# Working towards a model for evaluating LMS use amongst academics at MUT

Project Report,

Pradesh K Ramdeyal, Mangosuthu University of Technology
Enquiry group #5

## Introduction

The higher education sector in South Africa (and indeed, the world over) is faced with a dual demand of increased access (in the face of limited resources) and success (in the face of an ever increasing underprepared student population). Most HEIs view the implementation of an LMS as a partial answer to these and other challenges prevalent across the sector. While there have been notable success stories with respect to the adoption of technologies in HE, these have been limited as most e-learning adoption initiatives appear to stagnate over time and the associated staff training programmes appear to be based on unfounded or, at best, ill-defined outcomes. As a result most of the successful technology adoption initiatives are driven by individual academic staff who are interested, motivated and have the necessary time to learn about LMS features and to implement them for the benefit of their students.

A key challenge identified early in this project was the absence of tools and models to track and evaluate e-learning adoption in the HE sector. Consequently, institutions are unable to accurately measure the progress of their e-learning interventions, resulting in incomplete or inaccurate reporting of e-learning projects. Accordingly, this project proposes the development and implementation of a model to assist in evaluating the extent to which a course/module makes use of an LMS and provides the framework within which a number of courses/modules may be compared with each other based on pre-defined and accepted criteria. Additionally, staff development professionals in the HE sector may use the model to plan, implement and evaluate training interventions and academic staff may use it to evaluate their own LMS use and to evaluate and track their training progress.

## Theoretical Framework

The Analytic Hierarchy Process (AHP) is a framework that enables decision makers to structure decisions hierarchically with the overall goal at the top of the decision framework, strategic objectives at the higher levels, evaluation criteria in the middle levels, and alternative choices at the bottom.
The framework is a powerful and flexible process used to make decisions in order to develop priorities amongst different attributes. It allows decision makers to intuitively evaluate the relative weights of multiple criteria (or multiple options) against given criteria[1]. It helps decision makers with both qualitative and quantitative data for decision making, as the decision makers can easily distinguish which criterion is more important than others. The decision makers perform simple pairwise comparison judgments (A is more important than B) as they become comfortable using a

[1] T. L. Saaty, 1997

pairwise comparison form of input data. Saaty[2], developed a reliable method of transforming such pairwise comparisons into sets of numbers expressing the relative priority of each criteria.
The input can be obtained from actual measurement such as price, weight etc., or from subjective opinions such as satisfaction, feelings, and preference. The ratio scales are derived from the principal Eigen vectors and the consistency index is derived from the principal Eigen value. Currently available group decision making software such as Expert Choice[3] are capable of facilitating the entire process of brainstorming (idea generation), clustering (grouping similar features) and ranking (using a scientifically accepted method). Unfortunately there was a delay in acquiring the software and I was therefore forced to design a process flow for the project that could be implemented using the available tools and open source software to complete the project.

The success of AHP as a practical and reliable method is highlighted by its extensive application in the past two decades[4].

## Project aims and applications

The project was aimed at developing a model to measure the extent to which an academic unit (usually a course or module) makes use of an LMS. The proposed evaluation model is based on the identification, clustering and ranking of the features of the LMS with respect to its importance to the specific discipline or module. A decision tree is constructed during the initial phase of the problem structuring process

The project is expected to contribute to the promotion of e-learning technologies at MUT and the artefacts produced by the project can find application in the following contexts:

1. The proposed model (and any subsequent automated product resulting from its implementation) can serve as a tool to evaluate Senate's pending decision with respect to the promotion of e-Learning at MUT, wherein it is expected to resolve that "30% of courses at MUT will make use of an LMS by 2020". Notwithstanding the apparent ambiguity with respect to the 30% (every course must make use of at least 30% of the features provided by the LMS OR 30% of all approximately 320 courses must use an LMS), there are currently no tools to measure the extent to which this goal has been achieved.
2. The model is intended as a possible solution to assist in evaluating specific instances of LMS use among courses at MUT. It is posited that the VC Awards evaluation committee (at MUT and indeed across the HE sector) can make use of the proposed model (and resulting artefacts) to rate lecturers' use of e-learning technologies in their courses. Use of the model in combination with the

[2] T. L. Saaty, 1980
[3] Expert Choice URL: https://www.expertchoice.com/
[4] G. A. Forgionne, R. Kohli, and D. Jennings, 2002

evaluation rubric will result in relative quantitative scores assigned to each applicant's use of the LMS. The model and artefacts can also be used in the evaluation of portfolios submitted by academic staff for promotion purposes, in which the use of e-Learning technologies is a key component. In both cases, applicants can use the model themselves to determine their scores.

3. The model can be used to design, implement and evaluate e-learning training interventions / programmes at MUT. The proposed model will in fact be tested in this context during the second semester of 2019, during the training of FNS staff.

## Process/Methods

E-learning technologies, including the learning management system previously known as WebCT have been used variously across the institution since the early 2000s. MUT continued to use the LMS after it was re-branded as the Blackboard Learning Management System (BB LMS). A major concern among decision-makers and e-learning practioners at the Institution is the low adoption rates among academic staff at MUT - this combined with other important factors have led to MUT's management recommitting the organisation to creating an environment which will enable the promotion of e-Learning technologies at the institution. Senate subsequently concurred with the recommendation and an e-Learning Task Team comprising of key members of the MUT community was established and a completed terms of reference, including standard operating procedures for the task team were developed and adopted by Senate. Subsequently, Senate is expected to adopt a task team resolution that "30% of all modules at MUT will have an online and LMS presence by 2020.

The project was divided into two sub-projects due to the timing of the various activities. Since the faculty training seminar was scheduled before the model could be finalised, the activities from the faculty training fed into, rather than compliment, the second sub-project of developing the evaluation model.

