Developing Online Educational Resources for Online Learning: Student Teachers' Experiences at Muni University, Uganda

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https://doi.org/10.58653/nche.v11i1.09
(Accepted: 1st December 2023/Published: 14th December 2023)

Abstract

Teacher training pedagogy in the 21st century has drastically changed across the world with a focus on producing a teacher with adequate skills and knowledge in developing and using online educational resources for effective learning. This exploratory qualitative study aimed to explore the Bachelor of Science with Education student teachers ' experiences in developing multimedia educational resources for online learning. The study specifically assessed student teachers ' opinion of their experiences in using online educational resources and their challenges in developing online educational resources. Interviews were used to elicit insights from participants to achieve both objectives. Nine participants were purposively selected from the subjects of specialisation being undertaken. The findings of the study revealed student-teachers' enthusiasm, commitment, creativity and innovativeness in connection with developing online educational resources. The major challenges were the limited skills among student teachers in creating animated videos and assessment of online learning activities. The study recommends that institutions of higher learning should establish a harmonised and comprehensive competence framework and provide adequate time for skilling student teachers in developing online educational resources in order to produce a holistic 21st century teacher.

Keywords: *Student teachers; Online educational resources; Higher institutions of learning.*

Introduction

Higher education institutions around the world have heavily invested in using the internet and other digital technologies to promote online learning practices. A paradigm shift from traditional classrooms to blended learning is paramount (Simamora et al., 2020). With the recent onset of the Covid-19 pandemic across the world, many educational institutions remained closed for almost two years, and online learning was the only way to go (EdSource, 2020). It is, therefore, imperative for every higher institution of learning to support its student teachers with adequate skills and knowledge in developing effective online

educational resources for effective online learning if it has to produce relevant teachers who can ably overcome the learning challenges of the 21st century (Archambault & Rice, 2022). Scholars have revealed that when teachers use modern technology and tools, student learning and their interactivity increase, and, in addition, they find learning full of interesting areas (Xie, Siau, & Nah, 2020; Zhou et al., 2020). The application of knowledge and skills becomes very easy and convenient, as well as effective. This, therefore, means that our minds tend to work faster when assisted with the use of modern technology, irrespective of any part of life in education (Szymkowiak et al., 2021). As such, reliance and dependence on online innovations to simplify learning is unavoidable in higher institutions of learning. It is on this basis that the current study explored student teachers' opinions with regard to developing and using online educational resources to promote online learning at Muni University, Arua City, Uganda.

Statement of the Problem

Higher institutions of learning are expected to play an integral role in preparing competent teachers for effective learning to take place in any given country (Renes & Strange, 2011). For many years, teacher trainers in higher institutions of learning, especially in sub-Saharan Africa and Uganda in particular, have been producing traditional teachers for traditional classrooms with regard to pedagogical practices (Nabukeera, 2020). However, advancements in technology across the world necessitate higher institutions of learning to support their student teachers with relevant competences in developing and using online resources if their trainees are to remain relevant in the 21st century job market (Abuhassna et al., 2020).

Unlike developed countries that embanked on online learning, in Uganda, almost all institutions of learning remained closed during the outbreak of Covid-19 to restrict people from getting into contact with one another as a measure to control the further spread of the Covid-19 virus. The Covid-19 lockdown contributed to delayed completion rates in higher institutions of learning due to staggered semesters (Nawangwe, Muwagga, Buyinza, & Masagazi, 2021). As a result, universities embarked on skilling their staff and students in the use of online learning resources. A need to establish the extent to which student teachers have developed their competences in the use of online learning resources and the challenges in developing and using the same necessitated this study.

Objective of the Study

The general objective of this study was to explore student teachers' experiences with regard to developing and using online learning resources for effective learning.

Specific objectives

(i) To establish student teachers' opinions of their competences in developing and using online learning resources.

(ii) To establish student teachers' opinions about opportunities and challenges in developing and using online educational resources.

