Journal of Learning for Development – JL4D
ISSN: 2311-1550
2020, Vol. 7, No. 3, pp. 423-432

Hindrance to Technologically Guided Education in Kenya Secondary Schools: A Case Study of Embakasi Girls' School

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Abstract: The COVID-19 epidemic has forced education managers and teachers to begin or enhance e-learning mode of education across the world. Kenya has not been left behind. This article is geared towards identification of challenges that face technologically based / supported education in schools.

Keywords: pedagogy, blended education, professional, digital, technological, accessibility, availability, COVID-19.

Introduction

The COVID-19 epidemic has forced education managers and teachers to begin or enhance the e-learning mode of education across the world. Kenya has not been left behind. This article is geared towards identification of challenges that face technologically based / supported education. Firstly, is the accessibility question. Availability of ICT systems and devices is limited for most learners, teachers, and parents due to their socio-economic status. Even for cases where gadgets and platforms are available, the drive and preference of the owners of devices / systems towards their use for education is not guaranteed. There is also a question of the digital divide, since most Kenyan parents and schools do not have Internet access or smart phones, even though they may have a mobile device. Secondly, is the issue of pedagogy – this implies practice and methodology that best fit the teaching of youthful students. Use of technologies in teaching should be done in a professional way by adhering to how instructional materials are prepared, dissemination of the same materials and then fusing them with technology for effective teaching and learning. There are few programmes that address this aspect in a professional way in Africa. The screenshot below is an indication of factors that may hinder e-learning education. It was taken from the online training of Machakos University tutors. A survey was done where the participants indicated challenges that they may face in their teaching. Clearly, students' readiness to engage, pedagogy and access were their main concerns as shown from the percentages rated for each challenge.

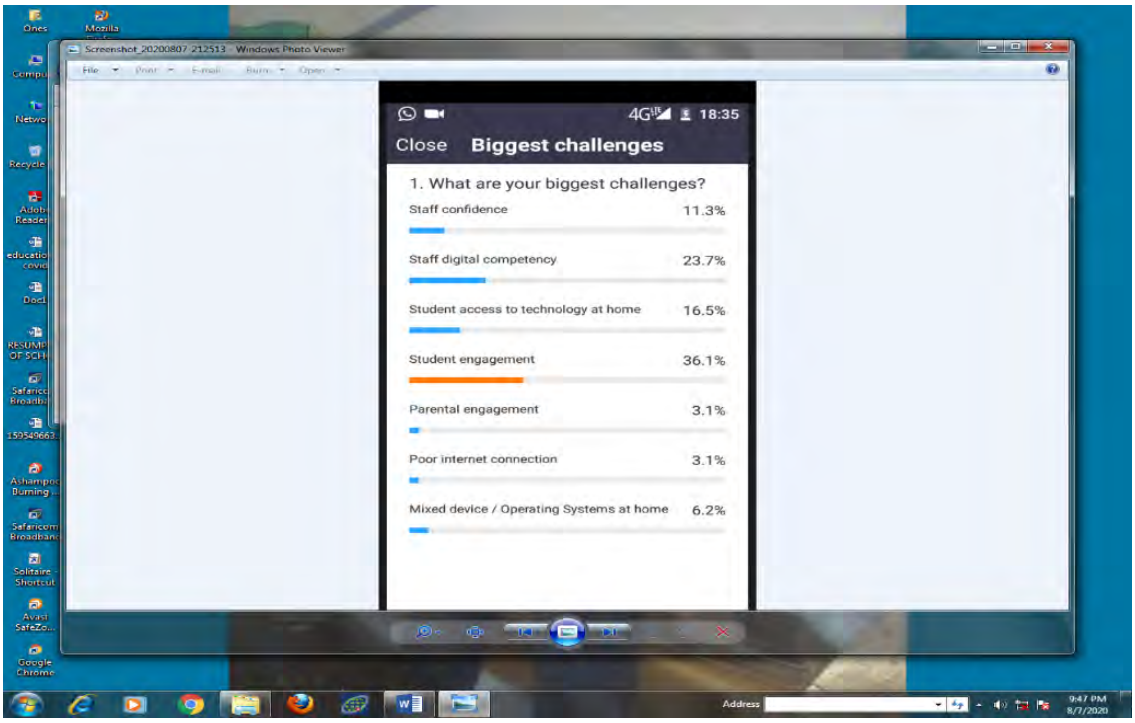

Figure 1: Response from Machakos University training participants on the main challenges on e-learning

General Objective

The study sought to find out the main challenges that face digital learning in a typical Kenyan secondary school.

