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Educational Technology: Revisiting Best Practices for Bridging the Digital Divide

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Abstract

The purpose of this paper is to revisit the best practices for bridging the digital divide in education in public primary schools in Uasin Gishu County, Kenya. The Government of Kenya provided all public primary schools with tablets and computers in March 2017; however, there have been limitations to the integration of technology in the classroom. The main objectives of the study were: To examine the teacher's ability to integrate technology in the classroom in primary schools and to find out ways of increasing digital compliance by teachers of primary schools in Uasin Gishu County. The theoretical framework was based on Mishra and Koehler's TPACK framework which describes what teachers need to know to integrate technology effectively into the instructional process. This study was conducted in Uasin Gishu County. Mixed method approach was adopted and heuristic inquiry enabled the researcher to make meaning from document analysis. Questionnaire were developed on google forms and used to collect the required data. Teachers (14) were reached through google forms enabled by snowball sampling in Uasin Gishu County. Quantitative data was analyzed using Google Sheets and data was presented in pie charts and histogram charts. Findings indicated that most teachers (63.3%) have not used available digital devices to access online educational content due to insufficient technological pedagogy. Based on these findings, this paper recommends that the Kenya Institute of Curriculum Development (KICD) adopt the use of Google Workspace for education which allows teachers to use a learning management system called Google Classroom.

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Introduction

One of the key challenges facing the use of technology in education is the digital divide. Not all students have access to the technology and resources they need to participate in online learning. The government of Kenya provided all public primary schools with tablets and computers in March 2017; however, there have been limitations to the integration of technology in the classroom. United Nations Educational, Scientific and Cultural Organization's (UNESCO) concept note calls for governments and educational institutions to work together to bridge the digital divide and ensure that all students have access to high-quality online resources. The UNESCO concept note for 2024/2025 is a comprehensive document that provides a roadmap for the future of technology integration in education. The concept note recognizes the potential of technology integration that include selection and use of appropriate technology tools, integrating technology into instruction and assessing student learning using technology. It puts forward the fact that the use of technology in education can pose challenges, such as the digital divide, the need for teacher training, appropriate content and the need for safe and ethical use of technology. It calls for a concerted effort to address these challenges and to ensure that all young learners have the opportunity to benefit from the potential of technology in education.

Technology can be a powerful tool for learning and therefore teachers should be prepared to use it. Integrating technology in teacher preparation will enable teachers to use appropriate technology tools in the instructional process. By investing in teacher preparation, countries can greatly benefit from teachers with technological content knowledge and technological pedagogical skills. It can also be more flexible in extending learning beyond classroom walls, allowing students to learn at their own pace and in their own time. It is important to ensure that all students have access to high-quality education, regardless of their socioeconomic status, geographic location, or other factors. This paper therefore sought to examine the teacher's ability to integrate technology in the classroom and find out ways of increasing digital compliance by teachers of primary schools in Uasin Gishu County.

Kenya's Vision 2030 envisages creating a knowledge-based economy where all Kenyans will have access to high-quality education. Technology is to be leveraged to enable this goal. Schools have been equipped with digital devices and teachers are

expected to have been trained on how to use these digital devices effectively in the classroom. This will ensure personalized learning for students to learn at their own pace. Learners will get opportunities to connect with others around the world and get to see varied cultures across the globe. Technology creates more engaging and interactive learning experiences. With this vision, Kenya is geared towards creating a system of education that is global. So far, all public primary schools have been issued with tablets and computers. This is a step towards ensuring that learners in basic education can access the internet for content that enriches the instructional process.

Each learner in grade one was to access the digital content provided by the Kenya Institute of Curriculum Development (KICD) using the Learner Digital Device (LDD). For each school, the teachers were to use laptops to link with the LDD during the instructional process (Village Impact, 2020). This was one huge stride towards integrating technology in the classroom. There however been reported issues of lack of technical support to allow for use of the digital devices. A standardized course that is offered to all teachers across the country will ensure all learners interact with digital devices all through their basic education. This will help develop the competencies so desired in the Competency-Based Curriculum (CBC). Integrating technology in the classroom has the potential to be a powerful tool for improving student learning. However, it is important to address the challenges that exist to ensure that technology is used effectively.

