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Enhancing Geography Instruction through Digital Tools in Public Secondary Schools in Meru South Sub-County, Tharaka Nithi County, Kenya

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Abstract: ***This study investigates the influence of digital tools on Geography instruction in public secondary schools in Meru South Sub-county, Kenya. Grounded in the Technology Acceptance Model (TAM), the research identifies the commonly used tools and evaluates their impact on teaching outcomes and student engagement. A descriptive survey involving 322 participants selected from a population of 1,957 was conducted using structured questionnaires. Results indicate that smartphones, computers and tablets are widely used, with YouTube emerging as the most effective instructional tool. Teachers reported increased student interest, improved comprehension of complex topics and enhanced experiential learning. The study concludes that digital tools significantly improve Geography instruction and recommends their broader adoption, alongside continuous teacher training to maximize their effectiveness.***

Keywords: Digital tools, Geography instruction, Public secondary schools, Teaching effectiveness, Student engagement.

1. Introduction

In the modern educational landscape, integrating digital tools is reshaping how subjects are taught and learned, with Geography being a prime beneficiary (Allam, 2019). As a discipline that involves spatial reasoning, environmental awareness, and the study of both natural and human systems, Geography is particularly suited to the dynamic capabilities of digital tools. These tools offer many opportunities to enhance instructional methods, improve student engagement, and ultimately lead to better learning outcomes (Witschel et al., 2019).

Using digital tools in Geography instruction enables the presentation of complex concepts through interactive and real-time data visualization (Börner et al., 2019). For instance, Geographic Information Systems (GIS) and online mapping tools allow students to explore spatial patterns and relationships visually, making abstract concepts like climate change, population migration, and urbanization more concrete (Xiang & Liu, 2019). Similarly, platforms such as YouTube and Google Earth provide immersive experiences, allowing students to virtually explore different parts of the world, observe geographical phenomena in real-time, and understand the environmental and human processes shaping them (Johnson, 2019).

This paper focuses on the influence of digital tools on Geography instruction in public secondary schools in Meru South Sub-County. By identifying the types of digital tools commonly used and assessing their impact on the teaching and learning process, the study aims to provide valuable insights into how these technologies are shaping the educational experiences of both teachers and students. The findings suggest that integrating digital tools enhances the delivery of Geography content and fosters a more engaging and interactive learning environment. Teachers in the study reported that digital tools have significantly increased student interest in Geography, improved comprehension of complex topics, and promoted positive attitudes toward the subject.

Moreover, using digital tools has been linked to better learning outcomes, as students are more likely to retain information when presented in an interactive and visually appealing manner. This study underscores the importance of embracing digital tools in Geography education and advocates for their broader adoption to maximize their educational potential.

Research Objectives

1) To identify the types of digital tools used in Geography instruction in Meru South Sub-County public secondary schools.
2) To determine the influence of digital tools on Geography instruction in public secondary schools in Meru South Sub-County.

2. Literature Review

The integration of digital tools in education is increasingly becoming a cornerstone of modern instructional strategies, mainly due to the growing body of research highlighting their transformative potential (Istance & Paniagua, 2019). Digital platforms, especially social networking sites like Facebook, YouTube, and WhatsApp, have been identified as powerful tools for enriching the educational experience. These platforms allow for a more dynamic and interactive learning environment where students and educators can collaborate, create, and share content more effectively (Manca, 2020).

Facebook, for instance, serves as a space where educators can create groups for classes, share resources, and facilitate

discussions outside the traditional classroom setting. This platform enables students to continue learning beyond school hours, allowing for more in-depth discussions and continuous access to educational materials. Similarly, YouTube offers a vast repository of educational videos that can illustrate complex concepts visually, making them more accessible to students. Educators can curate specific playlists tailored to their course content, providing students with additional resources to support their learning (Khan, 2020).

WhatsApp, known for its ease of use and widespread accessibility, is another platform that has been effectively integrated into educational settings. It facilitates real-time communication between students and educators, supporting collaborative learning through group chats where ideas can be exchanged, questions can be asked, and assignments can be discussed. This instant communication fosters community and collective learning, which is crucial for student engagement and motivation (Bouhnik & Deshen, 2014).

