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FOREWORD

This volume brings together a rich tapestry of scholarly inquiry that reflects the evolving landscape of education, language, culture, and technology in Kenya and beyond. The contributions herein highlight the dynamic interplay between tradition and innovation, theory and practice, and local realities and global challenges. The articles span diverse disciplines, yet they converge on a common theme: the pursuit of knowledge that transforms societies. From the evaluation of school practice and mentorship in higher education institutions to the critical analysis of Ngugi wa Thiong'o's translated works, the journal underscores the importance of contextualized scholarship in shaping both pedagogy and cultural identity.

Education emerges as a central pillar, with studies examining mathematics pedagogy, digital integration in early years, financial management in junior schools, and the implementation of Competency-Based Education. These works not only interrogate current practices but also propose pathways for more inclusive, equitable, and effective learning environments.

Equally compelling are the explorations of language and justice in multilingual contexts, which remind us of the profound role that communication plays in shaping identity, equity, and social cohesion. The inclusion of research on gender representation in Luhya popular songs, rhetorical structures in vice-chancellors' speeches, and ethical dilemmas in the digital age reflects the journal's commitment to bridging the humanities with contemporary societal issues.

The volume also ventures into pressing global and local challenges: dropout trends in Kenyan universities, the effectiveness of AI-powered tools in education, inclusive education for marginalized communities, and community perceptions of flood risk in the Lower Gucha-Migori River Basin. These studies exemplify scholarship that is not only analytical but also solution-oriented.

Together, this collection of articles reaffirms the journal's mission: to provide a platform for critical reflection, innovative research, and transformative ideas. It is our hope that readers will find inspiration in these pages, engage with the debates presented, and contribute to the ongoing discourse on education, culture, and technology in Africa and beyond.

Dr. Ben Nyongesa Wekesa
The Chief Editor

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An Evaluation of School Practice and Mentorship in Higher Education Institutions

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Abstract
Teachers plays pivotal role in promoting Sustainable Development Goals of education and its contribution to the national development agenda. School Practice is one of the fundamental cornerstones for training quality teachers by most institutions of higher learning. The practice offers student-teachers the opportunity to put theory into practice as they are allocated classes to teach. The study focused on determining the effectiveness of the school practice and mentorship at higher education institution of learning. The study adopted the theory of change (ToC) which underlines the view that "if mentoring and support of teachers is done through the school practice model, the teachers' competence skills will be improved, effective teaching will be guaranteed, and student learning outcomes will be improved". Ultimately, improved teaching will result in improved quality of education at large. The study target population was all Third-Year Students Teachers (2024 Cohort) (1000) from Kibabii university, the Host School Advisors (300) and, Zonal Coordinators (14) and Advisors (65). Data collection was carried out using an online questionnaire distributed via Google Forms, ensuring ease of access and participation across the targeted groups and interviews also was conducted on advisors and host institutions representative.This study adopted the mixed design approach, which provides the opportunity of studying a phenomenon holistically in the way it is experienced by participants to get comprehensive findings regarding the use of mentorship during school practice in higher institutions of learning.Data was analyzed using both descriptive and inferential statistics and findings presented using tables,pie chats and graphs. The study revealed that majority of students (54%) disagreed with the notion that the assessment made them dislike teaching as a career, with an additional 37% strongly disagreeing with this sentiment. This suggests that most students were satisfied with their performance and the overall assessment process.The results also indicate a generally positive perception of the support provided by advisors.on average, host advisors were impressed by the students' overall personal outcomes, with a mean score of 3.9764 (equivalent to 79.528% on a 5-point scale). This high mean score suggests that the majority of students demonstrated a commendable level of competency and professionalism at their host schools. The variability and range of scores (Min=1.00, Max=5.00, Std. Deviation= 1.05312). Study recommended that the institution to increase the availability and accessibility of teaching and learning materials and essential resources to students teachers. Regular communication and coordination from zonal coordinators, particularly in relation to assessments and logistical support is highly recommended. Institutions should Implement a comprehensive briefing program that includes guidance on portfolio development, assessment expectations, and strategies for professional conduct during the teaching practice.

Keywords: *Effectivenes, Mentorship, School Practice*

Background of the study

School practice, also known as teaching practicum, is a fundamental component of teacher education programs. It serves as the bridge between theoretical learning and practical classroom experience, providing pre-service teachers with the opportunity to apply pedagogical knowledge in real educational settings (Darling-Hammond, 2006). Through school practice, teacher trainees gain firsthand experience in lesson planning, classroom management, student assessment, and professional collaboration under the guidance of experienced mentors.

The central goal of school practice is to prepare competent, confident, and reflective educators who are well-equipped to address the diverse needs of learners. According to Zeichner (2010), effective school practice fosters the development of professional teaching identity and supports the acquisition of critical teaching skills that cannot be fully developed through coursework alone. It allows teacher trainees to observe

experienced educators, experiment with different teaching methods, receive feedback, and reflect on their practices to improve their instructional competence.

Furthermore, school practice enhances understanding of school culture, policies, and the broader educational context, which is essential for professional socialization (Komba & Kira, 2013). It provides opportunities for teacher trainees to navigate real classroom challenges, build resilience, and develop problem-solving skills essential for effective teaching.

Research has shown that the quality of school practice significantly influences teacher preparedness. A well-organized and supportive practicum experience contributes to improved teaching efficacy and greater retention of teachers in the profession (Ronfeldt, Reininger, & Kwok, 2013). Conversely, inadequate supervision, poorly matched mentor relationships, and lack of alignment between theory and practice can undermine the benefits of school practice.

Given its pivotal role, educational institutions must ensure that school practice is well-structured, adequately supervised, and closely integrated with the teacher education curriculum. Collaboration between teacher training institutions and schools is essential to create meaningful learning experiences that align with national education standards and address classroom realities (Komba & Kira, 2013; Darling-Hammond, 2006).

School practice, or teaching practicum, is a critical component of teacher education in Kenya. It provides pre-service teachers with the opportunity to transition from theoretical learning in teacher training colleges and universities to practical engagement in real classroom environments. This hands-on experience is essential for the development of teaching competencies, classroom management skills, and professional identity (Ong'ondo & Borg, 2011).

In the Kenyan context, school practice is typically undertaken during the second or third year of training and lasts between 6 to 12 weeks, depending on the institution. During this period, teacher trainees are placed in primary or secondary schools where they engage in lesson planning, teaching, classroom management, student assessment, and co-curricular activities under the supervision of trained mentor teachers and university or college lecturers (Ngugi, 2012). This practicum is designed to expose student teachers to the real challenges and dynamics of the teaching profession.

School practice plays a vital role in preparing teachers to handle the realities of the Kenyan education system, including large class sizes, limited teaching resources, and diverse learner needs. According to Kafu (2011), effective school practice not only enhances professional readiness but also promotes reflective practice, allowing trainees to critically evaluate their instructional methods and adjust accordingly.

However, several challenges affect the effectiveness of school practice in Kenya. These include insufficient supervision due to limited staffing, inadequate coordination between teacher training institutions and schools, and a lack of consistency in mentorship quality (Ong'ondo & Borg, 2011; Ngugi, 2012). Addressing these issues is crucial to ensuring that school practice serves its intended purpose of producing well-prepared and competent teachers.

