of thinking. The current instrument is different from previous instruments because it measures critical thinking skills and thinking dispositions simultaneously, and it uses subject specific content. By doing so, the influence of time, place and subject matter are offset.

#### ***6.2.14.2 Probing research participants' underlying reasoning***

The survey instrument used both multiple choice responses and open-ended questions. Open-ended questions were used as follow-up to multiple choice responses to probe research participants' underlying reasoning about certain dispositions. Using these responses, the researcher identified and coded the dispositions. If such underlying reasons were not revealed, the rating would have been incomplete because it would have been difficult to understand what prompted them to rate a particular disposition the way they did. Open-ended questions gave the research participants the opportunity to think of other interpretations of the statements they rated. An instrument that demands research participants to justify the choices they have made not only assesses the individuals' ability to recognise correct responses and spontaneous application of thinking skills (Ku, 2009), but it also provides them the opportunity to exhibit a

disposition to seek and be open to alternative hypotheses, and to go beyond the data and draw conclusions (Ennis, 1996). For example, in response to the *why* questions, in some cases they also added answers related to *how*, *what* and *when*. The example in Table 6.1 presents one of the statements investigating lecturer perceptions of evaluating students' logical argumentation in the discussion forum posts. It also shows responses from two lecturers.

Table 6.1  
*Example of Lecturers' Responses to a Statement*

Statement DF 2	Through the discussion forum, I can judge how logical or illogical the students' comments are.
Lecturers' reasons	
Lecturer 01	The discussion topics are usually prepared by the instructor, hence, a chance to carefully prepare, monitor and evaluate.
Lecturer 11	I agree because I can see easily the flow of ideas and their connectedness in each student's explanation.

In this example, both lecturers agree with the statement and describe ways they use to evaluate arguments in the posts. Lecturer 01 appears to base the evaluation from the time of preparation to the time of actual discussion. Lecturer 11 focuses on the coherence of students' arguments in the actual discussion. Lecturer 01 hints at useful information that was not initially expected. The assertion that "The discussion topics are usually prepared by the instructor" gives a clue that Lecturer 01 is unlikely to involve students during the planning process of those discussion forum tasks. This additional information enriches data collection and generation. For example, the clue deduced from Lecturer 01 of not involving students during planning the learning tasks corroborates students' survey and interview data. Some students had complained that some of the tasks in Moodle were not based on their interests, but on the lecturers' interests. Additional answers given by research participants such as Lecturer 01, helped to collect more data than those that were initially expected. It was possible to collect this additional information because both closed and open-ended questions were used to complement each other.

### ***6.2.14.3 Promoting divergent thinking***

Other than enriching the data collection and generation processes, the use of open-ended questions promotes divergent thinking that is unlikely to be promoted when closed questions alone are used. Some of the previous instruments such as CCTS, CTDI, and Washington State University Critical and Integrative Thinking Scale use only multiple choice questions. In such cases, they measure convergent thinking. Divergent thinking is also important in critical thinking. The process of giving reasons to justify choices made is a way of gauging actual thinking performance. From the reasons given, the level of critical thinking of the research participants could be determined.

As discussed earlier, a classifying scheme was developed to capture critical thinking performance of the research participants. Each reason given was classified as relevant, unclear or lacking disposition. When the researcher compared the rating with the reasons given, it was evident how consistent or inconsistent the reasons were with the ratings. For example, all the 22 reasons given by lecturers in open-mindedness were consistent with the statements given; while for students, 76 reasons out of 79 were consistent with skills and dispositions related to analyticity. This classification partly shows how consistent the lecturers' and students' reasons were with statements related to critical thinking skills and critical thinking dispositions for open-mindedness and analyticity.

### ***6.2.14.4 Determining respondents' willingness to think***

Critical thinking is a voluntary process. When research participants are given open-ended questions in addition to rating the statements, this process can also be used as a way of determining an individual's willingness to think. The instrument helped to reveal critical thinking dispositions in terms of willingness, motivation or intentions of the thinker.

The instrument can be used to measure and promote both critical thinking skills and critical thinking dispositions if adapted for a learning situation. For example,

lecturers may integrate it into subject specific content, where students respond to a given thinking task by rating as well as justifying their choices of the rating. Through engaging in such a task, students are likely to promote their critical thinking skills and critical thinking dispositions. By doing so, students will display their willingness, motivation, or intentions for engaging in critical thinking.

#### **6.2.14.5 *Generating qualitative and quantitative data***

The use of the rating scale accompanied by open-ended questions captures both qualitative and quantitative data. The collection and generation of the two forms of data helped to complement each other as well as to relate and compare the two data sets. This was a way of ensuring validity of data. Such a process is also significant for mixed methods research, especially when a concurrent mixed methods research design is used. As stated earlier in Chapter 4, section 4.2.6.1, this study used a concurrent mixed methods research design.

#### **6.2.15 Summary of findings from the first research question**

In brief, the first research question examined student teacher and lecturer perceptions of the use of the discussion forums, quizzes, and uploaded resources for promoting critical thinking. Results have revealed similarities and differences in perceptions between student teachers and lecturers, male and female students, pre-service and in-service student teachers, younger and older lecturers, and between universities.

Furthermore, the survey instrument is useful because it is able to capture critical thinking skills and dispositions simultaneously. It also helps to probe research participants' underlying reasons. The instrument further promotes divergent thinking. The survey tool helps to determine the willingness of the research participants to engage in thinking. Finally, the instrument is useful in collecting and generating both qualitative and quantitative data.

Mediating tools can be effective in promoting critical thinking when they are used effectively. The following section discusses student and lecturer perceptions of effective ways of using asynchronous discussion forums, quizzes, and uploaded resources for promoting critical thinking.

### **6.3 Student and Lecturer Perceptions of Effective Ways of Using Moodle Tools for Promoting Critical Thinking**

The second research question examined student teacher and lecturer perceptions of effective ways of using asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking. The next sections discuss each of the ways suggested for promoting critical thinking through the selected Moodle tools.

#### **6.3.1 Giving immediate feedback**

Since learning through LMS takes place when the lecturers are physically absent, students and lecturers were of the view that immediate feedback is important for student learning. In one of the interviews, Lecturer 05 notes: "...if the teacher does not give feedback on time, there may be problems. They can think that you are not serious. In the future forum they may fail to participate." In the discussion forum, immediate feedback is likely to motivate students to participate in the discussion. Additionally, feedback is likely to help students learn from their mistakes and correct them. Depending on the purposes of the feedback, they suggested that it could be specific to individual students or a general one to all students. Getzlaf, Perry, Toffner, Lamarche, and Edwards (2009) found that immediate feedback helps students improve in their future assignments as well as to apply the feedback to practical situations related to their daily lives. However, A. Butler and Roediger (2008) reported that delayed feedback led to a higher proportion of correct responses than was the case with immediate feedback. In this case, it is argued that delayed feedback improves retention more than immediate feedback because when immediate feedback is used, the learner's error interferes with the correct response due to the immediacy of the feedback, while delayed feedback does not have this interference (Mory, 2008). However, most of

the studies that favour the effectiveness of delayed feedback are not classroom-based studies, but experimental studies such as those of A. Butler and Roediger (2008), and Mory (2008). Most of the classroom-based studies suggest that immediate feedback is more effective than delayed feedback.

Furthermore, given the nature of lecturers' workload, most of the students felt that online feedback seemed to have more immediacy than paper-based feedback. Student 06 suggested in one of the interviews: "... computer feedback is much better because it does not take much time. After submitting the quiz, you see your results, while the paper based one takes more time." Paper feedback is likely to take more time because it can involve the lecturers marking the papers; while in online based feedback, other than the lecturer, students themselves get the opportunity to support fellow students. In this case, both the lecturer's time and energy are saved. The findings corroborate those of McCabe, Doerflinger, and Fox (2011) who reported that e-feedback leads to faster, better and more detailed feedback, it increases clarity compared to handwriting, and it also improves writing skills.

From a sociocultural perspective, feedback is given in a form of interaction between students and lecturers through mediating artefacts such as discussion forums, online quizzes or any other media. The quality of feedback depends not only on the degree of interactivity between the students and the lecturers, but also on the nature of mediating artefacts used for learning. Some students reported that there was no option to download posts in the discussion forums. From the survey data, Student 42 pointed out that "... the system administrators forget [sic] to include uploading Discussion Forum for courses. This brings problems to the learners." The results suggest that these missing features of the discussion forum might have limited the use of the forums for some students. In order to maximise student participation, other than the quality of mediating artefacts, Falloon (2012) suggests that feedback and interaction need to be structured, and guidelines should be given to students.



In summary, the results suggest that for feedback to promote critical thinking, it needs to be not only immediate but also personalised, specific, and corrective so that students are able to self-evaluate and address their concerns. Leaving students' concerns unaddressed is likely to inhibit further learning. Likewise, delayed feedback appears to be ineffective in helping students deal with their immediate concerns.

### **6.3.2 Using authentic learning tasks and resources**

Both students and lecturers believed that meaningful learning takes place when tasks and resources are authentic. To promote critical thinking, students suggested that the tasks and resources need to reflect real life and practical issues as demonstrated by Student 05 from one of the interviews: "It [Moodle integration] should focus on all the aspects in life." The use of authentic tasks tends to motivate students to learn in rich, relevant and real-world context; hence, this supports knowledge construction and meaningful learning (A. Herrington & Herrington, 2006; J. Herrington, Reeves, & Oliver, 2006). One of the main purposes of most education systems is to help students be able to solve real life problems now and in the future. For students to be able to solve real life issues, meaningful transfer of learning is important. Transfer of learning can be facilitated when authentic tasks are used because students are likely to be able to see the connection between theories learnt in class and their applications in their lives. Sansone, Fraughton, Zachary, Butner, and Heiner (2011) affirm that students become active in online lessons especially when the tasks explicitly show the connection of how the skills could be applied in real life.

Furthermore, the lecturers perceived that the use of authentic resources that take into account individual learning styles have the potential for promoting critical thinking because students become more engaged and motivated. Interview data from Lecturer 05 illustrates this: "The content has to be interactive enough to engage multiple sensory organs. So it should not only be text, it should include other formats, tables, drawings, diagrams, illustrations ...." Since the resources

are authentic, they are likely to motivate online learners. When students are motivated, online learning is likely to be sustained. Resources that cater for multiple learning styles have the potential for promoting critical thinking because a variety of styles will be used. Use of varied resources exposes students to different perspectives that might call for evaluating such perspectives.

In all the three universities there was evidence of using authentic tasks and resources. One of the learning tasks from University B has the potential for promoting synthesis and open-mindedness: “Read the two extracts from William Robb’s 1996 book cited above, and summarise the major arguments. Post your ideas on the discussion board labelled Activity 3.2 and comment on at least one contribution of your colleagues.” When students summarise the reading to capture major arguments, synthesis skills are likely to be promoted. When the students comment on colleagues’ posts, they get the opportunity to learn from colleagues’ views, hence, becoming open to other ideas other than their own.

For meaningful learning to take place, sociocultural theory advocates the use of authentic tasks and contexts. The use of authentic contexts helps learners transfer what they learn to real and everyday contexts (Kumpulainen & Wray, 2004). Thus, authentic learning tasks and resources are useful because they are likely to bridge the gap between theory and practice, and stimulate students’ critical thinking. As a result, such tasks and resources have the potential for promoting students’ problem-solving skills and rational decision-making processes because when students use them they are likely to be reflecting on the application of what they learn to real life situations.

In brief, authentic tasks and resources are likely to facilitate transfer of learning and make students motivated, reflective and self-confident. To motivate students and to promote critical thinking, such authentic tasks and resources also need to take into account learners’ learning styles.

### 6.3.3 Using different types of questions and resources

Students and lecturers believed that the use of different types of questions had the potential for promoting critical thinking because they help assess different thinking skills. Similarly, the findings suggest that open-ended questions have the potential for promoting divergent thinking. In one of the interviews, Student 08 identifies the role of open-ended tasks: “When you are given an open-ended assignment, you have to think. You think beyond.” In contrast, closed questions tend to promote convergent thinking. However, the use of different types of questions alone, may not promote critical thinking. Different types of questions need to capture different levels of critical thinking skills such as application, analysis, synthesis and evaluation. Narloch, Garbin, and Turnage (2006) reported that students who did either matching or fill-in-the blank pre-lecture quizzes, performed better on both multiple-choice and essay examination questions, and they asked more high level questions than students who were not involved in the quizzes. This indicates that different types of questions and the quizzes have the potential for promoting students’ critical thinking especially when such questions demand students to apply different thinking skills to solve them.

Bradley, Thom, Hayes, and Hay (2008) confirm that the use of different types of questions such as course link, brainstorm, and direct link are significant for facilitating students’ critical thinking.

- *Course link* are questions that require specific information from the course to be integrated with a topic from the article;
- *Brainstorm* are questions meant to generate any and all ideas or solutions to an issue; and
- *Direct link* are questions that refer to specific aspects of the article such as a quotation, and demands students to interpret or analyse them.

Similarly, M.-K. Kim, Patel, Uchizono, and Beck (2012) found that after doing questions that incorporated Bloom’s taxonomy, most of the students (88%) reported that they realised the importance of critical thinking skills in the course.

Lecturers’ survey and interview responses indicated that the use of thought-

provoking distracters helps to engage students actively on the tasks. Through such engagement critical thinking can be promoted. Lecturers reported that they used challenging questions when composing quizzes. Lecturer 04 stresses: "... make sure that you set questions that demand the students to use higher order thinking." A similar view was expressed by Lecturer 05 in one of the interviews that questions need to challenge the students: "For a student to understand that the answer is A, B, or True or False, she[he] needs to have a clear set of mind." However, students' actual performance in quizzes could not be ascertained because the researcher was not given access to quiz results in Moodle.

Lecturers' perceptions of using challenging tasks corroborated learning tasks in Moodle as illustrated from University C:

Read the case study 'Criteria for textbook evaluation: Azerbaijan' and the case study 'Criteria for evaluation of technical quality of textbooks in Romania'... Based on your own context, think of other factors used for evaluating textbooks that are not in the above cases.

Among other considerations, the task demands students to relate how the quality of textbooks is evaluated from other contexts and then they have to link to their contexts. Such a task may motivate learners because they approach a new task with reference to what is already known from their contexts. Other than motivating students, skills such as analysis, synthesis and application can be promoted as students work on the task.

Students and lecturers further believed that the use of a variety of resources facilitates self-evaluation and goal setting. This view is supported by survey data from Student 54 who states that " [the] right variety [of] resources related to the course which [I] am learning help me realize various difficulties facing me and making clear understanding for further evaluation." The findings suggest that the use of varied resources facilitates student self-evaluation and goal setting. Such processes have the potential for promoting critical thinking. Tsang (2008) stresses that the use of hyperlinks, audio and video clips, interactive activities and exercises with immediate feedback can strengthen the learner-content

interactivity; and, consequently, motivate the learners and also engage their psychomotor, cognitive as well as affective skills. Additionally, Borham-Puyal and Olmos-Migueláñez (2011) reported that the use of a variety of resources helps to cater for different needs of the students; as a result, the resources encourage self-regulated learning. The use of a variety of resources in LMS is significant as it gives students the opportunity to access several resources as well as catering for different learning styles of the students. Exposure to such resources is likely to motivate students and involve them in complex thinking as they work on the learning tasks.

With reference to sociocultural theory, self-regulated learning is a result of active participation of learners in shaping the goals and processes of learning within a cultural context (Hellermann, 2008). Since learners become more active participants in cultural activities, learning is then seen as a process of enculturation (Kumpulainen & Wray, 2004). To motivate learners, learning needs to be relevant and related to the cultural context of learners.

To sum up, the use of challenging, open-ended and different types of questions, and varied resources is significant in engaging students actively, and in promoting divergent thinking and self-regulated learning. All these processes are likely to promote student critical thinking skills and dispositions.

#### **6.3.4 Integrating different Moodle tools**

Students and lecturers felt that the integration of different Moodle tools that can be accompanied by graphics, texts, audios or videos are likely to cater for different learning styles. This is significant for promoting student learning as some students learn best by reading, seeing, listening, manipulating resources, or a combination of these strategies. Furthermore, given that the tools are different, but related to a particular theme or topic, this will help students relate and contrast ideas or information given. For instance, a quiz can be composed based on ideas that have been explored in the discussion forums as suggested in an interview by Lecturer 02: “The quizzes can go together with the discussion forum.” This

process of associating ideas or information is likely to promote students' divergent thinking. Also, resources integrated with different Moodle tools such as text, video or audio, influence students' dispositions. Chua and Bernado (2011) suggest that resources can be integrated with class activity, test assessment, a combination or part of a tutorial. Using a combination of reading resources and quizzes, Bälter, Enström, and Klingenberg (2013) reported that lecturers indicated that students' results, study habits, and self-evaluation improved compared to previous classes that did not use the binary (correct/incorrect) feedback to improve learning. Research evidence suggests that students who have used quizzes integrated with other resources, such as readings for formative assessments, tend to perform better in summative examinations (Bälter et al., 2013; Braun & Sellers, 2012; Kibble, 2007; Padilla-Walker, 2006).

The role of tools in mediating learning is reflected in sociocultural theory. This is more significant in LMS where learning is mediated by tools such as asynchronous discussion forums, quizzes and uploaded resources. These tools help learners engage in social activities such as learning where language is a tool for thinking (Karen Johnson, 2009; Kumpulainen & Wray, 2004). Furthermore, the tools influence how learners interact with other learners and with the lecturers within an online sociocultural setting. Research indicates that collaboration through such tools also leads to development of new knowledge and ideas (Malik, 2013). When these tools are used in combination, critical thinking can be promoted because students have the opportunity to engage in different thinking skills such as analysis, evaluation, inference or decision-making.

In conclusion, tools such as discussion forums, quizzes and uploaded resources that use language in its symbolic form facilitate thinking. Thus, the integration of different Moodle tools may engage students in complex thinking as well as promote divergent thinking. Other than catering for the different learning styles of the students, integration of different Moodle tools helps students interact with other students, the lecturers and with the resources. Through interaction, students are likely to display their dispositions through their feelings, motivation, or mood.

### 6.3.5 Encouraging freedom of expression

Students and lecturers felt that freedom of expression was vital for promoting critical thinking. This view is evident in an interview with Student 03: “The discussion forum accommodates ideas from different students; therefore, it is something much better because you get different ideas from different people.” Freedom of expression helped students share different views and learn from different participants. Furthermore, students got the opportunity to evaluate colleagues’ views and their own views. In such cases, students were encouraged to be open-minded. Lecturers felt that proper moderation was likely to increase interaction and motivate students to express their views freely.

Lecturers believed that freedom of expression, among other factors, could be promoted when lecturers maintain good rapport with the students. Lecturer 05 stresses: “The most basic thing is ... the rapport the teacher creates when teaching students using the different tools.” This implies that online discussions need to make students feel psychologically unthreatened by both fellow students as well as lecturers. This psychological state has the potential for making students curious and open-minded. It is the role of the lecturer to ensure that divergent thinking is accommodated through freedom of expression and students respect each other’s ideas even if they do not agree with such ideas.

Lecturers and students felt that the success of online learning is dependent partly on proper planning of the learning tasks and preparedness of the students to participate in those tasks. Lecturers believed that interactivity that encourages freedom of expression can be achieved through proper planning of the learning tasks. Lecturer 05 emphasizes: “If the teacher is not keen enough may not get what he [/she] wants to get from the students. Therefore, careful planning is important ...” A similar view was expressed by Student 08 in the survey: “... before I go to [the] discussion [forum] I must be prepared so that I will be able to suggest solutions.” These findings suggest that technology, a mediating artefact, needs to be used as a means to an end, but not as an end in itself. The level of engagement and interaction of online learners also depend on other factors not

related to technology that is being used. From this perspective, E. Wang and Chen (2012) caution that interactivity does not depend only on technological perspectives such as ease of use, but it depends on social motivation and norms that tend to increase interpersonal trust and commitment to the online community members. Online learning as a community of inquiry, Nentl and Zietlow (2008) argue, must encourage individuals in the freedom to explore ideas, question, and construct meaning.

Thus, freedom of expression is likely to lead to productive online interaction amongst students and lecturers. They get the opportunity to share ideas. Freedom of expression has the potential for promoting critical thinking because it allows students to accommodate divergent views and evaluate their own views. Among other factors, it can be promoted through moderating discussion forums, creating rapport with students, and through careful planning of learning tasks.

### **6.3.6 Proper moderation of discussion forums**

Lecturers believed that proper moderation of discussion forums makes students more focused on the tasks as demonstrated by Lecturer 02 in one of the interviews: “On the course of the discussion, the lecturer can intervene to give some directions.” Moderation is likely to save time that may be wasted on discussing irrelevant or unnecessary issues. Findings from this study have revealed that through moderation, the lecturers can raise the required levels of critical thinking. The results confirm previous studies that lecturers’ feedback promotes students’ critical thinking, improves performance in examinations, and develops self-regulated and reflective learning (Arend, 2009; Borham-Puyal & Olmos-Migueláñez, 2011; Lemley, Sudweeks, Howell, Laws, & Sawyer, 2007; Stein et al., 2013; Wilkinson & Barlow, 2010).

Students and lecturers noted that initiation and moderation of discussion forums can be done by the lecturer or the students. In an interview, Lecturer 03 explains: “In the discussion forum, we need to remember that it is not only the lecturer that initiates the discussion. Students can initiate the discussion.” A similar view was



expressed by Student 05 in an interview: "... one student starts the discussion then another student contributes. In this way there is sharing of ideas... it develops higher order thinking ...." When students are involved in initiating and facilitating discussions, they are likely to become more responsible learners, self-confident, and motivated to learn in online environments. This calls for lecturers to take new roles, different from those taken during face-to-face environments. Vlachopoulos and Cowan (2010) argue that online tutors and e-moderators need to adopt social, pedagogical, and intellectual roles in order to effectively moderate online discussions. Inadequacy of such roles may lead to what Sharpe and Pawlyn (2009) reported, that students developed and sustained a student-led community, to the extent that lecturers were sometimes unsure of the role they should take and when they should intervene. The shift in students' and lecturers' roles is important, especially in a sociocultural context such as Tanzania, where traditionally teaching has mainly been teacher-centred. The results suggest that the discussion forums are good mediating artefacts because they have the potential for changing the dominant role of lecturers that is so apparent in face-to-face environments.

Stein et al. (2013) support the view that student-led discussions can promote critical thinking and the sense of responsibility for learning. However, student-moderated discussions are not meant to replace the role of the lecturer. Xie and Ke (2011) found that student moderations were positively related to peers' low level of knowledge construction; while lecturer moderations were related to peers' high level of knowledge construction because even highly motivated students do not necessarily provide better quality moderation. These results point to the significant role of the lecturer in moderating online discussions. Among other considerations, Quinton and Allen (2014) suggest that individualised support needs to be given to the student moderator. Similarly, Chen and Jang (2010) suggest that online instructors need to spend time to understand students' intentions for studying, and provide customised facilitation to reduce students' uncertainty and anxiety so that students are assured, self-determined, and enjoy learning online.

In conclusion, properly moderated tasks in online environments tend to make students focused on tasks, self-regulated, reflective, and self-confident. Such attributes are essential for promoting critical thinking.

### **6.3.7 Discouraging cheating**

Students and lecturers felt that cheating can be a serious issue in online learning if great care is not taken to prevent it. Cheating limits the promotion of critical thinking because when students are involved in cheating, they do not engage critically on the task at hand. One of the causes of cheating could be the nature of the assessment tasks. Student 02 pointed out during one of the interview sessions: “The questions were shuffled to prevent cheating. It thus encouraged understanding. So you answer what you understand, not copying from your neighbour ...” Furthermore, students believed that cheating was caused by students’ inadequate preparation for the tests and examinations as survey data from Student 08 indicates: “I cannot guess the answers when I [am] prepared well ....” From this view, the motives for cheating can partly provide solutions to preventing it. Yazici, Yazici, and Erdem (2011) indicate that the motives for cheating could be the difficulty of the course or material, need for high grades, inadequate preparation, low risk of being caught, and instructor being indifferent to students. Since cheating is mainly related to psychological factors of the learner, tests and examinations need to be user-friendly and motivating to decrease students’ uncertainty about those assessment tasks. Students also need to have adequate preparations for tests and examinations. In such cases, cheating is likely to be discouraged.

