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Institutional Preparedness for E-Learning in Healthcare Professions Education: A Case of Mulungushi University School of Medicine and Health Sciences

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Abstract

Background and Objectives: In a bid to enhance e-Learning at Mulungushi University School of Medicine and Health Sciences in Kabwe-Zambia, the Strengthening Health Professional Workforce Education Programs for Improved Quality Health Care in Zambia (SHEPIZ) project in 2020, conducted an evaluation of Mulungushi University's level of preparedness for e-Learning as an initial step towards building the university's capacity. This article therefore, provides a systematic description of the evaluation process, lessons learnt and implications for the future in enhancing e-Learning programmes at Mulungushi University School of Medicine and Health Sciences. **Methods:** The evaluation process took a two-phased approach. The first phase involved a desk review of the literature on e-learning evaluation that informed the development of a

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framework to be used in the evaluation process. In the second phase, actual data was gathered through key informant interviews, and thorough physical assessment of ICT infrastructure. **Results:** Consequent to the desk review, a modified five (5) criteria evaluation framework was developed that considered key factors around organisational arrangements, Managerial approach, Technical and interface integration, Educational requirements and Logistic support. An evaluation of the five critical factors demonstrated that Mulungushi University School of Medicine and Health Sciences had inadequate ICT infrastructure with low internet bandwidth, and lack of on-site technical support for the effective implementation of e-learning programmes. **Lessons Learnt and Recommendations:** Some of the lessons learnt were that use of an evaluation framework to assess an institution's readiness for the adoption of e-learning was essential and that implementing e-learning programs might be difficult in the absence of on-site ICT technical staff and critical ICT infrastructure. Some of the recommendations made were that: Mulungushi University needed to conduct a self-assessment using the critical factors framework; have technical staff on site for system maintenance; give lecturers and students the necessary training and assistance to enable them use e-learning resources effectively. **Conclusion:** Evaluation of Mulungushi University revealed that most of the critical factors for e-Learning had not been fully addressed and the modified critical components framework could be a useful tool for institutional self-evaluation as an antecedent to effective delivery of the e-Learning programs.

Keywords

Medical Education, Healthcare Professionals, E-Learning, Information Communication Technologies, Critical Success Factors

1. Introduction

E-learning is a broad concept that includes a wide range of instructional designs, including synchronous and asynchronous formats to deliver education using Information and Communication Technology (ICT) (Lawn et al., 2017). Higher learning institutions embarking on a cost-effective way of training that provides fast-changing knowledge now rely on e-learning as a solution. E-learning, if properly harnessed, can equally be as successful for training health professionals as on-site training or face-to-face instruction (Schreurs et al., 2008).

This method has been widely adopted as a teaching and learning approach in the training of healthcare professionals internationally (Gachanja et al., 2021). E-learning has gained popularity in medical and health professions education because it transcends the boundaries of time and space whilst stimulating student-centred, self-directed and collaborative learning (Huynh, 2017). Further, it allows students to create new educational experiences and exercise flexibility in the sequence and pace of learning. E-learning also increases the

potential for student-teacher engagement and makes it possible to reach large audiences while maximising the use of resources, particularly for educational institutions with few faculty members (Zehry et al., 2011; Frehywot et al., 2013; Dhawan, 2020).

The inherent ability to lower costs while upholding standards and quality makes e-learning an ideal solution for resource-limited countries such as Zambia. The use of e-learning has also been endorsed by the World Health Organization (WHO) which has urged low and middle-income countries to utilise e-learning as a tool for bridging knowledge and capacity gaps among health workers (Al-Shorbaji et al., 2015). Despite the numerous benefits that may come with e-learning, its successful use depends on the availability of certain prerequisites that have been described as critical factors.