Review of Related Literature

Online learning in modern education

The rapid breakthroughs in modern educational technologies have continued to create a change in the way knowledge is developed, acquired and delivered across different institutions of learning in the world. Bansal (2014) argues that it is important for higher institutions of learning to realise that modern technologies offer opportunities to innovate online course content and teaching methods and to widen access to a variety of online educational resources. It is, therefore, of paramount importance that academics and educational designers in higher institutions of learning experiment with different innovations, so that student teachers and prospective learners can benefit from modern technologies in order to meet the needs of the 21st century (Renes, & Strange, 2011).

Alonso et al. (2005) proposed a web-based e-learning education model referred to as a pschopedagogical model which consists of a blended learning approach. This instructional model is based on content structure, information processing and social constructivism. The model supports learners through engagement with e-learning content so that they understand things that they did not comprehend before. This ADDIE model has seven main steps: Analysis, Design, Development, Implementation, Execution, Evaluation, and Review, as illustrated below:

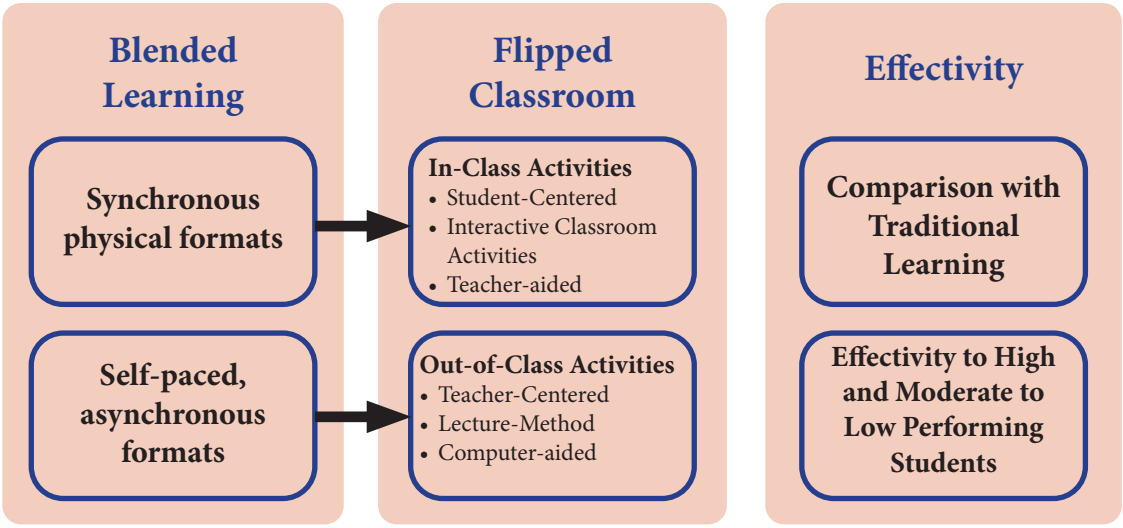


Figure 1: The ADDIE model by Alonso, Lopez, Manrique and Vine (2005).

The social constructivism approach to developing online learning provides learners with authentic, learner-centred experiences where they can determine how they will learn, evaluate alternative solutions to problems and collaboratively work with others, and how to use multiple modes of representation or technology. They also become aware of their knowledge construction processes. The goal is to provide them with ownership of what is being learnt and enable them to engage with content, while at the same time improving their social and communication skills. Developing learners' awareness of their own understandings and learning processes is also a significant benefit for life-long learning and the transfer of knowledge and skills (Bada, 2015; Richardson, 2003).

Learner-centredness seeks to meet specific needs by providing opportunities for learners to have a choice in the sequence, topics and tasks of instructional activities (McCombs, 2015). In the online classroom, additional flexibility is often afforded such that activities can be structured to be more self-directed, authentic and relevant to the learner. Learner-centredness is aligned with constructivism, which highlights learner-centred activities where students actively construct knowledge in their own minds (Bada, 2015). It represents a shift from a passive transmission of knowledge to an active construction of new knowledge based on prior understanding combined with new situations and contexts. In constructivist learning environments, learning results from fitting together new information, synthesising new information with prior knowledge, and building a new mindset of knowledge (Duffy & Jonassen, 2013). As learners build their knowledge, their personal mental models and perceptions of the world grow, opening the way for them to become active agents in the learning process (Driscoll, 2000). These principles that build from a theoretical understanding to practical implementation guide the development and use of online learning. The process leads to active knowledge construction, attention to prior knowledge and experiences, connections and interactions with people and content, and time (Bada, 2015; Duffy & Jonassen, 2013).