Strengthening the practicum component of teacher education requires a collaborative approach involving teacher training institutions, host schools, the Teachers Service Commission (TSC), and the Ministry of Education. Adequate funding, clear policy guidelines, and structured mentorship programs are essential to enhance the quality and impact of school practice in Kenya.

Purpose of the study

The study purpose was focused on determining the effectiveness of the school practice and mentorship at higher education institution of learning

Theoretical framework of the study

This study is anchored in two key educational theories that explain the significance of practical experience in teacher preparation: Experiential Learning Theory by David Kolb and Social Constructivist Theory by Lev Vygotsky. These theories provide a conceptual lens through which the role of school practice in shaping teacher competencies and professional identity can be understood.

1. Experiential Learning Theory (Kolb, 1984)

Kolb's Experiential Learning Theory posits that learning is a continuous process grounded in experience. According to this theory, knowledge is created through the transformation of experience, following a four-stage learning cycle: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. In the context of teacher preparation, school practice serves as the concrete experience where trainees apply theoretical knowledge in real-life classroom settings. This practical exposure enables them to reflect on their teaching, conceptualize improvements, and implement new strategies.

Through this cycle, pre-service teachers become active participants in their own learning, rather than passive recipients of information. The teaching practicum thus becomes a critical platform for professional growth, as it fosters continuous reflection and improvement (Kolb, 1984).

2. Social Constructivist Theory (Vygotsky, 1978)

Vygotsky's Social Constructivist Theory emphasizes the importance of social interaction and cultural context in learning. He introduced the concept of the Zone of Proximal Development (ZPD), which refers to the gap between what a learner can do independently and what they can achieve with guidance and support. In teacher education, school practice offers a ZPD where pre-service teachers develop their teaching skills under the guidance of experienced mentor teachers and supervisors.

Through collaborative teaching, observation, and feedback, trainees co-construct knowledge and refine their instructional techniques. The mentorship and dialogue that occur during school practice provide critical scaffolding, enabling novice teachers to internalize pedagogical practices and gradually become independent professionals.

Integration of Theories

Together, Kolb's and Vygotsky's theories underscore the importance of active participation, reflection, mentorship, and contextual learning in teacher preparation. School practice embodies these elements by offering a structured environment where pre-service teachers learn by doing, reflect on their experiences, and grow through social interaction and professional support. The theoretical framework thus justifies the centrality of school practice in producing competent, reflective, and adaptive teachers.

Literature Review

Available literature indicates that for educators to become effective 21st century teachers, they need to begin by acquiring 21stcentury skills. These include of what is popularly referred to as the "four Cs"; namely, **communication** skills characterised by effectiveness in sharing thoughts, questions, ideas, and solutions; **collaboration** which is an enabler of working together to attain specific goals; **critical thinking** that entails looking at problems in new ways, and finally, **creativity** that is manifested in trying using new approaches to attain best results.

Rotherham and Willingham (2009) argued that in order for educators to function effectively,

"*the 21st century skills movement will require keen attention to curriculum, teacher quality, and assessment*". Consequently, there is need to revamp the ways in which educational institutions think about human capital in education—in particular how teachers are trained. As part of the 21st century skills movements, there is call for greater collaboration among teachers through which experienced ones can have time to share their expertise with the novices (Rotherhamand Willingham). Kenyatta University recognised the veracity of these arguments focusing not only on implementation of curriculum delivery during TP *per se* but also on the quality of how teachers were being trained.

The use of mentor teachers has been deemed key in supporting novice teachers and student teachers acquire the relevant professionalisms through field practice. A study conducted in USA at the turn of this century foregrounded the purpose of implementing innovative practicum and mentorship as the "game-changer" in improving teacher education. Accordingly, models in the concurrent teacher education programmes must be charged with the responsibility of: providing the candidates with the experiences that have potential to develop knowledgeable, culturally aware, collaborative, resilient and resourceful professionals These skills and dispositions were believed to support graduates in becoming increasingly competent and employable in education-related career settings (Cantalini-Williams *et.al*, 2014).

Cantalini-Williams et.al. (1914) contend that through TP, student teachers are expected to gain the practical skills and dispositions that are believed to support them in becoming increasingly competent and employable in education-related career settings. Arguably, educating and training teachers entails a complex process that combines theoretical and practical aspects of professional development (Cochran-Smith & Lytle, 1999). While there are hardly any studies on teacher mentorship conducted within contexts of higher education in Africa, research conducted elsewhere shows that teaching practicum that embraces mentorship component is an integral part of teacher education (Cohen & Ball, 1999). It is further observed that teaching practicum placements are essential for promoting cohesion between theory and practice in teacher education programs (Falkenberg & Smits, 2010). Theoretically and in practices, it is through TP that student teachers can be mentored on the reality of the profession to which they aspire to build their careers.

Role of School Practice in the Teaching Profession

School practice, also referred to as teaching practicum, plays a pivotal role in the professional preparation of teachers across the world. It provides a platform for pre-service teachers to transition from theoretical learning in teacher training institutions to real-world teaching experiences. Scholars and practitioners widely acknowledge the practicum as a cornerstone of effective teacher education, essential for the development of professional teaching skills, identity, and reflective practice.

Bridging Theory and Practice

One of the most consistently emphasized roles of school practice is its function in bridging the gap between theory and practice. According to Darling-Hammond (2006), high-quality teacher education programs integrate coursework with field experiences, allowing teacher trainees to apply educational theories in practical settings. Through school practice, pre-service teachers implement lesson plans, manage classrooms, and adapt instructional strategies to meet learner needs. This experiential learning fosters deeper understanding and contextualization of pedagogical theories (Zeichner, 2010).

Development of Professional Identity

School practice also contributes to the formation of professional identity among teacher trainees. During practicum, student teachers begin to see themselves as educators, which enhances their self-efficacy and motivation. Beauchamp and Thomas (2009) argue that the teaching practicum provides a space for identity construction through reflection, interaction, and practice. By engaging in real teaching scenarios, trainees internalize the values, attitudes, and responsibilities of the teaching profession.

Enhancing Pedagogical Competence

Multiple studies have documented that school practice significantly improves pedagogical competence. According to Ngugi (2012), teaching practice enables student teachers in Kenya to acquire essential skills such as lesson preparation, learner assessment, and classroom management. Similarly, Ronfeldt et al. (2013) found that the structure and quality of field placements correlate with increased teaching effectiveness and retention in the profession. Mentorship from experienced teachers also enhances instructional skills and supports the transition from novice to professional.

Fostering Reflective Practice

Reflection is a crucial aspect of professional teaching, and school practice encourages reflective thinking among teacher trainees. Schön (1983) introduced the concept of the "reflective practitioner," emphasizing that professionals learn by reflecting on their experiences. During school practice, trainees are often required to keep teaching journals, participate in peer reviews, and engage in discussions with supervisors—all of which promote reflective learning and continuous improvement (Komba & Kira, 2013).

