

# Barriers and Motivators to Implementation of an E-Learning and Multimedia Technology towards Improving School Education Standards in Mathematics and Health Education in Nakivale Refugee Settlement, Uganda

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## ABSTRACT

The study examined the barriers and motivators to the implementation of an E-Learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda. Specifically, the quality of the content in the E-learning and Multimedia Technology, E-learning and Multimedia Technology quality, Support by ICT Technical Staff, Attitude towards the E-learning and Multimedia Technology and Stakeholder Involvement were examined using a sample of 297 learners and teachers obtained using Krejcie and Morgans table of sample size determination.

A 5-point Likert scale questionnaire was designed for data collection, a tested correlation coefficient reliability of the questionnaire was established at 0.82. The tables and frequencies were used to analyse the characteristics of the variables while the Spearman's correlation coefficient was used to examine the relationship between variables.

The study findings showed that there was weak correlation between quality of the content in the implemented E-learning and Multimedia Technology and learners' attitude, also it was showed that, there was moderately strong correlation between implemented E-learning and Multimedia Technology quality, stakeholder's involvement and learners' attitude.

The motivators to the implementation of an E-Learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement were established as support by ICT technical staff, E-learning and Multimedia Technology quality, and stakeholder's involvement. Quality of the content in the implemented E-learning and Multimedia Technology was established as the barrier since it was the only which had weak correlation to the implementation of an E-Learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement.

**KEYWORDS:** *Information and Communication Technologies, Electronic-learning, Multimedia Technology*

## 1. INTRODUCTION

Delivery of education everywhere in the world is becoming more and more contingent on Information and Communication Technologies (ICTs) (Deepshikha, 2018). In the application of ICTs in education, the latest ways of integrating technology with learning is the learners using Electronic learning (E-learning) and Multimedia Technology for their studies (Deepshikha, 2018; Seok, 2008). E-learning is a form or system of learning that encourages the use of ICTs in teaching, reading and discussion process. Often times, it is used to foster distant teaching and learning. While Multimedia refers to computer-mediated information that is presented concurrently in more than one medium. It entails but not certainly all, of the following elements: text; still

graphic images; motion graphics; animations; hypermedia; photographs; video; and audio, i.e., sounds, music, and narration.

Both E-learning and Multimedia Technology can support multiple representations of the same piece of information in a variety of formats. This has several implications for learning (Sawsan, et al, 2012). The use of E-learning and Multimedia Technology is a result of the need to change the current traditional educational systems in the developing countries which are incapable of dealing with learners of special needs and disabilities. Learners who have visual, or hearing problems may not be able to see or hear well the

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class material especially when class size is large. Uganda in particular, rural areas usually face the problem of shortages in the number of teachers, and even these teachers use poor teaching methods that are hardly interactive and less beneficial to learners, high student failure rates and drop outs, lack of access to modern teaching and learning resources/facilities, teachers' lack of Information Communication Technology (ICT) pedagogy skills, low teacher to high student ratio, and general lack of interest in education (UNHCR, 2014).

Generally, teachers may not be willing to teach in rural areas. Traditional educational systems may not provide a solution to this problem, but new technologies be helpful by recording different teacher courses or through E-learning and Multimedia Technology (Sawsan, et al, 2012). Besides, E-learning and Multimedia Technology differs significantly from traditional classroom education because it can be both synchronous and asynchronous (Desai, et al, 2008). With synchronous e-learning, learners and teachers interact simultaneously at a specific time using the internet for direct communication. With asynchronous e-learning, the learners and teachers interact at different times by placing messages, interacting with content uploaded on digital disks or coursework in files that are accessed at different times. With either approach, e-learning provides the advantage of allowing learners to gain knowledge without requiring the physical presence of the teachers on the institution's campus, which theoretically increases learners' access to education and provision of quality learning.

Evidence from literatures affirm that the implementation of ICTs in the education sectors of the world have been with utmost success (Obaseki (2017, Kimwise, 2016). Buttressing this statement in the words of Kasse and Balunywa (2013), adoption and usage of technologies in education has successfully implemented E-learning in the developed world. Similarly, the expansion in the use of the Internet in the mid-1990s is observed to have substantially changed the characteristics of education, initially in developed countries and increasingly in developing countries. Moya et al., observe that the application of e-learning improves the quality of teaching and learning, efficacy and accessibility (Moya et al. 2011).