Developing online resources

The spread of Covid-19 across the globe did not leave higher institutions of learning the same in terms of advancement in developing and using online resources to boost online pedagogy. Online learning enabled many higher institutions of learning to continue teaching and learning without interruption during the

Covid-19 lockdown (Zhou et al., 2020). The experiences undergone in the course of the pandemic in Africa, and in Uganda in particular, created a valid reason for the widest experimentation in online education across higher institutions of learning. However, it is important to systematically understand opportunities and challenges that come with online learning for the effective investment, planning and delivery of meaningful teaching and learning (Vlachopoulos, 2020). Singh (2003) argues that online learning focuses on optimising achievement of learning objectives by applying the "right" personal learning technologies to match the "right" personal learning style to transfer the "right" skills to the "right" person at the "right" time. In addition, Thorne (2003) describes the opportunities of using online learning as a way of meeting the challenges of tailoring learning and development to the needs of individuals by integrating the innovative and technological advances offered by online learning with the interaction and participation offered compared to traditional learning. An online learning environment is useful in promoting flexibility and efficacy, which can hardly be found in a traditional classroom environment.

In a study conducted on online learning in Pakistan's higher institutions of learning Mukhtar, Javed, Arooj and Sethi (2020) found that online learning was a flexible and effective source that allows students to become self-directed learners, although there were many challenges related to the inability of the students to teach and learn practical work using online pedagogy. Another critical challenge was represented by lack of competences to provide immediate feedback to the students. This study recommends the training of faculty lecturers to support students in increasing their online interactions. According to Verawardina et al. (2020), it is necessary to implement clear steps in applying online learning, such as preparing facilities, training with current technology, providing guidelines for teachers and students, offering interactive multimedia materials in line with the current curriculum and ensuring the availability of an evaluation system with a question bank.

Methodology

The study adopted a qualitative approach since the phenomenon being investigated is grounded in lived experiences in specific contexts. This approach provides the "complexity of social relations expressed in daily life and the meanings that the participants themselves attribute to these interactions" (Marshall & Rossman, 2011). The study was situated within one case, which included a group of 46 second-year Bachelor of Science with Education student teachers undertaking Education and Communication Technology as a core course unit. These students were assigned a project in groups that required them to design instructional materials, create a learning platform and upload educational resources using Google Sites.com.

At the end of the project, students from each subject of specialisation were randomly selected for interviews to provide insights into the opportunities and challenges encountered in the process of developing online learning platforms using Google Sites.com. The study used purposive sampling, selecting one individual student teacher from each of the nine subjects of specialisation who participated in designing the online learning platform using Google Sites to purposefully inform an understanding of the central phenomenon of the study (Creswell, 2007, p. 125). This case study comprised a single method of data collection with in-depth study (Stake, 2020). The investigation involved interviewing nine participants chosen from nine groups that participated in the project of developing online resources for online learning using Google Sites.com. The method enabled a deep understanding of the case as a complex social entity located within a single higher institution of learning. The study used interviews in order to elicit student teachers' experiences (Reagan, 2002). Regarding opportunities and challenges inherent in developing online resources to support online learning using Google Sites.com, semi-structured interviews were conducted to provide an opportunity for individual responses.

The interviews comprised questions regarding student teachers' experiences, opportunities and challenges, as well as the ways in which they would want to be supported, in connection with developing online resources for online learning using Google Sites.com. Participants were audio-recorded using a phone recorder and their voices were transcribed right after each interview. The importance of effectively

organising data has been highlighted in research (Emerson, Fretz, & Shaw, 2011). The audio interview transcripts from the in-depth student teacher interviews were transcribed and saved on a password-protected computer. Pseudonyms were used for all participants. Individual cases were analysed carefully to enable a deep understanding of each case at a time. Analysis involved developing codes for emergent themes, specifically those which addressed student teachers' experiences while targeting opportunities and challenges.

