University of Dar es Salaam

THE USE OF MOODLE TO SUPPORT TEACHING AND LEARNING AT THE UNIVERSITY OF DAR ES SALAAM, TANZANIA

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Acronym	Description
CASS	College of Arts and Social Sciences
CoET	School of Education and College of Engineering Technology
CoICT	College of Information and Communication Technologies
CoNAS	College of Natural Applied Sciences
CVL	Centre for Virtual Learning
ESDP	Education Sector Development Plan
ETI	Educational Technology Initiative
ETS	Educational Technology Strategy
HLIs	Higher Learning Institutions
ICT	Information and Communication Technology
ITRU	Instructional Technology Resource Unit
LMS	Learning Management System
NMMU	Nelson Mandela Metropolitan University
OSS	Open Source Software
PHEA	Partnership for Higher Education in Africa
TEIL	Technology Enhanced Independent Learning
UDSM	University of Dar es Salaam

1 Introduction

Information and communication technology (ICT) is a principal driver of economic development and social change, worldwide. Some countries have demonstrated efforts for utilizing the potential of ICT in improving access to education and quality of teaching and learning, to capitalize on the ability of ICTs to support learners and teachers' activities. The Government and higher learning institutions (HLI's) in Tanzania recognize the potential of ICT to act as a tool for improving education delivery, outcomes and impact, as evidenced through the national plans, policies and strategies. The Tanzania Vision 2025, the key national development strategy, recognizes the role of education as a strategic change agent for transformation of the economy to a knowledge economy, and identifies the potential of ICT to address most of the development challenges including those presented by education. The National ICT Policy of 2003[1] recognizes that ICT can enhance education opportunities and advocates for the introduction of an e-education system. Similarly, the *Education Sector Development Plan (ESDP)* [2] recognizes the role of computer studies in fostering technological and scientific developments, with the education sector review reiterating the need to expand the use of ICT to improve the quality of education.

It is in this context that most HLIs have established policies and strategies for harnessing ICT in institutional processes, and deployed several ICT systems to enhance teaching and learning. University of Dar es Salaam (UDSM) decided to implement Educational Technology Initiative (ETI) by development an Educational Technology Strategy (ETS). The Educational Technology Strategy Vision is "To ensure that all instructional technology programmes are available to support an environment in which student achievement is enhanced through a set of information age tools and skills". In addition, the strategy had identified the following priority areas

a) ***The Learning Management System*** - Mobilising, strengthening and customising the Moodle LMS that has been piloted in the institution since 2008. Other areas include training staff and students in the use of Moodle, adapting generic guidelines on the use of Moodle for use by UDSM staff and students.

b) ***E-learning materials*** - Identification, adaptation and usage of existing open source learning materials. This involves also the creation of new interactive e-learning materials to foster independent learning and adapting generic guidelines for UDSM staff on e-learning materials.

c) ***Research capacity on the use of educational technologies*** - Developing a monitoring and evaluation framework for current and future project activities. Increasing the output of research studies and publications on ICT use in education.

d) ***Policy development*** - Distilling and using lessons learned and other experiences to contribute to institutional policy development for ICT-mediated learning.

In line with the priorities of the institution, two key projects were identified and implemented. The first Project focuses on migration to a new LMS while Second Project focuses on the identification, adaptation and development of interactive learning materials. Both projects include capacity development of staff and

students to ensure the uptake of new ideas and practices related to educational technology.

The two Partnership for Higher Education in Africa (PHEA) ETI projects have been underway for two years (2010 – 2012), and the institution feels that it is now time to explore the outcomes of ICTs in teaching and learning in the two PHEA ETI projects at UDSM.

1. Locating the study within broader discourses of LMS in higher education

The adoption of LMSs in HLI specifically in developing countries has been increasing very fast alongside research focusing on pedagogical effectiveness of these systems [3][4]. The trend shows that even the largest HLIs such as University of Cape Town, Makerere University, University of Nairobi, University of Zambia and Nelson Mandela Metropolitan University (NMMU) have adopted these systems on their campuses [5]. The HLIs adopt these systems for different reasons. These reasons include to provide access to a wide range of materials electronically to supplement face-to-face classroom[6], improve quality of education, and widen access of education [7] through distance and blended learning.

Apparently there are more than 200 LMSs on the market today both Proprietary and Open Source Software (OSS) LMSs [8]. The most popular LMSs in the market today are Blackboard, Sakai, WebCT, and Moodle. Blackboard LMS is the most popular PE LMS which was founded in 1997. Recently the Blackboard LMS was merged with WebCT (2006) in order to remain competitive in the LMS market. Despite its popularity, the rising costs and inflexibility of PE LMS has created a demand for OSS alternatives. For instance, it was reported that the cost of deploying eLSs in the University of Education, Winneba, in Ghana was estimated to be $20 a year per student with a minimum of 15,000 students[6] in 2008. As a result, sseveral institutions have migrated from Blackboard and other PE LMS to OSS LMS in order to reduce the cost associated with licence fee, maintenance, training and support [9]. However, according to Ssekakubo et al. [5], even institutions which are currently using PE LMS are reviewing their current choices and a growing number are moving from Blackboard to either Moodle or Sakai. In his study conducted using 316 respondents who attended eLearning Africa 2008, Unwin [10] found out that Moodle LMS was the most popular OSS LMS and widely used in African Universities. To date, there are 68,783 active sites that have registered from 222 countries[11]. In Tanzania for instance, 78 per cent private and government owned institutions use Moodle LMS [12] in their campuses.

Most of these LMS, either PE LMS or OSS LMS have similar functionalitties and features.They provide access to learning resources in form of PowerPoint slides, PDF, Ms Word, and assessments. They also provide commutation tools such as chat, forum and mail [13] to facilitate asynchronous and synchronous communications. The LMSs through its tools facilitate learning in many ways. For instance, wikis enable learners to participate actively by contributing to a topic of interest and collaborating in groups to share available resources [12] while discussion forums enable learners and educators to share knowledge through asynchronous communication. Chat facility provides a platform for learners and

facilitator to communicate synchronously through text messages. In addition to these tools, some of these systems are integrated with multimedia facilities to enable delivery of course materials in various formats such as audio, video and animations [14] and therefore allow students to access interactive course materials.