Specific Objectives

(i) To what extent does the availability and access of digital technologies affect provision of e-education?

(ii) What is the level of professional training towards instructional systems design (ISD) in technologies in Kenya's teacher post-primary training institutions?

Scope

The study took a middle-class school for data on access to e-learning resources — where teachers and students were involved for the last four months during the COVID-19 period. For pedagogy and professional training, the research sought information from teachers in the same school and observation from their transcripts as far as ISD-related courses are concerned.

Literature Review

In this section, a literature review based on availability, access and digital pedagogy is discussed. It will shed light on the important factors that guide any e-learning or digital education provision, especially strategies employed during the COVID-19 period.

e-learning/Technology Guided Education

e-learning has no universal agreed-upon definition. However, from the word, we note that the letter 'e' stands for electronic. This implies that e-learning is an art of teaching and learning by use of electronic devices that are said to be digital for data transfer. According to Ehler (2011) "E-learning (or sometimes electronic learning or e-learning) is a term which may be used to encompass all forms of technology-enhanced learning (TEL) or in some cases very specific types of TEL such as online or web-based learning. That said, the term does not have a universally accepted definition and there are divides in the e-learning industry about whether a technology-enhanced system can be called e-learning, if there is no set pedagogy as some argue e-learning is." It is for this reason that the study took any form of education using digital technology as e-learning.

Availability and Access of Technologies

According to Njenga (2020), "the pandemic has accelerated digital transformation and is heavily skewed towards integration of digital technology to a more adaptable fully digitally enabled solution. The collaboration technological adoption of smartphones and computers has aided access to the internet and digital public service thereby helping overcome the current Covid-19 related challenges that we never worried about before."

The education sector is one of the sectors that have fallen in line. Most countries and institutions have tried to incorporate ICT for the new normal but most of them are far from ready, despite the notion expressed by Njenga.

The importance of any resource becomes relevant to human beings when it is available for use. It therefore follows that availability of learning materials is crucial for success in education. According to Jocelyn (2018), "learning materials are crucial to the success of student achievement conversely, lack of the learning resource minimize or block any meaningful teaching and learning". It is prudent to note that society can only make use of resources when they are available, since no one can make use of what is not there

The exposure of any technological resource sometimes alienates users to explore and learn from them. According to (Amirault et al, 2012), "limited shelf life of new devices and software in addition to barriers in internal organization hinder universities from effectively and efficiently integrating new technologies." In fact, you cannot have effective blended or pure digital learning without the accompanying resources. Equity is an attribute that should always be a concern when discussing availability of any resources.

Access to the available technology or resource is a different thing altogether. A resource may be physically there but not accessible for a specific need. For instance, there are people in society who cannot afford Internet to access the related information resources. Cultural issues and socio-status class in society always brings the digital divide to the fore, and access is not equitable.

According to Gorski (2015), "Like the racial and gender divides, the socio-economic digital divide must be understood in a larger socio-political and socio-historical context." Therefore, digital technologies will always fail to give all members of society even access. This lack of uniformity is passed on to the success quality and scaled learning when digital technologies are deployed for learning and teaching.

A report by USAWA (NGO), as reported by Githinji (2020), points out that "only 22% of children have access to learning through internet, " and she adds that, "less than 10% of learners in public schools have access of digital learning materials." This was a study in Kenya on digital learning status.

According to John et al (2015) "internet service providers to Kenyan Universities which include the government owned Kenya Education Network (KENET) should lower further the cost of internet bandwidth to make it more affordable by universities. This can be achieved through more bandwidth cost subsidy by the government to Kenyan Universities through KENET. Adequate internet bandwidth will ensure faster internet connectivity hence facilitating easier access to e-learning". Since most e-learning platforms make use of the Internet, the speed and cost usually hinder the access and provision of digital e-learning, and it leads to inadequate learning.

