

Conceptualising Design of Learning Management Systems to Address Institutional Realities

Gerald Gwamba^{1(✉)}, Godfrey Mayende^{2,3},
Ghislain Maurice Norbert Isabwe², and Paul Birevu Muyinda³

¹ University of Manchester, Manchester, UK
gwamgerald@gmail.com

² University of Agder, Grimstad, Norway

³ Makerere University, Kampala, Uganda

Abstract. There is growing interest in the use of E-Learning in higher educational institutions. However, studies have shown mismatches between Learning Management System (LMS) design and the general institutional context in developing countries. In this paper, we assess the design and implementation requirements for Makerere University LMS against the overall institution context. This research follows a qualitative method (interviews) and uses case study. We employ the design reality gap model to investigate the design requirements of the LMS against current institutional realities. A design reality gap of 46 was obtained implying ad-hoc measures need to be put in place otherwise the failure/stagnation of LMS is eminent. The study concludes with the need to identify hybrid approaches to LMS contextualization including use of tactical plus Strategic Information system plan (SISP), selecting/building hybrid staff and blended learning.

Keywords: e-Learning · Learning Management Systems · Design reality gap

1 Introduction

There is a growing interest in the use of eLearning and the corresponding adoption of Learning Management Systems (LMS). This is aimed at enhancing teaching and learning in higher educational institutions. ICTs are tools for building knowledge societies and provide opportunities for redesigning the education systems (Albert and Mercedes 2010). To ensure ICTs' full scale use, organizations are increasingly focusing on online learning enabled initiatives. Therefore, incorporating eLearning within higher education is seen to offer benefits for both the developed and developing world. However, studies have shown that there could exist significant mismatches between LMS design and implementation requirements and the general institutional context in developing countries (Ssekakubo et al. 2011; Heeks 2002; Kasim and Khalid 2016). Whereas incorporating eLearning within higher education is seen to offer benefits for both the developed and developing world, the strengths of institutional realities supersedes the unprecedented opportunities that LMSes should offer. These mismatches could be emanating from the implementation of Information Systems (IS) based on the

extremes of either social (soft) or technical (hard) neglecting the appropriate balance between the two constructs. There has been numerous research in the areas of LMS adoption, particularly covering the hard aspects of IS integration within the traditional educational systems. For example some research has focused on the integration of educational information systems (technical approach) as self-contained distributable objects (Learning objects) based on the standardization of IS designs (Torrente et al. 2009). This research is however engineering or technically centered to LMS implementation since it follows IEEE standardizations for learning objects (LO) for increased reuse across different LMS platforms and interoperability. Focusing on the technical aspects alone in implementing IS may not necessarily address the social context vital within an institutional ecosystem.

In contrast, proponents of social science research advocate for the integration of IS in existing educational systems following a soft approach. This approach recognizes the primary importance of people and social interactions in shaping successful LMS implementation (Mayoka and Kyeyune 2012; Opati 2013). For example, a research by Mayoka and Kyeyune (2012) based on the diffusion theory considers five soft aspects phased in stages including knowledge, persuasion, decision, implementation and confirmation. The soft approach however does not adequately account for the technical or technology centered aspects. However, research emanating from the pedagogists values the leading role of pedagogy in shaping sustainable educational systems as opposed to people and technology alone. One of the latest research on LMS implementation recognizes the leading role of E-Learning activities centered around instructional strategies, technologies and pedagogical models. (Aparicio et al. 2016). This research follows a hybrid path consolidating both hard and soft aspects in addition to people (Heeks 2006). In conceptualizing these aspects, we seek to answer the research question of how the design of the LMS and institutional reality affect the success or failure of the IS. In this paper, we will pursue to answer the research question by analyzing the design and implementation requirements for LMS against the overall institutional realities.

The remaining part of this paper is organized into four sections. In Sect. 2, we present the approaches and research methods used. Section 3, presents the findings and discussions of our work. We conclude with Sect. 4, summarising the outcomes and limitations of our research.

2 Research Approach and Methods

2.1 LMS in Makerere University

Makerere University the oldest higher education institution in Uganda has implemented more than three LMS' including Blackboard, KEWL, and Moodle. Since 1998, there have been several efforts to optimise distance education to more flexible modes of delivery. However, the development of LMS initiatives have yielded minimal success. Earlier initiatives were characterised with IS discontinuities, replacements and or stagnation without realising LMS' much anticipated benefits (Ssekakubo et al. 2011; Kituyi and Tusubira 2013). Blackboard for instance could not be sustained beyond donor support while Moodle has not yet registered its much-anticipated benefits despite being

open source. Within a wider geographical context, the trend of E-Learning in other universities in Uganda, East Africa and beyond could take a similar shape with little or minimal considerable growth (Ssekakubo et al. 2011). Notably though, research suggest that Makerere University like other developing country higher educational institutions (DC HEIs) operates in an environment characterised with inadequate resources, management mishaps, frequent strikes and other volatilities among others. Therefore, assessing the development of success/failure of major institutional initiatives could provide valuable inputs in deciding the future growth of the university.