However, despite massive investments by several institutions in adopting LMS into their campuses, it seems that such initiatives in developing countries do not fulfil their potential; they fail, either totally or partially [5]. Moreover, adoption of LMSs in majority of institutions in developing countries is low and is still at its infancy[6] [12].There are various reasons mentioned in majority of studies. These includes low connectivity speeds to internet [6][15][16], high ICT-illiteracy rates and low comfort levels using ICT–solutions, ineffective maintenance and inefficient user support strategies, and LMS selection and usability issues [5] [12].

With the tremendous improvement of ICT infrastructure and connectivity, increased access to internet and emergence low-cost smart phone in developing countries, there is no doubt that the use and adoption of LMSs will continue to increase. Several initiatives are currently underway to improve internet access and increase bandwidth in many developing countries. Some examples of initiatives include marine cables SEACOM cable[1] and EASSy[2] along the eastern and southern African coastlines and West African Cable System (WACS)[3] along western African coastline respectively. For instance, ”SEACOM expects to provide capacity to another 60Mbps-plus research and educational institutes in Tanzania at a discounted rate [16]”. The project was expected to be completed by end of 2011. Likewise developing countries particularly sub-Saharan Africa has been observed as the fastest growing telecommunication sectors in the world [17]. In recent report by World Bank published in 2009 [18] indicates that the mobile network coverage in Africa rose from 16 percent to 90 percent of the urban population and rural coverage stood at just under 50 per cent of the population between 1990 -2009. Smart phones are becoming less expensive and affordable to many users in developing countries. As a result of this, institutions are taking advantage of this opportunity to expand access to education up to rural areas where connectivity is still limited. This helps students to access LMSs without dependence on an extensive traditional communications infrastructure [19]. However, the success of mobile learning depends on the ability of instructors to design and develop pedagogical effective learning environments that lies beyond technological developments. Once this is overcome, the use of LMSs will continue to be the pivot of eLearning delivery both through computers and handheld devices in a number of years to come.

1 http://www.seacom.mu/
2 http://www.eassy.org/
3 http://www.ace-submarinecable.com/ace/default/EN/all/ace_en/

2. Research Design and Methodology

2.1 Research questions

The study intended to answer the following questions

a. What is the level of uptake of Moodle at UDSM?
b. What factors have affected the deployment and use of Moodle?
c. What is the nature of the use of Moodle?
d. What has been the impact of Moodle on teaching and learning in the university?
e. What factors could improve the use and impact of Moodle for teaching and learning?
f. If lecturers could do things differently, what would these be and how would it be done differently?
g. What would students like to see more of and less of in their programmes?

2.2 Methodology

The researchers used both quantitative and descriptive research in collecting the data from respondents. The design was preferred because it is concerned with answering questions such as who, how, what which, when and how much (Cooper & Schindler, 2003). A descriptive study was carefully designed to ensure complete description of the situation, making sure that there is minimum bias in the collection of data and to reduce errors in interpreting the data collected. On the other hand, the quantitative was in order to maximize objectivity, replicability, and generalizability of findings, and are typically interested in prediction. Integral to this approach is the expectation that researcher(s) set aside their experiences, perceptions, and biases to ensure objectivity in the conduct of the study and the conclusions that are drawn.

The target participants were instructors and students and technical support from the Centre for Virtual Learning (CVL). Both users and non-users of Moodle LMs were targeted in order to obtain a holistic picture of use and non-use of Moodle at UDSM. The number of participants in the various research methods is indicated in Table 1.

Table 1 Number of participants per each group involved in research

Research method	**Participants**	**No of respondents**
Survey	Students	230
	Instructors	98
Focus groups	Students	30
	Instructors	15
Focus group instrument administered as questionnaire	Students – non-users of Moodle	80

Regarding the survey, 230 students and 98 staff members completed the questionnaire. Male students constituted 66% of the sample and female students 34%. Students from Computer Science and Engineering made up 51% of the sample, followed by students from Chemical and Mining Engineering, who constituted 23%. Other disciplines like Electronics and Communication Engineering (6%) and Literature (4%) had very small compositions of students using Moodle. Students from History and literature, Literature and Kiswahili, Mineral Processing Engineering, and Foreign Language and Linguistics all had less than 1% student respondents respectively. This data was corroborated by lecturer data to a large extent, as 49% of the lecturers who indicated they were using Moodle for teaching used it for the courses “Introduction to high level programming” and “Physical Chemistry for Engineering.” This data suggests that use of Moodle is prevalent among engineering disciplines where information systems is an integral part. It also suggests that there is a strong association between lecturer use of technology and student uptake. All 230 students who completed the questionnaire were undergraduate students.

The sample of lecturers is discussed in relation to those who used Moodle (users) and those who did not (non-users). Only 30 respondents (31%) indicated they were users of Moodle while 67 (69%) reported they were non-users. The majority of lecturers for both groups were assistant lecturers as highlighted in Figure 1.

Figure 1: Designation of lecturers

Only one senior lecturer was using Moodle for teaching.

The majority of non-users as well as users were young, in the 25 – 40 age group as reflected in Figure 2.

Figure 2: Age profile of staff respondents

The age distribution suggests that as much as there are young people who are keen to take up technology for teaching and learning, there are also some young people who are not that excited about it.

2.2.1 Instruments and data collection

Two sets of instruments for data collection, for students and lecturers were developed in the form of a survey questionnaire and a focus group interview guide. The instruments were meant to probe to gain an understanding of the use of Moodle at UDSM. The instruments were developed collaboratively by the research team, with the project leader carefully considering every input and revising the instruments accordingly. When all inputs had been considered and it appeared there were no more problems with the questionnaires, the instruments were piloted and further reviewed, and adopted for use. The research team from CVL administered the survey and facilitated focus group interviews.