If not controlled, cheating is likely to reduce the credibility of online learning. Students and lecturers stressed that both lecturers and students need to be at the forefront to combat online cheating because it does not promote student learning. They suggested different ways to deal with online cheating. One of the measures suggested for preventing cheating is assigning different questions to each student as illustrated by Student 04 in an interview: “Because every student is known by the system, so each student should be given specific questions. This will prevent

cheating.” This is similar to using random questions as suggested by Watters, Robertson, and Clark (2011). Also, limiting the time the quizzes are open was one of the measures suggested. Student 03, in an interview, commented: “If the quiz is limited to a given time, let say from 12:10 to 12:30, this can reduce cheating ....” Because of time limit, students are likely to concentrate more on the test than on finding ways to cheat. However, cheating may be more than the timing of the quizzes. Task demand may discourage or encourage cheating. For example, tasks that demand convergent thinking are more likely to invite cheating than those that demand divergent thinking. Additionally, the prevalence for cheating in some institutions has been due to some lecturers tending to ignore student cheating. Coren (2011) reported that 40.3 per cent of the lecturers admitted to ignoring student cheating due to insufficient evidence, triviality of the offence, and insufficient time to deal with the issue.

Literature suggests some measures to prevent online cheating. Young’s (2013) suggestions include the use of a small popup window to prevent other students from looking up the answers, and the use of plagiarism checker for submitted assignments. The other measure is the use of *Kryterion’s Web-assessor* that helps the invigilator watch students remotely on web cameras and listen to their keystrokes. The use of *Securexam Remote Proctor* that scans fingerprints and captures a 360° view around a student is one of the measures for preventing online cheating. However, despite the use of such secure measures, in a study by Mirza and Staples (2010) students reported that webcam invigilation is to some extent effective in preventing cheating, but still there is a possibility of cheating. Other measures for combating cheating include clearly spelling out the academic standards regarding cheating, making students aware of the disciplinary actions against cheating, giving frequent but short time intensive examinations, and using essay type questions (King, Guyette Jr, & Piotrowski, 2009).

Cheating is detrimental to learning because it limits students’ level of analysis and curiosity, and consequently does not promote critical thinking. Assessment tasks need to be integrated in a formative way so that they reduce students’ phobia for

assessment because such phobia seems to be one of the root causes for cheating. While students need to be motivated to value learning more than passing, the nature of the task demand may also encourage or discourage cheating.

### **6.3.8 Using clear language**

Lecturers believed that tasks may not be understood by students due to the level of the language used. Lecturer 05 in an interview argued that language used “should help the students to get the concept.” If the language used is not clear to students, such tasks may not be done, or done incorrectly due to their vagueness. The nature of language used in tasks can either facilitate or limit students’ comprehension of the tasks. Since such tasks are not meant to test the student in understanding the complexity of the language, the focus has to be on using clear and comprehensible language. The use of long, complex sentences should be avoided as it is likely to confuse students (Miller, Linn, & Gronlund, 2009). Black (2002) adds that the language used should be within the reading level of the students. These considerations are more important for higher learning institutions in Tanzania because the mother tongue is not used as a medium of instruction, instead, English, a foreign language, is used.

Language clarity is significant from a sociocultural perspective because it is a tool for thinking and for developing socially shared meanings (Kumpulainen & Wray, 2004; Mercer & Littleton, 2007). Since language mediates learning as learners interact within the cultural context, the lecturer needs to be a guide and model for proper language use (Mercer & Littleton, 2007). Clear language is likely to promote clear thinking and make learning tasks more comprehensible. In such cases, students are likely to do the tasks with ease; consequently, they may achieve their expected learning outcomes.

### **6.3.9 Using up-to-date and user-friendly resources**

Students and lecturers believed that knowledge is not static. It is constructed over time, and it changes over time. This is demonstrated by interview data from Student 04: “The lecturer should be up to date... We know that knowledge is not

static.” This calls for students also to be constructors of knowledge. Students’ construction of knowledge can be possible when students are engaged actively in tasks that demand them to maximise their critical thinking. Projects that involve some investigations could be a typical example. Students felt that the use of up-to-date resources informs them of what is new in the field. These findings are similar to those of Chua and Bernado (2011) who reported that the use of scholarly articles in e-learning courses helps to maintain a high quality of online teaching because they help students learn past theories and their present applications as well as focus on their own future work.

Students and lecturers considered that user-friendly resources promote high interactivity between students and students as well as between the students and the resources. As indicated in the survey by Student 42, when resources are in a “wrong format [they lead to] pure distortion” of the information given. The nature of interactivity amongst students has the potential for promoting critical thinking. This is demonstrated by Student 19 who in the survey comments on the usefulness of using resources with colleagues: “Questions and suggestions from different people have challenged me.” The findings suggest that knowledge is socially constructed when students interact with each other. In such situations, they can share ideas, they can discard old ideas, and they can discover new practicable ideas.

Knowledge construction is in line with the view of sociocultural theory. Sociocultural theory views learning and knowledge creation as dynamic and shared processes manifested through participation in cultural and social practices (Hellermann, 2008; Lamy & Hampel, 2007). Therefore, use of up-to-date and user-friendly resources can encourage active participation amongst learners. Through such interactions, students may become inquisitive and open-minded.

### **6.3.10 Considering learners’ prior knowledge**

Students believed that their previous knowledge and experiences are important for promoting critical thinking. This view is affirmed in an interview by Student 08:

“You may have a question that demands the use of your own experience. The experience can be job related, but at some point is a general experience.” Since such tasks help students relate what they learn to their profession, they are likely to motivate them. These results suggest that our previous experiences tend to shape our current thinking as well as our future thinking. Additionally, the results imply that our thinking is rooted in cultural and social practices. Students’ prior knowledge needs to be considered when introducing new concepts because that will be the starting point to explore the concepts further. The results support A. Butler and Roediger (2008) who reported that students performed better on items that were tested on the prior multiple-choice tests than on items not initially tested.

The findings reflect sociocultural theory where learning is seen as being situated in social and cultural settings. Thinking does not start in a vacuum. It starts in a social context where the learners’ prior knowledge and experiences should be taken into account. From a sociocultural point of view, learning will be less successful if learning activities fall beyond the cultural understanding of the learners (Pritchard, 2009). Learner’s prior knowledge can act as a benchmark for successful subsequent learning. Therefore, prior knowledge seems to be significant not only in shaping what is learnt, but also in determining how, why and when learning takes place because learning is a conscious process.

Students’ prior knowledge and experiences are also important when promoting their critical thinking. Learning tasks that are meant to promote critical thinking need to take into account students’ prior knowledge and experiences. For instance, a task that demands students to synthesise and evaluate issues or draw conclusions about certain issues assumes that students can relate thinking skills such as recall and comprehension to thinking skills of synthesis, evaluation or inference. It further assumes that the learning tasks fall within the cultural understanding of the learners. All these considerations are significant for learning in general, and for promoting critical thinking in particular.

The following section discusses results related to student teachers' uncritical and critical thinking as displayed in asynchronous discussion forum posts.

#### **6.4 Critical Thinking Skills and Thinking Dispositions in Discussion Forums**

The third research question examined student teachers' critical thinking skills and thinking dispositions as displayed in tasks related to asynchronous discussion forum posts. The RCS-CAIS Model was used to determine students' critical thinking skills and thinking dispositions. The first section discusses students' general critical thinking skills. The second section discusses the overlapping nature of human thinking, followed by the iterative and multidirectional nature of human thinking. The final section discusses factors that can influence critical thinking in asynchronous discussion forums.

##### **6.4.1 Students' critical thinking skills**

Since most of the posts fell into the category of *clarification*, this indicates that most of the students were able to analyse and discuss issues raised during the course. This level of analysis is also supported by students' survey and interview data. For example, in the survey, Student 30 comments: "Discussion forum increases my experience. This experience helps me to analyse issues being discussed." This view was further emphasised by Student 08 in an interview: "If you are given a task, you have to read it and analyse it before attempting the task itself." Fewer posts into *recall* reveal that some students displayed low critical thinking. Fewer posts in *strategies* indicate that few students displayed higher levels of critical thinking in decision-making and problem-solving.

The findings corroborate those of Perkins and Murphy (2006), Jacob and Sam (2008) and Leng (2012), where most of the posts fell into categories of *clarification* and few posts into *strategies*. These findings suggest that more students engaged in analysis than in decision-making skills (i.e. strategies). Decision-making skills seem to place greater demand on students because they

involve a combination of almost all the other thinking skills. In practice, teaching could involve integrative teaching of these thinking skills.

Findings from the discussion forum posts revealed that thinking skills such as recall, comprehension, analysis, assessment, inference, and decision-making were influenced by dispositional factors. In the discussion forums, dispositional factors may appear off task, but they have the potential for sustaining online discussions. Online discussions can be sustained when students collaborate. This collaborative spirit tends to bring a sense of belonging to an online environment. A sense of belonging can be promoted through trust in other online members and self-disclosure (Davis, 2012; Zhao, Lu, Wang, Chau, & Zhang, 2012). Thus, trust in other members and self-disclosure, among other things, may influence students' intention to participate, share or collect information in online environments.

Other than classifying the discussion forum posts into different thinking skills, a critical review of each post provided some clues on the nature of thinking skills students exhibited. Two major patterns of thinking skills were revealed: the overlapping, and iterative.

#### **6.4.2 Overlapping nature of thinking skills**

Various thinking skills revealed in the discussion forum posts tended to overlap each other. This process is illustrated in Figure 6.1. This indicates that thinking skills are related to each other. Thinking skills influence each other. For example, analysis may involve skills such as comprehension and recall (remembering). Similarly, a deeper analysis of an issue or problem may lead to discovery of new facts (knowledge) that may be related to thinking skills of comprehension or recall.



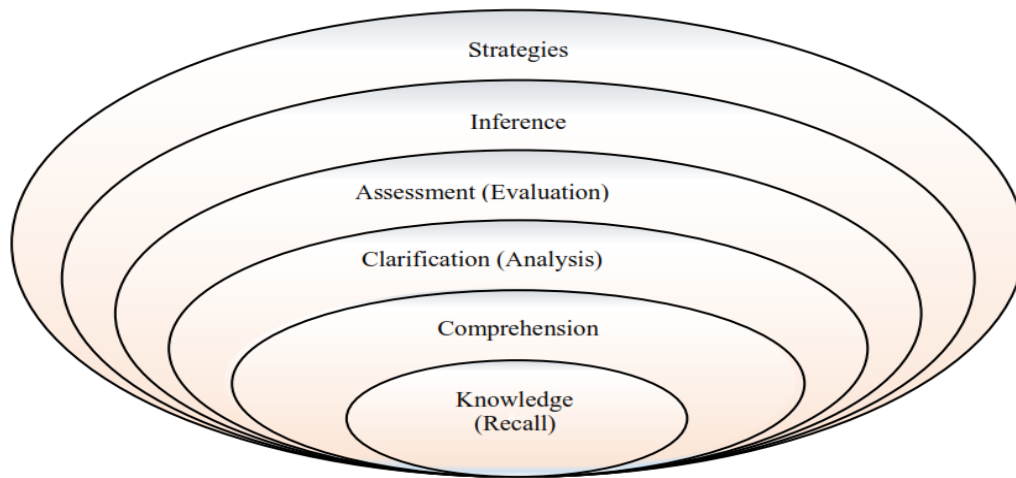


Figure 6.1. Overlapping nature of thinking skills

These thinking skills are related and linked to each other. At some point, the degree of overlap may be too high to the extent that categorical demarcation may be too difficult.

#### 6.4.3 Iterative and multi-directional nature of thinking skills

A review of asynchronous discussion forum posts revealed that thinking skills were iterative and multi-directional. In this case, various thinking skills tend to interact with each other. Likewise, thinking skills can start from simple to complex, or complex to simple. When students engaged in giving arguments, in many cases, the subsequent thinking skills were in some ways related to the preceding thinking skills. Below is one of the discussion forum posts revealing a student's thinking skills. The nature of argument could progress from simple to complex, complex to simple or back and forth. In brackets are the thinking skills.

Peer assessment is useful [*Recall*] because it gives confidence to a student who is being assessed by fellow students; rather than being assessed by a group of tutors. [*Assessment*] And it is useless where student are in conflicts and friendship, they will not look at what is presented. [*Assessment*] So the tutor or lecturer should also assess on his own by comparing the peer assessment and his. [*Strategies*] So the tutor is the one to have a final say. [*Inference*]

From this example, the student starts the argument with a claim which provides factual information (recall). The claim is supported by evaluating the advantages

and disadvantages of peer assessment (assessment/evaluation). Based on the evaluation of peer assessment, the student suggests a solution to deal with peer assessment (strategies). Finally, the student concludes by giving what s/he thinks is the best way to handle peer assessment (inference). This conclusion has been drawn after the processes of recall, assessment, and rational decision making (strategies). In several cases, thinking skills displayed in the asynchronous discussion forums were multi-directional, overlapping and linked to each other. The findings suggest that thinking skills such as recall, and comprehension may influence, or be influenced by, other critical thinking skills such as application, analysis, synthesis, evaluation and inference.

Posts from one of the learning tasks were used to trace the thinking skills students could exhibit as indicated in Figure 6.2. These posts were a response to this task: “As teachers to be of English as a Second Language, which teaching-learning approach(es) would you use? Why would you use such an approach or approaches?” The analysis focused on contextual factors that gave rise to different patterns of those thinking skills. The posts are presented in Figure 6.2 to capture the trend of various thinking skills. The posts were extracted from a discussion forum that lasted for four weeks. A total of 104 posts were generated by 12 students and one lecturer.

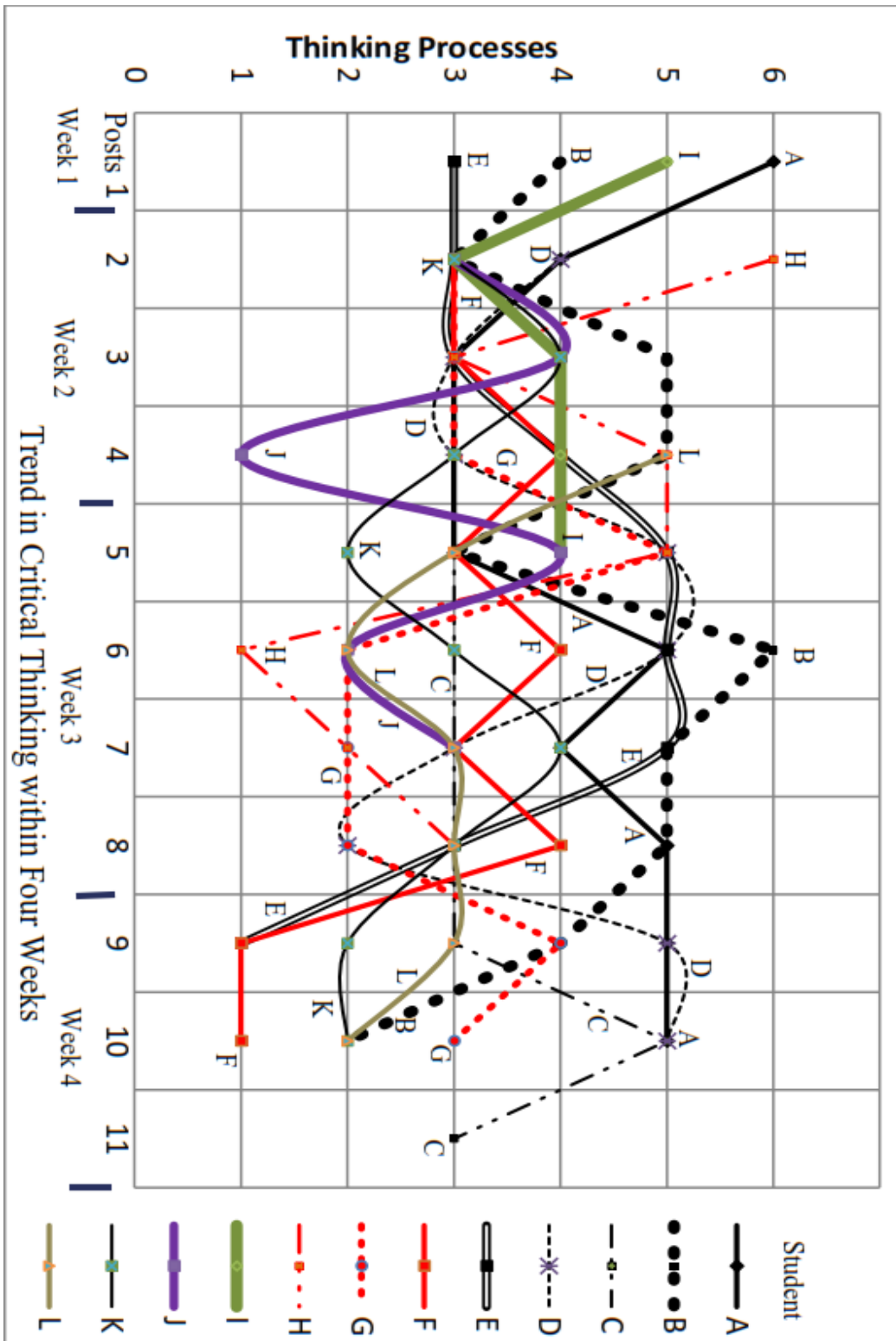


Figure 6.2. Students' thinking skills displayed in the discussion forum over four weeks

Notes: Thinking skills (1= Recall, 2 = Comprehension, 3 = Clarification, i.e. Analysis, 4 = Assessment, 5 = Inference, and 6 = Strategies, i.e. decision-making)

There was a variation in the number and quality of posts over the four week period. Week 1 had fewer posts. All the posts were above the comprehension level (i.e. analysis, assessment, inference, and decision-making). Weeks 2 and 3 had the most posts. Most of the posts were above the comprehension level, except six posts that fell into categories of recall and comprehension. Out of the six posts, one post from Student J and one from Student H were on recall as clarification and agreement respectively. The other four posts from Students G, K and L fell on comprehension as agreements. Similarly to week 1, week 4 had fewer posts. Most of the posts ranged from analysis to inference with the exception of four posts. Out of the four posts, two posts from Student F fell into recall, and two posts from Students K and L fell into comprehension. All the four posts were responses to agreements from colleagues' comments.

The analysis of the discussion forum posts revealed that the variation in critical thinking was influenced by contextual factors. Some of the factors promoted critical thinking, while other factors seemed to limit critical thinking. These factors are discussed in the next section.

#### **6.4.4 Factors influencing the nature of thinking**

Findings from asynchronous discussion forum posts indicated that thinking skills exhibited in the discussion forums may be different from those thinking skills displayed in other contexts. Analysis within posts and across posts revealed that thinking skills do not necessarily progress from simple to complex or from concrete to abstract as it has been advocated in Bloom's Taxonomy (B. Bloom et al., 1956; Krathwohl, 2002). In other words, thinking skills exhibited in the discussion forums were not hierarchical, but they were rather overlapping, iterative and multi-directional. The overlapping nature of thinking is illustrated in Figure 6.1, while iterative and multi-directional thinking is shown in Figure 6.2.

Several factors that influenced the levels of critical thinking were identified. A critical review of the discussion forum posts revealed that the overlapping, iterative and multi-directional nature of thinking skills was influenced by several

factors. These factors include the nature of the task, the nature of prompts from the lecturer or from other students, and presentation of conflicting ideas. These factors are discussed in the following paragraphs.

The findings revealed that the nature of the task was significant in influencing the degree of critical thinking students displayed in the discussion forums. For example, in Post 1, Student A responds critically to the initial task given by the lecturer. The task is challenging in that it asks students to choose particular teaching-learning approaches and justify their usefulness in teaching a foreign language. Student A starts by analysing the task, and finishes by making a rational decision about the given task. Similar critical arguments are made by other students, such as Students H and I, in their first posts. Students seem to tune their level of thinking depending on the demands of a given task. This is likely to be related to students' motivation about the tasks because affective factors tend to influence performance judgements. Affective factors such as satisfaction can boost morale, while dissatisfaction may trigger efforts to improve (Tobin & Tidwell, 2013). From a pedagogical point of view, to promote critical thinking, lecturers are expected to use challenging tasks that can critically engage students. These findings corroborate those of lecturers' interviews as illustrated by Lecturer 05: "... if you put garbage, you will get garbage." Among other things, learning outcomes are influenced by processes involved during learning. Thus, the nature of the task is significant in raising the required levels of critical thinking.

Furthermore, despite the nature of the tasks, some students need to be prompted to raise their levels of critical thinking. Analysis of the discussion forum posts showed that critical prompts from the lecturer or students influenced the level of thinking skills students exhibited. In cases where the previous comments prompted higher critical thinking, the proceeding comments also revealed higher critical thinking. For example, the lecturer's prompt changed the level of critical thinking of Student C from *analysis* to *inference* as indicated from Posts 2 to 10. The lecturer's prompt was a response to Student C who seemed to overemphasise the role of speaking in learning a foreign language. The response from Student C

after the lecturer's prompt indicates that the student was aware that skills other than speaking are important in learning a foreign language. A portion of her response illustrates this: "... you can't speak a foreign language without reading it, knowing its grammar and pronunciation, and listening to the way they [native speaker] pronounce ...." This response indicates that Student C was encouraged to think critically by considering other necessary skills in learning a foreign language. Prior to the lecturer's prompt, the level of thinking for Student C was constantly at *analysis*. These findings suggest that students' performance may be influenced by the lecturer's expectations and prompts. The findings further reveal that prompts are important because they tend to pinpoint the issues to be dealt with in a discussion forum. Other than making students critical, prompts make students more focused on the tasks. Critical prompts are significant in raising the degree of critical thinking in the discussion forums. Wicke (2013) affirms that helpful prompts are those that are related to real world situations, and specific to suggesting problem-solving strategies, but give the students the opportunities to exercise their individual judgement.

In affirmation posts, that is, in posts where students agreed with the previous students' comments, a low level of critical thinking was displayed. Good examples of these are in Posts 6, 9 and 10 from Student F, Posts 6, 7 and 8 from Student G, Posts 5 and 9 from Student K, Post 9 from Student E, and Post 6 from Student L. The students agreed with ideas given by other students, but did not seem to be critical enough about what they agreed with. However, though affirmation posts tend to reveal low processes of thinking, they have the potential for increasing students' participation because students may feel motivated when they realise that their ideas are acknowledged by other students. Since posts that affirm previous comments seem not to raise the required levels of critical thinking, the lecturer's moderation is important. Through moderation, lecturers can encourage students to go beyond affirmation by taking other related or different perspectives.

Posts that responded to rebuttals indicated higher levels of critical thinking. For example, Post 5 from Student E is a response to a rebuttal from Student A. Student A questions Student E on the usefulness of combining different teaching-learning approaches when teaching a foreign language. Student A prompts Student E in a polite manner. He begins by acknowledging ideas presented by Student E, followed by questioning the rationale for combining different teaching-learning approaches. In turn, Student E responds critically to the rebuttal. Other critical responses to rebuttals were displayed by other students such as Student B as indicated in Post 6. Students who responded to rebuttal posts appreciated feedback given by their colleagues. The following clauses in response to rebuttals in the discussion forum show appreciation of comments given by colleagues:

You have given a good point, John ... [names used are pseudonyms]

Peter, you are right ...

I really support Rachel ...

Yes, it is true ....

These agreements seem to indicate that students who committed some errors in their posts were open to other students' points of view. The responses indicated that, based on colleagues' comments, students whose posts were rebutted discarded their unsound views. These findings indicate that the manner of correcting other students also matters. When students are corrected in a manner that does not threaten their self-esteem, they are likely to take the correction positively.

However, some students whose posts were rebutted did not indicate any response to agree or disagree with such rebuttals. Several explanations could account for this. On the one hand, the lecturer crafted rebuttals or prompts in such a way that any student could respond to them. Rebuttals were not necessarily directed to students who had committed the errors. The following is a typical prompt from the lecturer: "Do both audio-lingual and integrated language approaches emphasise on [sic] speaking, writing, reading and listening?" Any student could respond to prompts raised by the lecturer. Since other students had already

responded to such prompts, students whose posts had been rebutted did not find any reason to respond because the ideas had already been clarified by other students. On the other hand, it could be interpreted that non-response was a sign of being unhappy about the rebuttals. Silence could probably have been *part of the response* in such circumstances. This view is partially supported by instances where some students who started other new threads without making any reference to rebuttals made by colleagues or the lecturer. However, since these new threads were started after several responses from other students about their rebuttals, it could indicate that the issues were already resolved by colleagues. Hence, it was time to start new threads. Additionally, since students whose posts were rebutted continued contributing other posts, it could also mean that they still had the morale to participate in the discussion forums. The lecturer's art of prompting students seemed to be non-threatening because rebuttals could be addressed by any participant, and not necessarily by the student whose post had been rebutted. Likewise, the lecturer's prompts focused on raising the levels of critical thinking required. This way of moderating discussion forums has the potential for encouraging participation, sustaining online discussions as well as promoting critical thinking.