Challenges in Implementation

Despite its benefits, school practice faces several challenges that can hinder its effectiveness. In the Kenyan context, studies by Ong'ondo and Borg (2011) revealed issues such as inadequate supervision, lack of structured mentorship, and disconnection between universities and host schools. These issues can compromise

the quality of the practicum experience and limit its impact on professional growth. Strengthening collaboration between teacher training institutions and placement schools, as well as investing in mentor training and supervision, is critical for maximizing the benefits of school practice.

Methodology of the study

Research design is the plan of action that provides the researcher with a framework of operation that steers the inquiry process (Cohen & Manion, 2000). The research process becomes purposeful and systematic if the pattern to carry out research blends well with research objectives. Accordingly, this study adopted a descriptive survey design. The research design was chosen because of its flexibility in the field, it allowed questionnaires to be issued and be collected there and then by the researcher. Besides, the design is cheap to undertake and the results from the sample can be inferred to the larger population. According to Mugenda and Mugenda (1999) survey research is probably the best method available to social scientists and other educators who are interested in collecting original data for describing a population, which is too large to be observed directly.

Population refers to an entire group of individual's events or objects having a common observable characteristic which is of concern to the researcher (Mugenda & Mugenda, 2003). To ensure a comprehensive evaluation, the survey targeted three key groups of stakeholders: Kibabii University Third-Year Teaching Students (2024 Cohort) (650), the Host School Advisors (100) and, Zonal Coordinators and Advisors (100). Data collection was carried out using an online questionnaire distributed via Google Forms, ensuring ease of access and participation across the targeted groups.Piloting is testing or having a preliminary trial of an idea: Before commencing on the study, a pre-testing of the questionnaires was conducted. Pre-testing is done to assist in familiarization, determining accuracy, clarity and suitability of the research instruments and to check their validity and reliability. To assure objectivity a pilot study was conducted in two schools before engaging the sampled schools (Kothari, 2009). The pilot schools will not be part of the final study (Mugenda and Mugenda, 1999). The test and re-test reliability procedure to test the consistency of the responses to the questionnaires was done. This was accomplished by comparing the same sample population for piloting after administering the same questionnaires to the same respondents and in the same school after two weeks. The two weeks were considered to avoid the replication of the same answers by the respondents. This pilot study enabled the researcher to modify and fine-tune the research instruments. Pilot studies guarantee that the choice of the instruments is able to overcome any challenges during the data collection process Mugenda and Mugenda (2003).

Borg et al (1996) observe that descriptive statistics are mathematics techniques for organizing and summarizing a set of numerical data. Qualitative and Quantitative data were used. Quantitative data were recorded from the research question after which tables, bar graphs, and pie charts were used to present data while frequencies and percentages were used to analyze data. Qualitative data were edited and then put into patterns using codes. Data was analyzed using the descriptive technique of data analysis. Data was analyzed using Statistical packages of Social Science (SPSS). Qualitative data was analyzed thematically by organizing the responses into themes guided by the research questions. The results were then tabulated for easy interpretation and presented in frequency tables, percentages and charts.Vilma (2018) asserts that accountability and responsibility are inherent in all human activities and decisions. Ethical considerations are closely observed in all circumstances and actions. Therefore, it is necessary to take into consideration accountability in the research management process. Creswell (2014) concurs with Israel and Hay (2006) on the importance of researchers safeguarding their participants, establishing confidence, upholding research integrity, and preventing misconduct. Creswell (2014) highlights that ethical considerations encompass matters such as the divulgence of personal information, genuineness, the veracity of the research findings, and concerns regarding personal confidentiality. This study proactively identified potential ethical concerns and developed strategies to address them.

The insights gained from this evaluation will inform strategic recommendations aimed at improving the program, ultimately contributing to the development of highly competent and professional teachers.

Findings and Discussion

General Demographic Characteristics of the Respondents

The demographic characteristics of the survey participants provide essential context for understanding the diverse perspectives captured in the 2024 Kibabii University School Practice Evaluation. Key demographic factors include the gender distribution of the participants, the study programs of Kibabii University students, and other relevant attributes. These characteristics help to ensure that the evaluation reflects a broad and representative sample of the involved groups, offering valuable insights into the effectiveness and potential areas for improvement in the School Practice Program.

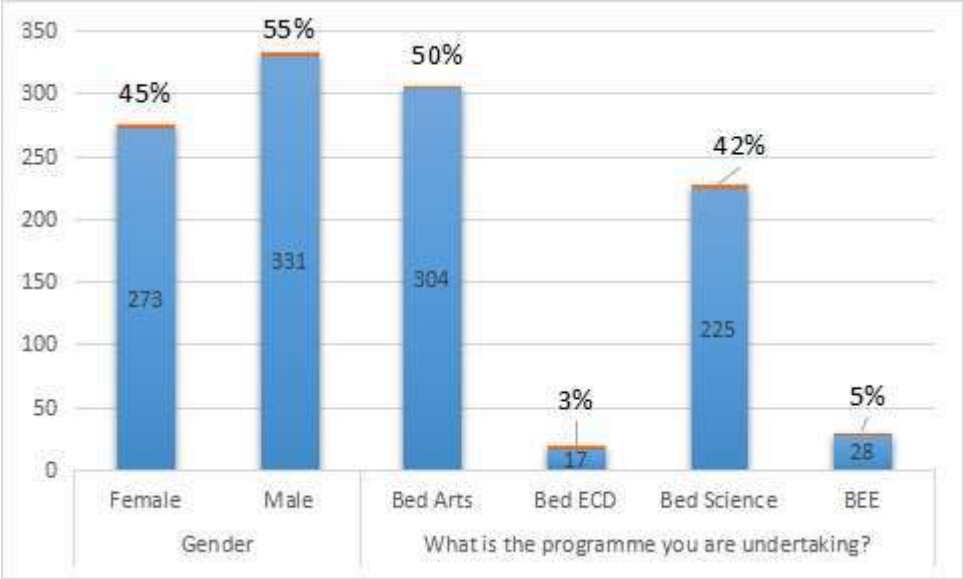

Figure 1.1; Demographic Characteristics of the Students

Figure 1.1 illustrates the gender distribution and study programs of Kibabii University students who participated in the 2024 School Practice Program, highlighting a balanced representation between male and female students. The gender breakdown shows that 55% of the respondents were male, while 45% were female, indicating near gender parity among the participants.

In terms of academic programs, the majority of the students were enrolled in the Bachelor of Education (Arts) program, comprising 50% of the respondents. This was followed by the Bachelor of Education (Science) program, which accounted for 42% of the participants. The Bachelor of Early Childhood Education (ECD) program had 3% of the respondents, while the Bachelor of Early Education (BEE) program represented 5%. These figures reflect the diverse academic backgrounds of the students involved in the School Practice Program, which is crucial for assessing the program's overall effectiveness and adaptability across different fields of education.

The following figures display the findings from the students who participated in the 2024 Kibabii University School Practice Program. The evaluation used a 4-point Likert scale, where respondents rated their agreement with various statements using the following scale: 1- Strongly Disagree, 2- Disagree, 3- Agree, and 4- Strongly Agree. These results provide insights into the students' general views on different aspects of the program, reflecting the overall effectiveness and areas for improvement.