Focus group interviews

A qualitative research interview seeks to cover both a factual and a meaning level, though it is usually more difficult to interview on a meaning level (Kvale, 1996). In this regard several interviews were conducted for both students (**Annexure D**) and staff (**Annexure C**), in the form of focus groups. Focus group interviews were particularly useful for getting the story behind the respondents' experiences of using the learning management system. Focus group interviews were facilitated with 30 students and 15 lecturers using Moodle. The focus group instrument was administered to 80 students who were not using Moodle (**Annexure E**), and their responses were captured and coded. Both student and lecturer focus group participants were drawn from the College of Arts and Social Sciences (CASS), College of Natural Applied Sciences (CoNAS), College of Information and Communication Technologies (CoICT), School of Education and College of Engineering Technology (CoET).

Questionnaires

The researchers chose the self-administered questionnaire method for all respondents as it is inexpensive and allowed the respondents to complete the questionnaire at a convenient time to them. Each respondent received the same set of questions in exactly the same way. To pre-test for reliability and validity of the research instruments expert validity views and suggestions of the supervisors were initially incorporated in the questionnaires which were aimed at capturing specific information from the respondents. Then the instrument was pilot tested with seven similarly situated respondents. As a result of the pilot test, minor changes in word selection and instructions were made to the questionnaire. The questionnaire was distributed to departments known to be using Moodle, selected randomly. The questionnaire that was used is included in this report as **Appendix A for** the lecturers' questionnaire and **Annexure B** for the student questionnaire.

2.2.2 Data analysis and presentation

This involved qualitative and quantitative analysis. The data collected through questionnaires and focus group discussions was carefully reviewed for completeness. All survey data was captured in SPSS for analysis. The data was then analyzed using descriptive statistics - frequencies and cross tabulation was applied to help establish patterns, trends and relationships and to make it easier for the researcher to understand and interpret implications of the study. Presentation of data was in the form of Tables, Pie-charts and Bar graphs only

where it provided meaningful interpretation of the findings. Descriptive data was provided in the form of explanatory notes. Focus group data was captured in grouped format – with all responses for students and staff separately captured for each question. This clustering was then used for thematic coding, using codes that were developed using the conceptual framework that identifies factors to technology uptake as being determined by levels and factors. Factors include socio-economic, organisational, pedagogical and epistemological, and technological. The levels that can intersect or influence these sectors are global, regional, national, institutional, disciplinary, course, and personal.

2.2.3 Validity and reliability

According to Hammersley [20] validity is "the extent to which an account accurately represents the social phenomena to which it refers" (1990: 57) and reliability is the "degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions" (1992: 67). Maxwell [21] distinguishes five kinds of validity, four of which were deployed in the execution of this study.

Descriptive validity relates to full and accurate recording of data. This was achieved through full transcriptions of all the focus group interviews that were conducted. All the survey data was captured and cleaned up before analysis. The detailed description of the research design, presentation of instruments used, data collection and analysis codes are all aimed at addressing reliability issues.

Interpretive validity is the ability of the research to make interpretations that data have for the participants. The central question for this study was an exploration of the level of uptake of Moodle by students and lecturers. This exploration involved use of a survey and focus group interviews. The instruments were designed collaboratively by the research team, ensuring that there were no ambiguities apparent in research questions. The instruments were also piloted and adjusted before use.

Coding of focus group interview data poses a validity and reliability risk as codes can be subjectively derived and used. This risk was addressed in the study by using codes derived from the contextual framework derived for the PHEA initiative. The codes were derived through constant comparison, by looking at the responses to each question grouped together and assigning codes to determine the level and factor for uptake, for example, the following table reflects some of the coding from lecturer focus groups.

Table 2 Example of coding of focus group interview data

Question	Response	Code
We're interested in your impressions of how the use of Moodle has impacted your	It has a little problem due to some constraints but since the offline created (CDs) it simplify the work and I did not get any complain from students.	Enabler – creation of CD Roms Impact - technology/pedagogical factor/simplifies

teaching and your students' learning. How has your teaching been impacted by the use of Moodle?	The students are very happy on using Moodle for learning process but some time discouraged due to some reasons e.g. internet problems therefore we need to put LMS the things like cloud computing	Barrier at institutional level/technical factor/infrastructure shortage
	The LMs help students to share material and access their own any time, hence no need to provide hardcopy to them. Some students also are not happy with Moodle features such as enrolment key, need to be eliminated.	Impact at personal level sharing of resources Barrier at personal level – enrolment key
	It is good system but many student from outside main campus are not aware with Moodle e.g. students from DUCE. Therefore it is important to advertise Moodle more especial outside campus	Barrier Barrier at institutional level - lack of awareness of Moodle Enabler to usage/publicize Moodle
	Moodle allows student to chat with teachers and discuss different issues based on the course topic and so on. Also it a way of avoiding some threats to computers such as virus because students can access material direct from the system no need to use flash disk to save softcopy.	Impact at pedagogical level/ student access to teachers through chat Impact on infrastructure/ protection of machines from viruses
	It is make easy to assess (To provide Quiz, assignment and test) students especial for the big class. Therefore ; it is good for sharing information and learning resources	Impact at pedagogic level/access to information
	Moodle is the key factor for me to manage big class smoothly because make life easy since you can circulate lecture notes and other material quick and ease just by uploading in LMS.	Impact at pedagogic level/access to information
	It is save time to provide resources to students and increase learning flexibility which allows student to access material any time	Impact at pedagogical level/reduced workload Impact at pedagogic level/access to information

	Moodle make interaction between me and student easy	Impact of ET/communication with students
	Moodle make communication with students more reliable and simple	Impact of ET/communication with students

In this example, although the question was asking lecturers to speak about impact, their expositions also highlighted enablers and constraints to usage of Moodle, and these expositions were coded accordingly. Several iterations of coding were done to ensure consistency of the codes and to ensure that codes were assigned levels and factors.