Beyond supporting traditional learning, these platforms facilitate new forms of interaction and content deliver aligned with students' digital habits. By leveraging these tools, educators can create a more engaging and communal learning environment that enhances students' educational experiences, making learning more interactive and practical (Istance & Paniagua, 2019; Manca, 2020).

In the context of subjects like Geography, which depends heavily on the visualization of spatial data and environmental processes, multimedia tools are particularly beneficial. Geography education often involves complex concepts that can be abstract and challenging to grasp through traditional methods alone (Lane & Bourke, 2019). Digital tools can bridge this gap by vividly bringing these concepts to life. For example, YouTube can provide visual demonstrations of natural phenomena such as volcanic eruptions, earthquakes, and climate patterns, giving students concrete examples that enhance their understanding and retention of the material (Slick, 2019).

For visual learners, videos and interactive maps provide clear and engaging representations of geographical phenomena. These resources allow students to see abstract concepts in action, making them more relatable and accessible to comprehend. Auditory learners benefit from podcasts or narrated explanations that combine complex topics into digestible pieces. Kinesthetic learners, who learn best through hands-on experiences, can interact with simulations that allow them to manipulate variables and observe the outcomes in real time. This hands-on approach not only aids in understanding but also in retaining information.

Moreover, digital tools in geography education help enhance spatial reasoning skills that are vital for practical problem-solving and informed decision-making. By enabling students to visualize and manipulate spatial data, these tools promote a deeper understanding of geographical concepts and their practical applications (Liu et al., 2019). For example, digital mapping tools can help students analyze patterns of urbanization or migration, allowing them to draw connections between these patterns and their broader implications for society and the environment. This level of engagement fosters critical thinking and equips students with the skills necessary to tackle complex global challenges (Degen & Barz, 2020).

For instance, visual learners can benefit from videos and interactive maps that depict geographical phenomena in a way that is engaging and easy to understand (Rane et al., 2020). Auditory learners prefer podcasts or audio explanations that break down these concepts. In contrast, kinesthetic learners can interact with simulations to manipulate variables and see the effects in real-time. This variety in instructional methods ensures that all students, regardless of their preferred learning style, have the opportunity to fully engage with and comprehend the material (Taçgın, 2020).

Moreover, digital tools significantly enhance spatial thinking skills, vital for real-world problem-solving and decision-making. By allowing students to visualize and manipulate spatial data, these tools help them develop a deeper understanding of geographical concepts, which they can apply to real-world scenarios (García de la Vega, 2019). For example, students can use digital mapping tools to analyze patterns of urbanization or migration, drawing connections between these patterns and their implications for society and the environment. This makes learning more engaging and equips students with the critical thinking skills necessary to address complex global challenges.

3. Theoretical Framework

The Technology Acceptance Model (TAM), developed by Davis in 1989, is a pivotal theory for understanding how individuals come to accept and use technology. It posits that two primary factors influence technology acceptance: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU is the degree to which an individual believes that using a specific technology will enhance their job performance, while PEOU refers to the belief that using the technology will be free from effort. These two factors are instrumental in predicting user behavior towards new technology, making TAM a widely applied model in various fields, including education (Davis, 1989).

In the context of Geography instruction in public secondary schools in Meru South Sub-County, Tharaka Nithi County, Kenya, TAM serves as a robust framework for researching the influence of digital tools. The model is particularly relevant for achieving the research objectives. For Objective 1, which seeks to identify the types of digital tools used in Geography instruction, TAM helps explain the choices made by teachers and students, based on their perceptions of the tools' usefulness and ease of use. Teachers are likely to select tools they believe will effectively improve student learning outcomes and are easy to integrate into their teaching practices.

For Objective 2, which aims to determine the influence of digital tools on Geography instruction, TAM allows for an assessment of how the perceived benefits and simplicity of these tools affect their integration and effectiveness. By applying TAM, the research can delve into the factors that drive the acceptance and successful adoption of digital tools in Geography instruction, ultimately providing insights into how these technologies can be better utilized to enhance educational outcomes in the region.

4. Methodology

The study used a descriptive survey research design to examine the impact of digital tools on Geography instruction in public secondary schools in Meru South Sub-County, targeting 1957 individuals, including 1868 Form Three students and 89 Geography teachers. A sample of 322 respondents was selected using the Krejcie and Morgan table, ensuring representation from both teachers and students. Data collection involved structured questionnaires that explored various aspects of digital tool usage, such as frequency, types of tools, and their perceived impact on instructional outcomes. The data were analyzed using SPSS version 29 to assess the effectiveness of digital tools in enhancing teaching and student engagement in Geography.