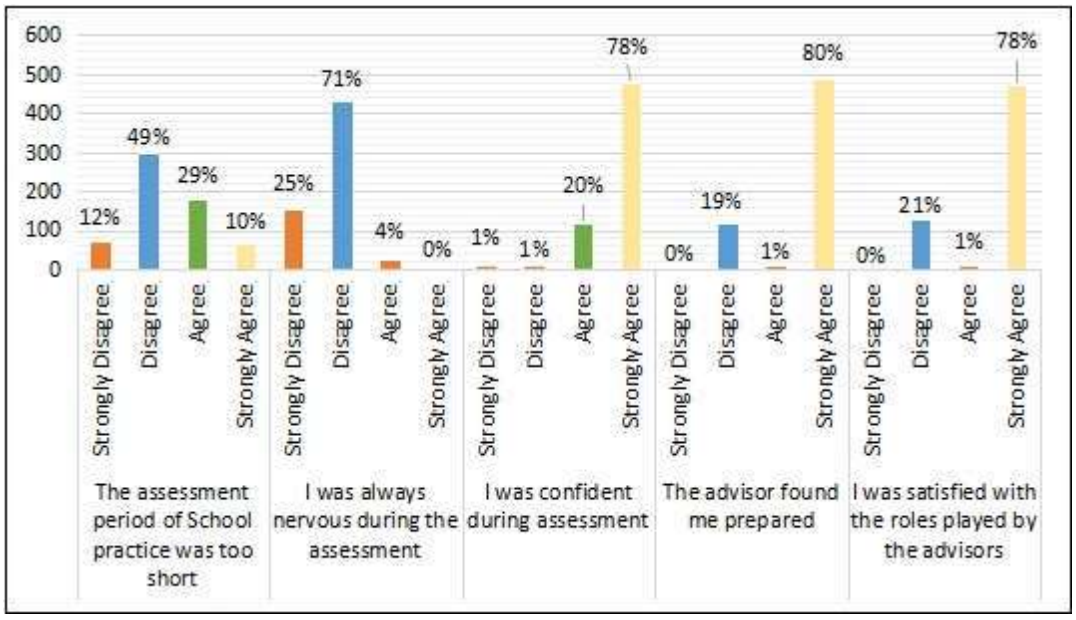

Figure 1.2; 2024 School Practice Evaluation

Figure 1.3 reveals that nearly half of the students (49%) who participated in the 2024 School Practice Program disagreed with the statement that the assessment period was too short. This perspective is echoed in the qualitative feedback provided by respondents, who suggested the following improvements:
The findings also indicate that the majority of students felt confident during the assessment phase. Specifically, 71% of students disagreed with the notion that they were nervous, and 78% strongly agreed that they felt confident. This confidence likely stems from adequate preparation, as evidenced by 80% of students who strongly agreed that their advisors found them well-prepared. Additionally, a significant proportion (78%) of students expressed satisfaction with the roles played by their advisors, although 21% disagreed, suggesting room for improvement in advisory support.The findings are in agreement with those of Qualitative Research Journal study (2024) in a study of Mentoring student teachers during practicum: exploring experiences and limitations revealed that Most common impediments are time pressure, unclear role expectations, and variable feedback; scheduled, dialogic mentoring meetings correlate with stronger mentee confidence and planning. This is also similar with Mlyakado. & Mwandambo. (2023) in a study of Student Teachers' Experiences of Mentorship during Teaching Practice in Tanzania — Papers in Education and Development (case study) found that All student teachers were attached to mentors; most reported useful support that boosted tolerance, confidence, and flexibility; persistent gaps were limited mentor training and time

1. **Preparation for School Practice**

Effective preparation for the Kibabii University School Practice program by both the university and host schools is crucial to the success of the program. Students provided feedback on their satisfaction with this preparation, and Figure 1.3 illustrates their responses.

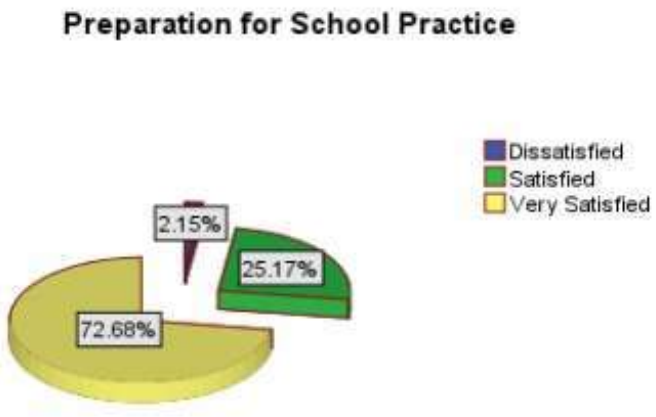

Figure 1.3; Preparation for School Practice

Figure 1.3 reveals that the majority of students were very satisfied with the preparation process for the school practice, with 72.68% expressing high satisfaction and 25.17% indicating general satisfaction. Conversely, 2.15% of students reported dissatisfaction with the preparation process.
This feedback is further supported by the following comments from the respondents that:

- *Comment 1: "Adequate preparations for the students who are to take on Teaching Practice."*
- *Comment 2: "Earlier informing of attachment teachers for proper preparation of assessment materials."*
- *Comment 3: "Early preparation by giving adequate knowledge to student-teachers on how to handle themselves during Teaching Practice and providing enough support to them."*

Although the preparation for the School Practice was generally well-received by the majority, there remains room for improvement. Enhancing the preparation process could involve ensuring even earlier communication and support for students to better equip them for their teaching roles, thereby further strengthening the effectiveness of the program.

2. Methods used For Identifying School Practice School

The methods used for identifying School Practice School are fundamental in ensuring the effectiveness of this program allowing all teaching students to participate in this process. The students gave their views about these methods and the feedback is as shown in figure 1.4.

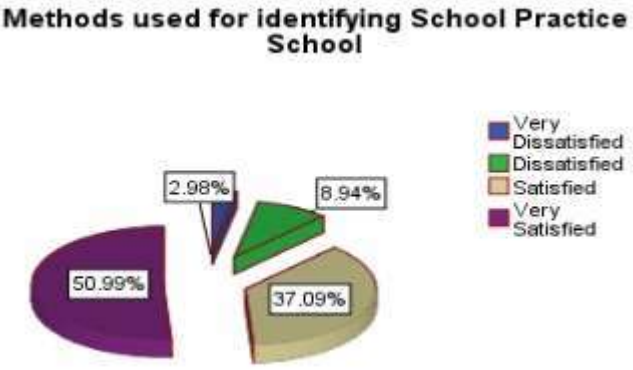

Figure 1.4; Methods used for identifying School Practice School

Figure 1.4 indicates that **50.99%** of students were very satisfied with the methods used to identify School Practice Schools, while **37.09%** were satisfied. However, a smaller proportion of students expressed dissatisfaction with these methods, with **8.94%** and **2.98%** indicating some level of dissatisfaction. This feedback suggests that while the majority of students were pleased with the methods, there is an opportunity to refine and improve these methods to better meet the needs of all participants.