A structured focus group interview guide was used, where the same questions were asked of the students and the lecturers about their experiences with Moodle, but from their own user perspectives as lecturers or students. This way, there was triangulation on factors and levels affecting uptake among the student and lecturer groups.

Conceptual validity was achieved through the use of the PHEA contextual framework which offers a language of description to code data based on levels and factors influencing uptake of technology.

2.2.4 Limitations of study

The study was conducted only at the main campus of the University of Dar es Salaam. As such, the study is not able to reflect on differences in geography as a result of the dispersed campuses of the University. It would be useful for this study to be replicated across multiple campuses to explore what the uptake of Moodle is at the various centres and to evaluate whether the enablers of and challenges to uptake resonate across the different sites. Further, the study did not include an analysis of Moodle data, to evaluate the extent to which Moodle was being used and for what purposes, for the purposes of corroborating research data. Future research should consider doing a log analysis to enrich the data.

3. Overview of national contextual factors

The Government has observed that the use of ICT is an inevitable component in the process of improving the quality delivery of education. The current developments in science and technology have stimulated ICT to become one of the basic building blocks of knowledgeable society, where many countries including the Government of Tanzania are now considering ICT as part of development in education and training as well as a means of solving the challenges facing the education sector.

In recognizing this, the Government of the United Republic of Tanzania has prepared a number of national policies, master plans and strategies that address the use of ICT (some particularly for education). Some of those are the Education Sector Development Programme (1998), the Teacher Education Master Plan

(2000), Secondary Education Master Plan (2000), the Higher Education Strategic Plan and the National ICT Policy (2003). The National ICT Policy stresses the use of ICT to improve the quality of delivery of education and training in all areas including ICT Mediated distance learning and Blended Learning. The policy further puts emphasis on retraining and re-skilling the existing human capital so as to enhance the use of ICT's in education. Furthermore the Government through MoEVT has Installing Moodle LMS to 34 teacher colleges. Also more than fifteen (15) institutions in Tanzania are using Moodle LMS e.g. Mzumbe, College of Business Education (CBE), Open University of Tanzania (OUT), Iringa University College (IUCO), and UDSM.

4. Brief overview of key contextual factors at UDSM

On-line Education is fast becoming a mainstream reality rather than a myth throughout the world. The University of Dar es Salaam has shown a strong commitment in the development and expansion of ICTs at the University and beyond. Beginning the year 1994, UDSM embarked on a University wide coordinated development of ICT resources. Following its Corporate Strategic Plan, approved by the UDSM Council in 1994 to guide Institutional Transformation Plan (ITP) activities, the University has, among other things put in place a University-wide ICT Master Plan [3] and ICT Policy [4].

E-learning activities at UDSM have been observed since 1998 when UDSM embarked on a TEIL programme to integrate ICT in teaching and learning with an objective to provide an independent learning environment. Under this programme, several achievements have been made, including establishment of the e-learning platform (Blackboard), creation of student ICT laboratories in most of the faculties, and students' halls of residence and hostels for increasing access to the learning platform, creating awareness of students and staff as well as conducting relevant training.

In 2001 UDSM established the Instructional Technology Resource Unit (ITRU) as a continuation of the Technology Enhanced Independent Learning (TEIL) programme with a purpose to incorporate pedagogical aspects in e-learning. The activities performed by ITRU include staff training in the best use of ICT in e-learning related education. It's usage by UDSM instructors has steadily increased over the past four years. Approximately 35% of all UDSM instructors have received training in using Blackboard through various workshops which were conducted under the End User Upgrading projects (TEIL & ITRU). Most of these instructors have been using blackboard to post their course materials for students to access. However initially the facility was not being fully utilised and was therefore supporting face-to-face teaching only.

Furthermore, UDSM decided to introduce pilot programmes that would run in blended mode so as to get experiences before the actual upcountry online delivery. Two blended learning programmes were selected based on a marketability survey that was done in 2004, and they were delivered from academic year 2005/06. These programmes are Certificate in Computer Science and Post graduate Diploma in Engineering management. A total number of 136 students have benefitted from the pilot delivery.

Moreover UDSM has considered other factors that are crucial for online delivery. These include:

a) Improve Internet accessibility by increasing bandwidth from 256kbps/512 kbps to 1Mbps/2Mbpsand later to 155 Mbps (STM 1 Capacity). Also UDSM is in the process of acquiring active components in order to enhance the network connectivity. The purpose being to enable staff and students to get better access to information within and outside the UDSM network. UDSM's main campus has now been connected to the SEACOM OPTIC Fibre cable that means an increase of bandwidth capacity from 10 megabits to 155 megabits per second, and this has resulted in tremendous improvement in the accessibility of the internet resources.

b) Provision of wireless access points within the university.

c) Establishment of a digital library through the University Main Library and is accessible from within and outside the university network.

Other UDSM e-learning experiences include the collaboration with External universities for such delivery. Since 2003 UDSM had collaborate with Royal Melbourne Institute of Technology (RMIT) and CURTIN universities through African Virtual University (AVU) for provision of online degree and diploma programmes. The programmes that were offered were Diploma and degree in Computer Science (RMIT, Diploma and degree in Business Administration (CURTIN). A total number of 180 students had benefit from this collaboration.