Integrating Technology in the Classroom

The COVID-19 pandemic period enabled schools and colleges an opportunity to re-engineer new forms of online instructional delivery. Covid- 19 crisis took all educators by surprise. A few teachers had previous experience in online instruction (Klimanova, Merrill, & Spasova, 2021). The language community they worked with was quick to share tips on best practices of online delivery. McGlynn and Kelly (2019) proposed the use of educational technology tools in the classroom to meet diverse learners' needs in the science classroom. They employed Google Classroom, Schoology, and Blackboard learning management systems. This study examined the use of Google workspace for education tools involving the use of Google Classroom as it offers a good teacher and learner experience. It has features like streaming, classwork, people and grades. The provision for people in a Google Classroom enables the teacher to add co-teachers and

learners and the issue of attendance is well catered for. This is a learning management platform that allows for assignments that enable students to explore knowledge from various resources found online. Integrating technology into the classroom has however been hampered by insufficient technological pedagogy.

Technology in the classroom has the potential to transform education at every stage from Pre-K to K-12 and even to higher education and adult education. The choice of instructional tools should be based on the ability to maximize the benefits of educational technology and its impact on student productivity and educational outcomes. Digital learning is to augment rather than replace traditional educational venues. Technology will revolutionize schools by preparing learners for the changing job market that requires a high degree of technical skill (Nelson, 2013). The job market requires a skillset that enables editing, sharing and collaborating with files seamlessly. This calls for the introduction of technological tools that are relevant to the work environment throughout basic education. Technology can help to ensure that all young learners have the opportunity to reach their full potential irrespective of their social or geographical backgrounds. The Sustainable Development Goal (SDG) number 4 in Kenya has one of the targets being ensuring lifelong learning opportunities for all from early childhood to adult education. It envisions education as a fundamental human right and an enabling right. By 2030, substantially increase the number of youths and adults who have skills that are relevant for employment and entrepreneurship. This will be achieved by building and upgrading instructional facilities that are child-friendly, gender and disability sensitive. Young learners are entitled to an opportunity to benefit from the potential of technology for learning. Primary schools need adequate technological support to enable children to enjoy digital painting on graphics through artificial intelligence tools.

Increasing Digital Compliance by Teachers

Technology self-efficacy is crucial in teacher preparation programs. This is the belief that one can accomplish a role or complete a task successfully and bring out a desired outcome through technology (Williams, Christensen, McElriy, & Rutledge, 2023). This indicates that technology self-efficacy is a value that should be developed in teacher preparation. The 21st-century skills should be learned in teacher training institutions (Zainal, 2016). The application of the TPACK framework should be interrogated to see how it will affect 21st-century skills in the classroom (Shafie & Ismail,

2019). When teachers acquire technological pedagogical content knowledge, they have the confidence to respond to learners' inquiries about technology as well.

In examining the challenges of Technology integration in the Bangladesh Education System, teachers are the main stakeholders in integrating technology into the instructional process. Technology only changes the teacher's role in the instructional process but does not change pedagogy. It has the potential to develop relevant skills in disadvantaged communities. Though there was poor ICT infrastructure in Bangladesh, they sought to develop a digital Bangladesh between the years 2009 to 2021. They identified first-order barriers which included lack of digital equipment and low technical support. The second-order challenges were related to teacher preparation (Mou, 2016). Integrating technology in the classroom is hindered by insufficient technological content knowledge by teachers.