Other Resources

Apart from the Internet as a resource, a good e-learning experience involves a lot more. The basic requirements such as software, text editor, browser, plugins, a PDF reader, a webcam, headset and FTP client are all items that come with some cost. If one goes on listing more tools for technologically guided learning, then we have tools like projectors, video cameras, printers, scanners and loudspeakers/microphones. It is therefore evident that even starting e-learning at a basic level, there would be some cost involved.

Instructional Systems Design

Any good and effective digital or technologically-based learning comes with a suitable Instructional Design (ID) or instructional systems design (ISD). This is basically a practice of systematically designing, developing and delivering instructional products and experiences both digital and physical in a consistent and reliable manner. For example, Andrea (2018) observes, "There has been a number of instructional design models and processes defined through the years but only a few have widely been accepted and implemented by most instructional design practitioners." This is an area that requires tutors and educationists to be well-equipped with appropriate pedagogy, as discussed in this study report.

Professional Pedagogy in e-Learning

Good instructional design using digital technologies requires training of tutors to get the right methods and authority tools for their specific areas. Indeed, putting educational resources online or even offline (synchronous or asynchronous) without the right pedagogy leads to having learning that is incoherent and of poor quality. According to Brendon et al (2018), "There are nearly 300,000 teachers across Australia. They need access to ICT improvement for classroom implementation and to keep up with continuous technological advances. This needs to be regular, scaffolded and sustainable". Most institutions in Kenya, and probably in most of sub-Saharan countries, were caught off-guard by the campus closures and they rushed to quick-fix programmes to offer online education. Many staff were professionally unprepared for this shift in pedagogy. As noted by Mehlinger and Powers (2020): "According to the association for educational communications and technology, one of the principal professional associations representing educational technologists, 'Instructional technology is a complex, integrated process involving people, procedure, ideas, devices and organization for analyzing problems and devising, implementing, evaluating and managing solutions in which learning is purposive and controlled (p.4)."

According to CommLab India, “Instructional design strategies and their importance in e-learning design. An instructional design strategy is a high-level approach of how a particular subject will be taught. It encompasses the methods techniques and devices used to instruct learners”. It is therefore clear that a well-thought-out technological learning strategy will be needed to deliver the intended learning outcome. Importantly, for example, a tutor must be able to involve learners actively online, where there is no face-to- face interaction.

As teachers, we know that curriculum development involves making decisions about **what** students will learn, while instructional design involves decisions about **how** students will learn it. They are related but not synonymous.

This aspect of expertise is important as Hulimann, March and Rogers (2013) observe, “Curriculum development is central to teaching quality. Yet as research has shown, it is rarely given priority in university departments.”

Gautam (2020) opines, from an e-learning industry perspective, that “migrating existing classroom training programs to an all-digital avatar calls for effort, beyond the mere application of existing technology solutions, in order to offer virtual learning. Rather, they represent a more fundamental rethinking of the learning experience to enable collaborative, interactive social learning experiences for groups of learners.“ Factors that may be barriers to digital learning from the same article are ”budgetary constraints due to economic instability, lack of infrastructure, and most importantly, unavailability of e-learning content and trainers with remote training expertise”. The swift change affected many countries, even the developed countries faced challenges, because even if one had addressed some of the factors, others may still have been missing.

Methods

Sampling

The study focused on an ‘average’ school located between a slum and a middle-class residence. It was envisaged that the data collected would represent the majority of socio-economic contexts from where the students came, and that this snapshot could provide insight into the bigger picture of the status of Kenya Secondary Schools’ preparedness status for digital learning.

The study used purposive stratified random sampling to get its data.

- Data was collected from WhatsApp assignment groups. Observation of records was key. The participants for the WhatsApp assignment groups were noted and the number of the participants recorded. The number of the students was extracted from the school register. The records from education units were recorded from different teachers’ transcripts.