Since May 2008, the Moodle Open Source LMS (which has a strong international user community) has been successfully deployed at the university to replace Blackboard LMS. Several training programmes have been conducted for both staff and students. Moreover, two ICT-mediated distance education programmes (the Postgraduate Diploma in Education and the Postgraduate Diploma in Engineering Management) are currently being delivered on Moodle. In 2010, course migration project was initiated for the purpose of migrating courses form Blackboard to Moodle. Since then, Moodle has been in use by students and staff from COICT, DUCE, MUCE, CoNAS, UDBS, SJMC, LAW, SoED, IRA, COET, CASS, Zanzibar institute of marine, IDS and IKS units. UDSM has since upgraded Moodle to version 2.3 from the former version 1.9 that was installed when Moodle was deployed. The newer version has improved features as well as enriched tools that can be integrated form external repositories.

The UDSM E-Learning Operational Policy and Procedures (output of course migration project) has been created and processes for approval are underway.

5. Findings

5.1 Uptake and use of Moodle

Of the 98 lecturers surveyed, only 31% were making use of Moodle. Analysis of data in relation to duration of use of Moodle suggests that although lecturers may have had an earlier adoption than the surveyed students, once students caught on to Moodle, it was in large numbers and their uptake surpassed that of their lecturers. Figure 3 highlights patterns of use by lecturers and students, by the year in which they started using Moodle.

Figure 3: Duration of use of Moodle by students and lecturers

In 2008, when Moodle was deployed, only 3% of lecturers who participated in the survey were using it. At that time, none of the surveyed students were using Moodle. The following year, the number of lecturers using Moodle was alsmost the same as that of students. However, in 2010, students using Moodle surpassed lecturers, and this was also the case in 2011, where only 7% of the lecturer sample and 77% of students were using Moodle. The slow uptake of Moodle by surveyed lecturers is corroborated by the lecturers themselves, whose response when asked if they had used Moodle for teaching showed that only 31% had and 68% had not. What is interesting about the lecturers who indicated that they are using Moodle is that the majority of them are junior staff members, as reflected in Figure 4.

Figure 4: Academic staff who use Moodle

Of the 30 academic staff who indicated that they use Moodle, only 7% are senior staff members, and the rest (93%) are junior staff members. A further significant finding was that more male lecturers than females were using Moodle– 86% of the staff using Moodle in their teaching were male.

When asked to name at most five courses where they learn using Moodle, the top five courses mentioned by students were:

- IS 142 - Introduction to high level programming (26.1%)
- CH 240 - Physical Chemistry for Engineering Students (22.6%)
- ES 101 - Technical drawing, laboratory and workshop administration (8.3%)
- IS 272 - Software Development I (7.8%)
- PR 305 - Advanced Advertising Issues (7.4%)

It appears most of the courses in the top five are related to science, engineerig and business. This finding may be unsurprising given the fact that students respondents from The School of Journalism and Mass Communication, Chemical and Mining Engineering, Computer Science and Engineering, and Electronics and Telecomunication Engineering constituted 87% of the sample. However, it is still a significant finding that these students, affiliated to disciplines where there are online and blended learning courses highlighted in the previous section, are using Moodle compared to students in the humanities, where it appears that most respondents were studying languages and linguistics. This suggests that students will take up technology if it is part of a course requirement.

A significant gender dimension is also evident in the use pattern of Moodle by students, and this is highlighted in Figure 5 below.

Figure 5: Gendered student uptake of Moodle

In all the three years under consideration for uptake, female students lagged significantly behind male students in embracing Moodle. In 2009, female students constituted 33% of the six students who were early adopters. In this year, there was a further boom in male student uptake. The gendered uptake trend of less females continued in 2011, where women constituted only 37% of adopters. This finding, and the fact that only 14% female academic staff indicated they are using Moodle for teaching suggests that females at UDSM are late adopters. The limited role modelling by female staff members seems to be affecting uptake by female students, while the higher uptake and role modelling by male staff seems to be motivating male students to embrace Moodle more readily.

In response to the question on what features of Moodle they use, and how often they used these, it was clear that the most used feature by academic staff was uploading content and files. This feature was also used quite regularly. Table 3 highlights some of the features used by academic staff and the extent to which they were used.

Table 3 Use and frequency of Moodle features by academic staff

	Frequency of Use		
Moodle Feature	**Very often**	**Often**	**Somewhat often**
Resources (Uploading content, uploading files)	11 (12%)	11 (12%)	6 (6%)
Discussion Board	3 (3%)	3 (3%)	15 (16%)
Chat	3 (3%)	1 (1%)	13 (16%)
Announcements	9 (9%)	9 (9%)	10 (10%)
Sending Messages	4 (4%)	7 (7%)	10 (10%)
Assignment	6 (6%)	13 (13%)	9 (9%)
Quizzes	4 (4%)	7 (7%)	5 (5%)
Glossary	-	-	4 (4%)
Questionnaire	-	-	4 (4%)

The least used features were the glossary and the questionnaire. Student respondents, as highlighted in Table 4, made regular use of Moodle to read and download notes, and to read instructors' announcements.

Table 4 Use and frequency of Moodle features by students

Moodle Feature	**Frequency of Use**			
	Every Week	**Once a Month**	**2-3 times a Month**	**Once per Semester**
Reading Notes	121 (56%)	30 (14%)	35 (16%)	7 (3%)
Downloading notes	119 (51%)	35 (16%)	25 (12%)	23 (11%)

Moodle Feature	Frequency of Use			
	Every Week	Once a Month	2-3 times a Month	Once per Semester
Discussion Board	27 (15%)	26 (14%)	36 (20%)	21 (12%)
Chat	41 (21%)	24 (12%)	27 (14%)	25 (13%)
Read instructors announcements	124 (56%)	24 (11%)	44 (20%)	4 (2%)
Sending Messages	56 (29%)	25 (13%)	9 (5%)	30 (15%)
Submitting Assignment	49 (23%)	44 (21%)	47 (23%)	25 (12%)
Doing Quizzes	66 (31%)	24 (11%)	31 (15%)	23 (11%)
Read Glossary Terms	43 (24%)	26 (15%)	19 (11%)	39 (22%)
Filling Questionnaire	15 (8%)	32 (17%)	24 (13%)	43 (23%)

Filling questionnaires was seldom utilised, and only weekly by a few students.