There is a need to use technology that creates personalized learning experiences and provides access to resources that are tailored to the individual needs and interests of both teachers and learners. Currently, many Kenyan schools enjoy access to electricity and the availability of digital devices. They have a potential of technology to transform education by providing access to education, supporting effective learning, and improving assessment and evaluation. Adopting technology in teacher preparation has the potential to significantly improve the quality of teacher preparation and development. By overcoming the challenges of using technology in teacher preparation and by taking advantage of the potential benefits of using technology, schools can ensure that their teachers are prepared to use technology effectively in their teaching. Technology can be used to help teachers to develop their professional learning communities which provide opportunities to collaborate with other teachers online as a means of continuous career progression. This study sought to find out ways of increasing digital compliance by teachers in Uasin Gishu County.

This study was anchored upon Mishra and Koehler's TPACK framework (2006) which puts forward the concept of Technological Pedagogical Content Knowledge. They propose three core components: content, pedagogy and technology. The interactions between the three components result in good-quality educational technology integration (Koehler, Mishra and Cain, 2013). A teacher should present pedagogical content knowledge, technological pedagogical knowledge and technological content knowledge for effective integration of technology in the instructional process. When the three are

acquired, then technological pedagogical content knowledge (TPACK) is achieved as illustrated in the diagram below;
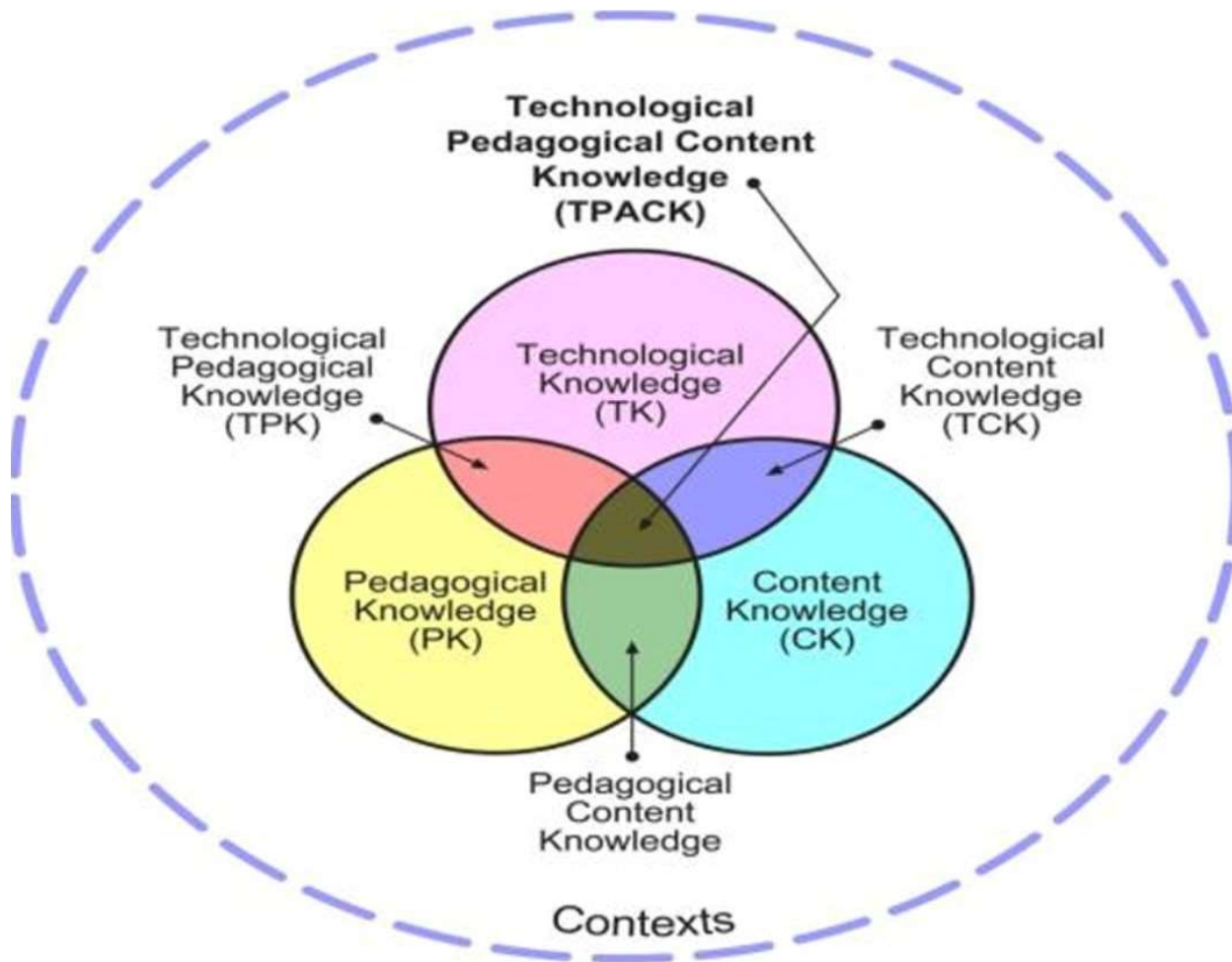