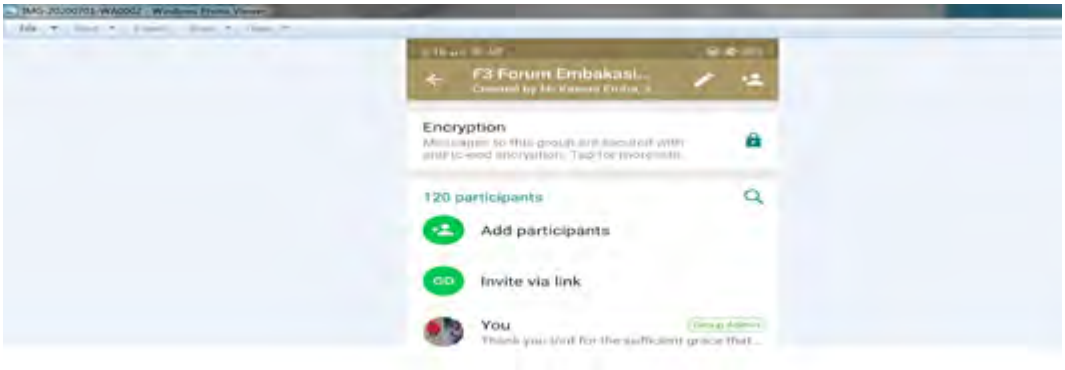

Figure 2: A sample screenshot of a WhatsApp participants forum for Form 3 learners

- Phone interviews were also undertaken for two categories of the population. Teachers were called for information on the college or university they attended. The other important phone interviews were done for the randomly selected students from the WhatsApp participants groups at each level, that is, from form one to form four. The students were asked whether they had accessed assignments sent by the teachers and the state of their completion.

Table 1: A sample question for students

Form Level	Students Name	Accessed and did Assignments (Yes/No)

The methods used were convenient during the current COVID-19 period as both methods avoided physical and social interactions. The only limitation is that some of the answers relied on the honesty of the respondents. The researcher's professional manner sought to reduce any anxiety which might cause respondents to be dishonest.

Results and Data Analysis

Content Accessibility

The study obtained results that were analysed using three tables, as shown below.

Table 2: WhatsApp percentage of students in the school

Stream	No. of Students	No. of Students in WhatsApp	%
Form 1	200	105	53
Form 2	220	74	34
Form 3	210	120	57
Form 4	135	64	47
TOTAL	**765**	**363**	**47**

The table above shows the number of the students in the school who were involved in the study. It was done per form level. In addition, the table indicates the students who were on WhatsApp groups used by teachers to send assignments. A percentage of the WhatsApp members against the total number of students per form level was calculated. It was evident that the students who were in the

WhatsApp groups were less than the school population. Not all students had access to a smart phone able to access WhatsApp.

Table 3: Analysis of students who did the assignments

Stream	No. of Students in WhatsApp	Students Interviewed	Assignment Done/Accessed	% Who did Assignment
Form 1	105	11	2	18
Form 2	74	8	4	50
Form 3	120	12	4	33
Form 4	64	9	2	22
	363	**40**	**12**	**30**

The study proceeded to get the percentage of students who accessed and did the assignment. It narrowed down to the students who were in a WhatsApp group. For any form, the number of students interviewed was above an average of *ten percent* for the WhatsApp groups in order to have a good population sample size.

Table 4: Overall analysis of assignment access for all

Stream	No. of Students	Assignment Done/Accessed	%
Form 1	200	2	1.00
Form 2	220	4	1.82
Form 3	210	4	1.90
Form 4	135	2	1.48
Overall	765	**12**	1.57

The table above, compared the percentage of assignments done against the whole school population. Clearly, the whole idea of access to the technologically-based education solution for this school was far below optimum. It brings to the fore that teaching high school youth from an average socio-economic class of society using mobile technology is quite a tall order. There may be more reasons for this but the key thing illustrated by these results is that access to technology, and the content attached to it, is a big challenge for the developing countries at this period of COVID 19. In fact, the shortcomings of this approach are depicted by the bar chart below.