Academic staff were asked if they had made use of Blackboard before, and students were asked if they had used any other learning management system besides Moodle. Only 2% of the 202 students who responded indicated that they had made use of another LMS. Of the 157 students who responded to the question about which LMS they prefered, 47% indicated that they prefered Moodle.

Academic staff were as emphatic as students in their preference of Moodle as highlighted in Figure 6.

Figure 6: Academic staff LMS preference

Thirty one percent of the staff prefered Moodle, while only 11% preferred Blackboard.

5.2 Factors enabling and hindering use of Moodle

Like any other intervention, technology adoption can be enabled if certain aspects make it attractive for users to adopt it. For this study, the interest was in establishing the degree to which access, power supply, technical support,

encouragement from lecturers, and training played a role in enabling the adoption of Moodle at UDSM.

In order for users to access Moodle, they need access to a computer, power and internet connectivity before they can even begin to engage with Moodle. As such, respondents were asked to reflect on the adequacy of computers and power supply on campus, as well as the availability of internet connectivity. Table 5 highlights the findings.

Table 5 Factors enabling or hindering uptake of Moodle

Enabling/hindering aspect	Lecturers		Students	
	Agree	**Disagree**	**Agree**	**Disagree**
Access to internet connection on campus	78 (80%)	16 (16%)	166 (75%)	23 (10%)
Institution has adequate power supply	54 (55%)	39 (40%)	147 (67%)	47 (22%)
Lecturer confidence to use Moodle	52 (54%)	36 (37%)	127 (58%)	33 (15%)
Lecturers encourage students to use Moodle	57 (59%)	29 (30%)	150 (69%)	60 (28%)
Improvement in teaching and learning experience	27 (29%)	50 (53%)	158 (72%)	41 (19%)
Lecturers award marks to encourage students to use Moodle	27 (29%)	50 (53%)	111 (51%)	70 (32%)
Institution has enough computers for accessing Moodle	22 (23%)	67 (68%)	47 (28%)	146 (51%)
Availability of technical support when needed	16 (16%)	70 (71%)	73 (33%)	60 (27%)

In the presentation of data above, the options strongly agree and agree have been combined into agree, and strongly disagree and disagree have also been combined into disagree. The results show that both students and lecturers participating in the study highlighted that there was adequate access to the internet on campus, there was adequate power supply, lecturers were confident to use Moodle, and that lecturers encouraged students to use Moodle. Students were also positive on the impact of Moodle on their learning, with the majority of the students indicating that Moodle was improving their learning experience. However, only 29% of the lecturers indicated that Moodle improved their teaching experience.

In order to use technology effectively, users need the skills to do so and training is one of the methods by which users acquire these skills. Lecturers were asked if they had attended training on how to use Moodle, and unsurprisingly, 96.7% of the 30 lecturers who use Moodle reported that they had been trained. All the lecturers who attended training rated this training as useful to very useful. The data also revealed that training alone is not a big enough motivator for use of Moodle, as 91% of the 59 lecturers who do not use Moodle also reported that they had received training, and all of them had found the training useful to very useful. The responses of the lecturers on the training that they would require to use Moodle more effectively for teaching and learning reflected that there is a need for capacity building through training. In addition to broadly citing basic and advanced training, the following were requested:

- Developing content
- Uploading content to Moodle

- Creating animations
- Developing interactive courses
- How to use quiz and assignment
- How to use Moodle for exams
- How to use wiki
- Adding video and audio to content.

Students were also asked about training; and the question posed to them was whether they had received training before they could use Moodle. Only 49% of the students indicated that they were taught how to use Moodle prior to using it. This strengthens the argument that training alone does not determine use. A majority of the students had not been taught how to use Moodle but they were still using it. Of those who highlighted that they had been trained, the most frequently cited source of training, by a majority 66% was CVL staff. Others indicated they had been taught by friends, and through self-learning brochures. When asked if they wanted any additional training on Moodle, 68% of the students indicated they did, with 17% indicating they needed basic training and 20% advanced training. A few more students were specific about the training that they needed, and this includes:

- Using chat, forum and discussion
- Registering for a course
- Sending messages
- Online tests
- How to do quizzes
- How to download notes
- How to read the glossary.

Forty six % of the student respondents indicated that they were aware that there was regular ICT training within the university. What is encouraging about the training requirements cited by both lecturers and students is that they show a desire to use Moodle in more complex ways than is currently the case, which was mainly accessing notes and lecture material.

6. Conclusion and way forward

This report has discussed findings from a survey conducted to explore use of Moodle at UDSM. The study highlighted some critical aspects about uptake of Moodle in the university which can inform future planning and deployment of Moodle. The study showed how the institutional, course level, and personal intersect to inform the nature of uptake of Moodle. The salient findings include:

- Lecturers at UDSM adopted Moodle much earlier than students, but student uptake surpassed that of lecturers once students started using Moodle. Students seem enthused by technology and this suggests that UDSM’s efforts on Moodle and other technologies will not be wasted.