The undertaking was followed by a cross-case analysis (Stake, 2020). Attempts were made to understand the findings from each case in relation to the other. This provided broader insights into student teachers' experiences with regard challenges and opportunities and the ways in which they would want to be supported in developing the required skills and competences for online resource development. Trustworthiness and credibility of the study were achieved through detailed engagement with student teachers during the project period and interviews, in order to build trust with the participants. Peer review and/or debriefing were also used, and involved a member from another department within the Faculty of Education carrying out an external check on the research process and asking questions about our research process. As an important part of a research process, reflexivity was ensured by the researchers, clarifying their bias from the outset of the study, so that the reader can understand the position and any biases or assumptions that impacted the inquiry. Using member checking, data, analysis, interpretation and conclusions and recommendations were taken back to the participants so that they could judge the accuracy and credibility of the account. Finally, the study was presented using a rich, thick description to allow readers to make decisions regarding the findings. Regarding ethical considerations, scholars whose work informed this study were acknowledged. Permission to conduct the study was sought from the Dean, Faculty of Education. Consent was sought from participants and the purpose of the study explained to them beforehand. The participants were assured of confidentiality and the researchers observed the methodology protocol as proposed (Creswell, 2014).

Findings

This chapter comprises findings of the study from nine second-year Bachelor of Science with Education student teachers of Muni University who were taking Education and Communication Technology as a course unit. The participants' characteristics are shown in Table 1 below.

Table 1: Participant characteristics

Year two Bachelor of Science with Education student teachers				
S/N	**Participants' pseudonyms**	**Sex**	**Age**	**Subject**
01	Tabu	M	20–25	ICT
02	Isabella	F	20– 25	Agriculture
03	Ruba	M	25–30	Physics
04	Mugisha	M	20–25	Biology
05	Kellen	F	20–25	Geography
08	Moses	M	25–30	Chemistry
09	Atema	M	25–30	Mathematics

Source: Field data (2023)

The study provides insights into student teachers' opinions of their competences in developing and using online learning resources for effective teaching and learning at Muni University, Uganda.

Accommodating diverse learning styles of the students

A key consideration during development process was accommodating the diverse learning styles of the individual learners. As a result, a variety of educational resources were created, including animated videos,

interactive quizzes, infographics, notes (text), help desk and audio lectures, catering to visual, auditory, linguistic, logical, interpersonal, intrapersonal and any other learning styles. This was elucidated by Tabu:

> In our Educational Technology course this semester at Muni University, we were given the exciting opportunity to develop a comprehensive Google Site for online learning resources. With the aim of enhancing the educational experience, we embarked on a systematic approach to ensure the effectiveness of our online resources. To begin, we carefully identified a relevant topic and broke it down into sub-topics, allowing us to create a well-structured learning framework. We then focused on defining clear learning competences and learning outcomes, ensuring that our resources aligned with the desired educational objectives. Recognising the diverse learning styles and preferences of our students, we made it a priority to develop a wide range of educational resources as in this site.

The finding is in agreement with that by Verawardina et al. (2020), who posited that it is necessary to implement clear steps in applying online learning, such as preparing facilities, training with current technology, providing guidelines for teachers and students, offering interactive multimedia materials in line with the current curriculum and ensuring the availability of an evaluation system with a question bank. The finding reveals that teaching and learning is a development process which accommodates the diverse learning styles of the individual learners.

Flexible learning environment

The advantages of utilising Google Sites for online learning are broad. It allows an environment that is conducive to flexible learning, enabling students to access resources at their convenience. It also promotes a healthy work-life-study balance, provides refreshment through educational games, and allows instant assessment and feedback, as well as being a channel for synchronous and asynchronous lessons. Moreover, the platform provides engaging learning activities, leveraging various multimedia tools to stimulate learners' interest and comprehension. Isabella, a student of Agriculture Double Main, revealed:

> The advantages of using our Google Site for educational purposes are truly endless. Firstly, it promotes a learner-centred approach by providing students with the flexibility to access resources at their own pace and convenience.

The finding reveals that learners enjoy a competence-based curriculum which enables them to understand its contents and application.