Figure 1: TPACK framework, (Mishra & Koehler, 2006)

Research Approach

Mixed method approach was adopted and heuristic inquiry enabled the researcher to make meaning from document analysis on Google's support documents. Google has robust support for Google Workspace users: documentation that informed this study a great deal. A questionnaire was developed and used to collect the required data from teachers. The teachers (14) were reached through google forms enabled by snowball sampling from public primary schools in Uasin Gishu County. This study did not include private schools because they did not receive the learner digital devices issued by the Government of Kenya. The questionnaire in form of a google form sought to examine the teacher's ability to integrate technology into the classroom and to find out ways of

increasing digital compliance by teachers in public primary schools. The form did not collect any email so as to remain anonymous.

Data collection was dependent on the teacher's confidence to access a form through a link. In the process of data collection, some challenges were encountered. Most teachers who would have informed the study referred to any link as a scam. However, a few teachers were able to respond and gave their views on their ability to integrate technology in primary schools.

Research Findings and Discussions

The collected quantitative data was analyzed using Google Sheets and qualitative data was analyzed thematically.

Integration of Technology in the Classroom

This study sought to establish the use of common digital tools: in this case, YouTube which streams educational content was expected to be used in lessons for learners to get a broader insight of a topic. Findings indicated that most teachers have not used available digital devices to access YouTube. The respondents (57%) agreed to have failed to use learner digital devices in accessing YouTube videos. Forty-three percent of teachers (43%) reported having attempted to use learner digital devices to access YouTube. Normally, teachers are the main stakeholders in integrating technology into the instructional process (Mou, 2016) and they need to develop a positive experience online before they can provide the same engaging experience to the learner. The respondents highlighted several challenges hindering the use of online digital resources which include teachers' insufficient technological pedagogy and limited access to affordable and accessible internet. The findings indicated that there was a concern on the issue of lack of trust in links to any site due to data security risks. The respondents blamed people who misuse digital knowledge by stealing vital information from teachers. This has caused fear that has led to rigidity towards the integration of technology in education. This study established that Google Workspace for Education uses a Google Chrome browser that has features tailored to protect everyone online. As soon as one is signed into a Google account, setting security features can be done. The system saves an individual's work automatically to the cloud while typing and teachers do not have to worry when there is a power outage. This study established that the digital devices

available in public primary schools can serve as Chrome books with sign-up for Google Workspace for Education.

The document analysis method revealed that institutions that sign up for Google Workspace enable learners to learn how to access assignments, documents and YouTube videos in a secure digital ecosystem that does not allow learners to come into contact with inappropriate content. Learners can submit assignments and get prompt feedback because the system grades assignments automatically.

The findings indicate that the system offers originality reports that promote the authenticity of learners' work. The teacher chooses to grade with rubrics and evaluating the whole class is a simple task with assignment options. The Google Classroom enables teachers to generate summaries of learner performance that are shared with parents. The available digital devices in public primary schools in Kenya are a great instructional resource because they act as Chrome books once signed into with Google Workspace accounts. With schools signing up for Google Workspace for education, children will color digital pictures creatively without having to require crayons. Artificial Intelligence tools have enabled children of the 21st century to enjoy working on activities within the institutions google workspace. This is enabled by extensions available for Google Workspace for Education.