- There are young lecturers who are using Moodle, and also young lecturers who are not using the LMS, so, at UDSM, age is not a proxy for technology uptake. However, of the lecturers in the study using Moodle, 93% were junior members of staff. This suggests that the potential for uptake of technology and Moodle is high as older staff retire and make way for new members of staff. Policies that require use of e-learning as part of the teaching would encourage any new staff who come to take up Moodle.
- The courses where the majority of students were using Moodle were Computer Science, Engineering and Marketing. These courses are being offered in blended and online mode. If UDSM offers more courses online, more students and lecturers are likely to take up Moodle for teaching and learning.
- There is a gender imbalance in the uptake of Moodle by both lecturers and students. This could be as a result that the courses where most respondents were are traditionally male dominated courses. The gender gap can be addressed if Moodle is also systematically deployed to the humanities, which is traditionally female dominated, as part of the course. This may make use of Moodle more equitable across different student groupings.
- The use of Moodle is limited to uploading comments, reading class notes and announcements. However, lecturers and students are keen to learn more aspects on Moodle. Students indicated that they are keen to learn about reading the glossary, online tests, using chat and discussion forums. Lecturers indicated they are keen to learn content development, creating animations, using wiki and using Moodle for exams among others. In future, it would be useful for CVL to structure their training around the needs of users, and the list that was generated for this research could be a starting point in determining interest and providing training in these areas.
- UDSM seems to have adequate access to the internet and power supply, which makes it enabling for uptake. Students also believe that Moodle improves their learning experience. What is a bit concerning is the fact that only 29% of the surveyed lecturers are convinced that Moodle improves their teaching experience. This threatens the sustainability of use. More work may be needed in the training to demonstrate to lecturers how Moodle can improve their teaching. Training should also focus on students.

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Annexure A – Staff Questionnaire

The purpose of this survey is to gather information from instructors regarding the use of Moodle Learning Management System (LMS) in the teaching and learning process at University of Dar Es Salaam (UDSM). Your responses will be treated in confidence and used for the purposes of this study only and will help us provide better courseware-support.

Section A: *General Information*:

Q1: Name:…… …… (Optional – we will not use it in public reports but this would be useful for follow up if we need to)

Q2: Title/Designation: (***Tick √)***

Professor		Lecturer	
Associate Professor		Assistant Lecturer	
Senior Lecturer		Tutorial Assistant	

Q3: Contacts (Optional)

Mobile:……
E-mail:……

Q4: Gender (Please tick one)

a. Male [ ]
b. Female [ ]

Q5: Department:……

Q6: Duration of service in University (Years)……

Q7: Age: □ 25 - 30 □ 31 - 35 □ 36-40 □ 41-45 □ 46-50 □ >50

Section B: Use of Moodle

Q8: Have you used Moodle in teaching? □ Yes □ No (If No, skip to Qn 12)

Q9: When did you start using Moodle at UDSM? Since …… Academic year

Q10: Mention at most five courses that you have taught using Moodle LMS.

a) .....

.....

b) .....

.....

c) .....

.....

Q11: Please rate how often you use the following Moodle LMS features ***(Tick √)***

Frequency **Feature**	**Very often**	**often**	**Somewhat often**	**Not at all Useful**	**Did not use this feature**
Resources (Uploading content, uploading files)					
Discussion Board					
Chat					
Announcements					
Sending Messages					
Assignment					
Quizzes					
Glossary					
Questionnaire					
Others (Specify)					

Q12: Did you use blackboard before? □ Yes □ No (If No, Skipto Qn 14)

Q13: Which one do you prefer Blackboard or Moodle? Give reasons for your choice

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...

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...

.....
...

Section C: Perceived benefits of Moodle

Q14: Are there any benefits from using Moodle for teaching and Learning? Yes No (Mention them)

a) .....
b) .....
c) .....
.....

Q15: Does the use of Moodle facilitate the following: ***(Tick √)***

Teaching specific concepts or skills	Yes No Not Sure
Support various student learning styles and to personalize learning	Yes No Not Sure
Facilitate teaching students with disabilities (cognitive, physical, behavioural)	Yes No Not Sure
Support activities that facilitate higher-order thinking	Yes No Not Sure
Support creativity	Yes No Not Sure
Foster students' ability to use technology in their learning	Yes No Not Sure

Q16: What are benefits of the following Moodle tools in relation to students' learning?

Perceived value Feature	**Very useful**	**useful**	**Not useful**	**Did not use this feature**
Resources (Uploaded content, uploaded files)				
Discussion Board				
Chat				
Announcements				

Sending Messages				
Assignment				
Quizzes				
Glossary				
Questionnaire				
Others (Specify)				

Section D: Capacity Building

Q17: Have you attended any training in using Moodle? □ Yes □ No

Q18: How can you rate these trainings? □Very Useful □ Useful □ Not Useful

Q19: Indicate the type of training that you need for effective teaching using Moodle.

.....

.....

Section E: Other issues

Q20: How would you rate the quality of the support available from CVL on using Moodle?

□ Poor □ Good □ Very good

Q21: For each of the following statements, please tick the applicable

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree	I don't know
a) I have access to internet connection within University Campus					
b) My institution has adequate power supply					
c) My institution has					

adequate computers for accessing Moodle					
d) Power supply within the institution is reliable					
e) There is technical support in my department to assist with student difficulty with use of Moodle					
f) I am confident to use Moodle					
g) There are enough computers to access Moodle					
h) I encourage students to use Moodle					
i) I coerce everyone to use Moodle by allocating marks for Moodle based tasks					
j) My teaching experience has improved through the use of Moodle.					

Q22: Are there any limitations or constraints you face in using Moodle LMS?

 Yes No (If yes, mention them)

.....

.....

Q23: In your opinion, what should be done to improve the use of Moodle LMS at UDSM?

.....

.....

Thanks for your participation!

Annexure B – Student Questionnaire

The purpose of this survey is to gather information, from students regarding the use of Moodle Learning Management System (LMS) in the teaching and learning process at University of Dar Es Salaam (UDSM). Your responses will be treated in confidence and used for the purposes of this study only and will help us provide better courseware-support.

Section A: *General Information*:

Q1: Name……(Optional – Will not be used for reporting but would be useful for following up if needed)

Q2: Contacts (Optional)

Mobile:……
E-mail:……

Q3: Gender (Please tick one)

a. Male [ ]
b. Female [ ]

Q4: Department:……

Q5: Which programme are you enrolled in? (Please tick one)

a. Undergraduate [ ]
b. Postgraduate Diploma [ ]

Section B: Use of Moodle

Q6: When did you start using Moodle at UDSM (Academic Year)?