Posts with conflicting views were responded with a higher degree of critical thinking. For example, Student A critically assesses the response given by Student B. In turn, Student B responds critically to the rebuttal as indicated in Post 6. When ideas were conflicting, the side that was critiqued tried to argue strongly to support their case. By doing so, higher critical thinking was demonstrated. Pedagogically, these findings reveal that tasks that have conflicting points of view are good for discussion forums. Through presentation of conflicting ideas, students may not only become open to other students' ideas, but also they become open to their own ideas.

Since asynchronous discussion forums are mainly based on texts, the RCS-CAIS model helps analyse such texts. The model has revealed that texts or messages are laden with clues about the dispositions of the authors of those messages. Texts



help online learners maintain a sense of connection and belonging with other online members (Davis, 2012; Manca, 2010). Texts also help learners understand beliefs, feelings and attitudes of the senders (Wetzels et al., 2011). Knowledge of other online members is important because it may increase trust and interest. Trust and interest about online community members are likely to motivate students' participation in online learning. Through prompts from the lecturers or students, students raised their levels of thinking. This view is in line with Lipman (2003) that online text-based interaction has the potential for promoting critical thinking and social construction of meaning.

Overall, the findings revealed that critical thinking in asynchronous discussion forums may be different from other contexts. Thinking skills displayed in the discussion forum posts did not take a predictable pattern. Thinking skills were overlapping, iterative and multi-directional. Thinking skills did not necessarily progress from simple to complex and concrete to abstract (B. Bloom et al., 1956; Furst, 1981; Krathwohl, 2002). These findings are in contrast to Bloom's incremental and hierarchical nature of cognitive processes. According to Bloom's taxonomy, achievement of the next more complex skill or ability requires achievement of the prior one. For example, Bloom et al. argue that "problems requiring behavior A alone should be answered correctly more frequently than problems requiring AB" (p. 18). In other words, it is assumed that critical thinking skills operate from simple to complex. In terms of task complexity and performance, they assumed that less complex tasks are performed more easily than more complex tasks. This is in contrast to evidence from neuroscience research. Cognitive research shows that even the most complex tasks can be learned with little effort at the level at which they are performed (J. Anderson, 2009). In other words, performance of the task is not necessarily influenced by its complexity. Task performance can be influenced by other factors such as the learner's cognitive ability, time pressure, familiarity with the task, and training on a particular task. Cognitive ability and time pressure can influence performance of a thinking task (Liu & Li, 2011). Depending on intellectual ability, for example,

different learners may perform the same task differently. Also, the same learner can perform the same task differently on different occasions. In a study by Haerem and Rau (2007), as participants were more familiar with the task, they felt that the task was less complex. Furthermore, training on a particular task improves task performance due to better attention allocation or appropriate and automatic methods to perform the task (Rice et al., 2012). Anxiety is also known to impair processing efficiency and performance effectiveness because it increases the level of perceived threat to the individual (Derakshan & Eysenck, 2009).

Findings from the discussion forum posts indicated that the levels of critical thinking were different from different posts depending on the contexts that prompted such responses. In some posts, fewer thinking skills were displayed, while in other posts more thinking skills were displayed. The RCS-CAIS model helps to analyse tasks related to the discussion forums. The model reveals not only the thinking skills displayed in the discussion forums, but also shows dispositional factors students exhibit as they engage in the discussion forums.

These findings have significant implications for teaching critical thinking. They imply that teaching of critical thinking does not necessarily have to move from simple to complex. Critical thinking skills can be taught in an integrative manner. Simultaneous teaching of these skills is important because they are related. In the same way, dispositions need to be developed in conjunction with thinking skills.

## **6.5 Chapter Summary**

In summary, both students and lecturers perceived themselves that they had high critical thinking skills and tendencies of being organised, focused, diligent, and persevering in inquiry. Likewise, both groups believed that they had high critical thinking skills and tendencies related to making rational decisions and solving problems related to the given learning tasks. Furthermore, a higher percent of students and lecturers perceived themselves as having high critical thinking skills and inclination of being cautious, and using logic and objective evidence during the teaching-learning process. While more students felt they had low intellectual

curiosity and tended to focus more on learning things when their immediate benefit were known, more lecturers reported that they did not have enough self-confidence to use asynchronous discussion forums, quizzes and uploaded resources for assessment purposes.

A higher percent of male students believed themselves that they had high critical thinking skills and dispositions related to truth-seeking than female students did. More female students rated that were ready to learn from colleagues as well as from their own mistakes than was the case with male students. A higher percent of in-service teachers perceived themselves that they were ready to learn from colleagues and from their own mistakes; they could evaluate the usefulness of Moodle tools; and they were more curious to learn than pre-service teachers did. A higher percent of students from Universities B and C felt themselves that they had high critical thinking skills and dispositions related to truth-seeking than was the case of students from University A. A higher proportion of students from Universities B and C believed that Moodle tools helped them achieve their learning objectives better than did the students from University A. More students from University C rated that they were more curious to learn through Moodle tools than was the case with students from Universities A and B. A higher percent of younger lecturers gave a high rating to Moodle tools because they believed that the tools helped them become more analytical, curious to learn, and ready to learn from colleagues and from their own mistakes than older lecturers did.

The combined instrument for measuring both critical thinking skills and critical thinking dispositions has some benefits. Since critical thinking skills and critical thinking dispositions operate together closely when a person engages in a thinking task, the instrument helps to better understand how these work together in a particular context. Because critical thinking varies over time and in different places, context influences what, how, why and when the person thinks. Furthermore, the combined instrument helps to capture the research participants' reasoning underlying their thinking. Since thinking is a voluntary process, the instrument helps to reveal the research participants' willingness, motivation or

intentions for their thinking. Additionally, the instrument helps to enrich data collection and generation because the research participants add new insights related to the research questions that otherwise would have not been revealed, if the instrument had captured only one of the components of critical thinking. Measuring the research participants' critical thinking skills and thinking dispositions helps to gauge their actual thinking performance, especially after evaluating their reasons. Finally, the instrument helps to collect and generate both qualitative and quantitative data. It is, therefore, a useful instrument, especially for mixed methods research.

Students and lecturers suggested effective ways for promoting critical thinking through the use of asynchronous discussion forums, quizzes and uploaded resources. Both students and lecturers believed that immediate feedback was significant, as it is likely to improve learners' performance. They also felt that the use of authentic tasks and resources helps to bridge the gap between theory and practice, as students are likely to apply what they learn in real life situations. Use of a variety of questions and resources was reported to have the potential for exposing students to different thinking skills, such as analysis, evaluation and synthesis. Students and lecturers felt that the integration of different Moodle tools is likely to engage learners in complex thinking. Freedom of expression and discouraging cheating were considered to have the potential for promoting curious learning amongst students. Lecturers felt that proper moderation of discussion forums has the potential for focusing learners more closely on the tasks. Since language is a tool for thinking, lecturers believed that the use of clear language facilitates clear thinking and comprehension of the learning tasks. Use of up-to-date and user-friendly resources is likely to promote active participation of students. Finally, they suggested that learners' prior knowledge and experiences are likely to influence what, how, when and why learning takes place in a given sociocultural context.

With reference to the discussion forums, most of the students believed that they were able to clearly analyse and discuss issues raised in class. However, it has to

be noted that few students felt that they had higher abilities in rational decision making processes. The nature of thinking skills exhibited in the discussion forums were overlapping, iterative, and multi-directional depending on dispositional and contextual factors prevailing at the time of the discussion. From this view, thinking did not necessarily move from simple to complex or from concrete to abstract.

The next chapter concludes the study. The chapter discusses the practical and theoretical contribution of the study. It then discusses the limitations of the study and suggests areas for further research.

## **Chapter 7**

### **Conclusion**

This study has investigated student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking within a pre-service teacher education programme. Taken together, the findings suggest that the survey tool and the RCS-CAIS model are useful instruments because they have managed to capture critical thinking skills and critical thinking dispositions simultaneously. The RCS-CAIS model is a useful instrument because it helps to understand the role and relationship of critical thinking skills, as well as the relationship between critical thinking skills and thinking dispositions in asynchronous discussion forums. The RCS-CAIS model has further revealed that thinking skills exhibited in the tasks related to asynchronous discussion forums tend to be overlapping, iterative and multi-directional depending on the prevailing circumstances of the time. Using data generated from these instruments, insights about the research participants have been gained and conclusions about the research questions have been drawn.

The chapter is divided into five sections. The first section discusses the contribution of the study. The implications of the research findings have been discussed in the second section. The third section discusses the limitations of the study. The recommendations for further research are discussed in the fourth section, followed by concluding remarks.

#### **7.1 Contribution of the Study**

This study contributes to knowledge by demonstrating the benefits of using a combined instrument for measuring critical thinking skills and thinking dispositions simultaneously. This view is discussed in the first section. The second section discusses the role of the RCS-CAIS model in showing the relationship between critical thinking, including recall and comprehension, and dispositional factors in tasks related to asynchronous discussion forums. The role of culture in promoting and measuring critical thinking is discussed in the third

section. The final section discusses the nature of thinking skills in tasks related to asynchronous discussion forums.

### **7.1.1 Benefits of a combined instrument for critical thinking**

A survey instrument was developed and used to capture critical thinking skills and critical thinking dispositions. This combined instrument has shown the relationship between critical thinking skills and critical thinking dispositions. Similarly, the instrument helps to gauge individuals' critical thinking dispositions through the use of open-ended questions.

The study contributes to existing knowledge by demonstrating that a clearer picture of an individual's critical thinking can be gained when both critical thinking skills and critical thinking dispositions are measured simultaneously. This is significant because learning how to think and engaging in a thinking task are context dependent. Since critical thinking varies over time and in different places, when measuring critical thinking, the context is important not only because it influences what an individual thinks about, but because it also influences how and why the individual thinks.

The use of open-ended questions helped to collect more insights into the research participants. For example, when responding to why questions, in some cases, they also gave answers related to how, when or what questions. Although most of these additional data were unanticipated, they helped to enrich the data collection and generation processes. Such data were generated because both closed and open-ended questions were used to complement each other.

Besides helping to collect insights from the research participants, open-ended questions promote divergent thinking. Divergent thinking is important in critical thinking and is unlikely to be promoted when closed questions alone are used.

Being a self-conscious process, critical thinking is voluntary. The use of open-ended questions in conjunction with rating the statements can be used as a way of

determining individuals' willingness to think. Such willingness in the research participant is important because thinking is a self-regulated process.

### **7.1.2 Benefits of the RCS-CAIS model**

The RCS-CAIS model broadens our understanding of measuring and conceptualising critical thinking in tasks related to asynchronous discussion forums. The first section discusses the role of the RCS-CAIS model in showing the relationship between recall and comprehension, and critical thinking. The final section shows how the RCS-CAIS model relates critical thinking skills and dispositional factors in tasks related to asynchronous discussion forums.

#### ***7.1.2.1 Recall and comprehension, and critical thinking***

This study has revealed that critical thinking is an iterative, multi-directional and connected process where thinking skills such as recall and comprehension influence critical thinking. Likewise, a deeper engagement in critical thinking may lead to further understanding of information, phenomena or ideas related to recall and comprehension.

In this study, the LMS was part of the learning context. Effective learning occurs when learning is contextualised. In the discussion forum posts reviewed, the research participants displayed a range of thinking skills from recall, comprehension, to decision-making. These findings indicate that critical thinking does not happen in isolation, but it occurs within a social setting, and it is connected to other thinking skills. Prevailing circumstances during the discussion may raise or lower levels of critical thinking. To that end, a clearer picture of an individual's critical thinking in tasks related to asynchronous discussion forums needs to take into account thinking skills such as recall, comprehension, clarification, assessment, inference and decision-making.

Thinking skills exhibited in the discussion forums were closely linked to each other, where the previous process informed the next process. Recall and comprehension help the learner make inferences and decisions about what has



been learnt (Pritchard & Woollard, 2010). These inferences and decisions are important because they may inform the manner in which subsequent learning occurs.

Some of the previous instruments (such as in studies by Jacob, 2010; McLean, 2005; and C. Perkins & Murphy, 2006) measuring critical thinking in asynchronous discussion forums have excluded so called lower order thinking skills such as recall and comprehension. This study has demonstrated that recall and comprehension influence and contribute to critical thinking and *vice versa*. In previous studies there appears to have been a missing relationship between recall and comprehension, and other thinking skills. The RCS-CAIS model suggests a relationship amongst all of these thinking skills and provides a method of investigating this relationship.

#### ***7.1.2.2 Influence of dispositions on critical thinking***

The RCS-CAIS model provides a holistic view that shows that dispositional factors need to be considered when measuring critical thinking in tasks related to the discussion forums because they are part of the online context where critical thinking is expected to be promoted. Analysis of the discussion forum posts has revealed that when students participated in the forums and collaborated with other students, they also displayed their thinking dispositions that were manifested through their feelings, mood, and motivations. This view indicates that dispositional factors are an integral part of critical thinking.

Using texts, for example, online learners expressed their emotions through sharing their feelings, attitudes, experiences and interests. In this case, students expressed happiness and agreement with other students' points of view. Because emotions are an integral part of motivation and persistence, they promote critical thinking (Garrison et al., 2000). Other than promoting critical thinking, this study has revealed that emotions being an integral part of motivation have the potential for sustaining collaboration amongst online community members. These emotions, in turn, can motivate students and help them keep focused on the tasks (Lapadat,

2004). Previous instruments measuring critical thinking in tasks related to asynchronous discussion forums have not directly related these dispositional factors to critical thinking. The RCS-CAIS model shows the role of dispositional factors in influencing critical thinking.

The RCS-CAIS model is useful because it is able to discriminate various posts into different thinking skills and thinking dispositions. Unlike some of the previous studies that discarded some of the posts for being social in nature (Corich et al., 2011; Jacob & Sam, 2008; Leng, 2012), the RCS-CAIS model gives more room for accommodating posts from a wider range of critical thinking levels. For instance, posts that are social in nature or related to recall and comprehension, but directly or indirectly promote critical thinking are accommodated. Because critical thinking in an LMS occurs in a holistic social context, a wider range of interactions that constitutes and contributes to the learning environment needs to be considered.

### **7.1.3 Influence of context and culture on critical thinking**

Similarly to learning, student and lecturer perceptions are not context free. This study has revealed that student and lecturer perceptions are part of the sociocultural context. In this study, the learning management system was part of the learning context. Use of LMS is emphasised in most higher learning institutions in Tanzania. Some of the learning objectives in the course syllabi from the selected universities indicated the use of LMS as teaching-learning tools for promoting critical thinking. Both students and lecturers were expected to use LMS tools to transform their learning and pedagogical practices. A similar view was reflected in policy documents such as Education and Training Policy (MoEVT, 1995), The Tanzania Development Vision 2025 (Planning-Commission, 2002), and Information and Communication Technology (ICT) Policy for Basic Education (MoEVT, 2007). For example, The ICT Policy categorically states the use of LMS for promoting critical thinking.

The assessment system in the Tanzanian context has traditionally been based on individual efforts and on cognitive abilities. Assessment that focuses mainly on individual efforts tends to encourage students to work on their own rather than in a group. Consequently, some students may find it difficult to accommodate other students' ideas, especially when such ideas contradict their own beliefs. Similarly, learning that focuses only on cognitive skills rather than on a combination of cognitive skills and dispositions, is unlikely to develop the learners holistically. All these pedagogical practices influence how learning and critical thinking can be promoted.

Sociocultural practices and activities influence knowledge creation. Because of the deep influence of culture, some of the LMS tools were not used to transform student learning and lecturer pedagogical practices. As discussed earlier, some of the students used some of the LMS tools for the sake of getting grades and some of the lecturers were hesitant to use some of the LMS tools for assessment purposes.

However, recently in the Tanzanian education system, there has been a shift from *learning for the grades* to competence-based learning. In the new shift, students are expected to develop certain skills and dispositions, and teachers are expected to ensure that students master the specified competencies. Likewise, the Tanzanian curricula for different levels such as secondary, teacher education and tertiary place more emphasis on collaborative and inquiry based learning through strategies such as portfolio use, group tasks and project based learning. The assessment process in these curricula also reflects the promotion of critical thinking.

In the light of these changes, the survey instrument and the RCS-CAIS model are helpful tools because they support this transition in the Tanzanian context. With higher preference for LMS as teaching-learning tools, the instruments will be useful not only at the tertiary education level, but also in other levels such as secondary and teacher education. The instruments are useful in both pedagogy and

research. For pedagogy, the RCS-CAIS model can be used as an assessment tool where teachers can ascertain the degree of students' cognitive skills and thinking dispositions in tasks related to asynchronous discussion forums. Using descriptors given in the RCS-CAIS model, teachers can assign grades to ascertain students' level of critical thinking displayed in tasks related to asynchronous discussion forums. To teachers, the model can also be used as a self-evaluation tool. Using the model, teachers can evaluate their degree of moderation in the discussion forums for promoting critical thinking. From this self-evaluation, teachers can improve their pedagogical practice.

As a formative learning tool, students can use the RCS-CAIS model either in groups or individually. In this case, using descriptors given in the model, students can gauge their critical thinking and improve their thinking in subsequent tasks related to the discussion forums. Since the model can be used by students in groups, tendencies related to open-mindedness can be promoted, especially when students share ideas. Because students can determine the instances that raised or lowered their levels of critical thinking, the RCS-CAIS model has the potential for improving students' moderation skills, especially in student-moderated discussion forums.

In terms of research, the survey tool and the RCS-CAIS model can be used to measure critical thinking skills and thinking dispositions simultaneously. The RCS-CAIS model can be used to evaluate teachers' pedagogy when using the discussion forums. Based on prevailing circumstances in the discussion forum, how effective or ineffective the teacher's pedagogical practice has been in a given discussion task can be revealed. Also, the model can be used to determine students' level of engagement in using asynchronous discussion forums for promoting critical thinking.

Since each context and culture may be unique, some of the student and lecturer perceptions revealed in this study may be unique to the Tanzanian context. When teaching and researching about critical thinking, both student and lecturer

perceptions are important because they may inform the nature of teaching and learning that may take place in a given sociocultural context.

#### **7.1.4 Human thinking is iterative**

Findings from this study have revealed that thinking skills do not operate in a hierarchical or linear manner. A critical review within and across discussion forum posts revealed that students' thinking skills were overlapping, multi-directional and iterative (for details refer to Chapter 6, sections 6.4.2 and 6.4.3).

- Different thinking skills tended to overlap each other and operated in relation to other processes. Since these processes were closely related to each other, at some point, it was difficult to demarcate them.
- The findings have revealed that the thinking skills are multi-directional. Thinking skills can take any sequence. That is, thinking can start from simple to complex or complex to simple.
- From this study, it has been revealed that thinking skills are not mechanical and linear, but they are rather iterative. Thinking skills do not follow a specific and predictable pattern. Thinking processes move to and fro depending on the prevailing circumstances at the time of the discussion, such as the nature of the thinking task, the subject matter under discussion, the role of the moderator, or experiences of the students about the task. These findings are significant for online learning. They suggest that different thinking skills and dispositions need to be developed in an integrative manner because thinking skills are related to each other, and thinking skills are related to dispositional factors.

The iterative and multi-directional nature of human thinking contradicts the view that thinking progresses from simple to complex and from concrete to abstract (B. Bloom et al., 1956; Krathwohl, 2002). However, findings from this study have shown that thinking skills in tasks related to asynchronous discussion forums can take any sequence – simple to complex or complex to simple, depending on the

circumstances at the time the thinking task is carried out. In several cases, students from this study demonstrated certain thinking skills without necessarily displaying a hierarchical or linear nature. Levels of critical thinking were raised by factors such as the nature of the task, and the nature of prompts from the lecturer or other students. Task complexity, as suggested in Bloom's taxonomy, does not necessarily relate to task performance. Task performance may be influenced by other factors such as prior experience and cognitive ability of the task performer (Liu & Li, 2011; Wu, Lowyck, Sercu, & Elen, 2013).

#### **7.1.5 Summary of the contributions**

Since context and culture tend to be unique, student and lecturer perceptions of the use of LMS tools can be better understood by investigating the social practices and activities within their culture and context. To take into account the influence of the environment, critical thinking skills and critical thinking dispositions need to be measured simultaneously. Doing this is likely to reveal a clearer picture of an individual's critical thinking. This process can be better achieved by using the same instrument. That is why, in this study, the survey tool was developed to capture both critical thinking skills and thinking dispositions simultaneously. Recall, comprehension and dispositional factors are important in understanding and promoting critical thinking. Since both critical thinking skills and critical thinking dispositions are likely to feature in tasks related to asynchronous discussion forums mainly through messages, the two components of critical thinking need to be measured in discussion forum posts.

The student and lecturer perceptions revealed in this study shed light on the influence of both context and culture in influencing the promotion of critical thinking. These perceptions are very significant in the Tanzanian context, as they may help in understanding pedagogical practices needed for integrating LMS tools for promoting critical thinking. Given that the social and cultural learning contexts may influence the development and promotion of critical thinking, it follows that evidence of critical thinking, its operationalization and measurement

need to consider the sociocultural contexts of the students and lecturers. Similarly, recall, comprehension and dispositional factors need to be considered because they are related to critical thinking.

Finally, this study contributes to theoretical knowledge by establishing that thinking skills are iterative in nature. Thinking skills are not hierarchical, but rather multi-directional, iterative and overlapping. Findings have revealed that the subsequent thinking skills tend to be related to preceding thinking skills.

## **7.2 Implications of the Research Findings**

The understanding of student and lecturer perceptions is significant. Since these implications have been derived from student and lecturer perceptions, they can inform lecturers' pedagogical practices as well as how students learn through LMS tools. Teaching being a value-forming act, lecturers are likely to influence students they teach. These two factors are closely related. For clarity, implications have been categorised according to their relevance for teaching and learning, and for institutions.

### **7.2.1 Pedagogical implications**

Pedagogical implications discussed in this section are related to the influence of culture, the role of the RCS-CAIS model, and to teaching and learning.

#### **7.2.1.1 *Influence of culture on critical thinking***

Though critical thinking is desirable at the personal, institutional and societal levels, some sociocultural practices may limit its promotion. Implementation and promotion of critical thinking depend on the willingness of individuals at all these levels. At the personal level, students need to be willing to learn and promote critical thinking. In an educational context, where the focus of the students is to *learn for grades*, critical thinking is likely to be far from being promoted.

Within institutions, critical thinking can be promoted by ensuring that it is part of the course design. If it is not part of the course design, it may not be promoted at

all. Findings from this study have revealed that conscious planning is needed for promoting critical thinking. Objectives need to be explicit. Institutions with a culture of celebrating critical thinking are likely to ensure that it is part of the course design.

The lecturers being responsible for promoting critical thinking within institutions, their views of learning and knowledge construction are significant for how they promote critical thinking. Lecturers who have an epistemological view of learning as transmission of knowledge may use LMS to promote rote learning. Their beliefs may influence the way they design and teach courses. The study has revealed that lecturers who have an epistemological view of learning as a socially constructed process, and those who are open-minded, are likely to use LMS tools for promoting critical thinking.

Similarly, critical thinking can be promoted in societies that celebrate contesting views. Such societies are likely to groom open-minded individuals and institutions that are critical of sociocultural practices. The findings from this study have revealed that culture influences the nature of critical thinking and the manner in which it can be promoted.

#### ***7.2.1.2 Implications of the use of the RCS-CAIS model***

As discussed in section 7.1.3, the RCS-CAIS model can be used by lecturers as an evaluation instrument, especially in tasks related to online asynchronous discussion forums. Lecturers can use the model for students' formative learning and assessment purposes. They can also use the RCS-CAIS model as a self-evaluation tool to gauge their pedagogical practices for promoting critical thinking. In the case of students, they can use the model as a self-evaluation tool. For example, to understand a student's levels of critical thinking, the student can rate his/her posts against the descriptors given in the model. Similarly, students as a group may use the model as a rubric to rate their degree of critical thinking in tasks related to asynchronous discussion forums.



### **7.2.1.3    *Implications for teaching and learning***

The lecturers' mistrust of Moodle tools for assessment purposes as found in this study deserves attention, especially because these tools have the potential for promoting critical thinking. Lecturers' mistrust of these tools can be overcome in several ways. The findings have revealed that lecturers need to be involved in professional development that focuses on promoting their pedagogical content knowledge in terms of integrating Moodle tools into the teaching-learning process, especially for assessment purposes, combating online cheating, and for promoting critical thinking. Similarly, the findings suggest that lecturers need to be encouraged to use Moodle tools frequently, because frequency of use is likely to reduce their uncertainty about these tools. All these considerations are likely to increase lecturers' self-confidence in using Moodle tools for assessment purposes, and ultimately for promoting critical thinking.