Using E-learning in education can also reduce costs for the institution and for the learners (Mazen and Haitham, 2013). Notwithstanding, literature (UNHCR, 2014) show that uptake and implementation of E-learning and Multimedia Technology has not been evenly dispersed in education sectors especially in schools located in refugee camps/settlements in developing countries. A multitude of issues interrelate to form barriers to implementation of E-learning and Multimedia Technology including, high cost involved, socioeconomic and technological conditions, lack of a systematic approach to teaching and learning, awareness and attitudes towards digital technologies, administrative and technical support, staff development, limited infrastructure and little expertise in the use of digital technology tools (Oye et al. 2011).

The issue of ICT use in education and the factors influencing the adoption of E-learning in refugee camps/settlements in developing countries have not been investigated before. Furthermore, the education institutions in developing

countries like Uganda are facing stakeholder pressures to implement many of the educational practices found in western education systems (Tulinayo, 2018; Mazen and Mohammad, 2013), including E-learning. This study examined the barriers and motivators to the implementation of an E-Learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda.

The following research questions guided this study.

1. Does the quality of the content in the implemented E-learning and Multimedia Technology affect learners' attitude towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda?
2. Does the implemented E-learning and Multimedia Technology quality affect learners' attitude towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda?
3. Is the support by ICT technical staff affect learners' attitude towards implemented E-learning and Multimedia Technology in improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda?
4. Does stakeholder's involvement affect learners' attitude towards implemented E-learning and Multimedia Technology in improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda?

The remainder of this paper is organized as follows. In Section 1 we present the Background of the Study; Section 2 We Discuss Related Works; Section 3 Research Methodology is presented. In section 4 Data Analysis and Presentation. In Section 5 Findings and Discussion. In Section 6 Conclusions and Further Works.

## 2. RELATED WORKS

Numerous studies have investigated issues affecting acceptance and adoption of E-learning and multimedia technologies. Venter et al., (2012) contend that among these issues affecting the acceptance and usage of e-learning technologies in most institution in developing countries include the technological infrastructure, high cost of technology, instructional efforts, graduate competencies, technology satisfaction, management support, methodology, resource accessibility and availability, culture of education and learning styles, intellectual investment, design of assistive tools, and global business (Ndume et al., 2008). Chen (2012) on the other hand examined the relationship between e-learning systems use and overall job outcomes based on the information system model in Taiwan. The study established that quality factors (information and system) had significant relationship with perceived usefulness, and that system quality has a significantly positive association with user satisfaction. Furthermore, both perceived usefulness and user satisfaction influenced system use, and the overall job outcome.

The results from the study by Lawoga (2014) who examined factors that predict students' continual usage intention of web-based learning content management systems in Tanzania, with a specific focus at Muhimbili University of Health and Allied Science (MUHAS) results showed that

quality-related factors (instructor and system) were a key predictor of perceived usefulness and user satisfaction, and that information quality was found to significantly affect perceived usefulness. Furthermore, perceived usefulness was found to be a key determinant of user satisfaction, which in turn predicted continual usage intention of students within the e-learning system under the analysis. As demands for education and e-learning continue to expand in Africa and particularly in Uganda, it is important to establish the issues that influence the perceptions of learners and teachers when using e-learning and multimedia technology. The success of an e-learning system relies on both its early adoption (acceptance) and its sustained usage (Tai et al., 2012). It is therefore important to understand the relevant motivators and barriers that affect its implementation.

### 3. METHODOLOGY

Cross sectional survey design was used to help in collecting quantitative data. This design helped in collecting large amount of data from learners and teachers the target population was 1271 learners from primary seven, senior two and teachers in the five primary and one secondary schools in Nakivale refugee settlement in Isingiro District, Uganda. Furthermore, learners from primary seven and senior two were selected for this research because they could easily understand the process during the implementation of the E-learning and Multimedia technology.

The six schools were selected based on division representation within the Nakivale refugee settlement, where sample size was selected by use of Krejcie and Morgan (1990). Krejcie and Morgan (1990) standardized tables show the sample sizes for different population (or proportion of it) at 95% confidence level, a sampling error of 5% is accepted by most evaluations. From Krejcie and Morgan's table (1990), the optimal (effective and valid) sample size to represent a population of 1271 students was 297. According to Krejcie and Morgan (1990) tables, the smaller the number of cases in the target population, the larger the sample proportion of that population and vice versa. In line with the above reasons, an accessible sample size of 297 i.e. 277 learners and 20 teachers were selected.