Studies have highlighted successful factors necessary in the implementation of e-learning programmes (Hasan & Najafi, 2011). Khan (2005) identified eight (8) critical factors required for the successful implementation of an e-learning programme. These include organisational, educational, technological interface, evaluations, management, logistical support, ethics and cultural diversities factors (Hasan & Najafi, 2011). The absence of these critical factors may lead to the unsuccessful implementation of e-learning programmes.

In sub-Saharan Africa and Zambia in particular, the healthcare worker to patient ratio is still very high (Kayamba et al., 2022). This is impacting the quality of health care provision in most health facilities in Zambia. In order to mitigate this, a number of public training institutions' including Mulungushi University have been established and dedicated to providing quality training for healthcare workers. In order to successfully implement these various educational programmes, various delivery methods have been designed in order to facilitate learning and among them, is through e-learning to complement the traditional face-to-face methods. As a newly established health training institution, Mulungushi University, still faces many challenges required to effectively deliver health training programmes. Among the many challenges include inadequate qualified human and financial resources, inadequate infrastructure and digital literacy. Although efforts to utilize e-learning may have been initiated with clear objectives, success in e-learning requires an understanding of the needs as well as the preparedness of major players in the online learning environment. It is for this reason that in 2020, the Strengthening Health Professional Workforce Education Programs for Improved Quality Health Care in Zambia (SHEPIZ) project sought to assess the e-learning preparedness of Mulungushi University to adapt materials from training and research programs from UNZA in order to ensure success of the newly established programs at Mulungushi University School of Medicine and Health Sciences. The current article therefore provides a systematic description of the process, lessons learnt and implications for the future in establishing and enhancing e-learning programmes at Mulungushi University, School of Medicine and Health Sciences.

2. Materials and Methods

The process involved two major phases, the first being a desk review and the second being the actual collection of data. In the desk review, literature on evaluation of e learning was reviewed with an objective of creating a framework and tools which would be utilised in the evaluation process.

The first step in the desk review involved scanning through literature from three databases namely, google scholar, pubmed, and emerald in order to identify factors that are considered critical for the successful implementation of e-Learning. An appraisal of the literature to ascertain quality constituted the second step while analysis and synthesis of the data was the third and final step of the desk review. This third step culminated into the development of a modified 5 criteria conceptual framework based on Badrul Khan's eight critical factors for successful implementation of e-learning which include; organisational, educational, technological interface, evaluations, management, logistical supports, ethics and cultural diversities factors. The conceptual framework guided the development of the data collection tool and also informed the data collection process. On the basis of the framework therefore, the data collection tool was organised into distinct sections each of which assessed one of the 5 criteria. Prior to their usage, the developed framework and tools were subjected to a peer review process and to ensure internal consistency, the tools were piloted.

The second stage of the process involved the actual data collection and data analysis. A two-phased approach was used. The first part of this phase was interviews with key informants. The second part was an evaluation of the physical ICT infrastructure or proposed sites.

3. Results

The desk review process culminated into a modified five (5) criteria evaluation framework that considers factors around organisational arrangements, Managerial approach, Technical and interface integration, Educational requirements and Logistic support (Figure 1). Results from the evaluation of each component in the modified framework are summarised in Table 1.

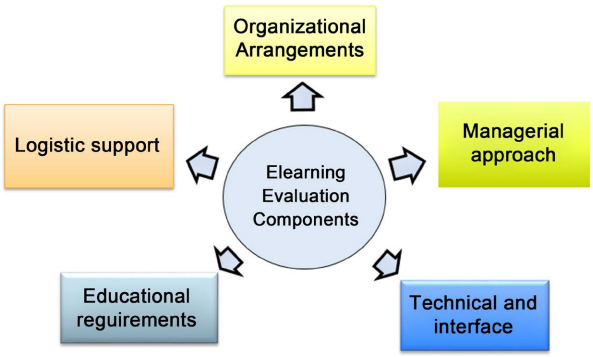

Figure 1. Modified e-learning evaluation framework adapted from Badrul Khan (2005).

Table 1. Findings/outcomes of the evaluation.