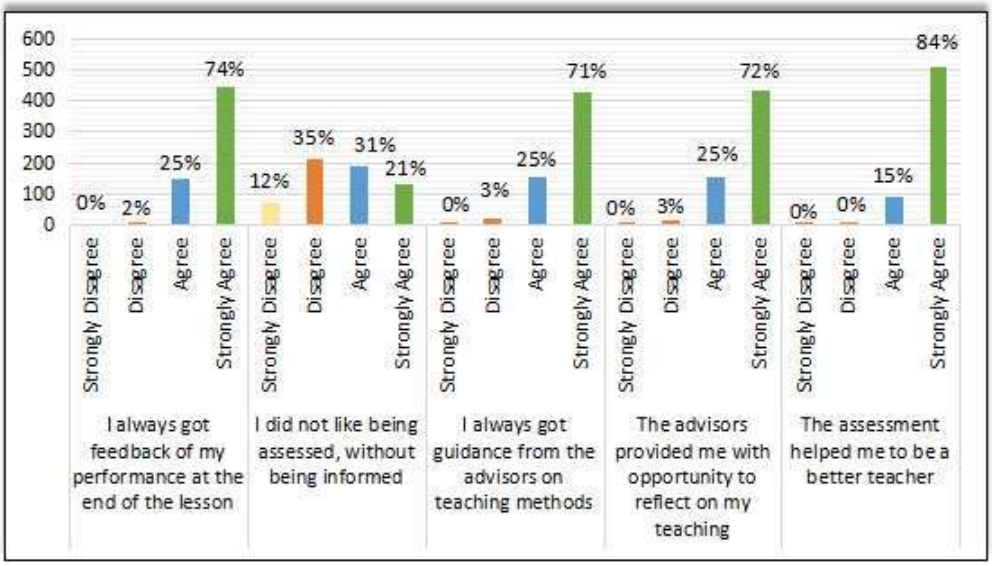

Figure 1.5; 2024 School Practice Evaluation

Figure 1.5 highlights that a significant majority of students (**74%**) strongly agreed that they consistently received performance feedback at the conclusion of each lesson. When it comes to prior notification of assessments, student preferences were divided: 35% favored surprise assessments, while 31% and 21% expressed a preference for prior notification.

The data further reveals that 71% of students strongly agreed that they received adequate guidance from their advisors on teaching methodologies, with an additional 25% expressing agreement. However, qualitative feedback suggests areas for improvement in guidance:

Conclusion

The study concludes that the institution demonstrated considerable success in preparing teaching students for their future careers. The majority of participants expressed high levels of satisfaction with the program's preparation, resources, and support mechanisms. However, the findings also underscore the need for targeted improvements, particularly in extending the practice duration, enhancing resource availability, and improving communication and coordination efforts. By addressing these areas, Kibabii University can further strengthen its School Practice Program, ensuring that it not only meets but exceeds the professional development needs of its teaching students. This continuous improvement process will contribute to producing highly competent, confident, and well-prepared graduates ready to excel in their teaching careers.

Recommendation

Continue and strengthen partnerships with model schools to ensure they remain adequately prepared and supportive. Explore opportunities for deeper integration of students into the school's daily activities, including co-curricular programs.

Implement a comprehensive briefing program that includes guidance on portfolio development, assessment expectations, and strategies for professional conduct during the teaching practice. This briefing should occur well before the start of the school practice period.

To strengthen the Kibabii University School Practice program, it is recommended to focus on enhancing students' teamwork and creativity skills. Providing targeted training and development opportunities in these areas can better prepare students for their roles as professional teachers and increase their ability to contribute positively to their future educational environments.

To improve the quality and effectiveness of the school practice program, it is recommended to increase the number of advisors, especially in zones with a larger number of schools. Additionally, providing advance notice of assessments can help students better prepare and engage with the program

To further enhance the school practice program, it is recommended that Zonal Coordinators increase their involvement through more frequent checks, advocate for student participation in co-curricular activities,

consider additional coordinators for larger zones, and work with school principals to ensure adequate support for student accommodations.

References

Darling-Hammond, L. (2006). Powerful teacher education: Lessons from exemplary programs. Jossey-Bass.

Komba, S. C., & Kira, E. S. (2013). The effectiveness of teaching practice in improving student teachers' teaching skills in Tanzania. Journal of Education and Practice, 4(1), 157–163.

Ronfeldt, M., Reininger, M., & Kwok, A. (2013). Teacher preparation programs and teacher retention in the first three years. Teachers College Record, 115(3), 1–36.

Zeichner, K. (2010). Rethinking the connections between campus courses and field experiences in college- and university-based teacher education. Journal of Teacher Education, 61(1–2), 89–99. https://doi.org/10.1177/0022487109347671

Kafu, P. A. (2011). Teacher education in Kenya: Emerging issues. International Journal of Curriculum and Instruction, 1(1), 43–52.

Ngugi, M. (2012). The role of teaching practice in teacher education programmes in Kenya. Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS), 3(4), 538–544.

Ong'ondo, C. O., & Borg, S. (2011). 'We teach plastic lessons to please them': The influence of supervision on the practice of English language student teachers in Kenya. Language Teaching Research, 15(4), 509–528. https://doi.org/10.1177/1362168811412881

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice-Hall.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

A Peek into the Language of Mathematics: Evidence from Undergraduate Secondary Education Students of Mathematics

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Abstract
Education develops human capital. Teachers, especially, should possess the knowledge and skills to deliver on their mandates. Mathematics teaching is key to sustainable human capital development. Therefore, prospective mathematics teachers should demonstrate proficiency in the language of mathematics for learning and knowledge transfer. As a consequence, a study was conducted to evaluate Bachelor of Education students' mathematics understanding and use of specific mathematical terms ("prime number" and "parallelogram") as well as the two basic symbols (the "equal" and "plus" signs). The study involved 256 third-year first-semester students taking mathematics as one of their teaching subjects in secondary education. The study examined the definitions of these terms/symbols and students' ability to apply them in various contexts. A written open-ended mathematics test was administered. The results revealed mixed levels of comprehension across different concepts. All participants understood the basic meanings of the "equal" and "plus" signs; however, the majority did not recognize the broader applications of these concepts in mathematical reasoning. For instance, while a majority (66.8%) of students could identify that "=" denotes equivalence, they often failed to provide an example applying it correctly in relational thinking. Similarly, "+" was universally recognized as an operator for addition, but no students demonstrated usage in abstract algebraic expressions. In contrast, conceptual understanding varied significantly between the two mathematical terms studied. The majority (69.1%) accurately defined a "prime number," showcasing strong foundational knowledge in number theory. However, understanding geometric terminology proved weaker; 71.1% of students exhibited misconceptions or incomplete definitions regarding a "parallelogram." This disparity highlights potential gaps in geometry education compared to arithmetic-centered topics. These findings highlight the need for enhanced instructional strategies emphasizing relational symbol usage and comprehensive geometry education. Addressing these gaps could improve overall mathematical literacy among undergraduates, equipping them with a more robust conceptual framework for the workplace.