Increasing Digital Compliance by Teachers

This study also sought to find out ways to increase teacher compliance with digital integration and most teachers (64%) wished to be provided with Wi-Fi for internet access. 57% of the respondents desired to gain technological pedagogy through in-service training while 43% wished that a digital integration course is introduced for teacher trainees. The respondents also reported that online content exposes learners to unregulated content. The Presidential Working Party on Education Reforms (2023) recommended that teachers undergo a one-year mandatory retooling and upgrading program for compliance with curriculum change in Kenya. This will enable training to embed the use of technology to support teachers. Redesigning instructional resources is necessary to allow learners to benefit from digital integration. To cater for this need, the Teachers Service Commission (TSC) in Kenya has already provided emails to all teachers which can be used to sign up for Google Workspace for Education. This study established that with a common platform run by an organization, it is possible for all teachers to gain

access to similar training resources. Teachers can learn both synchronously and asynchronously. Training online enables teachers within a group to learn how to edit, share and collaborate with files seamlessly.

This study explored Google for education fundamental tools and discovered the 24/7 support that Google offers to all Google Workspace users. This system indicates a promising future for online learning that will benefit learners at all levels. This paper emphasizes the need for teachers to learn how to use Google Tools for education for the acquisition of technological pedagogical content knowledge.

Conclusion and Recommendations

The aim of this paper was to highlight the best practices in bridging the digital divide in education. In regard to teacher's ability to integrate technology in the classroom, this study found out that most teachers have not used available digital devices to access YouTube. Google workspace is a system that can help to bridge this digital divide in education. The digital devices available in public primary schools can serve as Chrome books with sign-up for Google Workspace for Education. Institutions that sign up for Google Workspace enable learners to learn how to access digital resources in a secure digital ecosystem that does not allow learners to come into contact with inappropriate content. Learners can submit assignments and get prompt feedback because the system grades assignments automatically. Schools need to be supported by the government and communities to be successful in integrating technology.

In regards to increasing digital compliance by teachers of primary schools, signing up for Google Workspace will ensure that teachers and learners operate within the confines of an institution's workspace. It offers a digital ecosystem that is easy to manage. It does not require robust computer knowledge because Google offers full-time support for workspace administrators. Ensuring internet access to all schools is an enabler of digital integration. These are just some of the best practices that can help to improve digital compliance by teachers. This support can include providing resources, such as funding and training, as well as creating a supportive policy environment. With a common platform run by an organization, it is possible for all teachers to gain access to uniform training resources. School leaders are able to use google workspace collaborative tools to collect data necessary for making decisions about how to improve their schools. The data can come from a variety of sources, such as student achievement data, teacher

surveys, and parent feedback which Google Workspace tools enable. Google Workspace allows administrators to integrate third-party applications that enable special needs learners to meet their educational needs. To enable all these, teachers can access free online training on a platform they use their organizational emails to sign in. These google accounts work so well with Google Workspace. This paper acknowledges the inadequacy of technical support and insufficient technological pedagogy that needs to be addressed through continuous teacher professional development.

Based on the findings, the following recommendations were made: School administrators should ensure teachers are supported to use digital devices available to ensure effective, efficient, and equitable school and the Kenya Institute of Curriculum Development (KICD) should adopt the use of Google Classroom: a learning management system (LMS) by allowing all schools to sign up for Google Workspace for education, the Teachers Service Commission (TSC) should ensure free online courses are available for teachers to boost technological pedagogy and the Government of Kenya should come up with a country-specific online policy that will take care of handling students, teachers and guardian data.

Since this paper was limited to examining the teacher's ability to integrate technology into the classroom and finding out ways of increasing digital compliance by teachers of primary schools, further research should be conducted to establish the effectiveness of using Google Workspace for Education in the instructional process and examine the influence of teachers' technological knowledge on administering, analysis, recording and reporting of learner assessment scores.

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