Evaluation area	Findings/Outcomes
Organisational factors	**Inadequacy of ICT Infrastructure**: a) Inadequate infrastructure at both the hospital and school b) Ill developed ICT infrastructure necessary for e-learning, especially the local area network. c) No ICT infrastructure designed for virtual teaching/learning or assessment of clinical skills. d) No computer laboratories or access to computing facilities for students and general staff. e) Few computers were accessible to members of staff and not to students.
	Internet access challenges a) Limited bandwidth (only 25 mbps). b) Limited access at both hospital and university.
	Inadequate funding to support e learning
Managerial Factors	**Human resources constraints** a) Inexperienced personnel. b) No trained clinical simulation personnel. c) Ill developed continuous professional development in ICT.
Technical factors and interface	**Underdevelopment and Underutilization of E-learning systems** a) both the school and the hospital did not have local e-learning systems in place. b) the centralised university e-learning system was underdeveloped and underutilized. c) only hospital based student learning management platform owned by the Ministry of health.
Educational	**Eagerness to Commence e-learning programmes and use of simulation** a) enthusiasm and commitment to implement e-learning programmes. b) Management support and planning for ICT.
Logistic Support	Lack of On-site ICT Technical Personnel

The physical evaluation of the ICT infrastructure was conducted by the technical team composed of educators and ICT personnel. The aim was to assess the available proposed sites for development of the e-learning centre. Three sites were evaluated and one selected. Requirements for the preferred site were developed and presented in Table 2.

Table 2. List of ICT requirements for proposed ICT.

Serial	Description	Quantity
1	Desktop Computers	35
2	Wireless Access Points	3
3	Wifi Adapters	35
4	CCTV system	1
5	48 port switch	1

4. Discussion

The current article aimed at providing a systematic description of the process that was undertaken to enhance e-learning at Mulungushi University School of Medi-

cine, together with the key lessons learnt and implications for the future. In the desk review that constituted the initial step of the process, an e-Learning evaluation framework consisting five critical factors was adapted from Badrul Khan (2005) and these factors included; organizational, managerial, technical factors and interface, educational, and logistics support. Khan's framework has been applied widely by other researchers (Ali & Ahmad, 2017; O'Leary & Quinlan, 2018; O'Keefe & Jost 2019; Naeem & Iqbal 2017) investigating factors necessary for the success of e-Learning. Use of Khan's framework in the current study underpinned development of data collection tools, and guided presentation of findings from both the key informant interviews and the physical evaluation of infrastructure.

Findings from key informant interviews on organisational factors revealed a number of shortcomings including inadequacy of ICT infrastructure at both the hospital and school, absence of computer laboratories, as well as inadequacy of computers. Non availability of critical ICT infrastructure has potential to impair effective implementation of e-learning as reported in various studies (Vural & Zahedi, 2019; Saleh, 2021; Zhang & Zhang 2020; Kariuki, 2020; Alenezi et al., 2018; Wijekumar et al., 2018; Zhang et al., 2020). Therefore, MUSMHS needed to invest in the necessary technology and infrastructure to support e-learning initiatives.

Development of ICT infrastructure demands the availability of adequate financial resources. In the current investigation however, it was noted that financial resources were inadequate to meet all the e-learning related needs that the institution had. Studies (Prasad & Usunier, 2021; Alzahrani et al., 2021; Adetunji et al., 2021) have suggested that inadequate funding can be a significant barrier to the implementation of e-learning in universities. Without sufficient financial resources, institutions may struggle to provide the necessary infrastructure, technology, and support services to make e-learning effective and accessible for students and faculty. A need therefore remains for MUSMHS, together with stakeholders to mobilise funding to be channelled towards acquisition of e-learning requirements.