The study has revealed that feedback is a significant pedagogical practice because it is likely to improve students' learning outcomes. For feedback to improve student learning, the findings suggest that lecturers need to ensure that feedback given to students is immediate, frequent, corrective, personalised (or non-personalised) - depending on its purpose.

Student perceptions have indicated that lecturers need to involve students in the process of planning, implementing and evaluating learning tasks. The process of involving students not only helps students achieve their expected learning outcomes, but also motivates student participation in those tasks.

Student and lecturer perceptions have revealed that cheating can be very serious in online learning, if not combated well and in a timely manner. When students are involved in cheating they are not likely to engage in critical thinking. Likewise, learning may not be sustainable because what is learnt can be forgotten after taking the examinations. Since cheating limits the promotion of critical thinking, students and lecturers suggested various ways to prevent it. Though ways of preventing cheating may vary from one context to another, the following ways

suggested by both students and lecturers may apply to many contexts. First, regulations related to cheating need to be spelt out and disciplinary action against defaulters should be taken. This is likely to create a culture of honesty. Second, the findings suggest that the use of essay questions is likely to limit cheating because in such cases it may be difficult for students to share the answers, especially in invigilated examinations. Third, a higher level of students' preparedness is likely to minimise cheating. Students need to be encouraged to be well prepared for assessment and learning tasks so that they are not trapped in cheating. Finally, student and lecturer perceptions have revealed that user-friendly examination tasks given at a convenient time are likely to decrease students' anxiety about examinations. The nature and timing of examination tasks are likely to reduce cheating, because students will be confident in what they do and will have enough time to prepare themselves for the examinations. When students are not involved in cheating, it is expected that they will be curious and motivated to learn. Their curiosity and motivation are likely to help them engage in critical thinking.

In most Moodle tools, language is used in its symbolic forms such as written text or audio. It is known that language is a tool for thinking. To promote critical thinking, Moodle tools such as asynchronous discussion forums, quizzes and uploaded resources need to use clear and comprehensible language. Clear language is likely to help students engage in the learning tasks meaningfully and successfully. This is especially important in the Tanzanian context, where a foreign language, English, is used as a medium of instruction.

Lecturers' careful planning related to the learning tasks and the use of resources has the potential for promoting critical thinking. The study has revealed that when planning the learning tasks, lecturers need to ensure that students' expected learning outcomes are explicit, so that students can easily know what they are expected to learn. Likewise, the findings indicate that lecturers need to plan tasks that may address the differences in open-mindedness between male and female students. In such cases, they can include tasks that involve students' self-

reflection and learning from other students. Carefully planned tasks are likely to make students focused and able to interact easily with their colleagues and lecturers.

The differences in perceptions between younger and older lecturers may suggest that the two groups have different attitudes towards the use of Moodle tools. The results have revealed that younger lecturers tend to have more positive attitudes towards LMS use than older lecturers. With such difference in attitudes, they are likely to be teaching students differently. Institutions need to encourage them to use LMS in their teaching, particularly for promoting critical thinking. Similarly, co-teaching amongst younger and older lecturers is likely to help them share experiences and good pedagogical practices for promoting critical thinking through LMS tools.

This study has shown that critical thinking skills and critical thinking dispositions are closely related. Lecturers need to ensure that the teaching of the two components of critical thinking is interwoven. Similarly, since critical thinking skills are iterative and overlapping, critical thinking skills and dispositions can be promoted at the same time. However, since some skills may be mastered faster than others, the lecturers can focus more on certain critical thinking skills to further promote them.

The tendency of some pre-service male students of learning for the sake of grades and disliking jobs that involve working with LMS seems to threaten the use of technological tools that have the potential for simplifying work and for promoting critical thinking. This tendency is likely to make students less inquisitive, and consequently, less open-minded. To minimise the impact of this problem, several strategies can be used during the teaching-learning process. First, lecturers need to familiarise students to the technology they use so as to reduce technology anxiety. For example, initial tasks that involve the use of learning management system tools may not be focused on assessment, but rather be used for formative learning purposes, so that students become familiar with the tools before they need to use

them for assessment purposes. Likewise, for the mastery of the tools, students need to use the tools frequently. Second, use of authentic learning tasks and resources is likely to help students see easily the connection of what they learn and how they can apply what is learnt to their real life situations. Finally, since education seems to pay more attention to certification that tends to focus mainly on cognitive skills, this tendency is likely to encourage students to focus on grades. Thus, the assessment process needs to be holistic, where students are assessed not only in their cognitive skills, but also in their dispositions. Therefore, familiarisation of students to the tools used, frequent use of the tools, use of authentic tasks and resources, and holistic assessment of learners are likely to keep students motivated not only for grades, but also for their professional development and for promoting critical thinking.

Reluctance of some pre-service teachers to learn from other students and from their own mistakes or errors deserves attention. This habit of the mind may make them less open-minded. During the teaching-learning process, lecturers may design frequently tasks that encourage students to share ideas amongst themselves, and with lecturers. Use of asynchronous discussion forums, where freedom of expression is encouraged, is likely to make students appreciate views of other students and learn from them. Additionally, lecturers need to incorporate self-assessment tasks such as reflections, because they tend to encourage students' self-evaluation abilities and skills. In such cases, students are likely to become aware of their shortcomings and thus, they may devise strategies to overcome them.

Student perceptions of the use of Moodle tools are significant because, based on such perceptions, students' future use of LMS may be determined. Likewise, intervention strategies can be carried out to direct students to the desired dispositions such as motivating them to use Moodle tools for promoting critical thinking.

Pedagogical implications discussed in this section give lecturers the insights on how to improve teaching in general, and promote critical thinking in particular, through Moodle tools such as asynchronous discussion forums, quizzes and uploaded resources. Additionally, the insights given are likely to inform the nature of professional development lecturers may need for smooth integration of Moodle tools into the teaching-learning process and the promotion of critical thinking.

### **7.2.2 Implications for institutions**

Since institutional restrictions tend to limit maximum use of LMS for learning in general, and for promoting critical thinking in particular, universities need to ensure that there are enough facilities, such as computers. They need to ensure that students and lecturers are given the basic skills in using computers. It has been found that these factors limit some lecturers and students in their use of Moodle tools for learning and for promoting critical thinking.

Universities need to find ways of motivating lecturers to use LMS, not only for promoting critical thinking, but for meeting other ends as well. Ways to motivate lecturers may involve incentives, valuing lecturers who use LMS in their teaching, and addressing the institutional challenges such as internet connectivity and computer literacy amongst students and lecturers.

Stakeholders such as government ministries and other institutions dealing with curriculum design, development and evaluation can benefit from the findings of this study when planning courses related to the integration of learning management systems, by taking into account both student teacher and lecturer perceptions that have been revealed in this study.

The study has its limitations. The following section discusses these limitations.

### **7.3 Limitations of the Study**

The sample size used in the current study was relatively small. The sample was geographically limited to three universities with a relatively small number of students and lecturers using the learning management system, Moodle, as a

teaching-learning tool. Thus, given the small sample used, the results have to be interpreted based on this context, and transferability of the results has to be done cautiously.

The research focused mainly on the process of promoting critical thinking using Moodle tools. There was less focus on assessed outcomes of critical thinking. The only outcome examined was the discussion forum posts. The researcher had no access to students' grades or other graded works such as quizzes or other assignments. Additional evidence from other sources could have enriched our understanding about promoting critical thinking.

Finally, the researcher had no access to lecturer-student or student-student interactions that took place outside the LMS. Such interactions might have influenced the interactions in LMS.

#### **7.4 Recommendations for Further Research**

Based on the limitations of the current study, it is recommended that further research may consider including suggestions given in the following paragraphs.

- Future study can use a larger sample of both student teachers and lecturers where the instruments developed, the RCS-CAIS Model and the survey tool can be further tested. In such cases, if the sample is selected randomly, greater generalisation of the findings to a larger population can be possibly made. The instruments can also be tested on different disciplines and in other learning management systems. Testing the instruments in other learning management systems is significant, because currently there is a higher preference of using LMS tools for teaching-learning purposes in many higher learning institutions in Tanzania and in other parts of the world.
- A longitudinal study can be carried out to trace how students' and lecturers' critical thinking skills and critical thinking dispositions change over time. The findings are likely to reveal which skills and dispositions

are developed faster, and which ones take a longer time to be developed. The study can also examine which online teaching-learning contexts are optimal for promoting critical thinking.

- An intervention study on lecturers' self-confidence with Moodle tools, particularly for assessment purposes, can be conducted. Such intervention is likely to empower lecturers in the use of Moodle tools for teaching-learning purposes, and for assessment purposes. Without self-confidence in valuing that these tools can mediate learning, lecturers may not see the potential of these tools for promoting critical thinking.
- Another intervention study can be related to pre-service students. The focus of the study can be to familiarise students with LMS tools for promoting critical thinking. Lecturers can model effective use of LMS for promoting critical thinking through the use of authentic tasks, students' self-reflection, and the use of tasks that encourage students to share ideas and express their ideas freely. These tasks have the potential for helping pre-service students appreciate other students' views and their own views, and be motivated to use LMS tools for promoting critical thinking in their future teaching career.
- Further research can focus on both the process and outcomes of critical thinking. The outcomes can involve examining students' written assignments and quizzes to ascertain the degree of critical thinking displayed.
- Further research can investigate the role of interactions outside an LMS for promoting critical thinking. This can involve examination of communications through emails, or informal conversations.
- The role of administrative support in implementing the integration of Moodle tools into the teaching-learning process can also be a focus for further research. Research participants in this case can be heads of

institution and department. Evidence from the current study suggests that such support is desirable to promote critical thinking through LMS.

- Finally, further research can trial the survey tool and the RCS-CAIS model outside learning management systems.

## **7.5 Conclusion**

This study used mixed methods research to investigate student teacher and lecturer perceptions of the use of asynchronous discussion forums, quizzes and uploaded resources for promoting critical thinking within a pre-service teacher education programme.

The study has shown that a clearer picture of an individual's critical thinking can be achieved when both critical thinking skills and thinking dispositions are measured simultaneously. The findings indicate that critical thinking skills are related to dispositional factors and that thinking skills exhibited in tasks related to asynchronous discussion forums are iterative, multi-directional and overlapping.

Additionally, the study suggests that those interested in the development, promotion and measurement of critical thinking need to take into account the sociocultural contexts of the learners and the ways in which these influence their thinking skills and dispositions.

The study's findings, and the instruments developed in this study, are a useful addition to the knowledge and tools available to enhance both pedagogy and research aimed at promoting critical thinking.





## References

- Abrami, P., Bernard, R., Borokhovski, E., Wade, A., Surkes, M., Tamim, R., & Zhang, D. (2008). Instructional interventions affecting critical thinking skills and dispositions: A stage 1 meta-analysis. *Review of Educational Research, 78*(4), 1102-1134.
- Adler, E. S., & Clark, R. (2011). *An invitation to social research: How it's done* (4th ed.). Belmont: Cengage Learning.
- Agbatogun, A. (2010). Self-concept, computer anxiety, gender and attitude towards interactive computer technologies: A predictive study among Nigerian teachers. *International Journal of Education and Development using Information and Communication Technology, 6*(2), 1-14.
- Al-Busaidi, K. A., & Al-Shihi, H. (2012). Critical factors influencing instructors' acceptance and use of learning management systems. In R. Babo & A. Azavedo (Eds.), *Higher education institutions and learning management systems: Adaptation and standardization* (pp. 116-140). Hershey, PA: Information Science Reference.
- Al-Fadhli, S., & Khalfan, A. (2009). Developing critical thinking in e-learning environment: Kuwait University as a case study. *Assessment & Evaluation in Higher Education, 34*(5), 529-536. doi: 10.1080/02602930802117032
- Al-Zaidiyeen, N., Mei, L., & Fook, F. (2010). Teachers' attitudes and levels of technology use in classrooms: The case of Jordan schools. *International Education Studies, 3*(2), 211-218.
- Alexander, M. E., Commander, N., Greenberg, D., & Ward, T. (2010). Using the four-questions technique to enhance critical thinking in online discussions. *Journal of Online Learning and Teaching, 6*(2), 409-415.
- Ali, N., & Jaafar, J. (2010). Transforming moodle as a reflective tool in learning French language. *International Journal of Academic Research, 2*(3), 238-240.
- Ally, M. (2004). Foundations of educational theory for online learning. In T. Anderson & F. Elloumi (Eds.), *Theory and practice of online learning* (pp. 3-31). Athabasca: Athabasca University.
- Ambrose, S., Bridges, M., DiPietro, M., Lovett, M., & Norman, M. (2010). *How learning works: Seven research-based principles for smart teaching*. San Francisco, CA: Jossey-Bass.
- Anderson, J. (2009). *The architecture of cognition*. New York: Psychology Press.

- Anderson, T. (2004). Towards a theory of online learning. In T. Anderson & F. Elloumi (Eds.), *Theory and practice of online learning* (pp. 33-60). Athabasca: Athabasca University.
- Arend, B. (2009). Encouraging critical thinking in online threaded discussions. *The Journal of Educators Online*, 6(1), 1-23.
- Ary, D., Jacobs, L. C., & Sorens, C. K. (2010). *Introduction to research in education* (8th ed.). Belmont: Cengage Learning.
- Aydin, C., & Tirkes, G. (2010). Open source learning management systems in distance learning. *The Turkish Online Journal of Educational Technology* 9(2), 175-184.
- Bacdayan, P. (2004). Comparison of management faculty perspectives on quizzing and its alternatives. *Journal of Education for Business*, 80(1), 5-9.
- Bälter, O., Enström, E., & Klingenberg, B. (2013). The effect of short formative diagnostic web quizzes with minimal feedback. *Computers & Education*, 60(1), 234-242. doi: 10.1016/j.compedu.2012.08.014
- Bangert, A. (2008). The influence of social presence and teaching presence on the quality of online critical inquiry. *Journal of Computing in Higher Education*, 20(1), 34-61.
- Barnett, J., & Francis, A. (2012). Using higher order thinking questions to foster critical thinking: A classroom study. *Educational Psychology*, 32(2), 201-211.
- Beachboard, M. R., & Beachboard, J. C. (2010). Critical thinking pedagogy and student perceptions of university contributions to their academic development. *Informing Science: The International Journal of an Emerging Transdiscipline* 13, 53-71.
- Bergman, M. M. (2008). The straw men of the qualitative-quantitative divide and their influence on mixed research. In M. M. Bergman (Ed.), *Advances in mixed methods research* (pp. 11-21). London: Sage.
- Biesta, G. J., & Burbules, N. C. (2003). *Pragmatism and educational research*. Oxford: Rowman & Littlefield Publishers.
- Black, P. (2002). *Testing: Friend or foe? Theory and practice of assessment and testing*. London: The Falmer Press.
- Blatter, J. K. (2008). Case study. In L. M. Given (Ed.), *The Sage encyclopedia of qualitative research methods* (Vol. 1 & 2). London: Sage.

- Bloom, B., Engelhart, M., Furst, E., Hill, W., & Krathwohl, D. (1956). *Taxonomy of educational objectives: The classification of educational goals, Book 1 Cognitive domain*. London: Longmans.
- Bloom, P., & Ellis, L. (2009). Helping teachers identify and articulate their values and beliefs. *The Director's Link*, 1-6.
- Bolliger, D., & Wasilik, O. (2009). Factors influencing faculty satisfaction with online teaching and learning in higher education. *Distance Education*, 30(1), 103-116.
- Booker, M. (2007). A roof without walls: Benjamin Bloom's taxonomy and the misdirection of American education. *Academic Questions*, 20, 347-355.
- Boreham, N., & Morgan, C. (2004). A sociocultural analysis of organisational learning. *Oxford Review of Education*, 30(3), 307-325.
- Borham-Puyal, M., & Olmos-Migueláñez, S. (2011). Improving the use of feedback in an online teaching-learning environment: An experience supported by Moodle. *US-China Foreign Language*, 9(6), 371-382.
- Bradley, M. E., Thom, L. R., Hayes, J., & Hay, C. (2008). Ask and you will receive: How question type influences quantity and quality of online discussions. *British Journal of Educational Technology*, 39(5), 888-900. doi: 10.1111/j.1467-8535.2007.00804.x
- Brady, L. (2011). Teacher values and relationship: Factors in values education. *Australian Journal of Teacher Education*, 36(2), 56-66.
- Braun, K. W., & Sellers, R. D. (2012). Using a "Daily Motivational Quiz" to increase student preparation, attendance, and participation. *Issues in Accounting Education*, 27(1), 267-279.
- Brave, S., & Nass, C. (2008). Emotion in human-computer interaction. In A. Sears & J. Jacko (Eds.), *The human-computer interaction handbook: Fundamentals, evolving technologies, and emerging applications* (2nd ed., pp. 77-92). New York: Taylor & Francis Group.
- Brown, M., Paewai, S., & Suddaby, G. (2010). The VLE as a trojan mouse: Policy, politics and pragmatism. *Electronic Journal of e-Learning*, 8(2), 63 - 72.
- Brown, T., et al. (2009). Are learning style preferences of health science students predictive of their attitudes towards e-learning? *Educational Technology*, 25(4), 524-543.

- Bryman, A. (1989). *Research methods and organization studies*. London: Routledge.
- Bryman, A. (2008). *Social science research methods*. Oxford: Oxford University Press.
- Butler, A., & Roediger, H. (2008). Feedback enhances the positive effects and reduces the negative effects of multiple-choice testing. *Memory & Cognition*, 36(3), 604-616. doi: 10.3758/MC.36.3.604
- Butler, H. (2012). Halpern Critical Thinking Assessment predicts real-world outcomes of critical thinking. *Applied Cognitive Psychology*, 26(5), 721-729.
- Carvalho, A., Areal, N., & Silva, J. (2011). Students' perceptions of Blackboard and Moodle in a Portuguese university. *British Journal of Educational Technology*, 42, 1-18. doi: 10.1111/j.1467-8535.2010.01097.x
- Cavas, B., Cavas, P., Karaoglan, B., & Kisla, T. (2009). A study on science teachers' attitudes toward information and communication technologies in education. *The Turkish Online Journal of Educational Technology* 8(2), 20-32.
- Chan, N.-M., Ho, I. T., & Ku, K. Y. L. (2011). Epistemic beliefs and critical thinking of Chinese students. *Learning and Individual Differences*, 21(1), 67-77.
- Chen, K.-C., & Jang, S.-J. (2010). Motivation in online learning: Testing a model of self-determination theory. *Computers in Human Behavior*, 26(4), 741-752.
- Chiu, Y.-C. (2011). *Crossing into a new comfort zone: Critical online discussions with a western facilitator*. Paper presented at the Annual International Conference on Education and e-Learning (EeL), Singapore.
- Chua, B. B., & Bernado, D. V. (2011). Integrating scholarly articles within e-learning courses. In R. Kwan, C. McNaught, P. Tsang, F. L. Wang & K. C. Li (Eds.), *Enhancing learning through technology: Education unplugged: Mobile technologies and web 2.0* (pp. 37-50). London: Springer.
- Clark, V. P., Creswell, J., Green, D. O. N., & Shope, R. (2008). Mixing quantitative and qualitative approaches: An introduction to emergent mixed methods research. In S. N. Hesse-Biber & P. Leavy (Eds.), *Handbook of emergent methods* (pp. 363-387). New York: The Guilford Press.

- Cluskey, G. R., Hodges, C., & Smith, S. (2006). The impact of online quizzing on student success in an introductory financial accounting class. *Journal of College Teaching & Learning*, 3(7), 13-18.
- Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education (6th ed)*. London: Routledge.
- Cole, J., & Foster, H. (2007). *Using Moodle: Teaching with the popular open course learning management system (2nd ed)*. Beijing: O'Reilly.
- Collins, A. (2006). Cognitive apprenticeship. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 47-60). Cambridge: Cambridge University Press.
- Colucciello, M. (1997). Critical thinking skills and dispositions of baccalaureate nursing students: A conceptual model for evaluation. *Journal of Professional Nursing*, 13(4), 236-245. doi: 10.1016/S8755-7223(97)80094-4
- Conceição, S. (2004). *Exploring the relationship between learning style and critical thinking in an online course*. Paper presented at the Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education, The Indiana University, Indianapolis.
- Conde, M. A., García, F., Rodríguez-Conde, M. J., Alier, M., & García-Holgado, A. (2014). Perceived openness of learning management systems by students and teachers in education and technology courses. *Computers in Human Behavior*, 31, 517-526. doi: <http://dx.doi.org/10.1016/j.chb.2013.05.023>
- Cook, R. G., Ley, K., Crawford, C., & Warner, A. (2009). Motivators and inhibitors for university faculty in distance and e-learning. *British Journal of Educational Technology*, 40(1), 149-163. doi: 10.1111/j.1467-8535.2008.00845.x
- Corbetta, P. (2003). *Social research: Theory, methods and techniques*. London: Sage.
- Coren, A. (2011). Turning a blind eye: Faculty who ignore student cheating. *Journal of Academic Ethics*, 9(4), 291-305.
- Corich, S. (2009). *Using an automated tool to measure evidence of critical thinking of individuals in discussion forums*. Paper presented at the Annual Conference of the National Advisory Committee on Computing Qualifications (NACCQ 2009), Napier, New Zealand.

- Corich, S., Kinshuk, & Jeffrey, L. (2011). Automating the measurement of critical thinking for individuals participating in discussion forums. In D. Ifenthaler, P. Isaias, J. Spector, Kinshuk & D. Sampson (Eds.), *Multiple perspectives on problem solving and learning in the digital age* (pp. 143-157). New York: Springer.
- Cresswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, California: Sage.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage.
- Creswell, J. W. (2012). *Educational research: Planning, conducting and evaluating quantitative and qualitative research* (4th ed.). New York: Pearson.
- Creswell, J. W., & Clark, V. P. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Creswell, J. W., & Creswell, J. D. (2005). Mixed methods research: Developments, debates, and dilemmas. In R. Swanson & E. H. III (Eds.), *Research in organizations: Foundations and methods of inquiry* (pp. 315-326). California: Berrett-Koehler Publishers.
- Crisp, G. (2012). Assessment in virtual learning spaces. In M. Keppell, K. Souter & M. Riddle (Eds.), *Physical and virtual learning spaces in higher education: Concepts for the modern learning environment* (pp. 199-218). Hershey, PA: Information Science Reference.
- Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology*, *11*(100), 1-9.
- Cuadrado-García, M., & Ruiz-Molina, M. (2009). *The use of Moodle in higher education for improving English skills in non-language courses*. Paper presented at the International Conference: ICT for Language Learning, Florence, Italy.
- Cubukcu, Z. (2006). Critical thinking dispositions of the Turkish teacher candidates. *The Turkish Online Journal of Educational Technology* *5*(4), 22-36.
- Davis, K. (2012). Friendship 2.0: Adolescents' experiences of belonging and self-disclosure online. *Journal of Adolescence*, *35*(6), 1527-1536.
- de Leng, B., Dolmans, D., Jöbbsis, R., Muijtjens, A., & van der Vleuten, C. (2009). Exploration of an e-learning model to foster critical thinking on basic

- science concepts during work placements. *Computers & Education*, 53(1), 1-13.
- Denscombe, M. (2008). Communities of practice: A research paradigm for the mixed methods approach. *Journal of Mixed Methods Research*, 2(3), 270-283.
- Denscombe, M. (2010). *The good research guide for small-scale social research projects* (4th ed.). London: Open University Press.
- Denzin, N. (1978). *The research act: A theoretical introduction to sociological methods*. New York: McGraw-Hill.
- Derakshan, N., & Eysenck, M. (2009). Anxiety, processing efficiency, and cognitive performance: New developments from attentional control theory. *European Psychologist*, 14(2), 168-176.
- Dogan, M. (2010). Primary trainee teachers' attitudes to and use of computer and technology in mathematics: The case of Turkey. *Educational Research and Review* 5(11), 690-702.
- Dooley, K., & Murphy, T. H. (2001). College of Agriculture faculty perceptions of electronic technologies in teaching. *Journal of Agricultural Education*, 42(2), 1-10.
- Dooley, L. (2002). Case study research and theory building. *Advances in Developing Human Resources*, 4(3), 335-354.
- Dornyei, Z. (2011). *Research methods in applied linguistics: Quantitative, qualitative, and mixed methodologies*. Oxford: Oxford University Press.
- Dougiamas, M. (1998). A journey into constructivism. Retrieved from <http://dougiamas.com/writing/constructivism.html>
- Dougiamas, M. (1999). *Developing tools to foster online educational dialogue*. Paper presented at the Proceedings of the 8th Annual Teaching Learning Forum, The University of Western Australia, Perth, Australia.
- Dougiamas, M. (2000). *Improving the effectiveness of tools for Internet based education*. Paper presented at the 9th Annual Teaching Learning Forum, Curtin University of Technology, Perth, Australia.
- Dougiamas, M., & Taylor, P. (2002). *Interpretive analysis of an internet-based course constructed using a new courseware tool called Moodle*. Paper presented at the The Higher Education Research and Development Society of Austrasia (HERDSA) Conference, Perth, Australia. Retrieved from <http://dougiamas.com/writing/herdsa2002/>



- Dougiamas, M., & Taylor, P. (2003). *Moodle: Using learning communities to create an open source course management system*. Paper presented at the EDMEDIA Conference, Honolulu, Hawaii.
- Dumova, T. (2012). The usability of online quizzes: Evaluating student perceptions. In S. Kelsey & K. Amant (Eds.), *Computer-mediated communication: Issues and approaches in education* (pp. 50-61). Information Science Reference: Hershey.
- Duron, R., Limbach, B., & Waugh, W. (2006). Critical thinking framework for any discipline. *International Journal of Teaching and Learning in Higher Education*, 17(2), 160-166.
- Ellinger, A. D., Watkins, K. E., & Marsick, V. J. (2005). Case study research methods. In R. A. Swanson & E. F. H. III (Eds.), *Research in organizations: Foundations and methods of inquiry* (pp. 327-350). California: Berrett-Koehler Publishers.
- Ennis, R. (1996). Critical thinking dispositions: Their nature and assessability. *Informal Logic*, 18(2 & 3), 165-182.
- Facione, P. (1990). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction*. Millbrae, CA: The California Academic Press.
- Facione, P. (2013). *Critical thinking: What it is and why it counts*. Millbrae, CA: The California Academic Press.
- Fahy, P. (2005). Two methods for assessing critical thinking in computer-mediated communications (CMC) transcripts. *International Journal of Instructional Technology and Distance Learning*, 2(3), 13-28.
- Falloon, G. (2011). Exploring the virtual classroom: What students need to know (and teachers should consider). *Journal of Online Learning and Teaching*, 7(4), 439-451.
- Falloon, G. (2012). Inside the virtual classroom: Student perspectives on affordances and limitations. *Journal of Open, Flexible and Distance Learning*, 16(1), 108-126.
- Feilzer, M. Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4(1), 6-16. doi: 10.1177/1558689809349691
- Fischer, A. (2011). Gendered social interactions in face-to-face and computer-mediated communication. In A. Kappas & N. Kramer (Eds.), *Face-to-face*

*communication over the internet: Emotions in a web of culture, language and technology* (pp. 53-78). Cambridge: Cambridge University Press.

- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to design and evaluate research in education* (8 ed.). New York: McGraw-Hill.
- Frank, R. (2008). Introduction: Sociocultural situatedness. In R. Frank, R. Dirven, T. Ziemke & E. Bernardez (Eds.), *Body, language and mind volume 2: Sociocultural situatedness* (pp. 1-20). Berlin: Mouton de Gruyter.
- Friedman, A., Bolick, C., Berson, M., & Porfeli, E. (2009). National educational technology standards and technology beliefs and practices of social studies faculty: Results from a seven-year longitudinal study. *Contemporary Issues in Technology and Teacher Education*, 9(4), 476-487.
- Furst, E. (1981). Bloom's taxonomy of educational objectives for the cognitive domain: Philosophical and educational issues. *Review of Educational Research*, 51(4), 441-453.
- Gardner, S., Hayes, M., & Neider, X. (2007). The dispositions and skills of a Ph.D. in education: Perspectives of faculty and graduate students in one college of education. *Innovative Higher Education*, 31(5), 287-299. doi: 10.1007/s10755-006-9029-1
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2-3), 87-105.
- Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *The American Journal of Distance Education*, 15(1), 7-23.
- Garver, M. S., & Roberts, B. A. (2013). Flipping & clicking your way to higher-order learning. *Marketing Education Review*, 23(1), 17-22. doi: 10.2753/MER1052-8008230103
- Gauvain, M. (2005). Sociocultural contexts of learning. In A. Maynard & M. Martini (Eds.), *Learning in cultural context: Family, peers, and school* (pp. 11-40). New York: Kluwer Academic.
- Gefen, D., Geri, N., & Paravastu, N. (2009). The gender communication gap in online threaded discussions. In L. Tomei (Ed.), *Information communication technologies for enhanced education and learning: Advanced applications and developments* (pp. 15-28). New York: Information Science Reference.

- Genc, S. (2008). Critical thinking tendencies among teacher candidates. *Educational Sciences: Theory & Practice*, 8(1), 107-116.
- Gerring, J. (2007). *Case study research: Principles and practices*. Cambridge: Cambridge University Press.
- Getzlaf, B., Perry, B., Toffner, G., Lamarche, K., & Edwards, M. (2009). Effective instructor feedback: Perceptions of online graduate students. *Journal of Educators Online*, 6(2), 1-22.
- Ghadi, I., Alwi, N. H., Bakar, K. A., & Talib, O. (2012). Construct validity examination of critical thinking dispositions for undergraduate students in University Putra Malaysia. *Higher Education Studies*, 2(2), 138-145.
- Giacumo, L., Savenye, W., & Smith, N. (2013). Facilitation prompts and rubrics on higher-order thinking skill performance found in undergraduate asynchronous discussion boards. *British Journal of Educational Technology*, 44(5), 774-794.
- Giancarlo, C., & Facione, P. (2001). A look across four years at the disposition toward critical thinking among undergraduate students. *The Journal of General Education*, 50(1), 29-55.
- Giddings, L. S., & Grant, B. M. (2009). From rigour to trustworthiness: Validating mixed methods. In S. Andrew & E. J. Halcomb (Eds.), *Mixed methods research for nursing and the health sciences* (pp. 119-134). Oxford: John Wiley & Sons.
- Gideon, L. (2012). The art of question phrasing. In L. Gideon (Ed.), *Handbook of survey methodology for the social sciences*. New York: Springer.
- Gorard, S., & Taylor, C. (2004). *Combining methods in educational and social research*. Berkshire: Open University Press.
- Gravetter, F., & Forzano, L.-A. (2012). *Research methods for the behavioral sciences* (4th ed.). Belmont: Wadsworth.
- Gray, D. (2004). *Doing research in the real world*. London: Sage.
- Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco, CA: Jossey-Bass.
- Greenhow, C., Dexter, S., & Hughes, J. (2008). Teacher knowledge about technology integration: An examination of inservice and preservice teachers' instructional decision-making. *Science Education International*, 19(1), 9-25.

- Greeno, J. (2006). Learning in activity. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 79-96). Cambridge: Cambridge University Press.
- Griffith, S. (2009). Assessing student participation in an online graduate course. *International Journal of Instructional Technology and Distance Learning*, 6(4), 35-43.
- Grosser, M. M., & Lombard, B. J. (2008). The relationship between culture and the development of critical thinking abilities of prospective teachers. *Teaching and Teacher Education*, 24(5), 1364-1375. doi: 10.1016/j.tate.2007.10.001
- Gruijter, D. N., & Kamp, L. J. (2008). *Statistical test theory for the behavioral sciences*. London: Taylor & Francis Group.
- Haerem, T., & Rau, D. (2007). The influence of degree of expertise and objective task complexity on perceived task complexity and performance. *Journal of Applied Psychology*, 92(5), 1320-1331. doi: 10.1037/0021-9010.92.5.1320
- Halpern, D. F. (1998). Teaching critical thinking for transfer across domains: Dispositions, skills, structure training, and metacognitive monitoring. *American Psychologist*, 53(4), 449-455.
- Halpern, D. F. (2001). Assessing the effectiveness of critical thinking instruction. *The Journal of General Education*, 50(4), 270-286. doi: 10.1353/jge.2001.0024
- Halpern, D. F. (2003). *Thought and knowledge: An introduction to critical thinking* (4th ed.). London: Lawrence Erlbaum Associates.
- Hamann, K., Pollock, P., & Wilson, B. (2012). Assessing student perceptions of the benefits of discussions in small-group, large-class, and online learning context. *College Teaching*, 60(2), 65-75.
- Hammersley, M. (2013). *What is qualitative research?* London: Bloomsbury Academic.
- Hays, P. (2004). Case study research. In K. deMarrais & S. Lapan (Eds.), *Foundations for research: Methods of inquiry in education and the social sciences* (pp. 217-234). Mahwah, NJ: Lawrence Erlbaum Associates.
- Heijltjes, A., Gog, T. v., Leppink, J., & Paas, F. (2014). Improving critical thinking: Effects of dispositions and instructions on economics students' reasoning skills. *Learning and Instruction*, 29, 31-42. doi: 10.1016/j.learninstruc.2013.07.003

- Hellermann, J. (2008). *Social actions for classroom language learning*. Toronto: Multilingual Matters Ltd.
- Henn, M., Weinsntein, M., & Foard, N. (2006). *A short introduction to social research*. London: Sage.
- Hennessy, T. (2009). Supporting collaboration in my work place through the use of Moodle. *Educational Journal of Living Theories*, 2(1), 96-120.
- Herrenkohl, L., & Mertl, V. (2010). *How students come to be, know, and do: A case for a broad view of learning*. Cambridge: Cambridge University Press.
- Herrington, A., & Herrington, J. (2006). What is an authentic learning environment? In A. Herrington & J. Herrington (Eds.), *Authentic learning environments in higher education* (pp. 1-13). London: Information Science Publishing.
- Herrington, J., Reeves, T., & Oliver, R. (2006). Authentic tasks online: A synergy among learner, task, and technology. *Distance Education*, 27(2), 233-247. doi: 10.1080/01587910600789639
- Hesse-Biber, S. N. (2010). *Mixed methods research: Merging theory with practice*. New York: The Guilford Press.
- Hesse-Biber, S. N., & Leavy, P. (2008). Pushing on the methodological boundaries: The growing need for emergent methods within and across the disciplines. In S. N. Hesse-Biber & P. Leavy (Eds.), *Handbook of emergent methods* (pp. 1-16). New York: The Guilford Press.
- Hewitt, J. (2005). Toward an understanding of how threads die in asynchronous computer conferences. *Journal of the Learning Sciences*, 14(4), 567-589. doi: 10.1207/s15327809jls1404\_4
- Hinton, P. (2005). *Statistics explained* (2nd ed.). London: Taylor & Francis Group.
- Hsu, J. (2009). EFL teacher values and identity in tertiary education in Japan. *The Journal of Kanda University of International Studies*, 21, 385-399
- Huck, S. (2012). *Reading statistics and research* (6th ed.). Boston, MA: Pearson Education.
- Ihantola, E.-M., & Kihn, L.-A. (2011). Threats to validity and reliability in mixed methods accounting research. *Qualitative Research in Accounting and Management*, 8(1), 39-58.

- Ijaiya, N., Alabi, A., & Fasasi, Y. (2011). Teacher education in Africa and critical thinking skills: Needs and strategies. *Research Journal of Business Management*, 5(1), 26-34. doi: 10.3923/rjbm.2011.26.34
- Illeris, K. (2007). *How we learn: Learning and non-learning in school and beyond*. London: Routledge.
- Ireson, J. (2008). *Learners, learning and educational activity*. London: Routledge.
- Jackson, S. L. (2009). *Research methods and statistics: A critical thinking approach* (3rd ed.). Belmont: Cengage Learning.
- Jackson, S. L. (2010). *Research methods: A modular approach* (2nd ed.). Belmont: Cengage Learning.
- Jacob, S. M. (2010). A study of critical thinking skills and online forums in engineering mathematics. *International Journal of Engineering and Technical Education*, 1, Retrieved from [http://fke.uitm.edu.my/v1/images/stories/IJETE/IJETE2010/ijete\\_mary.pdf](http://fke.uitm.edu.my/v1/images/stories/IJETE/IJETE2010/ijete_mary.pdf)
- Jacob, S. M., & Sam, H. (2008). *Measuring critical thinking in problem solving through online discussion forums in first year university mathematics*. Paper presented at the Proceedings of the International MultiConference of Engineers and Computer Scientists (IMECS), Hong Kong.
- Jagger, S. (2013). Affective learning and the classroom debate. *Innovations in Education & Teaching International*, 50(1), 38-50.
- Jeong, A. (2003). The sequential analysis of group interaction and critical thinking in online threaded discussions. *The American Journal of Distance Education*, 17(1), 25-43.
- Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, 24(4), 602-611.
- Johnson, K. (2009). *Second language teacher education: A sociocultural perspective*. London: Routledge.
- Johnson, K., Lillis, C., & Hall, T. (2010). An evaluation of the effectiveness of, and students attitudes towards, technology enhanced learning (TEL) in a clinical skills laboratory environment. Retrieved from [http://www.iiis.org/CDs2010/CD2010IMC/ICSIT\\_2010/PapersPdf/HB524RH.pdf](http://www.iiis.org/CDs2010/CD2010IMC/ICSIT_2010/PapersPdf/HB524RH.pdf)

- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14-26.
- Jones, E., Lindner, J., Murphy, T., & Dooley, K. (2002). Faculty philosophical position towards distance education: Competency, value, and educational technology support. *Online Journal of Distance Learning Administration*, 5(1). Retrieved from <http://www.westga.edu.ezproxy.waikato.ac.nz/~distance/ojdla/spring51/jones51.html>
- Jonker, J., & Pennink, B. (2010). *The essence of research methodology: A concise guide for master and PhD students in management science*. London: Springer.
- Kaptelinin, V., & Nardi, B. (2012). *Activity theory in HCI: Fundamentals and reflection*. California: Morgan & Claypool.
- Kaufman, J., Plucker, J., & Baer, J. (2008). *Essentials of creativity assessment*. Hoboken, NJ: John Wiley & Sons.
- Kavanagh, J., Campbell, F., Harden, A., & Thomas, J. (2012). Mixed methods synthesis: A worked example. In K. Hannes & C. Lockwood (Eds.), *Synthesizing qualitative research: Choosing the right approach* (pp. 113-136). Sussex: Wiley-Blackwell.
- Kehrwald, B. (2008). Understanding social presence in text-based online learning environments. *Distance Education*, 29(1), 89-106.
- Kensinger, E., & Schacter, D. (2008). Memory and emotions. In M. Lewis, J. Haviland-Jones & L. Barrett (Eds.), *Handbook of emotions* (3rd ed., pp. 601-617). New York: The Guilford Press.
- Keshan, W., & Qing, L. (2009). Synchronous learning network: How college students use peer assessment techniques in evaluation of their writing. *Teaching English in China - CELEA Journal*, 32(6), 52-64.
- Khojasteh, M., & Smith, J. (2010). Using technology to teach critical thinking in higher education: A look at an undergraduate business course. *Issues in Information System*, 11(2), 54-65.
- Khoo, E., Forret, M., & Cowie, B. (2010). Lecturer-student views on successful online learning environments. *Waikato Journal of Education*, 15(3), 17-34.
- Kibble, J. (2007). Use of unsupervised online quizzes as formative assessment in a medical physiology course: Effects of incentives on student participation and performance. *Advances in Physiology Education*, 31(3), 253-260.

- Kidwell, L., Fisher, D., Braun, R., & Swanson, D. (2013). Developing learning objectives for accounting ethics using Bloom's taxonomy. *Accounting Education: An International Journal*, 22(1), 44-65.
- Kim, J. (2011). Developing an instrument to measure social presence in distance higher education. *British Journal of Educational Technology*, 42(5), 763-777.
- Kim, M.-K., Patel, R., Uchizono, J., & Beck, L. (2012). Incorporation of Bloom's taxonomy into multiple-choice examination questions for a pharmacotherapeutics course. *American Journal of Pharmaceutical Education*, 76(6), 1-8.
- King, C. G., Guyette Jr, R. W., & Piotrowski, C. (2009). Online exams and cheating: An empirical analysis of business students' views. *Journal of Educators Online*, 6(1), 1-11.
- Krathwohl, D. (2002). A revision of Bloom's taxonomy: An overview. *Theory into Practice*, 41(4), 212-218.
- Ku, K. (2009). Assessing students' critical thinking performance: Urging for measurements using multi-response format. *Thinking Skills and Creativity*, 4(1), 70-76. doi: 10.1016/j.tsc.2009.02.001
- Ku, K., & Ho, I. (2010). Dispositional factors predicting Chinese students' critical thinking performance. *Personality and Individual Differences*, 48(1), 54-58. doi: 10.1016/j.paid.2009.08.015
- Kuhn, T. (1962). *The structure of scientific revolutions*. Chicago: University of Chicago Press.
- Kuhn, T. (1996). *The structure of scientific revolutions* (3rd ed.). Chicago: University of Chicago Press.
- Kumar, S., & Dutta, K. (2011). Investigation on security in LMS Moodle. *International Journal of Information Technology and Knowledge Management*, 4(1), 233-238.
- Kumpulainen, K., & Wray, D. (Eds.). (2004). *Classroom interaction and social learning: From theory to practice*. London: Routledge.
- Lahaut, V., Jansen, H., Mheen, D. v. d., Garretsen, H., Verdurmen, J., & Dijk, A. v. (2003). Estimating non-response bias in a survey on alcohol consumption: Comparison of response waves. *Alcohol & Alcoholism*, 38(2), 128-134.



- Lamy, M.-N., & Hampel, R. (2007). *Online communication in language learning and teaching*. New York: Palgrave Macmillan.
- Lapadat, J. (2004). Online teaching: Creating text-based environment for collaborative thinking. *The Alberta Journal of Educational Research*, 50(3), 236-251.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Lave, J., & Wenger, E. (2003). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Lave, J., & Wenger, E. (2005). Legitimate peripheral participation in communities of practice. In R. Harrison, F. Reeve, A. Hanson & J. Clarke (Eds.), *Supporting lifelong learning: Perspectives on learning* (Vol. I, pp. 111-126). London: Taylor & Francis.
- Leach, B., & Good, D. (2011). Critical thinking skills as related to university students' gender and academic discipline. *International Journal of Humanities and Social Science*, 1(21), 100-106.
- Leavy, P., & Hesse-Biber, S. N. (2008). Historical context of emergent methods and innovation in the practice of research methods. In S. N. Hesse-Biber & P. Leavy (Eds.), *Handbook of emergent methods* (pp. 17-22). New York: The Guilford Press.
- Lemley, D., Sudweeks, R., Howell, S., Laws, R. D., & Sawyer, O. (2007). The effect of immediate and delayed feedback on secondary distance learners. *Quarterly Review of Distance Education*, 8(3), 251-260.
- Leng, J. (2012). *A case study of critical thinking behavior in an online collaborative inquiry*. Paper presented at the The 20th International Conference on Computers in Education (ICCE 2012), Nanyang Technological University, Singapore.
- Leont'ev, A. N. (1978). *Activity, consciousness and personality*. Englewood Cliffs, NJ: Prentice-Hall.
- Leontidis, M., & Halatsis, C. (2009). Affective issues in adaptive educational environments. In C. Mourlas, N. Tsianos & P. Germanakos (Eds.), *Cognitive and emotional processes in web-based education: Integrating human factors and personalization* (pp. 111-133). New York: Information Science Reference.
- Lewis, A., & Smith, D. (1993). Defining higher order thinking. *Theory into Practice*, 32(3), 131-137.

- Li, K. (2009). *The effect of a pedagogy model integrated with weblogs on critical thinking skills of students*. Paper presented at the Proceedings of the 17th International Conference on Computers in Education, Hong Kong.
- Lipman, M. (2003). *Thinking in education* (2nd ed.). Cambridge: Cambridge University Press.
- Littlejohn, A., Cook, J., Campbell, L., Sclater, N., Currier, S., & Davis, H. (2007). Managing educational resources. In G. Conole & M. Oliver (Eds.), *Contemporary perspective in e-learning research: Themes, methods and impact on practice* (pp. 134-146). London: Routledge.
- Liu, P., & Li, Z. (2011). Toward understanding the relationship between task complexity and task performance. In P. L. P. Rau (Ed.), *Internationalization, design and global development* (Vol. 6775, pp. 192-200). Berlin Heidelberg: Springer
- Lloyd, M., & Bahr, N. (2010). Thinking critically about critical thinking in higher education. *International Journal for the Scholarship of Teaching and Learning*, 4(2), 1-16.
- Lloyd, S., Byrne, M., & McCoy, T. (2012). Faculty-perceived barriers of online education. *Journal of Online Learning and Teaching*, 8(1), 1-12.
- Lodico, M. G., Spaulding, D. T., & Voegtle, K. H. (2010). *Methods in educational research: From theory to practice* (2nd ed.). San Francisco, CA: Jossey-Bass.
- Lovatt, J., Finlayson, O., & James, P. (2007). Evaluation of student engagement with two learning supports in the teaching of 1st year undergraduate chemistry. *Chemistry Education Research and Practice*, 8(4), 390-402.
- Lowenthal, P. (2010). Social presence. In S. Dasgupta (Ed.), *Social computing: Concepts, methodologies, tools, and applications* (pp. 129-136). Hershey, PA: Information Science Reference.
- Lun, V. M.-C., Fischer, R., & Ward, C. (2010). Exploring cultural differences in critical thinking: Is it about my thinking style or the language I speak? *Learning and Individual Differences*, 20(6), 604-616. doi: 10.1016/j.lindif.2010.07.001
- Ma, Y., Lai, G., Williams, D., & Prejean, L. (2008). Teachers' belief changes in a technology-enhanced pedagogical laboratory. *Journal of Educational Technology Development and Exchange*, 1(1), 13-28.
- Malik, K. (2013). Engaging learners as moderators in an online management course. In C. Wankel & P. Blessinger (Eds.), *Increasing student*

*engagement and retention in e-learning environments: Web 2.0 and blended learning technologies* (pp. 175-197). Bingley, UK: Emerald Group.

- Manca, S. (2010). Computer-mediated communication learning environments: The social dimension. In S. Dasgupta (Ed.), *Social computing: Concepts, methodologies, tools, and applications* (pp. 38-44). Hershey, PA: Information Science Reference.
- Marczyk, G., DeMatteo, D., & Festinger, D. (2005). *Essentials of research design and methodology*. New Jersey: Wiley & Sons.
- Marin, L., & Halpern, D. (2011). Pedagogy for developing critical thinking in adolescents: Explicit instruction produces greatest gains. *Thinking Skills and Creativity*, 6(1), 1-13.
- Marshall, K. (2008). The use of multiple choice tests in law. In R. Kwan, R. Fox, F. T. Chan & P. Tsang (Eds.), *Enhancing learning through technology: Research on emerging technologies and pedagogies* (pp. 263-276). London: World Scientific Publishing.
- Marzano, R. (2004). *Building background knowledge for academic achievement: Research on what works in schools*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Maslow, A. (1970). *Motivation and personality* (3rd ed.). New York: Harper & Row Publishers.
- Mason, M. (2008). Critical thinking and learning. In M. Mason (Ed.), *Critical thinking and learning* (pp. 1-11). Oxford: Blackwell Publishing.
- Mayers, T. (2006). Theoretical perspectives on interactivity in e-learning. In C. Juwah (Ed.), *Interactions in online education: Implications for theory and practice* (pp. 9-26). New York: Routledge.
- McBride, D. (2011). Sociocultural theory: Providing more structure to culturally responsive evaluation. *New Directions for Evaluation*, 2011(131), 7-13.
- McCabe, J., Doerflinger, A., & Fox, R. (2011). Student and faculty perceptions of e-feedback. *Teaching of Psychology*, 38(3), 173-179. doi: 10.1177/0098628311411794
- McLean, C. L. (2005). Evaluating critical thinking skills: Two conceptualizations. *Journal of Distance Education*, 20(2), 1-20.