5. Results and Discussion

5.1 Results

Types of Digital Tools and Geography Instruction

The study sought to identify the types of digital tools used by Geography teachers in public secondary schools in Meru South Sub-county. The findings in Table 1 indicate that smartphones were the most commonly used digital devices (61.5%), followed by computers (28.2%) and tablets (10.3%). The frequency of use varied, with 46.2% of teachers using these devices more than once a week and 41% using them daily.

Table 1: Usage of Digital Devices by Teachers

Variable	Category	Frequency	Percentage
Digital device used	Smartphone	24	61.5
	Tablet	4	10.3
	Computer	11	28.2
	Total	39	100.0
Frequency of use of digital device	Daily	16	41.0
	More than once a week	18	46.2
	Once a week	2	5.1
	Rarely	3	7.7
	Total	39	100.0

Table 2: Types of Digital Tools Used during Lesson Preparation and Introduction

Digital Tool	Geography Teachers (%)	Students (%)
Facebook	69.2	57.9
YouTube	87.2	69.3
WhatsApp	79.5	53.4
Twitter	69.2	51.4
Instagram	15.4	7.9

The findings revealed that YouTube was the most frequently used digital tool during lesson preparation (87.2% of teachers), confirmed by 69.3% of students. Other commonly used tools included WhatsApp (79.5% of teachers) and Facebook (69.2%). Instagram was the least utilized tool.

Table 3: Types of Digital Tools Used during Lesson Presentation

Digital Tool	Geography Teachers (%)	Students (%)
Facebook	59.0	56.9
YouTube	87.2	77.9
WhatsApp	56.2	51.7
Twitter	30.8	21.4
Instagram	12.8	7.9

YouTube remained the most used tool during lesson presentations, with 87.2% of teachers and 77.9% of students affirming it. Facebook and WhatsApp were also commonly used, while Twitter and Instagram were less frequently utilized.

Table 4: Types of Digital Tools Used during Lesson Evaluation

Digital Tool	Geography Teachers (%)	Students (%)
Facebook	35.9	36.9
YouTube	53.8	77.9
WhatsApp	53.8	51.7
Twitter	45.4	22.1
Instagram	15.1	7.9

During lesson evaluation, YouTube (53.8% of teachers) and WhatsApp (53.8%) were the most used tools, confirmed by 77.9% and 51.7% of students, respectively.

Influence of Digital Tools on Geography Instruction

Teachers' opinions on the influence of digital tools on Geography instruction were overwhelmingly positive. Most (94.9%) agreed that digital tools increased students' interest in Geography, improved learning outcomes, and promoted positive attitudes toward the subject. Similarly, 87.8% of teachers believed digital tools enhanced experiential learning, making lessons more tangible and permanent.

Table 5: Influence of Digital Tools on Geography Instruction (Teachers)

Statement	Disagree (%)	Not Sure (%)	Agree (%)	Strongly Agree (%)	Total (%)
Digital tools influence the learner to have an interest in learning geography.	-	5.1	30.8	64.1	100.0
Using digital tools helps a learner develop new knowledge in specific learning areas.	-	25.6	43.6	30.8	100.0
Digital tools influence experiential learning in geography.	-	30.8	56.4	12.8	100.0
The use of digital tools makes learning real and permanent.	-	20.5	61.5	17.9	100.0
When digital tools are used, they motivate learning in geography.	-	12.8	48.7	38.5	100.0
Digital tools make learning faster.	-	17.9	58.3	28.2	100.0
The use of digital tools promotes learners' attitudes towards learning geography.	-	5.1	41.0	53.8	100.0
Learner's creativity and problem-solving is enhanced by using digital tools	7.7	15.4	59.0	17.9	100.0
Learner engagement during the instructional process is enhanced when using digital tools.	-	23.1	66.7	10.3	100.0
Digital tools provide differentiated learning styles and abilities.	-	30.8	46.2	23.1	100.0
The use of digital tools has a positive impact on student's learning outcomes.	-	5.1	56.4	38.5	100.0

Table 6: Influence of Use of Digital Tools on Geography Instruction (Students)