Data was collected using a closed structured questionnaire and interview guide. The closed structured questionnaire as the main data collection tool, allowed the researcher to collect large amount of data from the sampled participants who were learners. While the interview guide was administered to the teachers to complement the responses from the learners. A pilot study for the draft questionnaire was carried out in order to establish its reliability and construct validity. The results of the pilot study revealed that the Cronbach's Alpha coefficients for data collection instrument was relatively high: Attitude Towards the Technology (0.88), Quality of the Content in the E-Learning and Multimedia Technology (0.90), E-Learning and Multimedia Technology Quality (0.91) Support by ICT Technical Staff (0.70) and Stakeholder Involvement(0.71). Though, four items that scored lesser than 0.70 were deleted to make the overall reading of Cronbach's Alpha coefficients to settle at 0.82 which showed a high degree of reliability. Besides, item analysis revealed that all the items from the questionnaires reached the significant level at 0.05.

Moreover, the results of factor analysis also showed adequate construct validity. Data was collected in line with

the stated research purpose and variables, after which data was analyzed using descriptive statistical methods, correlation and regression to establish causal relationship among the variables. The results interpretation was done using the mean and standard deviations from 5-point Likert type responses ranging from Very Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4) and Strongly Agree (5).

### 4. DATA ANALYSIS AND PRESENTATION

Data collated for the study were collated, analyzed and discussed in line with the stated research questions for the study, as arranged below:

**Table1. Descriptive Statistics of Respondents Characteristics**

Measure	Frequency	%
Male	171	61.8
Female	106	38.2
Total	277	100.0
Age	Frequency	%
10-17	276	92.9
18-25	21	07.1
Total	297	100.0
Nationality	Frequency	%
Ugandans	83	28.0
Congolese	107	36.0
Rwandans	49	16.5
Burundians	49	16.5
Somalis	1	.3
South Sudanese	5	1.7
Ethiopians	3	1.0
Total	297	100.0

As shown in table 2, majority of the respondents were male with a percentage 61.8% as opposed to female who were 38.2%. This presupposes that generally, there were more male in Nakivale Refugee Settlement schools than female. Regarding age, majority of the respondents were in the age bracket of 10-17 years which had a percentage of 92.9%. This was followed by respondents in the age bracket of 18-25 years with 41.9%. Respondent by nationality, majority of were Congolese with 36% and these were followed by Ugandans who had 28%. Rwandans and Burundians had the same percentage of 16.5% while Somalis, south Sudanese and Ethiopian had respective representation of 0.3%, 1.7% and 1.0%.

**Table 2: Mean and Standard Deviation for the Study Variable**

Variable	Mean	Standard Deviation	Decision
Attitude Towards the Technology	4.13	0.32	Agreed
Quality of the Content in the E-Learning and Multimedia Technology	4.16	0.46	Agreed
E-Learning and Multimedia Technology Quality	3.83	0.67	Agreed
Support by ICT Technical Staff	4.07	0.75	Agreed
Stakeholder Involvement	3.45	1.27	Neutral
Overall	3.93	0.7	Agree

Mean and standard deviation were used to obtain the overall mean value for each study dimension followed by comparing the overall mean with mean interpretation to determine the barriers and motivators to implement E-learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda.

The overall mean value is presented in Table 2 above. The finding showed that the mean value for almost all the dimensions were high and respondents agreed; Attitude towards the Technology (4.13), Quality of the Content in the E-Learning and Multimedia Technology (4.16), Support by ICT Technical Staff (4.07), E-Learning and Multimedia Technology Quality (3.83) and Stakeholder Involvement (3.45). The overall mean value among the respondents was also high (3.93).

**Answering Research Questions  
Parametric Assumptions**

To determine whether or not the data are parametric, the researcher tested assumptions of parametric. First and foremost, the data were continuous and measurements met the minimum sample size requirement (Saunders, Lewis and Thornhill, 2016). Besides, there was no linear relationship among the variables and data collected were not normally distributed based on the results obtained from the linearity and normality tests respectively. Therefore, to examine the barriers and motivators to implement E-learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda, the researchers used Spearman’s Rank Test to measure the non-parametric data.

**Correlation Value Interpretation**

The correlation values in this study were interpreted following the table of correlation value interpretation developed by Bartlett, Kontrlik and Hinggins (2001) as shown in Table 3.