Keywords: *Language of mathematics, Parallelogram, Equal sign, Plus sign, Prime number.*

Introduction

Mathematics is a human activity occurring in our daily undertakings. Nevertheless, mathematics has not been precisely defined and is considered variously as: A *language* which, like other languages, uses carefully defined terms and symbols to express ideas and to communicate thought; an *art* which reveals patters that creates fun with aesthetic an value; a *tool* for problem solving; a *way of thinking* which provides learners with strategies for organizing, analyzing, synthesizing, and interpreting data; and a *study of patterns and relationships* which involves observing, representing and investigating patterns and relationships in social and physical phenomena (Carter & Quinnel, 2012; Peng, Lin, Unal, Lee, Namkung, Chow, & Sales, 2020). Mathematics remains a prerequisite in many fields such as commerce, industry, human interaction, and communication in general.

As a language, mathematics is more than a code used to express thoughts and communicate ideas or store information in a retrievable form (Barwell, 2003; Carter & Quinnell, 2012; Steinbring, 2006). Furthermore, words and symbols, in structure, come in various ways, constituting the vocabulary of mathematical concepts, which "is not only varied, but also abstract" (Little,2009, p.5).

Mathematical language is a distinct "register" within a natural language which has been described, for example, as "a set of meanings that is appropriate to a particular function of language, together with the words and structures which express these meanings" (Moschkovich, 2018). This register consists of two main features: a special set of well-defined vocabulary used in mathematics in specific or particular situations; and words, phrases, and methods of arguing within a given situation, conveyed through natural language (Herbel-Eisenmann, Johnson, Otten & Cirrillo, 2013).). Planas, Morgan, and Schütte (2018) consider mathematical language as the language or linguistic features of the texts that arise in mathematical discourse,

emphasizing a contextual understanding.

Largely, the process of learning mathematics will involve mastering mathematical register. The emerging learner's mathematical register provides the learner with analytical, descriptive, and problem-solving skills to resolve a wide range of mathematical scenarios. Once the register is mastered, learners can (a) listen, question, and discuss, and (b) read and record in an interactive mathematics learning environment. Steinbring (2006) justifies the centrality of the mathematics register in human activity that without signs, no human thinking and mental generalization would exist; and that mathematics requires certain symbolic systems to keep a record of and code knowledge.

Mathematical definitions of words and symbols are important, particularly in textbooks and classroom discourse, partly based on the assumptions that: Concepts are mainly acquired through their definitions, and definitions are used to solve problems and prove theorems when necessary (Vinner, 2002). Consequently, definitions are fundamental in mathematical dialogue, especially in critical thinking and problem-solving. A deeper conceptual understanding of mathematical concepts is emphasized over rote memorization. Therefore, the ability to construct a formal definition indicates a deep understanding of concepts (Vinner, 2002).

Observing the fundamental place that definitions in mathematics occupy, the purpose of this study was to analyze how undergraduate students define and conceptualize key mathematical terms (parallelogram, "=", "+", and prime number). This led to identifying common misconceptions and linguistic challenges that guide their understanding and application of these concepts in various mathematical contexts. Consequently, a brief discussion of the four mathematical terms is offered below.

To understand a parallelogram, a quadrilateral's meaning and visual representation are usually presented first as a four-sided plane figure: either convex or concave (with a reflex interior angle) (De Villiers, 1994). Therefore, a parallelogram is a "quadrilateral with two pairs of parallel sides" (Marchis, 2012, p.34).

"Equality" is spoken of even before children attend school. Daily activities imply equality besides other mathematical operations (Warren, 2007). Learning mathematics, from basic to advanced concepts such as arithmetic to algebra to calculus, equality plays a central role in the actualization of mathematical development. Equality is important to algebraic understanding (Knuth, Stephens, McNeil & Alibali, 2006; McNeil et al., 2006).

The equal sign has varied applications and meanings in different contexts. For example, Lankham, Nachtergaele, and Schilling (2007) indicate that "=" means "is the same as". This "sameness" implies a relational understanding, indicating that both sides of an equation are the same and information is symmetrical in either direction (Kieran & Chalouh, 1992). According to Knuth et al. (2006), the relational view of "=" meaningfully generates and interprets equations and *operates* on them. However, elementary students initially tend to interpret the equal sign as an operational symbol (as a "do something" sign) (Molina, Castro & Castro, 2009).

Besides the equal sign, the plus sign is one of the first mathematical symbols introduced to learners. The "+" serves multiple roles in mathematics and computer science, interpreted as binary, symmetric, or unary (Cengiz, Aylar & Yildiz, 2018; Toxtle-Colotl, Nieto-Ruiz & Juarez-Lopez, 2025). A binary operator combines two operands to produce a result (e.g., adding numbers, "a + b"). Its symmetric property characterizes commutativity in mathematical systems (e.g., "a + b" = "b + a"), however, it is not universal, such as in non-commutative algebras. As a unary operator, it denotes identity (e.g., "+a", "a" as positive). Understanding these distinctions ensures accurate application across disciplines like arithmetic, algebra, and computer science. Notwithstanding wide use and encounters in daily lives, this study sought to elicit more advanced applications of "+" from undergraduates.

Prime numbers are a fundamental concept in mathematics education, introduced at the elementary level as integers greater than 1 with no divisors other than 1 and themselves. However, students often struggle with misconceptions, such as including "1" as a prime or misunderstanding why 2 is prime (Gurefe & Aktas, 2020; NCTM, 2000). Teaching strategies like visual aids, factor trees, and problem-solving activities improve comprehension (Burkhart, 2009; Gurefe & Aktas, 2020). Research in higher education reveals that prospective teachers frequently face challenges in defining and explaining primes accurately (Zazkis & Liljedahl, 2004). These findings highlight the need for robust educational strategies across all levels to address conceptual gaps and foster a deeper understanding of mathematical concepts.

Materials and Methods

This study addresses four research questions: a) how do undergraduate students conceptualize and define a "parallelogram," and what misconceptions or alternative definitions arise in their understanding? b) What are undergraduate students' interpretations of the "equal sign," and how do these interpretations influence their problem-solving approaches? c) How do undergraduate students define and interpret the "plus sign", particularly in contexts beyond basic arithmetic, such as algebra or set theory? And d) What challenges do undergraduate students face when defining "prime numbers," and how does their understanding reflect broader issues in number theory comprehension?

The respondents for this study were 256 third-year students in their first semester pursuing a Bachelor of Education (with Mathematics as one of the teaching subjects). They had gone through an introductory course in "Subject Methods in Mathematics I" in their second year.

Before the students undertook a second course in "subject Methods in mathematics, they were subjected to a "pre-test" on the common symbols and words used in mathematical language. The Subject Methods Course II has Mathematical Language as one of the topics. A test with four items on the identification and definition of "parallelogram", "prime number", "equal sign", and "plus sign" was administered. The results from the test were mainly qualitative statements on the definitions, subjected to a thematic analysis procedure. Each item on the definition was analyzed as follows:

1. Parallelogram: A deductive coding and classification approach as correct (economical or uneconomical) and incorrect definition based on the "minimal" properties of a parallelogram (Govender & De Villiers, 2004; Vinner, 2002).
    a. A definition that contains *sufficient* properties is classified as correct. A correct definition that contains unnecessary (redundant) properties is uneconomical, otherwise, it is economical.
    b. A definition is incorrect if it contains an *incorrect property* or *insufficient properties*.
2. The "equal sign": Starting with a deductive coding as operational, relational or hybrid, a further inductive coding classification was conducted basing on the intention and purposes of the words contained in the definition statement (Asquith, Stephens, Knuth & Alibali, 2007; Knuth et al., 2006).
    a. A response was coded as *operational* if the student expressed that the equal sign means "add the numbers" or "the answer."
    b. A response was coded as *relational* if the response expressed the general idea that the equal sign means "the same as."
    c. A response was coded as *operational–relational* if the response expressed the general ideas in (a) and (b) above.
3. The "plus sign": An inductive coding and analysis using the statements of intention and purpose to categorize into classes of "use."
4. Prime number: Deductive coding based on the properties of a prime number, as "having only two factors," was classified as correct or incorrect.