□ 2009/10 □ 2010/11 □ 2011/12

Q7: Mention at most five courses that you have been learning via Moodle LMS.

a) ……

……

b) ……

……

c) ……

……

d) .....

.....

e) .....

.....

Q8: What do you use Moodle for? Tick the item against the respective frequency of use

Frequency Item	Every week	once a month	2 – 3 times a month	Once per semester	Never
Reading Notes					
Downloading notes					
Discussion Board					
Chat					
Read instructors announcements					
Sending Messages					
Submitting Assignment					
Doing Quizzes					
Read Glossary Terms					
Filling Questionnaire					
Others (Specify below)					

Q9: Have you used any other LMS besides Moodle? If so, which one?

.....

.....

.....

Q10: Which LMS do you prefer? Moodle or the other one you have indicated you have also used? Why?

.....

.....

Section C: Perceptions of benefits of Moodle.

Q11: Are there any benefits for you from using Moodle in Learning? ☐ Yes ☐ No (Mention them)

.....

.....

Q12: How useful are the following Moodle tools in relation to your learning experience?

Perceived value Feature	Very useful	useful	Not useful	Did not use this feature
Resources (Reading notes and downloading notes)				
Discussion Board				
Chat				
Announcements				
Sending Messages				
Assignment				
Quizzes				
Glossary				
Questionnaire				
Others (Specify - below)				

Q13: Does the use of Moodle facilitate the following: (Tick √)

a) Teaching specific concepts or skills	☐ Yes ☐ No ☐ Not Sure
b) Support various student learning styles and to personalize learning	☐ Yes ☐ No ☐ Not Sure
c) Facilitate teaching students with disabilities (cognitive,	☐ Yes ☐ No ☐ Not Sure

	physical, behavioural)	
d)	Support activities that facilitate higher-order thinking	☐ Yes ☐ No ☐ Not Sure
e)	Support creativity	☐ Yes ☐ No ☐ Not Sure
f)	Foster students' ability to use technology in their learning	☐ Yes ☐ No ☐ Not Sure

Section D: Enablers and challenges to use of Moodle

Q14: Before using Moodle, were you taught how to use it? ☐ Yes
No

Q15: How were you taught?

- ☐ Friend taught me
- ☐ Teacher taught me
- ☐ I was given a self learning Brochure
- ☐ CVL Staff taught me

Q16: Do you need any other training for using Moodle? ☐ Yes ☐ No

Q17: Indicate the type of training that you need for effective use of Moodle.

.....

.....

Q18: Reflect on the following statements and choose the option which best describes the way in which uptake of Moodle is supported or hindered at UDSM.

Statement	Disagree	I don't know	Agree
a. There is technical support in my department to assist with student difficulty with use of Moodle LMS			

b. I have access to internet connection within University Campus			
c. In my institution there is ICT capacity development training regularly			
d. Power supply within the institution is reliable			
e. I am free to use Moodle for my learning even though my lecturers are not using technology			

Q19: For each of the following statements, please tick the applicable

Statement	Disagree	I don't know	Agree
a) I have access to internet connection within University Campus			
b) My institution has adequate power supply			
c) My institution has adequate computers for accessing Moodle			
d) Power supply within the institution is reliable			
e) There is technical support in my department to assist with student difficulty with use of Moodle			
f) My lecturers are confident to use Moodle			
g) There are enough computers to access Moodle			
h) My lecturers encourage students to use Moodle			
i) My lecturers coerce everyone to use Moodle by allocating marks for Moodle			

based tasks			
j) Students are trained to use Moodle at the beginning and throughout the year			
k) My learning experience has improved through the use of Moodle.			
l) Moodle affects my learning negatively.			

Section E: Other issues

Q20: Are there any limitations or constraints that you face in using Moodle? □Yes □ No

(Mention them)

.....

.....

Q21: What do you like most about Moodle?

.....

.....

Q22: What do you dislike most about Moodle?

.....

.....

Q23: What would you like to see being used more in your courses available in Moodle

.....

.....

Q24: What would you like to see being used less in your courses available in Moodle?

.....

.....

Thanks for your participation!

Annexure C – Moodle Users Staff Interview

1. We’re interested in your impressions of how the use of Moodle has impacted your students’ learning. Overall, how have students been impacted by the use of Moodle for teaching?
2. Which tools do you see are most useful in Moodle? How often do you use them?
3. What factors have affected the deployment and use of Moodle in the teaching and learning at UDSM?
4. What technical problems do you normally face while using Moodle? How do you handle the problems?
5. What changes could be made to technology at UDSM which would allow your students to benefit more from technology?
6. What, if any, impact has the use of information technology had on your teaching?
7. In your opinion, what should be done to improve the impact and use of Moodle LMS at UDSM?
8. In what ways has your professional practice (i.e., teaching) improved through the use of educational technologies?
9. What changes would you like to see made at UDSM with regard to how technology is allocated or structured?
10. Is there anything else you would like to share with us?

Annexure D – Moodle users student focus group discussion

1. We’re interested in your impressions of how the use of Moodle has impacted your learning experiences.
2. Which tools do you see are most useful in Moodle? How often do you use them?
3. What motivates you to use Moodle?
4. What technical problems do you normally face while using Moodle? How do you handle the problems?
5. What changes could be made to technology at UDSM which would allow you to benefit more from technology?
6. In your opinion, what should be done to make more students use Moodle LMS at UDSM?
7. Is there anything else you would like to share with us?

Annexure E - Questions to non – Moodle users: students

1. Do you make use of technologies for personal use? Which technologies do you use, and for what purpose?
2. Please describe the methods you use to learn?
3. Do you think these methods are effective? Why?
4. Why do you not use Moodle?
5. Are you confident with the use of technology?
6. What stops you from using technology for learning?
7. What would motivate you to use technology for learning?
8. Do you think not using Moodle affects your learning ? If so, how?
9. What do you think are the advantages of using Moodle – from what you have heard and seen from those who use it? What would be the disadvantages?