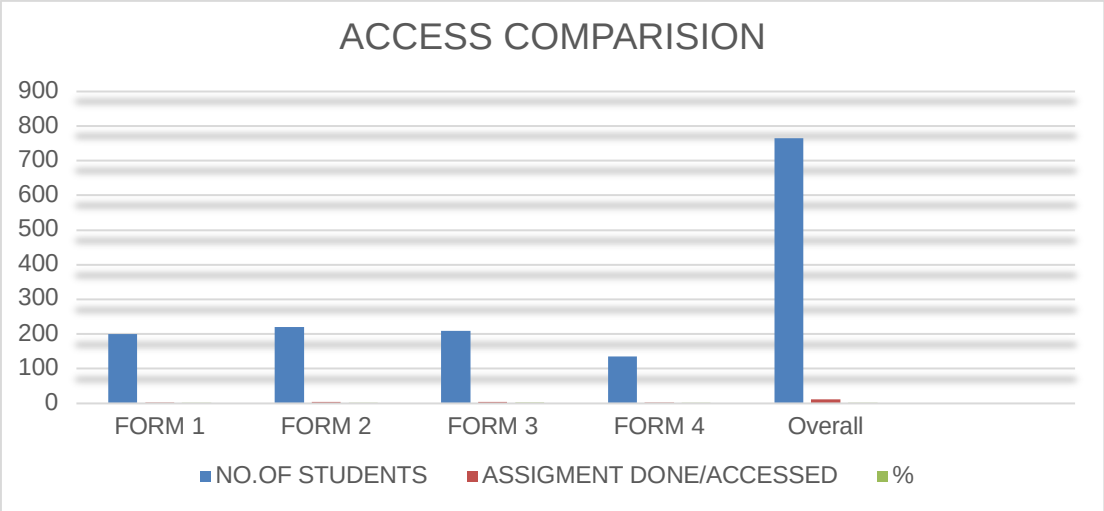

Figure 3: Access comparison

So, although access to mobile technology is growing, we cannot assume that all students have access to smart mobiles nor that they will have the data, skills or desire to use the technology even if they have it. This then speaks to how teachers motivate and support the students to use the technology they have. How prepared are teachers for mobile pedagogy?

Pedagogy

Pedagogy training is very important for the success of any form of teaching. All training institutions should be able to adhere to international standards for professional pedagogy. In this study, ten universities from where teachers from the school under study trained were identified. By examining the teacher's education units from their transcripts, it was observed that only one university had a full course and units for an Instructional System Design module, as indicated by the table below.

Table 5: Number of ISD Units in teachers training institutions

University	No. of ISD Units (Education)
Machakos	0
Kenyatta	0
Nairobi	0
KTTC	0
NTTC	0
Mt. Kenya	0
Jomo Kenyatta	1
Riara	0
Moi	0
Karatina	0
Total	1
%	10

Conclusion

Provision of ICT resources to secondary schools and using professional pedagogy in Sub-Saharan Africa is a big challenge, especially during the current Pandemic-COVID-19. There is need to re-structure and make the necessary policies that should include funding to schools towards ICT integration in education.

The results from the study show an alarming level of poor ICT penetration among Kenyan students in a typical school. It is made worse by lack of expertise of tutors who are expected to author and deliver content to the technologically-deprived learners. Digital devices and access to internet are paramount for quality and quantity of learning content. Professional pedagogy is needed for proper direction and stimulation for digital learning. This helps the learner to engage in a friendly and frequent manner while maintaining a high level of skills attainment. Although this study was limited to a single school, and might usefully be extended to a larger sample of schools, the fairly 'typical' nature of this school does suggest that there may be some systems challenges that need to be addressed.

All training institutions need to include Instructional Systems Design (ISD) in their teacher education programmes. Well-designed and implemented ISD training equips the teacher with the twenty first century (21st century) skills: collaboration, creativity, critical thinking and communication. These skills are essential across all professions.

The Ministry of Education (MOE), Teachers' Service Commission (TSC) and the Kenya Institute of Curriculum Development (KICD), universities and teachers' training colleges should have a joint consortium to re-evaluate the current education framework for future planning and delivery of ICT blended education.

Evidently, COVID-19 has exposed our education system's ICT underbellies. However, there is a silver lining — having learned from the current experience, countries can now work towards and invest in a professional and stable Instructional Systems Design environment for the future.

Acknowledgement: I would like to convey my gratitude to the students, teachers and school institutions administrators who provided me with information for this article. I also thank my family for their psychological support during the entire period of study. And to the almighty God, thanks so much for everything.

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Cite this paper as: Onesmus, G. (2020). Hindrance to technologically guided education in Kenya secondary schools: A case study of Embakasi Girls' School. *Journal of Learning for Development, 7*(3), 423-432.