2.2 Research Framework

LMS can be deemed successful if all stakeholder groups attain their anticipated goals without undesirable outcomes. Identifying gaps in the implementation of LMS helps us to decide on future approaches to drive more effective e-learning initiatives. Recognising the need to measure the success or failure of information systems is important in deciding the most suitable LMS based on the institutional realities. In this study, we adopt the design-reality gap model Heeks (2002) (Fig. 1).

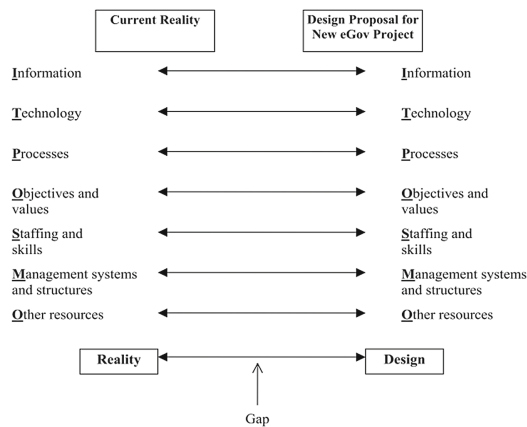


Fig. 1. Design reality gap model adopted from Heeks (2002)

The reliability and applicability of this model is high as it has attracted application in assessing major LMS project success and failures in developing countries in general (Heeks 2002; Munene 2015). The design reality gap model is based on the “ITPOSMO” dimensions which are regarded as applicable in contextualising any organisation IS defined as; information, technology, processes, objectives and values, staffing and skilling, management systems and structures, other resources (Heeks 2002). By rating the IS on ITPOSMO dimensions, it is possible to determine the degree of divergence or convergence of the IS towards success/failure on an established scale illustrated in Fig. 2. By summing all the scores obtained from the rating of the ITPOSMO dimensions, the result can be mapped on to the scale to inform the degree of success or failure of the IS in question. however, it is important to determine the extent of success/failure of the

IS as; total failure, partial failure and success. Total failure implies that the IS was implemented and immediately abandoned or was never implemented. Partial failure means that major goals for the implementation of the IS were not attained or there were undesirable outcomes. Success implies that major stakeholder groups attained their major goals and did not experience major undesirable outcomes (Heeks 2003). Important in this model is to judge the degree of convergence to zero or divergence away from zero as a measure of the extent of the design reality gap to depict the success of the IS.

<i>Overall Rating</i>	<i>Likely Outcome</i>
57 – 70	Your e-government project will almost certainly fail unless action is taken to close design-reality gaps.
43 – 56	Your e-government project may well fail unless action is taken to close design-reality gaps.
29 – 42	Your e-government might fail totally, or might well be a partial failure unless action is taken to close design-reality gaps.
15 – 28	Your e-government project might be a partial failure unless action is taken to close design-reality gaps.
0 – 14	Your e-government project may well succeed.

Fig. 2. The scale of rating success/failure of IS (Heeks 2002)

2.3 Research Methods

This study uses Qualitative methods (interviews and observations). Interviews were guided by semi-structured questions. A total of 8 respondents were interviewed with interviews lasting 1 and half hours. This was the done through the themes created from ITPOSMPO dimensions. Respondents were experienced E-Learning personalities in Makerere University. A case study strategy was used based on the institutional LMS. Interviews were further validated with email questions to minimize bias and allow respondents to freely express themselves on controversial topics. This data was triangulated with institutional literature to answer the research question. Three coders were used for inter-code reliability.

3 Findings and Discussion

The findings are presented using the design reality gap analysis. The design-reality gap analysis compares expected requirements within the LMS design with the institutional reality. The analysis is presented in ITPOSMO dimensions.

3.1 Information

The LMS system assumed that courses to be implemented on the platform were already designed, developed and customized. The system further assumed that appropriate

instructional design approaches were used suitable for standardization of online programmes/courses. This is in resonance with instructional strategy and online pedagogical models for “onlinisation” of content based on the online context (Aparicio et al. 2016). The use of the LMS as a repository for simply sharing content implies that LMS is far from its design use. The absence of resources and failure for management to own the LMS initiatives has hampered development. LMS achieved a gap score of 8.