- McLoughlin, D., & Mynard, J. (2009). An analysis of higher order thinking in online discussions. *Innovations in Education and Teaching International*, 46(2), 147-160.
- McMahon, G. (2009). Critical thinking and ICT integration in a Western Australian secondary school. *Educational Technology & Society*, 12(4), 269-281.
- Menachemi, N. (2011). Assessing response bias in a web survey at a university faculty. *Evaluation & Research in Education*, 24(1), 5-15.
- Mercer, N., & Littleton, K. (2007). *Dialogue and the development of children's thinking: A sociocultural approach*. London: Routledge.
- Mertens, D. (2010). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods* (3rd ed.). London: Sage.
- Meyer, K. A. (2003). Face-to-face versus threaded discussions: The role of time and higher order thinking. *Journal of Asynchronous Learning Networks*, 7(3), 55-65.
- Meyer, K. A., & Xu, Y. J. (2009). A causal model of factors influencing faculty use of technology. *Journal of Asynchronous Learning Networks*, 13(2), 57-70.
- Mgendi, M. (2010). *Introducing web-based elearning platform at an African university* Paper presented at the ISPRS Commission VI Symposium: Cross-Border Education for Global Geo-information, ITC, Enschede, The Netherlands.
- Mijatovic, I., Cudanov, M., Jednak, S., & Kadjevich, D. M. (2012). How the usage of learning management systems influences student achievement. *Teaching in Higher Education*, 18(5), 506-517. doi: 10.1080/13562517.2012.753049
- Miller, M. D., Linn, R. L., & Gronlund, N. E. (2009). *Measurement and assessment in teaching* (10th ed.). Upper Saddle River, NJ: Pearson Education.
- Miri, B., David, B.-C., & Uri, Z. (2007). Purposely teaching for the promotion of higher-order thinking skills: A case of critical thinking. *Research in Science Education*, 37(4), 353-369. doi: DOI 10.1007/s11165-006-9029-2
- Mirza, N., & Staples, E. (2010). Webcam as a new invigilation method: Students' comfort and potential for cheating. *Journal of Nursing Education*, 49(2), 116-119.

- Mitchell, B., & Geva-May, I. (2009). Attitudes affecting online learning implementation in higher education institutions. *Journal of Distance Education, 23*(1), 71-88.
- Mnyanyi, C., & Mbwette, T. (2009). Open and distance learning in developing countries: The past, the present and the future [http://www.ou.nl/Docs/Campagnes/ICDE2009/Papers/Final\\_paper\\_280Mnyanyi.pdf](http://www.ou.nl/Docs/Campagnes/ICDE2009/Papers/Final_paper_280Mnyanyi.pdf)
- MoEVT. (1995). *Education and training policy*. Dar es Salaam: Ministry of Education and Vocational Training.
- MoEVT. (2007). *Information and communication technology (ICT) policy for basic education*. Dar es Salaam: Ministry of Education and Vocational Training.
- MoEVT. (2012). *Medium term strategic plan 2012/13 - 2015/16*. Dar es Salaam: Ministry of Education and Vocational Training.
- Moore, T. (2013). Critical thinking: Seven definitions in search of a concept. *Studies in Higher Education, 38*(4), 506-522. doi: 10.1080/03075079.2011.586995
- Morales, C. (2010). Constructivist instructional design: A blueprint for online course design. In H. Song & T. Kidd (Eds.), *Human performance and instructional technology* (pp. 24-42). New York: Information Science Reference.
- Morgan, D. (2008). Focus groups. In L. Given (Ed.), *The Sage encyclopedia of qualitative research methods* (Vol. 1 & 2, pp. 352-354). London: Sage.
- Mory, E. H. (2008). Feedback research revisited. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (2nd ed., pp. 745-784). Oxon, UK: Taylor & Francis.
- Moseley, D., Baumfield, V., Elliott, J., Gregson, M., Higgins, S., Miller, J., & Newton, D. (Eds.). (2005). *Frameworks for thinking: A handbook for teaching and learning*. Cambridge: Cambridge University Press.
- Mugaloglu, E. Z., & Bayram, H. (2009). How are prospective science teachers' values and their attitudes toward science associated?: Implications for science teacher training programs. *Procedia Social and Behavioral Sciences, 1*(1), 749-752.
- Muncey, T. (2009). Does mixed methods constitute a change in paradigms? In S. Andrew & E. Halcomb (Eds.), *Mixed methods research for nursing and the health sciences* (pp. 13-30). Sussex: Wiley-Blackwell.

- Murray, N., & Beglar, D. (2009). *Inside track writing dissertations and theses*. Essex: Pearson.
- Mwalongo, A. (2010). Teachers' knowledge, beliefs and pedagogical practices in integrating ICTs in different curriculum areas in secondary schools: A case study of Pakistan. *Educational Research Journal*, 13(1), 69-79.
- Mwalongo, A. (2011). Teachers' perceptions about ICT for teaching, professional development, administration and personal use. *International Journal of Education and Development using Information and Communication Technology*, 7(3), 36-49.
- Mwalongo, A. (2012). Peer feedback: Its quality and students' perceptions as a peer learning tool in asynchronous discussion forums. *International Interdisciplinary Journal of Education*, 1(11), 846-853.
- Nagi, K., Suesawaluk, P., & Vate U-Lan, P. (2008). Evaluating interactivity of eLearning resources in a learning management system (LMS): A case study of Moodle, an open source platform. *International Journal of the Computer, the Internet and Management*, 16(3), 32.01 - 32.07.
- Narloch, R., Garbin, C. P., & Turnage, K. D. (2006). Benefits of prelecture quizzes. *Teaching of Psychology*, 33(2), 109-112. doi: 10.1207/s15328023top3302\_6
- Nasir, N., Rosebery, A., Warren, B., & Lee, C. (2006). Learning as a cultural process: Achieving equity through diversity. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 489-504). Cambridge: Cambridge University Press.
- Nentl, N., & Zietlow, R. (2008). Using Bloom's taxonomy to teach critical thinking skills to business students. *College & Undergraduate Libraries*, 15(1-2), 159-172.
- Newmann, F. (1990). Higher order thinking in teaching social studies: A rationale for the assessment of classroom thoughtfulness. *Journal of Curriculum Studies*, 22(1), 41-56.
- Nihuka, K., & Voogt, J. (2009). *E-learning course design in teacher design teams: Experiences in the Open University of Tanzania* Paper presented at the 13th Biannual Conference for Research on Learning and Instruction, Amsterdam, August 25th - 29th, 2009.
- Norton, L., Richardson, J., Hartley, J., Newstead, S., & Mayes, J. (2005). Teachers' beliefs and intentions concerning teaching in higher education. *Higher Education* 50(4), 537-571.

- Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., & Zoran, A. G. (2009). A qualitative framework for collecting and analyzing data in focus group research. *International Journal of Qualitative Methods*, 8(3), 1-21.
- Onwuegbuzie, A. J., & Johnson, R. B. (2006). The validity issues in mixed research. *Research in the Schools*, 13(1), 48-63.
- Onwuegbuzie, A. J., Slate, J. R., Lech, N. L., & Collins, K. M. T. (2007). Conducting mixed analysis: A general typology. *Interdisciplinary Journal of Multiple Research Approaches*, 1(1), 4-17.
- Oriogun, P. (2007). Assessing critical thinking in a new approach to computer-mediated communication (CMC) transcripts. *International Journal of Instructional Technology and Distance Learning*, 4(2), 21-36.
- Ottenbreit-Leftwich, A. T., Glazewski, K. D., Newby, T. J., & Ertmer, P. A. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & Education*, 55(3), 1321-1335.
- Ozkahraman, S., & Yildirim, B. (2012). Investigation of critical thinking disposition in a university hospital of nurses working in Turkey. *International Journal of Applied Science and Technology*, 2(3), 143-149.
- Ozuru, Y., Briner, S., Kurby, C., & McNamara, D. (2013). Comparing comprehension measured by multiple-choice and open-ended questions. *Canadian Journal of Experimental Psychology*, 67(3), 215-227. doi: 10.1037/a0032918
- Padilla-Walker, L. M. (2006). The impact of daily extra credit quizzes on exam performance. *Teaching of Psychology*, 33(4), 236-239. doi: 10.1207/s15328023top3304\_4
- Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-332.
- Palmer, S., & Holt, D. (2009). Staff and student perceptions of an online learning environment: Difference and development. *Australasian Journal of Educational Technology*, 25(3), 366-381.
- Parker, K. R., & Chao, J. T. (2007). Wiki as a teaching tool. *Interdisciplinary Journal of Knowledge and Learning Objects*, 3, 57-72.
- Passer, M. (2014). *Research methods: Concepts and connections*. New York: Worth Publishers.

- Perkins, C., & Murphy, E. (2006). Identifying and measuring individual engagement in critical thinking in online discussions: An exploratory case study. *Educational Technology & Society*, 9(1), 298-307.
- Perkins, D. (2004). When is good thinking? In D. Y. Dai (Ed.), *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development* (pp. 351-384). Mahwah, NJ: Lawrence Erlbaum.
- Petrina, S. (2007). *Advanced teaching methods for the technology classroom*. London: Information Science Publishing.
- Planning-Commission. (2002). *The Tanzania development vision 2025*. Dar es Salaam: Planning Commission.
- Porta, D., & Keating, M. (2008). How many approaches in the social sciences? An epistemological introduction. In D. Porta & M. Keating (Eds.), *Approaches and methodologies in the social sciences: A pluralist perspective* (pp. 19-39). Cambridge: Cambridge University Press.
- Postareff, L., Lindblom-Ylänne, S., & Nevgi, A. (2007). The effect of pedagogical training on teaching in higher education. *Teaching and Teacher Education*, 23(5), 557-571.
- Prasad, D. (2009). Empirical study of teaching presence and critical thinking in asynchronous discussion forums. *International Journal of Instructional Technology and Distance Learning*, 6(11), 3-26.
- Pritchard, A. (2009). *Ways of learning: Learning theories and learning styles in the classroom*. London: Routledge.
- Pritchard, A., & Woollard, J. (2010). *Psychology for the classroom: Constructivism and social learning*. London: Routledge.
- Profetto-Mcgrath, J. (2003). The relationship of critical thinking skills and critical thinking dispositions of baccalaureate nursing students. *Journal of Advanced Nursing*, 43(6), 569-577. doi: 10.1046/j.1365-2648.2003.02755.x
- Quinton, S., & Allen, M. (2014). The social processes of web 2.0 collaboration: Towards a new model for virtual learning. In M. Gosper & D. Ifenthaler (Eds.), *Curriculum models for the 21st century: Using learning technologies in higher education* (pp. 35-54). New York: Springer.
- Rainbolt, G., & Dwyer, S. (2012). *Critical thinking: The art of argument*. Wadsworth: Boston.



- Remesal, A., & Colomina, R. (2013). Social presence and online collaborative small group work: A socioconstructivist account. *Computers & Education*, 60(1), 357-367.
- Renaud, R., & Murray, H. (2008). A comparison of a subject-specific and a general measure of critical thinking. *Thinking Skills and Creativity*, 3(2), 85-93. doi: 10.1016/j.tsc.2008.03.005
- Resnick, L. (1987). *Education and learning to think*. Washington, D.C.: National Academy Press.
- Revilla, E. (2010). IT and the social construction of knowledge. In S. Dasgupta (Ed.), *Social computing: Concepts, methodologies, tools, and applications* (pp. 55-63). Hershey, PA: Information Science Reference.
- Rice, S., Geels, K., Hackett, H. R., Trafimow, D., McCarley, J. S., Schwark, J., & Hunt, G. (2012). The harder the task, the more inconsistent the performance: A PPT analysis on task difficulty. *The Journal of General Psychology*, 139(1), 1-18. doi: 10.1080/00221309.2011.619223
- Ridenour, C. S., & Newman, I. (2008). *Mixed methods research: Exploring the interactive continuum*. Illinois: South Illinois University Press.
- Rimiene, V. (2002). Assessing and developing students' critical thinking. *Psychology Learning and Teaching*, 2(1), 17-22.
- Ritchhart, R., & Perkins, D. (2005). Learning to think: The challenges of teaching thinking. In K. Holyoak & R. Morrison (Eds.), *The Cambridge handbook of thinking and reasoning* (pp. 775-802). Cambridge: Cambridge University Press.
- Rogoff, B. (1990). *The cultural nature of human development*. Oxford: Oxford University Press.
- Rogoff, B. (2003). *The cultural nature of human development*. Oxford: Oxford University Press.
- Rossmann, G. B., & Wilson, B. L. (1985). Numbers and words: Combining quantitative and qualitative methods in a single large-scale evaluation study. *Evaluation Review*, 9(5), 627-643. doi: 10.1177/0193841x8500900505
- Rubin, A., & Babbie, E. (2011). *Research methods for social work* (7th ed.). Belmont, CA: Cengage Learning.
- Ruggiero, V. R. (2012). *Beyond feelings: A guide to critical thinking* (9th ed.). New York: McGraw-Hill.

- Ruleman, A. B. (2013). Comparison of faculty and student ownership and use of technology. *Technical Services Quarterly*, 30(1), 38-55. doi: 10.1080/07317131.2013.735954
- Saadé, R. G., Morin, D., & Thomas, J. (2012). Critical thinking in e-learning environments. *Computers in Human Behavior*, 28(5), 1608-1617.
- Sachs, J. (2014). Managing the challenges of technology to support learning: Some lessons from experience. In M. Gosper & D. Ifenthaler (Eds.), *Curriculum models for the 21st century: Using learning technologies in higher education* (pp. 407-422). London: Springer.
- Sahin, C., Bullock, K., & Stables, A. (2002). Teachers' beliefs and practices in relation to their beliefs about questioning at Key Stage 2. *Educational Studies*, 28(4), 371-384.
- Sanchez, R., & Hueros, A. (2010). Motivational factors that influence the acceptance of Moodle using TAM. *Computers in Human Behavior*, 26(6), 1632-1640.
- Sansone, C., Fraughton, T., Zachary, J., Butner, J., & Heiner, C. (2011). Self-regulation of motivation when learning online: The importance of who, why and how. *Educational Technology Research & Development*, 59(2), 199-212. doi: 10.1007/s11423-011-9193-6
- Sawyer, R. K. (2006). Introduction: The new science of learning. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 1-16). Cambridge: Cambridge University Press.
- Schoonenboom, J. (2014). Using an adapted, task-level technology acceptance model to explain why instructors in higher education intend to use some learning management system tools more than others. *Computers & Education*, 71, 247-256.
- Schreiber, J. B., & Asner-Self, K. (2011). *Educational research: The interrelationship of questions, sampling, design, and analysis*. New Jersey: John Wiley & Sons.
- Schutz, P., Chambless, C., & DeCuir, J. (2004). Multimethods research. In K. deMarrais & S. Lapan (Eds.), *Foundations for research methods of inquiry in education and the social sciences* (pp. 267-281). London: Lawrence Erlbaum.
- Scott, D., & Usher, R. (2011). *Researching education: Data, methods and theory in educational enquiry*. New York: Continuum.

- Scott, S. (2008). Perceptions of students' learning critical thinking through debate in a technology classroom: A case study. *The Journal of Technology Studies*, 34(1), 39-44.
- Sharpe, R., & Pawlyn, J. (2009). The role of the tutor in blended e-learning: Experiences from interprofessional education. In R. Donnelly & F. McSweeney (Eds.), *Applied e-learning and e-teaching in higher education* (pp. 18-34). New York: Information Science Reference.
- Shaughnessy, J. J., Zechmeister, E. B., & Zechmeister, J. S. (2012). *Research methods in psychology* (9th ed.). New York: McGraw-Hill.
- Sieber, S. D. (1973). The integration of fieldwork and survey. *American Journal of Sociology*, 78(6), 1335-1359.
- Siegel, H. (2010). Critical thinking (pp. 141-145). Coral Gables, Florida: University of Miami.
- Smeets, E. (2005). Does ICT contribute to powerful learning environments in primary education? *Computers & Education*, 44(4), 343-355.
- Soccio, D. (2013). *How to get the most out of philosophy* (7th ed.). Boston, MA: Wadsworth Cengage Learning.
- Spotts, T. (1999). Discriminating factors in faculty use of instructional technology in higher education. *Educational Technology & Society*, 2(4), 92-99.
- Stake, R. E. (2010). *Qualitative research: Studying how things work*. New York: The Guilford Press.
- Stangor, C. (2011). *Research methods for the behavioral sciences* (4th ed.). Belmont: Cengage Learning.
- Steel, C. (2009). Reconciling university teacher beliefs to create learning designs for LMS environments. *Australasian Journal of Educational Technology*, 25(3), 399-420.
- Stein, D. S., Wanstreet, C. E., Slagle, P., Trinko, L. A., & Lutz, M. (2013). From 'hello' to higher-order thinking: The effect of coaching and feedback on online chats. *Internet & Higher Education*, 16, 78-84.
- Steinke, I. (2004). Quality criteria in qualitative research. In U. Flick, E. Kardorff & I. Steinke (Eds.), *A companion to qualitative research* (pp. 184-190). London: Sage.
- Sun, P.-C., Tsai, R. J., Finger, G., Chen, Y.-Y., & Yeh, D. (2008). What drives a successful e-Learning? An empirical investigation of the critical factors

influencing learner satisfaction. *Computers & Education*, 50(4), 1183-1202. doi: <http://dx.doi.org/10.1016/j.compedu.2006.11.007>

- Sutherland, R., Lindstrom, B., & Lahn, L. (2009). Sociocultural perspectives on technology-enhanced learning and knowing. In N. Balacheff, S. Ludvigsen, T. Jong, A. Lazonder & S. Barnes (Eds.), *Technology-enhanced learning: Principles and products* (pp. 39-54). New York: Springer.
- Tashakkori, A., & Teddlie, C. (2008). Quality inferences in mixed methods research. In M. Bergman (Ed.), *Advances in mixed methods research: Theories and applications* (pp. 101-119). London: Sage.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55.
- Teddlie, C., & Sammons, P. (2010). Applications of mixed methods to the field of educational effectiveness research. In B. Creemers, L. Kyriakides & P. Sammons (Eds.), *Methodological advances in educational effectiveness research* (pp. 115-152). London: Routledge.
- Teddlie, C., & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the social and behavioral sciences. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 3-50). London: Sage.
- Tedre, M., Ngumbuke, F., & Kemppainen, J. (2010). Infrastructure, human capacity, and high hopes: A decade of development of e-learning in a Tanzanian HEI. *Revista de Universidad y Sociedad del Conocimiento*, 7(1), 7-19.
- Teo, T. (2008). Pre-service teachers' attitudes towards computer use: A Singapore survey. *Australasian Journal of Educational Technology*, 24(4), 413-424.
- Thompson, S., Martin, L., Richards, L., & Branson, D. (2003). Assessing critical thinking and problem solving using a web-based curriculum for students. *Internet and Higher Education*, 6(2), 185-191.
- Timmons, V., & Cairns, E. (2010). Case study research in education. In A. Mills, G. Eurepos & E. Wiebe (Eds.), *Encyclopedia of Case Study Research* (Vol. 1, pp. 98-102). London: Sage.
- Tobin, S., & Tidwell, J. (2013). The role of task difficulty and affect activation level in the use of affect as information. *Journal of Experimental Social Psychology*, 49(2), 250-253.

- Torff, B., & Warburton, E. C. (2005). Assessment of teachers' beliefs about classroom use of critical-thinking activities. *Educational & Psychological Measurement, 65*(1), 155-179. doi: 10.1177/0013164404267281
- Torrance, H. (2012). Triangulation, respondent validation, and democratic participation in mixed methods research. *Journal of Mixed Methods Research, 6*(2), 111-123.
- Tracy, S. (2013). *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*. West Sussex: Wiley-Blackwell.
- Trushell, J., & Byrne, K. (2013). Education undergraduates and ICT-enhanced academic dishonesty: A moral panic? *British Journal of Educational Technology, 44*(1), 6-19. doi: 10.1111/j.1467-8535.2012.01381.x
- Tsang, E. (2008). Learner-content interactivity: Instructional design strategies for the development of e-learning materials. In R. Kwan, R. Fox, F. T. Chan & P. Tsang (Eds.), *Enhancing learning through technology: Research on emerging technologies and pedagogies* (pp. 251-261). London: World Scientific.
- Vaiciuniene, V., & Gedviliene, G. (2008). Students learning experience in the integrated information literacy course constructed in virtual learning environment. *Informatics in Education, 7*(1), 127-142.
- van der Kaay, C. D., & Young, W. H. (2012). Age-related differences in technology usage among community college faculty. *Community College Journal of Research and Practice, 36*(8), 570-579. doi: 10.1080/10668920903054865
- Vennesson, P. (2008). Case studies and process tracing: Theories and practices. In D. d. Porta & M. Keating (Eds.), *Approaches and methodologies in the social sciences: A pluralist perspective* (pp. 223-239). Cambridge: Cambridge University Press.
- Verschuren, P. (2003). Case study as a research strategy: Some ambiguities and opportunities. *International Journal of Social Research Methodology, 6*(2), 121-139.
- Vlachopoulos, P., & Cowan, J. (2010). Reconceptualising moderation in asynchronous online discussions using grounded theory. *Distance Education, 31*(1), 23-36.
- von Kinsky, B., Ivins, J., & Gribble, S. (2009). Lecture attendance and web based lecture technologies: A comparison of student perceptions and usage patterns. *Australasian Journal of Educational Technology, 25*(4), 581-595.

- Walsh, C., & Hardy, R. (1999). Dispositional differences in critical thinking related to gender and academic major. *Journal of Nursing Education, 38*(4), 149-155.
- Wang, E., & Chen, L. (2012). Forming relationship commitments to online communities: The role of social motivations. *Computers in Human Behavior, 28*(2), 570-575.
- Wang, L., Bruce, C., & Hughes, H. (2011). Sociocultural theories and their application in information literacy research and education. *Australian Academic & Research Libraries, 42*(4), 296-308.
- Wang, X. (2008). What factors promote sustained online discussions and collaborative learning in a web-based course? In S. Negash, M. Whitman, A. Woszczynski, K. Hoganson & H. Mattord (Eds.), *Handbook of distance learning for real-time and asynchronous information technology education* (pp. 192-211). New York: Information Science Reference.
- Wang, Y. (2009). On the cognitive processes of human perception with emotions, motivations, and attitudes. In P. Zaphiris & C. Ang (Eds.), *Human computer interaction: Concepts, methodologies, tools, and applications* (pp. 685-697). New York: Information Science Reference.
- Wangensteen, S., Johansson, I., Bjorkstrom, M., & Nordstrom, G. (2010). Critical thinking dispositions among newly graduated nurses. *Journal of Advanced Nursing, 66*(10), 2170-2181.
- Ward, M., Peters, G., & Shelley, K. (2010). Student and faculty perceptions of the quality of online learning experiences. *The International Review of Research in Open and Distance Learning, 11*(3), 57-77.
- Watters, M., Robertson, P., & Clark, R. (2011). Student perceptions of cheating in online business courses. *Journal of Instructional Pedagogies, 6*, 1-14.
- Wei, C.-W., Chen, N.-S., & Kinshuk. (2012). A model for social presence in online classrooms. *Educational Technology Research & Development, 60*(3), 529-545.
- Wertsch, J. (1991). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.
- Wertsch, J. (1993). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.
- Wertsch, J. (1998). *Mind as action*. Oxford: Oxford University Press.

- Wetzels, S., Kester, L., Merrienboer, J., & Broers, N. (2011). The influence of prior knowledge on the retrieval-directed function of note taking in prior knowledge activation. *British Journal of Educational Psychology*, *81*(2), 274-291.
- Wicke, S. (2013). Teacher prompting: Investigating a way to help students develop critical thinking skills. *Journal of Purdue Undergraduate Research*, *3*, 84.
- Wilkinson, S., & Barlow, A. (2010). Turning up critical thinking in discussion boards. *eLearning Papers*, *21*, 1-12.
- Willig, C. (2013). *Introducing qualitative research in psychology*. Berkshire: Open University Press.
- Woodside, A. (2010). *Case study research: Theory. methods. practice*. Bingley, UK: Emerald Group.
- Wu, X., Lowyck, J., Sercu, L., & Elen, J. (2013). Task complexity, student perceptions of vocabulary learning in EFL, and task performance. *British Journal of Educational Psychology*, *83*(1), 160-181.
- Xie, K., & Ke, F. (2011). The role of students' motivation in peer-moderated asynchronous online discussions. *British Journal of Educational Technology*, *42*(6), 916-930. doi: 10.1111/j.1467-8535.2010.01140.x
- Yang, Y.-T., & Chou, H.-A. (2008). Beyond critical thinking skills: Investigating the relationship between critical thinking skills and dispositions through different online instructional strategies. *British Journal of Educational Technology*, *39*(4), 666-684. doi: doi:10.1111/j.1467-8535.2007.00767.x
- Yazici, A., Yazici, s., & Erdem, M. (2011). Faculty and student perceptions on college cheating: Evidence from Turkey. *Educational Studies*, *37*(2), 221-231.
- Yin, R. (2008). *Case study research: Design and methods* (4th ed.). London: Sage.
- Yin, R. (2011). *Qualitative research from start to finish*. New York: The Guilford Press.
- Young, J. (2013). Online classes see cheating go high tech. *The Education Digest*, *78*(5), 4-8.
- Young, P. (2009). *Instructional design frameworks and intercultural models*. Hershey, PA: Information Science Reference.