*Sub-project A: Staff Training*

During January 2019, a 2-day staff training session was hosted for 15 academic staff members from across the departments in the FNS (excluding the department of ICT). The training commenced with an explanation of the various elements / features of the LMS after which, participants were engaged in prioritising the features with respect to which ones they believed were important for use in their courses. The decisions at this session were reached via consensus and was carried out in a semi-formal manner. The list of prioritised features appears in appendix A. The training was then undertaken in an order that was aligned to the prioritised list. Participants also attended a follow-up session in the following week, during which time the training was evaluated and evaluation criteria on which their courses will be evaluated at the end of the semester was agreed upon. During the semester I was available to assist the 15 participants in resolving difficulties they were experiencing in using the Moodle LMS.

*Sub-Project B: Development of the evaluation model*

While most LMSs provide very similar features, the use and importance of a specific feature varies from discipline to discipline, resulting in different sets of priorities for each of the departments in the institution. The motivating factor for some form of customisation is the belief that not all HE courses are homogenous, for example, while higher order assessment features (such as rubrics) may be a critical feature used in one discipline it may not necessarily be used in another discipline. Hence, the model will allow programme staff to first decide (agree) on the relative importance of the features provided by the LMS for their field.

The initial input for the model was provided by academic staff in the Department of ICT at MUT and the designed model therefore has an ICT bias. This is an inherent feature of the model as described above and the model will be tested in the other departments in the FNS during the second semester of 2019, hopefully with the aid of the Expert Choice Software.

## Outcomes

The following key activities were undertaken during the development of the model:

1. Sub-project A as described above was executed during January 2019 and the data generated during execution was analysed and served as input into the development of the model.
2. Meeting to explain the project and the steps involved, including the pairwise comparisons method and the scale used in the AHP. Braining storming to identify the features of LMS which are useful to the discipline – used chart paper and transcribed features into excel spreadsheet. Clustering of the identified features into groups based on the feature's function/type
3. Ranking of the features with respect to its importance in contributing to the TLA processes in the discipline. The decision tree was developed and a questionnaire to illicit the pairwise responses from project participants was implemented on an online survey service providers site. The questionnaires were completed online in a lab on campus, during which I was present to provide clarity on any of the terms and processes involved in the exercise. [Appendix B: Questionnaire]
4. The data (pairwise comparison matrices) was fed into the SuperDecisions[5] Software package to be analysed within the AHP framework.
5. The consistency index was determined and a prioritised list was produced by the software. [Appendix C]

The following key project activities are still to be undertaken in the second semester of 2019:

[5] Vendor URL: https://www.superdecisions.com/

1. The results of the prioritisation exercise needs to be combined with an appropriate scoring system and a user manual developed for its use
2. Additional testing of the model needs to be undertaken and this is intended to be carried out during the faculty training session in the second semester of 2019(see #5 below)
3. A mini-project to establish the digital literacy levels and training requirements of staff in the FNS. Data will be collected via an online survey questionnaire and results of the analysis of the data and recommendations for the advancement of digital literacy among faculty and staff will be presented to Faculty Board
4. ALL FNS staff will be provided with opportunities to develop their skills and knowledge of the Moodle LMS over targeted training sessions. It is expected that at least 100 staff members will attend elements of this training intervention.
5. A joint research mini-project with the Faculty Dean and TAU Fellow, to identify and prioritise the challenges facing e-learning adoption rates at MUT will be executed in the final phase of the project.
6. The final deliverable from this project will be an automated system with an easy-to-use user interface, anticipated to be implemented in the medium to longer term.

## References

[1] T. L. Saaty, "A scaling method for priorities in hierarchical structures," Journal of mathematical psychology, vol. 15, pp. 234-281, 1977.

[2] T. L. Saaty, "The analytic hierarchy process: planning, priority setting, resources allocation," M cGraw-Hill, 1980.

[3] G. A. Forgionne, R. Kohli, and D. Jennings, "An AHP analysis of quality in AI and DSS journals," Omega, vol. 30, pp. 171-183, 2002.

Appendix: AHP Tables [Note: final priority vectors determined by the AHP model will be available after data analysis]
The following features were identified as being important for ICT teaching and learning:

| Category | Courses | how to set up your courses. |
|---|---|---|
| A | Editing text | how to use the text editor and what the icons mean. |
| A | Activities | how to involve students actively in their learning. |
| A | Resources | how to add static materials to your course. |
| A | Blocks | how to add extra items and information to the sides of your course page. |
| D | Questions | how to create questions for use in quizzes and LMS lesson module |
| E | Course enrolment | how to give students access to your course. |
| E | Grouping users | how to put students into groups and why this is useful. |
| C/D | Grades | how to use the gradebook, scales and advanced grading methods. |
| C | Tracking progress | how to control and display progress through a course. |
| A | Reusing activities | how to copy or recycle elements of your course. |
| A | Working with files | how to upload files and folders to Moodle. |
| A | Repositories | how to import content into Moodle from external storage sites like Flickr, Youtube, Google docs etc. |
| E | Portfolios | how to export content from Moodle into external portfolios like Mahara. |
| A | Working with media | how best to upload and display images, sound, video and embedded content. |
| B | Data formats | formats for downloading data such as logs, assignment submissions, quiz results and feedback responses. |
| D | Document converters | plugins for converting uploaded assignment submissions to PDF format for teachers to annotate. |
| A | Filters | how to display links,media players, Maths symbols, emoticons and more. |
| D | Plagiarism prevention | how to check students' submitted work is not copied. |

The features were grouped into the following broad categories

A-Course management features
B-Communication management features
C-Reporting features
D-Assessment features
E-Other features