Results and Discussion

The "parallelogram"

Among the correct definitions, only 1.6% were classified as economical, meaning they were concise and included all necessary and sufficient conditions. However, 12.9% of correct definitions were uneconomical. Additionally, 14.5% of correct uneconomical definitions specified subsets of parallelograms, such as rectangles or rhombuses, reflecting a lack of generalization and hierarchical understanding of the broader category. Alarmingly, the majority (71.1%) of responses were incorrect, demonstrating widespread misconceptions or incomplete knowledge about parallelograms among students. These findings echo Marchis' (2012) observation that elementary pre-service teachers have difficulties in understanding geometry concepts, that two-thirds of the students could not define basic geometrical shapes correctly for different reasons, such as not knowing the correct definition.

Definitions in Table 1 differ in clarity. Par01, while technically correct, uses less formal contextual language such as "sets" and "lines," which could lead to ambiguity. "Lines" might be interpreted as infinite rather than

finite sides of a parallelogram. Par02 is more precise and elegant, which avoids confusion and enhances clarity.

Table 1. Sample of Correct Economical Definitions of "Parallelogram."

Definition	Statement of definition
Par01	Four-sided figure which has two *sets* of parallel *lines*
Par02	A quadrilateral with pairs of opposite sides that are parallel
Par03	It is a quadrilateral with two pairs of parallel sides *of equal length*
Par04	It is a quadrilateral whose opposite sides are parallel and *equal* in length.

Table 2 indicates definitions Par05–09 describing a parallelogram with varying accuracy and redundancy. Par05 states opposite sides are equal and parallel, but redundantly mentions the sum of interior angles, which applies to all quadrilaterals. Par06 and Par08 focus on opposite sides being parallel (and equal in Par06). Par07 highlights the equality of opposite sides, and its mention of angles makes it redundant; however, not stating explicitly that opposite sides are parallel does not invalidate its correctness. Par09 has more redundant properties.

Table 2. Sample of Correct Uneconomical Definitions of "Parallelogram."

Definition	Statement of definition
Par05	It is four-sided figure whose opposite sides are equal and parallel and *sum of its interior angles adds up to 360^0*
Par06	It is a four-sided figure or *is a quadrilateral figure* whose opposite sides are equal and parallel to each other
Par07	This is a four-sided figure in which opposite sides are equal, *opposite angles are equal*.
Par08	Is a figure or quadrilateral *with four sides* and opposite sides are parallel.
Par09	Four-sided *polygon* whose properties are: opposite sides are equal and parallel, and *opposite angles are equal*.

Note: In definition Par06, using "figure" alone would render it incorrect.

In Table 3, definitions deviate from the inclusive definition of a parallelogram. Par10 incorrectly excludes rectangles and squares by stating that no angle equals 90^0. Par11 erroneously adds that diagonals intersect at right angles, which implies squares and rhombuses. Par12 misleadingly calls it a "regular four-sided figure," implying that all sides and angles are equal, which describes squares. Par13 unnecessarily distinguishes between "shorter" and "longer" sides, while Par14 inaccurately describes it as having all sides equal, which characterizes squares and rhombuses.

Table 3. Sample correct definitions for a Subset of Quadrilaterals

definition	Statement of definition (Key words are italicized)
Par10	This is a mathematical figure with two pairs of parallel *lines* in which *no angle* [interior] is equal to 90^0
Par11	Is a quadrilateral, i.e., a four-sided figure whose opposite sides are equal and parallel to each other. Its *diagonals intersect at right angles*
Par12	This is a regular four-sided figure with opposite sides parallel
Par13	A quadrilateral or a four-sided figure with 2 opposite *lines* which are parallel to the other and consist of 2 opposite and short sides, and also other 2 parallel and longer sides
Par14	Four-sided figure. All sides are equal, and two sides are parallel to one another. It is also known as a tilted square

The sample definitions (Table 4) are incorrect because they either state an incorrect characteristic or are incomplete. Par 15 and Par 16 focus on parallelism but fail to mention other essential properties, making them incomplete and confusing (e.g., including trapeziums). Par17 incorrectly states that opposite angles are supplementary rather than adjacent angles. Par18 oversimplifies by calling it a "tilted rectangle" while omitting defining features like parallel lines. Par19 lists examples without specifying what uniquely defines a general parallelogram. Par20 emphasizes parallelism and equality in length but does not clarify that these apply only to opposite sides.

Table 4. Sample incorrect definitions

Definition	Statement of definition
Par15	It is a four-sided figure with two opposite sides being parallel
Par16	It is a four-sided figure with parallel lines of each side
Par17	This is a mathematical figure that entails the following characteristics: i) Opposite sides are equal ii) Opposite *angles are supplementary, i.e., add to* 180^0
Par18	Is a *tilted* rectangle and has interior angles that add up to 360^0
Par19	Four-sided figure, e.g., square, rhombus, and rectangle
Par20	Figures whose lines are parallel to each other, the parallel lines are equal in length.

The "Equal Sign, ="

The thematic classification of the responses reveals three categories: *operational* (33.2%), *relational* (44.6%), and *operational-relational hybrid* (22.3%). The operational perspective views the equal sign as a directive for computation, while the relational perspective emphasizes equivalence. These results highlight that while many students still interpret the equal sign procedurally, a significant portion (66.9%) demonstrates varying levels of relational understanding, resonating with Essien (2009). These results contradict the assertion by McNeil et al (2008) that students will demonstrate relational understanding of the equal sign by middle school. However, the relational view is more prevalent, contrary to findings of Knuth et al. (2006) and Asquith et al. (2007). Generally, these findings agree with Stallings' (2000) conclusion that students exhibit multiple meanings of the equal sign. Students tend to misunderstand the equal sign as an operator rather than a relational symbol.