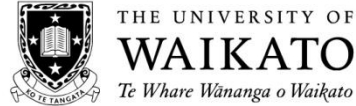
- Zhang, H., & Lambert, V. (2008). Critical thinking dispositions and learning styles of baccalaureate nursing students from China. *Nursing and Health Sciences, 10*(3), 175-181.
- Zhao, L., Lu, Y., Wang, B., Chau, P. Y. K., & Zhang, L. (2012). Cultivating the sense of belonging and motivating user participation in virtual communities: A social capital perspective. *International Journal of Information Management, 32*(6), 574-588.
- Zucker, D. (2009) How to do case study research. *School of Nursing Faculty Publication Series. Paper 2*. Massachusetts: University of Massachusetts, Amherst.
- Zuzeviciute, V., & Butrime, E. (2010). E-learning as a socio-cultural system. In B. Ertl (Ed.), *Technologies and practices for constructing knowledge in online environments: Advances in learning* (pp. 202-218). New York: Information Science Reference.





## Appendices

### Appendix A: Invitation Letter for Universities A and B



August 24, 2011

Vice Chancellor  
University of Dar es Salaam  
P. Box 35091  
Dar es Salaam.

u.f.s

Deputy Principal  
Dar es Salaam University College of Education  
P. O. Box 2329  
Dar es Salaam

#### **Re: Conducting Research in Your Institutions**

I would like to request your permission to conduct research on Student teachers' perceptions about Moodle as a tool for teaching-learning purposes at the School of Education, Dar es Salaam University College of Education and Mkwawa University College of Education between September 2011 and February 2012. The institution's participation will be anonymous.

The study will specifically examine the potential of different tools in Moodle such as discussion forums, quizzes and wikis for promoting students' critical thinking. This, in turn, will help address students' learning with Moodle and facilitate smooth integration of Moodle in the teaching-learning process.

This research is conducted as a requirement for a PhD of the University of Waikato, New Zealand.

Students from a selected pedagogy course will be involved in filling in questionnaires for no more than 30 minutes. At a later stage, seven students from one of the institutions will be invited to participate in three focus group discussions. Each session is estimated to last for an hour. Their participation is voluntary.

The discussion will be audio-taped, but consent will be sought prior to the discussion.

Furthermore, students' data in Moodle will be accessed. To that end, informed consent of the lecturers and students involved in a pedagogy course will be sought prior to accessing the said data. The use of such data will not influence students' academic progress in any way.

A PhD thesis will be a product of the research. Only the researcher and supervisors will have access to the recorded and transcribed data. Afterwards, the transcribed data will be destroyed and recording will be erased. It is possible that journal articles and presentations may be the product of the research. In such cases, names of the research participants, the lecturers and institutions involved will remain anonymous.

The participants who take part in the study will have the right to refuse to answer any particular

question, to withdraw from the study at any time, ask any further questions about the study that occur during their participation, and be given access to transcribed focus group data and a summary of findings from the study when it is concluded.

The proposed study has had ethical approval from the University of Waikato Human Research Ethics Committee.

If you have any questions about the research, please feel free to contact either the researcher or the supervisors using the given contact details below.

Researcher:

Alcuin Ivor Mwalongo

Cellular phone: +255 784 855 061

E-mail: aim4@waikato.ac.nz or mwalongo@duce.ac.tz

Supervisors:

Dr. Michael Forret

E-mail: mforret@waikato.ac.nz

Dr. Garry Falloon

E-mail: falloong@waikato.ac.nz

Sincerely yours,



Alcuin Ivor Mwalongo

## Appendix B: Permission to Conduct Research from University A

**UNIVERSITY OF DAR ES SALAAM**  
**DIRECTORATE OF RESEARCH**  
 P.O. Box 35091 ■ DAR ES SALAAM ■ TANZANIA

Tel: 2410500-8 Ext. 2087,2077,  
 2410743, 2410727  
 Mobile: 0754 270789



Fax: 255 022 241 0743  
 255 022 241 0 023  
 e-mail: [research@udsm.ac.tz](mailto:research@udsm.ac.tz)

Ref: No. AB3/31

16 November 2011

Mr. Alquin Ivor Mwalongo,  
 Dar es Salaam University College of Education,  
 P.O. Box 2329,  
 Dar es Salaam.

**RE: YOUR APPLICATION FOR ETHICAL CLEARANCE TO UNDERTAKE RESEARCH  
 INVOLVING UDSM STUDENT TEACHERS**

Reference is made to your e-mail letter to the UDSM Vice Chancellor of 24<sup>th</sup> August 2011 on the above-captioned subject.

I am glad to inform you that your application seeking ethical clearance to undertake research involving UDSM staff and student teachers was approved by the Vice Chancellor on 15<sup>th</sup> September 2011. As suggested in your letter, this approval is valid up to March 2012 and is applicable in all Mwl. J.K. Nyerere Mlimani Campus colleges/schools/institutes as well as the constituent colleges of DUCE and MUCE.

Please take note that, this approval letter must be tendered/produced to the respective heads of UDSM colleges/schools and institutes before commencement of your field research.

Bernhard J. Sanyagi  
**PAO- Directorate of Research**

cc: Prof. J.V. Tesha (DR) – on file

## Appendix C: Invitation Letter for University C



August 24, 2011

Vice Chancellor  
The Open University of Tanzania  
P. Box 23409  
Dar es Salaam.

u.f.s

Deputy Principal (Academic)  
Dar es Salaam University College of Education  
P. O. Box 2329  
Dar es Salaam

**Re: Conducting Research in Your Institution**

I would like to request your permission to conduct research on Student teachers' perceptions about Moodle as a tool for teaching-learning purposes at The Open University of Tanzania between October 2011 and February 2012. The institution's participation will be anonymous.

The study will specifically examine the potential of different tools in Moodle such as discussion forums, quizzes and wikis for promoting students' critical thinking. This, in turn, will help address students' learning with Moodle and facilitate smooth integration of Moodle in the teaching-learning process.

This research is conducted as a requirement for a PhD of the University of Waikato, New Zealand.

Students from a selected pedagogy course will be involved in filling in questionnaires for no more than 30 minutes. At a later stage, seven students will be invited to participate in three focus group discussions. Each session is estimated to last for an hour. Their participation is voluntary.

The discussion will be audio-taped, but consent will be sought prior to the discussion.

Furthermore, students' data in Moodle will be accessed. To that end, informed consent of the lecturers and students involved in a pedagogy course will be sought prior to accessing the said data. The use of such data will not influence students' academic progress in any way.

A PhD thesis will be a product of the research. Only the researcher and supervisors will have access to the recorded and transcribed data. Afterwards, the transcribed data will be destroyed and recording will be erased. It is possible that journal articles and presentations may be the product of the research. In such cases, names of the research participants, the lecturers and institution involved will remain anonymous.

The participants who take part in the study will have the right to refuse to answer any particular question, to withdraw from the study at any time, ask any further questions about the study that occur during their participation, and be given access to transcribed focus group data and a summary of findings from the study when it is concluded.

The proposed study has had ethical approval from the University of Waikato Human Research Ethics Committee.

If you have any questions about the research, please feel free to contact either the researcher or the supervisors using the given contact details below.

Researcher:

Alcuin Ivor Mwalongo

Cellular phone:

+255 784 855 061 or +255 767 855 061

E-mail: aim4@waikato.ac.nz or mwalongo@duce.ac.tz

Supervisors:

Dr. Michael Forret

E-mail: mforret@waikato.ac.nz

Dr. Garry Falloon

E-mail: falloong@waikato.ac.nz

Sincerely yours,

A handwritten signature in blue ink, appearing to be 'Am', enclosed in a circular scribble.

Alcuin Ivor Mwalongo

## Appendix D: Permission to Conduct Research from University C

**THE OPEN UNIVERSITY OF TANZANIA***DIRECTORATE OF RESEARCH, PUBLICATIONS, AND POSTGRADUATE STUDIES*

P.O. Box 23409 Fax: 255-22-2668759 Dar es  
Salaam, Tanzania,  
<http://www.out.ac.tz>



Tel: 255-22-2666752/2668445 ext.2101  
Fax: 255-22-2668759,  
E-mail: [drpc@out.ac.tz](mailto:drpc@out.ac.tz)

24/08/2011

To whom it may concern,

**RE: RESEARCH CLEARANCE**

This is to certify that **Mr. Alcuin Ivo Mwalongo** has been granted permission to conduct research on **“Students - teachers perceptions about Moodle as a tool for teaching – learning puposes”**.

This permission allows him to see and talk to the leaders, members of staff and students of The Open University of Tanzania in connection with his research.

This is in accordance with the Government circular letter Ref. No. MPEC/R/10/1 dated 4<sup>th</sup> July 1980; the Vice Chancellor was empowered to issue research clearance to the staff and students of the University on behalf of the Government and the Tanzania Commission for Science and Technology, a successor organisation to UTAFITI.

This permission is granted for the period between 1<sup>st</sup> November 2011 to the of 25<sup>th</sup> February 2012 covering areas/offices of the Open University of Tanzania.

We thank you in advance for your cooperation and facilitation of this research activity.

Yours sincerely,

**Prof. S. Mbogo**

**For: VICE CHANCELLOR**

**THE OPEN UNIVERSITY OF TANZANIA**

## Appendix E: Students' Survey about Moodle

We are interested in finding out your opinions about Moodle as a tool for promoting your learning. We, thus, would like to know how you use Moodle.		1. Rate the following statements related to your use of Moodle by ticking (✓) the most correct response ( <b>Note:</b> Tick only one response for each given statement). Then, for each response you have chosen give reason(s) why you think so.				Write your reason(s) in the space given below.	
		Strongly Disagree	Disagree	Agree	Strongly Agree		
<b>Discussion Forums</b>	1	Through the discussion forum I am able to analyse issues being discussed					
	2	In the discussion forum, I can judge how good or bad my colleagues' comments are					
	3	Using the discussion forum, I am able to generalise about issues being discussed and make logical conclusions					
	4	Through the discussion forum I am able to suggest for solutions about the problems or issues being discussed					
	5	I feel bad when I realise that I have made an error after posting my comments in the discussion forum					
	6	Through the discussion forum I learn a lot from my colleagues					
	7	If it were not for getting course grades, I would not bother participating in any activity related to the discussion forum					
	8	I believe that the discussion forum helps me express my views more confidently than I would do in a face-to-face discussion					
<b>Quizzes</b>	1	In many cases I guess the answers to the quiz questions					
	2	In a quiz I can judge how good or bad the questions are					
	3	The quizzes help me think and present my ideas logically					
	4	The tasks in a quiz help me solve problems related to what we learn					
	5	I feel bad when I realise that I have made an error after attempting a quiz					
	6	If it were not for getting course grades, I would not bother participating in any activity related to the quizzes					
	7	The computer feedback I get from the quiz is more helpful than the feedback given by the lecturers					



	8	I believe that quizzes help me express my views more confidently than I would do in a face-to-face environment					
Uploaded Resources	1	The teaching-learning resources such as notes or videos uploaded on Moodle helped me analyse issues discussed during the course					
	2	The resources did not help me achieve the objectives of the course					
	3	The resources helped me draw conclusions about issues related to the course					
	4	The resources helped me solve problems relate to the course					
General Views	1	I think I will enjoy teaching students using Moodle or any other learning management system during my future career.					
	2	I feel comfortable correcting my colleagues' arguments in an online environment than in a face-to-face environment					
	3	I would not take a job if I knew it involved working with computers					
	4	When I believe on something, I always stick to my ideas even if there is evidence against what I believe					
	5	I find it difficult to tolerate my colleagues' ideas especially when they contradict my own beliefs					
	6	Overall, Moodle has greatly improved my learning					

2. Tick (✓) the response that best suits you

Gender		Campus Location		
M	F	UDSM	DUCE	OUT

3. How old are

you? .....years (Write your age).

4. Indicate your teaching experience by ticking **one** of the options below

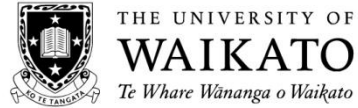
- Pre-service teacher (i.e Fresh from high school) **Or**
- In-service teacher, please indicate the number of years in teaching .....

5. Write any additional comment(s) about your use of Moodle as a learning tool .....

.....

**Thank you very much for your time and willingness to participate in the survey.**

Appendix F: Students' Informed Consent for the Survey



You are invited to participate in research on student teachers' perceptions about Moodle as a tool for teaching and learning.

The study is aimed at examining the potential of different tools in Moodle such as discussion forums, quizzes and wikis for promoting students' critical thinking. This, in turn, will help address students' learning with Moodle and facilitate smooth integration of Moodle in the teaching-learning process.

Your participation is voluntary and you will not be penalised academically for refusing to participate in the study.

You will be involved in filling in the questionnaire estimated to last for no more than 30 minutes during your class time.

A PhD thesis will be a product of the research. Only the researcher and supervisors will have access to the data. Afterwards, the data will be destroyed. It is possible that journal articles and presentations may be the product of the research. In such cases, your names will be anonymous.

You have the right to refuse to answer any question, to withdraw from the study at any time, ask any further questions about the study, and to access a summary of the research's findings when it is concluded.

For those of you willing and interested to participate in the focus group discussion, feel free to indicate your contact details at the end of this form. The discussion will be audio-taped, but consent will be sought prior to the discussion. Your participation is voluntary.

If you have any questions about the research, please feel free to contact either the researcher or the supervisors using the given contact details below.

.....  
.....

I have read this information in the Informed Consent Form and have had the details of the study explained to me orally. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to withdraw from the study at any time or to decline to answer any particular questions in the study. I understand I can decline to answer any or all questions in the survey, but once a survey is submitted, consent has been given to use the data. I agree to provide information to the researcher under the conditions of confidentiality set out on the Participant Informed Consent Form.

I also understand that it is possible that journal articles and presentations may be the product of the research, thus in such cases, my identity will remain anonymous.

I agree to participate in this study under the conditions set out on the Participant Informed Consent Form.

Signed: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Researcher: Alcuin Ivor Mwalongo  
Cellular phone: +255 784 855 061  
E-mail: aim4@waikato.ac.nz or mwalongo@duce.ac.tz  
Supervisors: Dr. Michael Forret  
Phone: +64 7 8384481  
E-mail: mforret@waikato.ac.nz

Dr. Garry Falloon  
Phone: +64 7 8384466  
E-mail: falloong@waikato.ac.nz

This survey will be followed by a focus group discussion about the use of Moodle as a teaching-learning tool. If you are interested and willing to participate in the discussion, fill in your e-mail address or cellular phone number for further contact.

(Note: Your contact details will not be shared to any other person and will not be used for any other purpose other than for contacting you for the focus group discussion).

E-mail address: \_\_\_\_\_ **or**

Cellular phone number: \_\_\_\_\_

## Appendix G: Lecturers' Informed Consent Form

Moodle as a Teaching-Learning Tool- Academic Staff

Exit this survey

### 1. PARTICIPANT INFORMED CONSENT

You are invited to participate in a research on the perceptions of university academic staff about Moodle as a tool for teaching and learning.

Your participation is voluntary and anonymous.

Data collected will be used by the researcher to write a research report for the PhD, University of Waikato, New Zealand. Only the researcher and supervisors will have access to the data. Afterwards, the data will be destroyed. It is possible that journal articles and presentations may be the product of the research. In such cases, your identity will be anonymous.

You will be involved in filling in the questionnaire estimated to last for no more than 15 minutes.

You have the right to refuse to answer any question, to ask any further questions about the study, and to access a summary of the research findings once concluded.

The proposed study has had ethical approval from the University of Waikato Human Research Ethics Committee.

If you have any questions about the project, please feel free to contact either the researcher or the supervisors using the given contact details at the end of this page.

.....  
I have read this information about Informed Consent and I fully understand the details of the study. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to decline to answer any particular questions in the study. I understand I can withdraw any information I have provided up until the researcher has commenced analysis on my data. I agree to provide information to the researcher under the conditions of confidentiality set out on the Participant Informed Consent.

I also understand that it is possible that journal articles and presentations may be the product of the research, thus in such cases, my identity will remain anonymous.

I agree to participate in this study under the conditions set out on the Participant Informed Consent.

Researcher: Alcuin Ivor Mwalongo

Cellular phone: +255 784 855 061 or +255767855061

E-mail: aim4@waikato.ac.nz, alcuinmwalongo@gmail.com, or mwalongo@duce.ac.tz

Supervisors:

Dr. Michael Forret

Phone: +64 7 8384481

E-mail: mforret@waikato.ac.nz

Dr. Garry Falloon

Phone: +64 7 8384466

Email: falloong@Waikato.ac.nz

Therefore, if you agree with the contents of this Participant Informed Consent, then click the **'Next'** button below to take the survey.

Next

## Appendix H: Lecturers' Survey Questions

Moodle as a Teaching-Learning Tool- Academic Staff Exit this survey

2.

**1. Tick (✓) the response that best identifies you**

	Male	Female	DUCE	MUCE	OUT	UDSM
Gender and University	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Indicate your age, and the number of years in teaching at the University

**2. Rate the following statements related to Moodle by clicking the radio button that contains the most correct response to you (Note: Tick only one response for each given statement). Then, for each response you have chosen give reason(s) why you think so by writing the reasons in the space provided at the end of the question.**

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. When I use the discussion forum with my students, I make sure that it helps them analyse issues being discussed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Through the discussion forum, I can judge how logical or illogical the students' comments are	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. When I use the discussion forum, I make sure that it helps students generalise about issues being discussed and make logical conclusions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Give reasons to support each of your choices above (i.e. a, b, and c)

**3. Rate the following statements related to Moodle by clicking the radio button that contains the most correct response to you (Note: Tick only one response for each given statement). Then, for each response you have chosen give reason(s) why you think so by writing the reasons in the space provided at the end of the question.**

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. When I use the discussion forum I ensure that students are able to suggest for solutions about the problems or issues posed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I feel bad when I realise that I have made an error after posting an issue or problem for discussion in the discussion forum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Through the discussion forum I learn a lot from my students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Give reasons to support each of your choices above (i.e. a, b, and c)

**4. Rate the following statements related to Moodle by clicking the radio button that contains the most correct response to you (Note: Tick only one response for each given statement). Then, for each response you have chosen give reason(s) why you think so by writing the reasons in the space provided at the end of the question.**

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. If it were not for conforming with the university requirements, I would not bother using the discussion forum as a teaching-learning tool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I believe that the discussion forum helps me teach certain concepts or topics more confidently than I would do in a face-to-face environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. When I make a quiz I make sure that it prevents students from guessing the answers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Give reasons to support each of your choices above (i.e. a, b, and c)

**5. Rate the following statements related to Moodle by clicking the radio button that contains the most correct response to you**

**(Note: Tick only one response for each given statement). Then, for each response you have chosen give reason(s) why you think so by writing the reasons in the space provided at the end of the question.**

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. When I compose a quiz I can judge how logical or illogical the questions are	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. When I compose a quiz I make sure that it helps students think and present their ideas logically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. When I compose a quiz I make sure that the tasks in a quiz help students solve problems related to what they learn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Give reasons to support each of your choices above (i.e. a, b, and c)

**6. Rate the following statements related to Moodle by clicking the radio button that contains the most correct response to you (Note: Tick only one response for each given statement). Then, for each response you have chosen give reason(s) why you think so by writing the reasons in the space provided at the end of the question.**

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. I feel bad when I realise that I have made an error after posting a quiz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. If it were not for confirming with university requirements, I would not bother using the quiz tool in Moodle as a teaching-learning tool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I prefer giving online quiz feedback to my students to face-to-face feedback	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Give reasons to support each of your choices above (i.e. a, b, and c)

**7. Rate the following statements related to Moodle by clicking the radio button that contains the most correct response to you (Note: Tick only one response for each given statement). Then, for each response you have chosen give reason(s) why you think so by writing the reasons in the space provided at the end of the question.**

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. I believe that online quizzes help me measure students' learning outcomes more confidently than I would do in a paper based quiz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. When I upload the teaching-learning resources such as notes, articles or videos on Moodle I make sure that they help students analyse issues discussed during the course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. When I upload the resources on Moodle I make sure that they help students draw conclusions about issues related to the course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Give reasons to support each of your choices above (i.e. a, b, and c)

**8. Rate the following statements related to Moodle by clicking the radio button that contains the most correct response to you (Note: Tick only one response for each given statement). Then, for each response you have chosen give reason(s) why you think so by writing the reasons in the space provided at the end of the question.**

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. When I upload the resources on Moodle I make sure they help students solve problems related to the course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I enjoy teaching students using Moodle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I feel comfortable correcting my students' comments in an online environment than in a face-to-face environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Give reasons to support each of your choices above (i.e. a, b, and c)

9. Rate the following statements related to Moodle by clicking the radio button that contains the most correct response to you (Note: Tick only one response for each given statement). Then, for each response you have chosen give reason(s) why you think so by writing the reasons in the space provided at the end of the question.

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. When I believe on something, I always stick to my ideas even if there is evidence against what I believe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I find it difficult to tolerate my students' ideas especially when they contradict my own beliefs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Overall, Moodle has greatly improved my teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

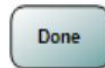
Give reasons to support each of your choices above (i.e. a, b, and c)

### 3. Thanks

This survey will be followed by a focus group discussion. Those willing to participate in the focus group discussion are advised to send an e-mail to the researcher for further contact.  
 Researcher's e-mail: [aim4@waikato.ac.nz](mailto:aim4@waikato.ac.nz) or [mwalongo@hotmail.com](mailto:mwalongo@hotmail.com)

Thank you very much for your time and willingness to participate in this survey.

To submit the survey click the 'Done' button

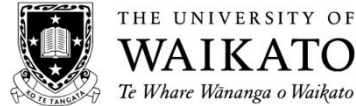


## Appendix I: Students' Guiding Questions for Focus Group Discussion

Area	Guiding Questions
Discussion forums	<ol style="list-style-type: none"> <li>1. Can you share with us your experience about using discussion forum as a teaching-learning tool?</li> <li>2. Probe based on the responses in 1 and/or elicit for responses reflecting elements of critical thinking: analysis, synthesis, evaluation and inference</li> <li>3. What are the characteristics of a good discussion forum?</li> <li>4. How will you use discussion forums in your teaching?</li> <li>5. What are the possible challenges that you think you may face on the course of using the forums with your students?</li> <li>6. How can you overcome such challenges?</li> <li>7. Any other remarks related to the discussion forum</li> </ol>
Quizzes	<ol style="list-style-type: none"> <li>1. Ask students their general views about quizzes as a tool to promote critical thinking</li> <li>2. Probe based on the responses in 1 and/ or elicit to reflect elements of critical thinking, namely analysis, synthesis, evaluation and inference</li> <li>3. What are the characteristics of a good quiz?</li> <li>4. How will you use quizzes with your students when you start teaching?</li> <li>5. What are the likely challenges that you may face when using quizzes with your students?</li> <li>6. How can you overcome such challenges?</li> <li>7. Opportunity to express any remarks they have about the tool under discussion</li> </ol>
Uploaded resources	<ol style="list-style-type: none"> <li>1. Share with us your general views about uploaded resources</li> <li>2. Probe based on responses in 1 and/or elicit for responses related to analysis, synthesis, evaluation and inference</li> <li>3. What are the characteristics of a good uploaded resource?</li> <li>4. How will you use uploaded resources with your students?</li> <li>5. What are the possible challenges that you are likely to encounter?</li> <li>6. How can you overcome such challenges?</li> <li>7. Any other views related to uploading resources as a tool for promoting critical thinking.</li> </ol>
Feedback	Views on online feedback and face-to-face feedback
Any other comments related to the use of Moodle as a teaching-learning tool	



## Appendix J: Students' Informed Consent Form for Interviews

**Re: Student teachers' perceptions about Moodle tools for teaching and learning**

I have read the Participant Invitation Letter for this study and have had the details of the study explained to me. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to withdraw from the study at any time or to decline to answer any particular questions in the study. I understand I can withdraw any information I have provided within two weeks after receiving the transcribed focus group data. I agree to provide information to the researcher under the conditions of confidentiality set out on the Participant Invitation Letter.

I also understand that the PhD thesis, journal articles and presentations will be the product of the research, thus in such cases, my identity will remain anonymous.

I agree to participate in this study under the conditions set out in the Participant Information Sheet.

I agree / do not agree to my responses to be audio-taped during the focus group discussion. (Note: cross out what is not needed).