**Table 3: Correlation Value Interpretation**

Correlation Value (r)	Relationship Strength
± 0.70-0.99	Very Strong
± 0.50-0.69	Strong
± 0.30-0.49	Moderately Strong
± 0.10-0.29	Weak
± 0.01-0.09	Very Weak

1. Does the quality of the content in the implemented E-learning and Multimedia Technology affect learners’ attitude towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda?

**Table 4: Spearman Correlation between quality of the content in the implemented E-learning and Multimedia Technology learners’ attitude**

Variable	Correlation Coefficient, r	Sig. (2-tailed)
Quality of the Content	.278**	0.000

\*\* Correlation is significant at the 0.01 level (2-tailed).

Table 4 indicates that there was a significant, positive and weak correlation between quality of the content in the

implemented E-learning and Multimedia Technology and learners’ attitude ( $r = .278, p < .01$ ). The results revealed that any increase in quality of the content in the implemented E-learning and Multimedia Technology will affect learners’ attitude. Furthermore, teachers through interviews confirmed that “*The content provided by E-learning is actually good, actually it has helped us in good methods of teaching and learning though there are challenge of learners saying that the get bored playing the same content on the CD and DVDs all the time*” (Respondent 1 from school A).

“*As per now we have not yet used the content a lot because we went for training once and sometimes we don’t know how to use it, sometimes we open the portal and see what’s there but sometimes we don’t know where to go or what to do which is affecting us the teachers and the learners*” (Respondent 3 from school B)

2. Does the implemented E-learning and Multimedia Technology quality affect learners’ attitude towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda?

**Table 5: Spearman Correlation between implemented E-learning and Multimedia Technology quality and learners’ attitude**

Variable	Correlation Coefficient, r	Sig. (2-tailed)
Implemented E-learning and Multimedia Technology Quality	.367**	0.000

\*\* Correlation is significant at the 0.01 level (2-tailed).

Table 5 indicates that there was a significant, positive and moderately strong correlation between implemented E-learning and Multimedia Technology quality and learners’ attitude ( $r = .367, p < .01$ ). The positive significant relationship showed that by having good quality of implemented E-learning and Multimedia Technology, it means that learners’ attitude will be affected.

Furthermore teachers through interviews confirmed that “*The system is good because the leaners feel motivated and they are happy with the system and because they love learning using it.*” (Respondent 1)

“*The system is truly good, pupils are always looking forward to the classes, which we have twice in a week and they are enjoying the classes*” (Respondent 3)

3. Is the support by ICT technical staff affect learners’ attitude towards implemented E-learning and Multimedia Technology in improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda?

**Table 6: Spearman Correlation between support by ICT Technical Staff and implemented E-learning and Multimedia Technology and learners’ attitude**

Variable	Correlation Coefficient, r	Sig. (2-tailed)
Support by ICT Technical Staff	.615**	0.000

\*\* Correlation is significant at the 0.01 level (2-tailed).

Table 6 indicates that there was a significant, positive and strong correlation between support by ICT technical staff of the implemented E-learning and Multimedia Technology and learners' attitude ( $r = .615, p < .01$ ). The strong positive significant relationship implied that support by ICT Technical Staff of implemented E-learning and Multimedia Technology affected learners' attitude.

The teachers further confirmed that the ICT technical staff has truly supported the implemented E-learning and Multimedia Technology as stated

*"Yeaaa they have, because when we call them that the data is not there, they send and also when there's no fuel in the generator, they come and give it to us and even sometimes they come and retrain us to use the portal because sometimes when the system fails to start, they help us to restart it."*(Respondent 1 from school A).

*"Yes they usually come and talk to us, give us CDs and DVD players loaded with content to use and train us how use it, surely my ICT pedagogical skills have improved as these IT facilities help me let learners study on their own"*(Respondent 3 from school C)

*"We have an internet problem of not being accessible regularly, it's on and off and sometimes we go days without it, and this could affect learning and in using the content which is a challenge"*(Respondent 4 from school B).

- Does stakeholder's involvement affect learners' attitude towards implemented E-learning and Multimedia Technology in improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda?

**Table 7: Spearman Correlation between Stakeholder's Involvement and implemented E-learning and Multimedia Technology and learners' attitude**

Variable	Correlation Coefficient, r	Sig. (2-tailed)
Stakeholder's Involvement	.406**	0.000
**. Correlation is significant at the 0.01 level (2-tailed).		