In addition to ICT infrastructure, success of e-learning requires skilled human resource to manage all infrastructure and processes (Dincer & Yildirim, 2016). Evaluation of MUSMHS however revealed some notable deficiencies in human resources including lack of experienced human resources to manage e-learning demands, and poorly designed continuous professional development in ICT. Inadequacy of human resource for implementing e-learning has also been reported in other investigations (Raju & Meenakshi, 2015; Dahiru & Bichi, 2019) in India and Nigeria respectively. Lack of skilled staff and experts in e-learning design and implementation can lead to poor quality e-learning experiences, technical glitches, and low engagement levels among students (Ozkul, 2018). To address this issue, universities need to invest in hiring and training personnel with the necessary skills to support the development and implementation of e-learning programs including learning management systems (LMSs) as illustrated in Gachanja et al. (2021).

Regarding LMSs, the current study revealed underdevelopment and underutilization of the system. Similarly, Al-Daihani and Al-Qallaf (2018) and Mousa and AlQahtani (2020), revealed underutilisation and underdevelopment of e-Learning systems as barriers to effective implementation of e-Learning. The challenge of underutilization can be addressed by leveraging the enthusiasm and eagerness for use of e-Learning that was expressed by most respondents in the current evaluation. Eagerness to implement e-learning programmes among members of faculty has also been reported by other researchers (Al-Bahrani et al., 2021; Charlotte, 2020) and it has been said to be a critical requirement for seamless implementation of e-learning programs. However, enthusiasm on the part of faculty needs to be supported by availability of technical personnel to address any challenges that may arise in use of the various LMSs and e-learning platforms. Non availability of technical staff on site can pose a challenge in the implementation of e-learning as there would be no one to offer immediate on-spot support in times of system failure and other related challenges. Researchers (Al-Qahtani & Higgins, 2013; Ravi, 2021) have reported technical support as a critical success factor for e-learning in higher education and that technical issues were one of the most common reasons for e-learning system failures. There is thus a need for MUSMHS to invest in technical support to ensure the sustainability of e-learning activities.

5. Lessons Learnt and Recommendations

This evaluation brought out a number of lessons drawn from the process. One of the lessons learnt was that use of an evaluation framework developed through a meticulous review of literature was beneficial in conducting a systematic evaluation of an institution's preparedness for implementation of e-learning. This framework is informed by the following crucial factors: Organisational arrangements, Managerial approach, Technical and interface integration, Educational requirements and Logistic support. In this regard, it would be expedient for the institution to conduct self-assessment using the Critical Factors Framework to ensure that the fundamentals are put in place prior to commencement of e-learning. This should include regular feedback from students and faculty, as well as data analysis to measure learning outcomes.

Non availability of ICT technical staff on site can present a serious challenge in the implementation of e-Learning programmes. It is therefore prudent to have technical staff on-site to attend to day-to-day challenges, system maintenance, updates and review.

Implementation of e-Learning can be hampered by underutilisation of learning management systems. Therefore, training of faculty and learners in the use of learning management systems should be prioritised to enable them to become comfortable with the technology for optimum utilisation of e-Learning platforms and other resources. Further, collaboration and communication among students and faculty through online discussion forums and other communication tools should be encouraged in order to create a sense of community and improve learn-

ing outcomes.

It was further learnt that effective implementation of e-Learning could be hindered by lack of essential ICT infrastructure such as computers, software, Internet access, as well as physical space to accommodate ICT implements. Therefore, it would be crucial for an institution that plans to implement e-learning to secure essential ICT infrastructure prior to the commencement of an e-learning programme. This will ensure that students and faculty have access to the necessary tools to participate in e-learning.

6. Conclusion

The importance of the implementation of an e-learning environment in higher learning institutions particularly medical education cannot be overemphasized. The evaluation of Mulungushi University revealed that none of the critical factors necessary for the implementation of e-learning such as technology, organizational and financial preparedness, curriculum content, human resources, e-learning systems, trainers and learners, environment and culture were in place at the time of evaluation.

Ethical Approval

Ethical approval was granted by the University of Zambia-Biomedical Research Ethics Committee (REF: 920-2020).

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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