Signed: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Researcher:

Alcuin Mwalongo

Cellular phone: +255 784 855 061

E-mail: aim4@waikato.ac.nz or mwalongo@duce.ac.tz

Supervisors:

Dr. Michael Forret

E-mail: mforret@waikato.ac.nz

Dr. Garry Falloon

E-mail: falloong@waikato.ac.nz

## Appendix K: Lecturers' Guiding Questions for Interviews

Area	Guiding Questions
Discussion forums	<ol style="list-style-type: none"> <li>1. I would like to know your experience of using the discussion forum as a teaching-learning tool</li> <li>2. Probe on the potential of the discussion forum to promote higher order thinking (based on Bloom's Taxonomy)</li> <li>3. Probe on the characteristics of a good discussion forum for promoting higher order thinking</li> <li>4. What are the possible challenges that you think you face or may face on the course of using the forums?</li> <li>5. How can you overcome such challenges?</li> <li>6. Any other remarks related to the discussion forum</li> </ol>
Quizzes	<ol style="list-style-type: none"> <li>1. I would like to know your experience of using the quiz tool for teaching-learning purposes</li> <li>2. Probe on the potential of the quiz tool for promoting higher order thinking.</li> <li>3. Probe on the characteristics for a quiz to be able to promote higher order thinking.</li> <li>4. What challenges they encounter or may encounter when using the quiz tool</li> <li>5. How they overcome such challenges?</li> <li>6. Opportunity to express any remarks they have about the quiz tool</li> </ol>
Uploaded resources	<ol style="list-style-type: none"> <li>1. I would like to know your experience of using the uploading resource tool</li> <li>2. Probe on the potential of the uploading resource tool to promote higher order thinking</li> <li>3. Probe on the characteristics of uploaded resources to be able to promote higher order thinking.</li> <li>4. What are the possible challenges they face or may face when using the uploading resource tool</li> <li>5. How can you overcome such challenges?</li> <li>6. Any other views related to uploading resources as a tool for promoting critical thinking.</li> </ol>
Feedback	Lecturers' views on online feedback and face-to-face feedback
Any other comments related to the use of Moodle as a teaching-learning tool	

## Appendix L: Lecturers' Informed Consent Form for Interviews



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

**Re: Academic staff perceptions about Moodle tools for teaching and learning**

You are invited to participate in a research on the perceptions of university academic staff about Moodle as a tool for teaching and learning.

Your participation is voluntary and anonymous.

Data collected will be used by the researcher to write a research report for the PhD, University of Waikato, New Zealand. Only the researcher and supervisors will have access to the data. Afterwards, the data will be destroyed. It is possible that journal articles and presentations may be the product of the research. In such cases, your identity will be anonymous.

You will be involved in an interview that will last for no more than 60 minutes. The interview will be audio-taped, but consent will be sought prior to the interview.

You have the right to refuse to answer any question, to ask any further questions about the study, and to access a summary of the research's findings once concluded.

The proposed study has had ethical approval from the University of Waikato Human Research Ethics Committee.

If you have any questions about the project, please feel free to contact either the researcher or the supervisors using the given contact details at the end of this page.

.....

I have read this information about Informed Consent and I fully understand the details of the study. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to decline to answer any particular questions in the study. I understand I can withdraw any information I have provided up until the researcher has commenced analysis on my data. I agree to provide information to the researcher under the conditions of confidentiality set out on the Participant Informed Consent.

I also understand that it is possible that journal articles and presentations may be the product of the research, thus in such cases, my identity will remain anonymous.

I agree to participate in this study under the conditions set out on the Participant Informed Consent.

Signed: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Researcher: Alcuin Ivor Mwalongo

Cellular phone: +255 784 855 061 or +255 767 855 061

E-mail: aim4@waikato.ac.nz, alcuinmwalongo@gmail.com or mwalongo@duce.ac.tz

Supervisors:

Dr. Michael Forret

Phone: +64 7 8384481

E-mail: [mforret@waikato.ac.nz](mailto:mforret@waikato.ac.nz)

Dr. Garry Falloon

Phone: +64 7 8384466

E-mail: [falloong@waikato.ac.nz](mailto:falloong@waikato.ac.nz)

## Appendix M: Technical Staff Interview Guide

1. What are your responsibilities as coordinator of the learning management system?
2. Technical and pedagogical support given to students and lecturers
  - a. What support
  - b. When is it given
  - c. How – web-based, phone, etc.
3. Probe on the potential of tools in Moodle to support higher order thinking.
  - a. Which tools
  - b. From the list which ones have more potential of promoting higher order thinking, and
  - c. Why
4. Probe on theoretical base upon which Moodle was developed
5. Existence or non-existence of staff training policy for using ICT as a teaching-learning tool
6. Any other general comments

## Appendix N: Technical Staff Informed Consent Form for Interviews

**Re: Technical staff perceptions about Moodle as a teaching-learning tool**

You are invited to participate in a research on the perceptions of technical staff about Moodle as a tool for teaching and learning.

Your participation is voluntary and anonymous.

Data collected will be used by the researcher to write a research report for the PhD, University of Waikato, New Zealand. Only the researcher and supervisors will have access to the data. Afterwards, the data will be destroyed. It is possible that journal articles and presentations may be the product of the research. In such cases, your identity will be anonymous.

You will be involved in an interview that will last for no more than 60 minutes. The interview will be audio-taped, but consent will be sought prior to the interview.

You have the right to refuse to answer any question, to ask any further questions about the study, and to access a summary of the research's findings once concluded.

The proposed study has had ethical approval from the University of Waikato Human Research Ethics Committee.

If you have any questions about the project, please feel free to contact either the researcher or the supervisors using the given contact details at the end of this page.

.....  
I have read this information about Informed Consent and I fully understand the details of the study. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to decline to answer any particular questions in the study. I understand I can withdraw any information I have provided up until the researcher has commenced analysis on my data. I agree to provide information to the researcher under the conditions of confidentiality set out on the Participant Informed Consent.

I also understand that it is possible that journal articles and presentations may be the product of the research, thus in such cases, my identity will remain anonymous.

I agree to participate in this study under the conditions set out on the Participant Informed Consent.

Signed: \_\_\_\_\_  
Name: \_\_\_\_\_  
Date: \_\_\_\_\_

Researcher:

Alcuin Ivor Mwalongo

Cellular phone: +255 784 855 061 or +255 767 855 061

E-mail: aim4@waikato.ac.nz, alcuinmwalongo@gmail.com or mwalongo@duce.ac.tz

Supervisors:

Dr. Michael Forret

Phone: +64 7 8384481

E-mail: [mforret@waikato.ac.nz](mailto:mforret@waikato.ac.nz)

Dr. Garry Falloon

Phone: +64 7 8384466

E-mail: [falloong@waikato.ac.nz](mailto:falloong@waikato.ac.nz)

## Appendix O: Lecturers' Consent to Access Moodle Data



October 3, 2011

Lecturer,

Dar es Salaam University College of Education

**Re: Student teachers' perceptions about Moodle tools for teaching and learning**

I would like to request your permission to access your students' teaching-learning tasks in Moodle. The institution's participation will be anonymous.

I am working on a research study about student teachers' perceptions about Moodle as a tool for teaching-learning purposes in your institution that commenced in August 2011 and will end in December 2011.

This research is conducted as a requirement for a PhD of the University of Waikato.

To be able to access students' learning tasks, I would request you to register me in Moodle as a guest. Furthermore, I do request to access some of your students' teaching-learning tasks such as completed quizzes, submitted assignments and other student related tasks. Consent will be sought from the students before accessing their data.

A PhD thesis will be a product of the research. Only the researcher and supervisors will have access to such data. Afterwards, the data will be destroyed. It is possible that journal articles and presentations may be the product of this research. In such cases, names or any other identity of the lecturers and students will remain anonymous.

You have the right to withhold any information, to ask any further questions about the study, and to be given access to a summary of findings from the study when it is concluded.

If you have any questions about the research, please feel free to contact either the researcher or the supervisors using the given contact details below.

Researcher:

Alcuin Mwalongo

Cellular phone: +255 784 855 061

E-mail: aim4@waikato.ac.nz or mwalongo@duce.ac.tz

Supervisors:

Dr. Michael Forret

E-mail: mforret@waikato.ac.nz

Dr. Garry Falloon

E-mail: falloong@waikato.ac.nz

## Appendix P: Students' Consent to Access Moodle Data



December 15, 2011

Student Teachers,

Dar es Salaam University  
 Dar es Salaam University College of Education  
 The Open University of Tanzania

**Re: Student teachers' perceptions about Moodle tools for teaching and learning**

I would like to request your permission to access your data in Moodle such as in discussion forums, quizzes and wikis. The use of such data will not influence your academic progress in any way.

Furthermore, your involvement and the institution's participation will be anonymous.

I am working on a research study about student teachers' perceptions about Moodle as a tool for teaching-learning purposes in your institution that commenced in August 2011 and will end in December 2011.

This research is conducted as a requirement for a PhD of the University of Waikato.

A PhD thesis will be a product of the research. Only the researcher and supervisors will have access to such data. Afterwards, the data will be destroyed. It is possible that journal articles and presentations may be the product of this research. In such cases, names or any other identity of the students will remain anonymous.

You have the right to withhold any information, to ask any further questions about the study, and to be given access to a summary of findings from the study when it is concluded.

If you have any questions about the research, please feel free to contact either the researcher or the supervisors using the given contact details below.

Researcher:

Alcuin Mwalongo

Cellular phone: +255 784 855 061

E-mail: aim4@waikato.ac.nz or mwalongo@duce.ac.tz

Supervisors:

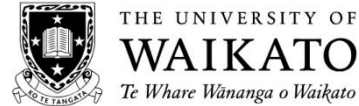
Dr. Michael Forret

E-mail: mforret@waikato.ac.nz

Dr. Garry Falloon

E-mail: falloong@waikato.ac.nz

## Appendix Q: Lecturers' Consent Form for Administering the Survey



August 25, 2011

Lecturers,  
 School of Education  
 Dar es Salaam University College of Education  
 The Open University of Tanzania, Faculty of Education

**Re: Student teachers' perceptions about Moodle tools for teaching and learning**

I would like to request your permission to conduct a survey on students' perceptions about Moodle as a teaching-learning tool with your students during your lecture time. The institution's participation will be anonymous. Furthermore, permission to carry out the study has been sought from university authorities.

I am working on a research study about student teachers' perceptions about Moodle as a tool for teaching-learning purposes in your institution that commenced in August 2011 and will end in December 2011.

The students of a chosen pedagogy course will be involved in filling in questionnaires for no more than 30 minutes in their respective lecture hours. Their participation is voluntary.

This research is conducted as a requirement for a PhD of the University of Waikato.

A PhD thesis will be a product of the research. Only the researcher and supervisors will have access to such data. Afterwards, the data will be destroyed. It is possible that journal articles and presentations may be the product of this research. In such cases, names or any other identity of the students will remain anonymous.

The participants who take part in the study will have the right to refuse to answer any particular question, to withdraw from the study at any time, ask any further questions about the study that occur during their participation, and be given access to a summary of findings from the study when it is concluded.

I, therefore, request you to disseminate this information to the respective students.

If you have any questions about the research, please feel free to contact either the researcher or the supervisors using the given contact details below.

Researcher:  
 Alcuin Mwalongo  
 Cellular phone: +255 784 855 061  
 E-mail: aim4@waikato.ac.nz or mwalongo@duce.ac.tz

Supervisors:  
 Dr. Michael Forret  
 E-mail: mforret@waikato.ac.nz

Dr. Garry Falloon  
 E-mail: falloong@waikato.ac.nz

**Thank you for your time and cooperation.**



## Appendix R: RCS-CAIS Model for Analysis of Moodle Generated Data

<b>S. No</b>	<b>Components 1</b>	<b>Coding Criteria</b>
1	Recall	The post indicates recall of ideas, materials, or phenomena related to the discussion
2	Comprehension	The post gives examples, summarises, or classifies the issue or idea under discussion, but it does not relate to other issues or ideas
3	Socialisation	The post is social in nature and has the potential of sustaining online discussion
	<b>Components 2</b>	<b>Coding Criteria</b>
1	Clarification	The post analyses and discusses the issue precisely and clearly
2	Assessment	The posting indicates relevant gathered information and makes value judgement based on the given situation
3	Inference	The posting makes generalisations and arrives at rational conclusions
4	Strategies	The posting proposes a solution(s) to a given issue (problem)

Appendix S: Students' Dispositions (Disagree and Agree)

Disposition	Code	Disagree	Agree	Non-response	Dis %	Agree %	Total
<b>Analyticity</b>	DF1	7	45	2	13.5	86.5	52
	QZ1	30	16	7	65.2	34.8	46
	UR1	5	42	6	10.6	89.4	47
<b>Truth-seeking</b>	DF2	10	41	2	19.6	80.4	51
	QZ2	17	31	5	35.4	64.6	48
	QZ7	23	22	8	51.1	48.9	45
	UR2	33	15	5	68.8	31.3	48
	GV6	12	32	9	27.3	72.7	44
<b>Systematicity</b>	DF3	6	44	3	12.0	88.0	50
	QZ3	9	39	5	18.8	81.3	48
	UR3	8	40	5	16.7	83.3	48
<b>Maturity</b>	DF4	5	45	3	10.0	90.0	50
	QZ4	11	38	4	22.4	77.6	49
	UR4	5	44	4	10.2	89.8	49
<b>Open-mindedness</b>	DF5	18	34	1	34.6	65.4	52
	DF6	10	41	2	19.6	80.4	51
	QZ5	11	38	4	22.4	77.6	49
	GV4	26	20	7	56.5	43.5	46
	GV5	25	20	8	55.6	44.4	45
<b>Inquisitiveness</b>	DF7	27	23	3	54.0	46.0	50
	QZ6	25	21	7	54.3	45.7	46
	GV1	6	39	8	13.3	86.7	45
	GV3	24	20	9	54.5	45.5	44
<b>Self-confidence</b>	DF8	9	39	5	18.8	81.3	48
	QZ8	11	36	6	23.4	76.6	47
	GV2	13	33	7	28.3	71.7	46

N = 54

Appendix T: Students' Dispositions by Gender

Disposition	Code	Disagree				Agree				Sum		Non-response
		Male	%	Female	%	Male	%	Female	%	Male	Female	
Analyticity	DF1	2	6.1	4	26.7	31	93.9	11	73.3	33	15	6
	QZ1	19	67.9	10	66.7	9	32.1	5	33.3	28	15	10
	UR1	2	6.9	2	13.3	27	93.1	13	86.7	29	15	9
Truth-seeking	DF2	4	12.5	4	26.7	28	87.5	11	73.3	32	15	6
	QZ2	8	27.6	7	43.8	21	72.4	9	56.3	29	16	8
	QZ7	14	50.0	7	50.0	14	50.0	7	50.0	28	14	11
	UR2	20	66.7	11	73.3	10	33.3	4	26.7	30	15	8
	GV6	4	13.8	7	53.8	25	86.2	6	46.2	29	13	11
Systematicity	DF3	3	9.7	2	13.3	28	90.3	13	86.7	31	15	7
	QZ3	4	13.8	4	25.0	25	86.2	12	75.0	29	16	8
	UR3	2	6.7	4	26.7	28	93.3	11	73.3	30	15	8
Maturity	DF4	2	6.5	1	6.7	29	93.5	14	93.3	31	15	7
	QZ4	5	16.7	5	31.3	25	83.3	11	68.8	30	16	8
	UR4	1	3.2	2	13.3	30	96.8	13	86.7	31	15	8
Open-mindedness	DF5	11	34.4	6	37.5	21	65.6	10	62.5	32	16	6
	DF6	6	19.4	4	25.0	25	80.6	12	75.0	31	16	6
	QZ5	5	16.7	5	31.3	25	83.3	11	68.8	30	16	8
	GV4	15	50.0	10	71.4	15	50.0	4	28.6	30	14	10
	GV5	15	51.7	9	64.3	14	48.3	5	35.7	29	14	10
Inquisitiveness	DF7	14	45.2	11	73.3	17	54.8	4	26.7	31	15	7
	QZ6	15	53.6	8	53.3	13	46.4	7	46.7	28	15	10
	GV1	2	6.7	3	23.1	28	93.3	10	76.9	30	13	10
	GV3	13	46.4	10	71.4	15	53.6	4	28.6	28	14	11
Self-confidence	DF8	6	20.0	3	20.0	24	80.0	12	80.0	30	15	8
	QZ8	6	20.7	3	20.0	23	79.3	12	80.0	29	15	9
	GV2	8	26.7	4	28.6	22	73.3	10	71.4	30	14	9
N = 54		Males n = 33				Females n = 16				Non-response = 4		

Appendix U: Students' Dispositions by Pre-service and In-service

Disposition	Code	Disagree				Agree				Sum		Non-response	
		Pre-serv	%	In-serv	%	Pre-serv	%	In-serv	%	Pre-	In-serv		
Analyticity	DF1	4	14.8	1	6.3	23	85.2	15	93.8	27	16	10	
	QZ1	15	60.0	12	85.7	10	40.0	2	14.3	25	14	14	
	UR1	3	11.1	1	7.1	24	88.9	13	92.9	27	14	12	
Truth-seeking	DF2	5	18.5	2	12.5	22	81.5	14	87.5	27	16	10	
	QZ2	8	32.0	6	37.5	17	68.0	10	62.5	25	16	12	
	QZ7	11	45.8	8	53.3	13	54.2	7	46.7	24	15	14	
	UR2	16	59.3	11	78.6	11	40.7	3	21.4	27	14	12	
	GV6	9	34.6	2	16.7	17	65.4	10	83.3	26	12	15	
Systematicity	DF3	3	11.5	0	0.0	23	88.5	16	100.0	26	16	11	
	QZ3	4	16.0	3	18.8	21	84.0	13	81.3	25	16	12	
	UR3	4	14.8	2	14.3	23	85.2	12	85.7	27	14	12	
Maturity	DF4	2	7.4	0	0.0	25	92.6	15	100.0	27	15	11	
	QZ4	5	20.0	4	25.0	20	80.0	12	75.0	25	16	12	
	UR4	2	7.4	1	7.1	25	92.6	13	92.9	27	14	12	
Open-mindedness	DF5	11	40.7	6	37.5	16	59.3	10	62.5	27	16	10	
	DF6	8	30.8	1	5.9	18	69.2	16	94.1	26	17	10	
	QZ5	6	24.0	4	25.0	19	76.0	12	75.0	25	16	12	
	GV4	15	57.7	8	61.5	11	42.3	5	38.5	26	13	14	
	GV5	14	51.9	9	75.0	13	48.1	3	25.0	27	12	14	
Inquisitiveness	DF7	14	51.9	10	66.7	13	48.1	5	33.3	27	15	11	
	QZ6	11	45.8	10	66.7	13	54.2	5	33.3	24	15	14	
	GV1	3	11.1	1	8.3	24	88.9	11	91.7	27	12	14	
	GV3	12	46.2	9	75.0	14	53.8	3	25.0	26	12	15	
Self-confidence	DF8	6	22.2	2	14.3	21	77.8	12	85.7	27	14	12	
	QZ8	5	20.0	3	20.0	20	80.0	12	80.0	25	15	13	
	GV2	7	25.9	5	38.5	20	74.1	8	61.5	27	13	13	
		N = 54		Pre-service: n = 27				In-service n = 17				Missing n = 10	

## Appendix V: Students' Dispositions by Universities

Disposition	Code	Disagree						Agree						Sum			Non-response
		Uni A	%	Uni B	%	Uni C	%	Uni A	%	Uni B	%	Uni C	%	A	B	C	
Analyticity	DF1	2	28.6	5	19.2	0	0	5	71.4	21	80.8	6	100	7	26	6	2
	QZ1	4	57.1	19	61.3	7	87.5	3	42.9	12	38.7	1	13	7	31	8	7
	UR1	1	14.3	3	9.4	1	12.5	6	85.7	29	90.6	7	88	7	32	8	6
Truth-seeking	DF2	3	42.9	6	17.1	1	11.1	4	57.1	29	82.9	8	89	7	35	9	2
	QZ2	2	28.6	12	37.5	3	33.3	5	71.4	20	62.5	6	67	7	32	9	5
	QZ7	3	50.0	14	46.7	6	66.7	3	50.0	16	53.3	3	33	6	30	9	8
	UR2	4	57.1	22	66.7	7	87.5	3	42.9	11	33.3	1	13	7	33	8	5
	GV6	3	42.9	7	23.3	2	28.6	4	57.1	23	76.7	5	71	7	30	7	9
Systematicity	DF3	0	0.0	6	17.6	0	0	7	100.0	28	82.4	9	100	7	34	9	3
	QZ3	3	42.9	4	12.5	2	22.2	4	57.1	28	87.5	7	78	7	32	9	5
	UR3	2	28.6	5	15.2	1	12.5	5	71.4	28	84.8	7	88	7	33	8	5
Maturity	DF4	0	0.0	5	14.7	0	0	7	100.0	29	85.3	9	100	7	34	9	3
	QZ4	2	28.6	6	18.8	3	30	5	71.4	26	81.3	7	70	7	32	10	5
	UR4	1	14.3	3	9.1	1	11.1	6	85.7	30	90.9	8	89	7	33	9	5
Open-mindedness	DF5	2	28.6	12	35.3	4	36.4	5	71.4	22	64.7	7	64	7	34	11	2
	DF6	3	42.9	7	20.6	0	0	4	57.1	27	79.4	10	100	7	34	10	2
	QZ5	1	14.3	7	21.9	3	30	6	85.7	25	78.1	7	70	7	32	10	5
	GV4	4	57.1	18	58.1	4	50	3	42.9	13	41.9	4	50	7	31	8	8
	GV5	4	57.1	18	58.1	3	42.9	3	42.9	13	41.9	4	57	7	31	7	8
Inquisitiveness	DF7	4	57.1	14	42.4	9	90	3	42.9	19	57.6	1	10	7	33	10	3
	QZ6	5	71.4	14	46.7	6	66.7	2	28.6	16	53.3	3	33	7	30	9	7
	GV1	1	14.3	4	12.9	1	14.3	6	85.7	27	87.1	6	86	7	31	7	8
	GV3	3	50.0	16	51.6	5	71.4	3	50.0	15	48.4	2	29	6	31	7	9
Self-confidence	DF8	1	16.7	7	21.9	1	10	5	83.3	25	78.1	9	90	6	32	10	5
	QZ8	3	42.9	6	19.4	2	22.2	4	57.1	25	80.6	7	78	7	31	9	6
	GV2	2	28.6	9	28.1	2	28.6	5	71.4	23	71.9	5	71	7	32	7	7
N = 54		University A: n = 7					University B: n = 35					University C: n = 12					

## Appendix W: Lecturers' Dispositions (Disagree and Agree)

Disposition	Code	Disagree		Agree		Total		Non-response	
			%		%		%		%
Analyticity	DF1	4	33.3	8	66.7	12	80.0	3	20.0
	QZ1	3	27.3	8	72.7	11	73.3	4	26.7
	UR1	1	8.3	11	91.7	12	80.0	3	20.0
Truth-seeking	DF2	4	33.3	8	66.7	12	80.0	3	20.0
	QZ2	2	16.7	10	83.3	12	80.0	3	20.0
	GV5	3	23.1	10	76.9	13	86.7	2	13.3
Systematicity	DF3	4	33.3	8	66.7	12	80.0	3	20.0
	QZ3	1	8.3	11	91.7	12	80.0	3	20.0
	UR2	1	8.3	11	91.7	12	80.0	3	20.0
Maturity	DF4	4	36.4	7	63.6	11	73.3	4	26.7
	QZ4	1	8.3	11	91.7	12	80.0	3	20.0
	UR3	8	66.7	4	33.3	12	80.0	3	20.0
Open-mindedness	DF5	5	45.5	6	54.5	11	73.3	4	26.7
	DF6	4	36.4	7	63.6	11	73.3	4	26.7
	QZ5	3	27.3	8	72.7	11	73.3	4	26.7
	GV3	11	84.6	2	15.4	13	86.7	2	13.3
	GV4	11	91.7	1	8.3	12	80.0	3	20.0
Inquisitiveness	DF7	7	63.6	4	36.4	11	73.3	4	26.7
	QZ6	8	72.7	3	27.3	11	73.3	4	26.7
	GV1	2	16.7	10	83.3	12	80.0	3	20.0
Self-confidence	DF8	6	54.5	5	45.5	11	73.3	4	26.7
	QZ7	9	90.0	1	10.0	10	66.7	5	33.3
	QZ8	7	63.6	4	36.4	11	73.3	4	26.7
	GV2	7	58.3	5	41.7	12	80.0	3	20.0

N = 15