3.2 Technology

The design expectations assumed that there is integrated use of E-Learning technologies. Within the design, the system ought to have had a well-established e-course authoring and development environment and supporting hardware. The development of an ICT enabling infrastructure for educational support and wider industrial and service sectors remains a huge national challenge. One of the respondents was quoted “...ICT enabling infrastructure for educational support is a national challenge...”. This was also in agreement with another respondent who said “...we still lack ICT infrastructure at Makerere University ...”. Makerere university in particular lacks adequate E-learning infrastructure to meet current LMS needs (Mayoka and Kyeyune 2012; Opati 2013; Mayende et al. 2015b). The gap score was 8.5.

3.3 Processes

The IS design assumed that teaching and learning would be offered as a minimum in a blended learning approach. According to the newly approved E-Learning policy, Makerere University has not yet fully operationalized E-learning since a proper roll out strategy for its implementation is yet to be agreed upon. A blended learning approach would consolidate both face to face and online learning approaches with each complimenting the other (Christian and François 2013). What is happening at Makerere could be far from blended learning since the traditional brick and mortar systems supersedes computer assisted learning. This leads to a high gap score of 8.5.

3.4 Objectives and Values

The system design assumed that the objectives for implementing the LMS were comprehensible to all stakeholders. However, Makerere University’s E-Learning policy is yet to be implemented. The university is characterised with poor stakeholder relations hampering decision making (Tabaire and Okao 2010). Some senior staff perceive the system as increasing the negative impacts of MacDonaldisation specifically within the lecturing community. According to one respondent, some traditional University staff’s attitudes restrain the culture of technology enhanced learning ecosystem. On the other hand, one respondent noted that the situation is not any different with some students familiar with brick and mortar education resisting change. This is out of phase with LMS design, specifically in terms of e-Learning activities as a result of contextualisation (Aparicio et al. 2016). Other proponents of pedagogy argue that there should exist continuous innovation in learning activities beyond 21st century skills of

communication, creativity and digital literacy resulting from rapidly changing workplace contexts (Sharples et al. 2016; Mayende et al. 2015a; Mayende et al. 2016). This contradicts current realities giving a gap score of 7.

3.5 Staffing and Skills

The IS design assumed adequate skills for staff and students. Makerere University does not have a formal training programme for stakeholders for E-Learning engagement. However, there have been some efforts to by the university to develop its capacity in eLearning through donor funding. One respondent was quote emphasizing that Makerere University needs to recognise balanced student/staff formal skills development as fundamental to the success of LMS initiatives. Another respondent warned that failures could instigate major impediments in LMS development efforts. This created a medium design gap of score: 5.

3.6 Management Systems and Structures

The design proposed no real changes to pre-existing institutional structures and no significant changes to management systems. Since Moodle was replacing a commercial system, a proper management structure was already in existence that required adaptation to the new IS. This yielded a small design reality gap of score 1.5.

3.7 Other Resources

The design assumed that a separate budget already existed catering for at least two financing options. Makerere University is yet to allocate a budget for E-Learning. One respondent narrated that the University does not have a budget for eLearning. In another comment, a key respondent recounted that the institution is largely understaffed. This is cemented in what has been termed as “the malaise of Makerere University” since the institution remain largely financially constrained further affecting other operations with more than 50% of the university under staffed. The overall gap is medium with a score of 7.5.

3.8 Summary of ITPOSMO Scores

Table 1 is a summary of the scores from the analysis of the ITPOSMO data.

Table 1. Summary of ITPOSMO scores

CODER	I	T	P	O	S	M	O
1	8	8.5	8.5	6.5	5	1.5	7.5
2	7.5	7.5	9	7	6	2	8
3	8.5	9.5	8	8.5	4.5	1	7
Average	8	8.5	8.5	7	5	1.5	7.5

By mapping the overall score of 46 (Sum of average scores) to Fig. 2, this puts the total score in the range of 43–56 which implies that Moodle has an overall medium/large design–reality gap. This implies that the LMS will likely fail unless ad-hoc action is taken to close the gaps and make the design more like the reality.