Table 6 indicates that there was a significant, positive and moderately strong correlation between stakeholder's involvement of the implemented E-learning and Multimedia Technology and learners' attitude ( $r = .406, p < .01$ ). The moderately strong positive significant relationship implied that stakeholder's involvement of implemented E-learning and Multimedia Technology was very important and affected learners' attitude.

The teachers further confirm that relevant stakeholders were involved to ease and boost students' attitude towards E-learning and Multimedia technology

*"Yeaaa they were consulted because they even held a meeting at Nakivale secondary school, Kabahinda and the stakeholders were there."*(Respondent 1 from school A)

*"Yeaaa, Windle trust Uganda, the manager was there, UNHCR staff and all the head teachers of the school which had E-Learning, because they have to be available before introducing anything in the said schools"*(Respondent 4 from school D).

In summary, we can conclude that there was a positive significant relationship between all the research variables of implemented E-learning and Multimedia Technology and learners' attitude.

However, there was weak correlation between quality of the content in the implemented E-learning and Multimedia Technology and learners' attitude meaning this could be established as the barrier to the implementation of an E-Learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement.

## 5. DISCUSSIONS AND FINDINGS

The analyzed data from the study revealed that majority of the respondents were male with 61.8% while almost all of the respondents were between 10-17 years (92.9%). The study findings showed that there was weak correlation ( $r = .278$ ) between quality of the content in the implemented E-learning and Multimedia Technology and learners' attitude meaning that this could be established as the barrier to the implementation of an E-Learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement. Besides to this finding, Majed and Qais, (2013) in their study 'the effect of information quality in e-learning system' concluded that information quality is the main factor that increase or decrease the efficiency of e-learning system and therefore e-learning systems developers should take consideration on the dimensions of information quality (accuracy, relevancy, accessibility, and validity). Results also showed that, there was moderately strong correlation between implemented E-learning and Multimedia Technology quality, stakeholder's involvement and learners' attitude ( $r = .367, r = .406, p < .01$ ). In support to this finding, literature establish that quality-related factors (instructor and system) are key predictor of perceived usefulness and user satisfaction to learners' attitude and e-learning system implementation (Lawoga, 2014). Support by ICT technical staff of the implemented E-learning and Multimedia Technology had strong positive effect on learners' attitude ( $r = .615, p < .01$ ) towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement. Stephanie & Vladlena (2014) postulate that the expertise to adopt e-learning systems in the academic environment is enhanced by effective technology training which must be hands-on, systematic and continuous.

## 6. CONCLUSIONS AND RECOMMENDATIONS

### 6.1. Conclusions

This study examined the barriers and motivators to the implementation of an E-Learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement, Uganda. The motivators to the implementation of an E-Learning and Multimedia Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement were established as support by ICT technical staff, E-learning and Multimedia Technology quality, and stakeholder's involvement. Quality of the content in the implemented E-learning and Multimedia Technology was established as the barrier since it was the only which had weak correlation to the implementation of an E-Learning and Multimedia

Technology towards improving school education standards in mathematics and health education in Nakivale Refugee Settlement. In addition to this, the content developed should be put in use by all the teachers as it was a concern by some teachers that they were not using it as the training seemed not to be enough. There is a need for management to provide adequate support to lecturers that are planning to integrate social media into the academic setting. Though stakeholders like "Windle trust Uganda", UNHCR staff and all the head teachers were there during implementation of the e-learning system, school management requires a e-learning policy in place to govern the use of emerging technologies in its teaching and learning environment.

## 6.2. Recommendations

The findings of this study should help policy makers and managers both at school and national levels to pay special attention to factors that have significant, positive and strong association in implementation of an E-Learning and Multimedia Technology towards improving school education standards for example having e-learning policy and effective technology training. Learners from institutions of primary and secondary who are to use E-Learning and Multimedia Technology in teaching and learning, they need to be motivated through support by ICT technical staff, E-learning and Multimedia Technology quality, and stakeholder's involvement. For future study, the researchers recommended to widen the scope of study in terms of subjects and participants. The current study limited to institutions in Nakivale Refugee Settlement. A future study might consider involving institutions of higher learning like universities in Uganda to draw a broader generalization or conclusion.

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## Availability of Data and Materials

The data will not be shared because this data can be used only by the researchers

## Competing interests

The authors declare that they have no competing interests.

## Authors' contributions

All authors read and approved the final manuscript.

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