Active engagement and collaboration

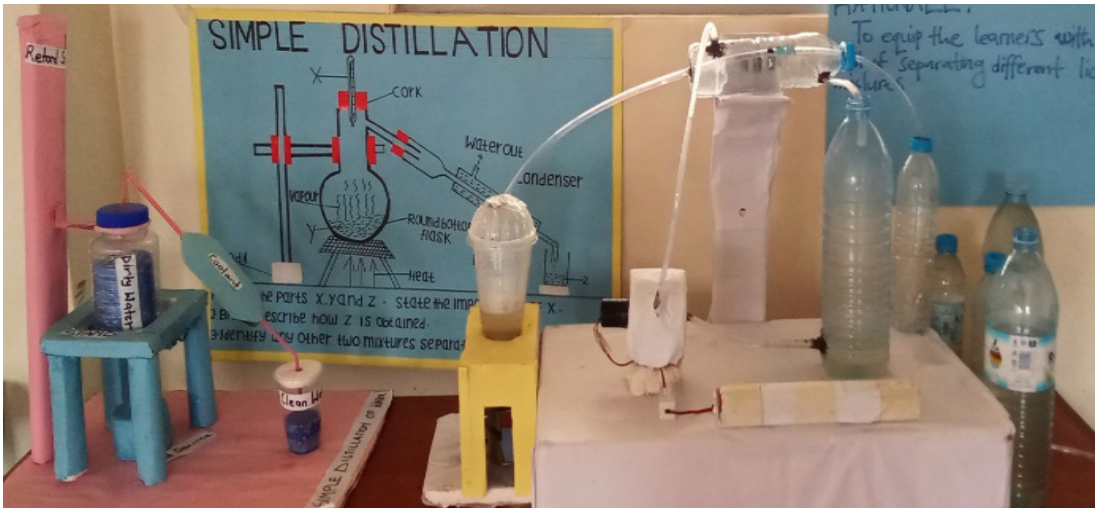
Google Sites was well designed as a multifunctional platform that can be used for various activities, ranging from self-paced learning modules and collaborative group projects to discussion forums and assessment submissions. Kellen, a student of Geography elaborated:

> Online resources on Google Sites encourages active engagement and collaboration among students through interactive features, fostering a sense of community and shared learning. Furthermore, our site allows for easy monitoring and assessment, as teachers can track student progress, provide timely feedback, and administer online assessments.

In addition, Moses, a student of Chemistry, divulged:

> We are proud of the comprehensive range of online learning resources we have developed and are confident that they will greatly contribute to the educational landscape at Muni University. Attached below is the link to our Google Site, where you can explore the resources first-hand as seen in this site.

Integration of traditional instructional materials



Furthermore, the integration of local materials fosters a sense of identity and pride among students since others explore their artistic talents in developing their model, and in integrating their valued cultural heritage into the modern education landscape. The diverse array of resources accommodates the varied learning preferences of students, facilitating a more inclusive and effective learning environment. Muni University's dedication to developing comprehensive online learning resources demonstrates its commitment to provide quality education that adapts to the needs of its students and the community at large. Google Sites serves as a dynamic platform that harnesses technology, cultural heritage, and instructional design principles to create an enriching and empowering learning experience for all. This is elucidated by Mugisha, a Biology student teacher:

> Our project aim was to create an interactive and informative Google Site, incorporating charts and models, as a part of the Education Technology course study. The objective was to showcase the integration of technology in education and present it at an exhibition. The Google Site design focused on creating a user-friendly and visually appealing educational site in line with the competence-based secondary curriculum in Uganda. The site structure included different sections, such as Home, About, Interactive Models, Learning Charts, and References. Each section was designed to effectively convey information as seen in this site.

Real-world experience

The study demonstrated how technology can be seamlessly integrated into education, preparing student teachers for a digital world and practical problem-solving. Mugisha, a Biology student, explains:

> We are happy to note that we successfully achieved our objectives of creating an engaging Google Site with interactive charts and models for educational purposes. The merits of the project encompassed enhanced visual learning, accessibility, interactivity, global reach, and real-world application.

In addition, Tabu, an ICT student, averred:

> The project demonstrated the potential of technology in education. It underscored the importance of overcoming challenges to harness the benefits of education technology effectively. The project's presentation at the exhibition showcased the potential impact of such initiatives on modern education.