4 Conclusions

We conclude that there is need for change in the current reality and making it more like the requirements with-in the LMS design through: Practicalising blended learning based on E-learning systems theoretical framework, developing strategic engagements that follow a tactical-plus SISP, selecting/building hybrid staff in key roles with both Information systems and management competences. The limitations of this research include subjectivity following case study research which cannot fully be mitigated even after data analysis is subject to more than research team in this case 3 members. The design reality gap model does not account for interrelatedness between the design reality dimensions yet these dimensions are not mutually exclusive.

Acknowledgements. This work has been supported by the DELP project which is funded by NORAD. Special appreciation to the University of Agder and Makerere University, who are in research partnership, for their support.

References

- Albert, S., Mercedes, G.-S.: The role of information and communication technologies in improving teaching and learning processes in primary and secondary schools. *Australas. J. Educ. Technol.* **26**(8), 207–220 (2010). <https://doi.org/10.1080/09687769.2010.529108>
- Aparicio, M., Bacao, F., Oliveira, T.: An e-learning theoretical framework. *Educ. Technol. Soc.* **19**(1), 292–307 (2016)
- Christian, D., François, O.: Developing countries in the e-learning era. *Fundamentals of educational planning* 096 (2013). <http://unesdoc.unesco.org/images/0021/002180/218002E.pdf>
- Heeks, R.: Information systems and developing countries: failure, success, and local improvisations. *Inf. Soc.* **18**(2), 101–112 (2002). <https://doi.org/10.1080/01972240290075039>
- Heeks, R.: Most eGovernment-for-development projects fail: how can risks be reduced? In: *Climate Change 2013 - The Physical Science Basis*, vol. 14, p. 4 (2003). <https://doi.org/10.1017/CBO9781107415324.004>
- Heeks, R.: *Implementing and Managing eGovernment: An International Text*. SAGE, London (2006)
- Kasim, N.N.M., Khalid, F.: Choosing the right learning management system (LMS) for the higher education institution context: a systematic review. *Int. J. Emerg. Technol. Learn.* **11**(6), 55–61 (2016). <https://doi.org/10.3991/ijet.v11i06.5644>
- Kituyi, G., Tusubira, I.: A framework for the integration of e-learning in higher education institutions in developing countries. *Int. J. Educ. Dev. Inf. Commun. Technol.* **9**(2), 19–36 (2013)

- Mayende, G., Isabwe, G.M.N., Muyinda, P.B., Prinz, A.: Peer assessment based assignment to enhance interactions in online learning groups. In: Paper Presented at the International Conference on Interactive Collaborative Learning (ICL), 20–24 September 2015, Florence, Italy (2015a)
- Mayende, G., Muyinda, P.B., Prinz, A., Isabwe, G.M.N., Nampijja, D.: Online learning needs assessment in Uganda. In: Digital Media, Tools, and Approaches in Teaching and Their Added Value. Waxmann Publishers (2015b)
- Mayende, G., Prinz, A., Isabwe, G.M.N., Muyinda, P.B.: Learning groups for MOOCs: lessons for online learning in higher education. In: Paper Presented at the 19th International Conference on Interactive Collaborative Learning (ICL2016), 21–23 September, Clayton Hotel, Belfast, UK (2016)
- Mayoka, K., Kyeyune, R.: An analysis of e-learning information system adoption in Ugandan Universities: case of Makerere University business school. *Inf. Technol. Res. J.* **2**(1), 1–7 (2012)
- Munene, S.: Application of the Design – Reality Gap Model to Enhance High Availability of Systems for Health Care Providers in Nairobi, Kenya. University of Nairobi (2015)
- Opati, O.D.: The Use of ICT in Teaching and Learning at Makerere University: The Case of College of Education and External Studies. University of Oslo, 102, 37 (2013)
- Sharples, M., Adams, A., Alozie, N., Ferguson, R., Fitzgerald, E., Gaved, M., Yarnall, L.: *Innovating Pedagogy 2016: Open University Innovation Report 5*. The Open University (2016). www.open.ac.uk/innovating
- Ssekakubo, G., Suleman, H., Marsden, G.: Issues of adoption: have e-learning management systems fulfilled their potential in developing countries? p. 236 (2011)
- Tabaire, B., Okao, J.: Reviving Makerere University to a Leading Institution for Academic Excellence in Africa Synthesis Report of the Proceedings of the 3rd State of the Nation Platform (2010). http://www.acode-u.org/Files/Publications/PDS_8.pdf
- Torrente, J., Moreno-ger, P., Martínez-ortiz, I., Fernandez-manjon, B.: Integration and deployment of educational games in e-learning environments: the learning object model meets educational gaming e-learning and videogames. *J. Educ. Technol. Soc.* **12**, 359–371 (2009)