Statement	Disagree (%)	Not Sure (%)	Agree (%)	Strongly Agree (%)	Total (%)
Digital tools influence the learner to have an interest in learning geography	1.7	3.4	55.2	39.7	100.0
The use of digital tools helps a learner develop new knowledge in specific learning areas	1.7	3.4	50.0	44.8	100.0
Digital tools influence experiential learning in geography	1.7	5.2	39.7	53.4	100.0
The use of digital tools makes learning real and permanent	5.2	8.6	48.3	37.9	100.0
When digital tools are used, they motivate learning in geography	1.7	5.2	43.1	50.0	100.0
Digital tools make learning faster	1.7	1.7	53.4	43.1	100.0
The use of digital tools promotes learner's attitudes towards learning geography	1.7	3.4	46.6	48.3	100.0
Learner's creativity and problem-solving is enhanced by using digital tools	1.7	3.4	58.6	36.2	100.0
Learner engagement during the instructional process is enhanced when using digital tools	1.7	1.7	46.6	50.0	100.0
Digital tools provide differentiated learning styles and abilities	1.7	10.3	39.7	48.3	100.0
The use of digital tools has a positive impact on student's learning outcomes	1.7	5.2	50.0	43.1	100.0

5.2 Discussion

The study underscored the transformative impact of digital tools on Geography instruction, revealing that their integration significantly enriched the teaching and learning experience. Teachers overwhelmingly reported that digital tools were crucial in increasing students' interest in Geography. By leveraging platforms such as YouTube, WhatsApp, and Facebook, educators were able to present content in more engaging and dynamic ways, capturing students' attention and fostering a deeper connection with the subject matter. This heightened interest directly contributed to improved learning outcomes, as students became more motivated to participate actively in lessons and explore geographical concepts beyond the classroom.

One of the most notable benefits of digital tools highlighted by the study was their ability to promote experiential learning. Digital tools allowed teachers to bring abstract geographical concepts to life, making them more tangible and relatable for students. For instance, using YouTube to showcase real-world geographical phenomena or virtual field trips enabled students to experience and understand complex concepts more meaningfully and meaningfully. This hands-on approach enhanced comprehension and made learning more permanent, as students could visualize and interact with the material rather than memorize facts.

Moreover, the study found that digital tools significantly enhanced creativity and accommodated diverse learning styles. Teachers and students acknowledged that these tools provided opportunities for creative expression, whether through multimedia projects, collaborative assignments, or interactive simulations. This creative freedom encouraged students to think critically and solve problems innovatively, fostering a more engaging and stimulating learning environment.

Furthermore, digital tools' ability to cater to different learning styles—whether visual, auditory, or kinesthetic—ensured that all students could engage with the content in a way that suited their preferences. This inclusivity led to better academic performance, as students were more likely to retain information and apply their knowledge effectively.

In conclusion, the study's findings strongly advocate for the strategic integration of digital tools in Geography instruction. By making lessons more interactive, effective, and aligned with modern educational practices, digital tools can revolutionize how Geography is taught and learned, ultimately leading to a more enriching educational experience for students.

6. Conclusion

The study's conclusion emphasizes the substantial benefits digital tools bring to Geography instruction, significantly enhancing the overall learning experience. Teachers have created a more interactive and engaging educational environment by integrating platforms like YouTube, WhatsApp, and Facebook. These tools have proven instrumental in sparking students' interest in Geography, which

is crucial for motivating them to explore the subject further. The ability to present content in a multimedia format allows students to visualize complex geographical concepts, making them easier to understand and remember.

Moreover, the study found that digital tools positively impact students' learning outcomes. The interactive nature of these tools not only aids in retaining information but also encourages students to apply their knowledge more effectively. For instance, YouTube videos can bring real-world geographical phenomena into the classroom. At the same time, WhatsApp facilitates communication and collaboration, allowing students to engage with the material and each other dynamically. These interactions foster a more positive attitude toward Geography, as students perceive the subject as more relevant and accessible.

Given these benefits, the study strongly recommends that public secondary schools in Meru South Sub-county increase the integration of digital tools into their instructional practices. By doing so, schools can maximize these tools' educational advantages, ensuring that Geography instruction becomes even more effective and engaging. This recommendation underscores the importance of embracing modern technology in education, as it aligns teaching practices with today's students' evolving needs and preferences, ultimately leading to better academic outcomes and a more enriched learning experience.

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