Technical expertise

Despite numerous opportunities that come with developing and using online resources for teaching and learning, student teachers at Muni University experience a number of challenges such as technical hurdles, content duration, design consistency, time constraints, and user accessibility. Mugisha elucidates:

> Setting up the Google Site, creating interactive charts, and developing models required technical expertise. Overcoming glitches and compatibility issues posed challenges during implementation.

Selection and organisation of content

Another challenge identified related to the selection and organisation of content which required consistency in the principle of design in relation to breadth and depth. Student teacher Moses explains:

> Selecting and organising relevant content in a coherent manner while maintaining a balance between depth / breadth and simplicity proved to be a complex task. Ensuring a consistent design theme across the Google Site, charts, and models demanded meticulous attention to detail and design principles.

Time

Another challenge highlighted by the participants was that designing meaningful learning resources required a lot of time. They argued that the course unit of Education Technology was taught only once in the three years of teacher training and that with the daily emerging technology in education, they needed a lot of practice to become competent in developing and using online resources. Isabella elaborates:

> It was a demanding task to design, develop and refine the content within a short period of time. The course demands a lot of time, yet it is offered in only one semester of the study programme. We need to study Education Technology every semester if we are to become competent.

The great challenge that students elaborated on was their inability to develop educational resources that meet the needs of learners with disability or special needs, especially the visually impaired learners and those with hearing impairments. Student teacher Kellen explains:

> Ensuring that the digital content was accessible to individuals with disabilities demanded adherence to accessibility standards, adding an additional layer of complexity as seen in this site.

Discussion of the Findings of the Study

Student teachers' opinions of their competences in developing and using online resources for effective online learning

This study reports many student teachers' opinions on the competence gap in developing a variety of educational resources which included, among others, animated videos, interactive quizzes, infographics, notes (text), help desk and audio lectures. The students also reported grappling with gaps in catering to visual, auditory, linguistic, logical, interpersonal and intrapersonal learning. This finding reveals that student teachers need more competences in integrating the innovative and technological opportunities that support effective online learning through interaction and participation. Scholars such as Thorne (2003) have reported that students teachers lack competences in developing and using online educational resources to accommodate diverse learning styles.

Student teachers' opinions about opportunities and challenges in developing and using online resources for effective online learning

In this study, the version of online educational resources accommodating diverse learning styles of students was illuminated in various responses where students developed a variety of educational resources such

as animated videos, interactive quizzes, infographics, notes (text), a help desk and audio lectures to cater for learners with varied learning styles. Singh (2003) argues that online learning, focuses on optimising achievement of learning objectives by applying the "right" personal learning technologies to match the "right" personal learning style to transfer the "right" skills to the "right" person at the "right" time. Indeed, a study conducted on online learning in Pakistan's higher institutions of learning by Mukhtar et al. (2020) found that online learning was a flexible and effective source of learning that allows individual students to become self-directed learners.

Indeed, this study agrees with Mukhtar et al. (2020) that online resources promote flexibility in learning by enabling students to access resources at their convenience, promoting a healthy work-life-study balance, providing refreshment through educational games, and allowing instant assessment and feedback, and can be a channel for synchronous and asynchronous lessons. Moreover, the platform engages learners in learning activities, leverages various multimedia tools to stimulate learners' interest and comprehension, integrates traditional media made from the local environment for preservation of cultural heritage and environmental conservation, and mostly brings real-life world experience into the classroom.

Conclusions

In conclusion, this study largely illuminated student teachers' enthusiasm, commitment, creativity and innovativeness in connection with developing online educational resources to support online learning despite student teachers' challenges resulting from having limited skills in creating animated videos and assessment of online learning activities. The study further concludes that it is important for higher institutions of learning to realise that modern technologies offer opportunities to innovate on course content and teaching methods and widen access to a variety of online educational resources to the learners. The emphasis should be on promoting online teaching and learning with modern technologies in the delivery of the content.

Recommendation

The study alerts key stakeholders in higher institutions of learning to the need to revise policy and practice, and to provide extra time for student teachers to practise online learning pedagogy and establish a harmonised comprehensive competence framework for skilling student teachers in developing and managing online educational resources for effective online learning practices. Consequently, such institutions will be able to produce relevant teachers to meet the needs of the digital-driven society.

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