Operational Understanding of "="

Initial clustering of words/phrases with similar meanings and purpose performed on the operational view revealed six categories:

1. *Giving Answers*. Phrases: "giving answers to", "show overall answer", "show that is the answer", "shows where the answer is", and "show the final answer". This emphasizes the operational or procedural use of "=" to indicate where the answer appears in a mathematical statement.
2. *Showing Results*. Phrases: "giving the result of", "result", "show the results", "result of", "shows the result of", "is a result", and "show results." This builds on "giving answers" but focuses broadly on presenting outcomes or consequences derived from calculations. Here, "=" provides an endpoint and conveys causality or derivation.
3. *Showing solutions*. Phrases: "show the solution" and "final solution." Here, "=" signifies resolution within problem-solving contexts.
4. *Showing Totals*. Phrase: "show total of" and "the total". This relates closely to summation and aggregation concepts. The "=" here indicates completeness or entirety when combining quantities. It reinforces understanding that "=" can represent holistic relationships between parts and their aggregate whole.
5. *Representing Sums*. Terms used: "sum of" and "sum". Similar to "showing totals," this category narrows focus specifically on *addition* operations. It reflects foundational arithmetic usage.
6. *Leading To*. Phrase: "leads to." This unique phrasing suggests causality or progression rather than strict equality. It implies that one side logically leads to or produces the other. While less common, this interpretation highlights dynamic relationships facilitated by logical reasoning.

After combining categories with overlapping meanings and analyzing each group in detail, four distinct thematic classifications for the operational understanding of the equal sign emerged:

1. Giving "*Answers/Results*": Focuses on representing outcomes derived from calculations. It acts as a directive to compile and provide a result. This perspective is common in early mathematics education, with such questions like $1 + 2 = \_\_$, leading students to see "=" as a "do something" symbol.
2. Indicating "*Totals/Summation*": Emphasizes *cumulative values* obtained through addition. While this understanding aligns with basic arithmetic operations, it remains limited, hindering comprehension of broader mathematical contexts involving relationships beyond summation, such as equations with operations on both sides (e.g., $4 + 4 = 3 + 5$).

3. Providing "*Solution Representation*": Highlights resolved states connected to equality. This understanding points to a developing relational view, a foundation for algebraic reasoning and problem-solving.
4. As "*Causal Relationship/Leads To*": Describes progression or causality implied by equality. This understanding introduces dynamic thinking by suggesting that one side of an equation causes or leads to the other side's value. Whereas this interpretation encourages progression-based reasoning, it may perpetuate misunderstandings if not contextualized properly within broader concepts of equivalence.

Relational Understanding of "="

Initial clustering of words/phrases with similar meanings and purpose performed on the relational perspective resulted in eight categories as follows:

1. "*No difference*" emphasizes the absence of disparity or variation between two entities; indistinguishable in value, quantity, or quality.
2. "*As great as*" conveying a sense of magnitude or size, being equal between two quantities.
3. "*Same as, same, same value, and sameness of*" collectively focus on identity and uniformity.
4. "*Equivalence in, equivalent to, and equivalence of*" extends beyond numerical equality to include functional or structural similarity. These terms give a broader interpretation of equality where two entities fulfil similar roles or possess interchangeable properties.
5. "*Equal to, to equate, are equal, equality, and equals*" form the core definition of the equal sign and its usage in mathematics.
6. "*Likeness*" focuses on resemblance rather than strict identity. It implies similarity in appearance or characteristics, but does not necessarily confirm exact equivalence.
7. "*To compare*" involves evaluating two entities to determine their relationship concerning equality or inequality.
8. "*Similar to*" denotes approximate resemblance rather than exact equality. It can describe proportional relationships, such as geometric similarity, rather than strict numerical parity.
9. "*Balancing and balance*" metaphorically represent equality as a state where opposing forces or quantities achieve equilibrium.

After reclassifying by combining categories with overlapping meanings and analyzing each category in detail, five main thematic areas on the relational emerged:

1. *Absolute Sameness* (No difference, same as, same value, sameness of) emphasizes the invariant nature of equality, where two entities are entirely identical with no differences. This foundational concept is crucial in basic arithmetic and algebra, as seen in equations like $3 + 5 = 8$, where both sides represent the same value.
2. *Mathematical Equivalence* (Equivalence, equivalent to, equivalence of, equal to, to equate, are equal, equality, equals) extends (1) above by incorporating broader contexts where equality holds under specific transformations or conditions. For example, fractions such as $1/2$ and $2/4$ are equivalent because they represent the same proportion despite differing numerically. This category applies to advanced mathematical concepts like modular arithmetic and logical equivalence.
3. *Approximate Similarity* (Likeness, similar to) introduces flexibility by acknowledging likeness rather than exactness. "Similar to" describes relationships where entities share comparable characteristics but are *not* identical.
4. *Equilibrium* (Balance, balancing) focuses on balance within systems or equations, emphasizing stability rather than strict numerical identity relevant in solving algebraic equations.
5. "*To compare*" remains distinct due to its evaluative nature rather than directly defining relationships of equality. It involves analyzing differences or similarities without necessarily concluding equivalence or balance (e.g., comparing magnitudes $a > b$).

The "Plus Sign, +"

The statements defining the "+" were grouped into four main themes based on their focus and context: (a) "a mathematical operation" (51.6%); (b) "Combining Objects, Values, or Data" (19.5%); (c) "Summation

and Total Calculation" (28.5%); and (d) "a Positive Number" with only 38.2% of all the respondents. There was one isolated case that "+" indicates the direction of a vector. The "+" indicating positive numbers was independent of the first three classifications. Upon further analysis of the first three categories, subthemes emerged:

1. "*Mathematical Operation*" focuses on using the plus sign in mathematical contexts for addition in arithmetic, algebra, and other mathematical calculations. Key characteristics: Focuses on numerical or symbolic addition, involves basic arithmetic and algebraic applications, and often involves explicit instruction for summing values.
   a) *Basic Arithmetic Addition:* Includes statements that describe the plus sign's role in adding numbers or figures to calculate a total.
   b) *Algebraic Summation:* Highlights using the plus sign in algebraic contexts, such as summing variables or terms.
   c) *Instructional Use in Mathematics:* Pertains to how the plus sign is used to instruct learners to perform addition operations.
2. "*Combining Objects, Values, or Data*" depicts how the plus sign is conceptually used to combine items, objects, data, or values into a single entity. It goes beyond strict numerical addition to encompass broader ideas of "putting together." Key characteristics: Broader than strict mathematical addition, including conceptual combination; involves non-numerical elements like data or objects; and highlights practical applications beyond formal mathematics. It is less technical and more conceptual than Theme 1:
   a) *Conceptual Combination:* Includes statements that describe combining elements (not necessarily numerical) into one entity.
   b) *Practical Applications of Combination:* Focuses on real-world or practical uses of combining data or information using the plus sign.
3. "*Summation and Total Calculation*" emphasizes using the plus sign for summation purposes – adding multiple quantities (numbers/variables/items) and obtaining their collective total. Key Characteristics: Focuses specifically on summation as an operation, includes both general references and specific contexts for summing values, and has a broader scope regarding what can be summed than Theme 1 above, while being more focused than Theme 2.
   a) *General Summation:* Includes statements broadly summing elements without specifying a particular context (e.g., math problems).
   b) *Specific Contexts for Summation:* Focuses on specific scenarios where summation is applied (e.g., solving math problems or summing different values).
4. "*Indicating a positive number*" identifies a number greater than zero. Sample statements: "Used to show that the quantity is greater than zero," and "it also means assigning a positive value to a number such that $x > 0$."

The "Prime Number"

The majority (69.1%) accurately defined prime number, for example, as "Numbers that are only divisible by one and themselves", "An integer that can only be multiplied by one to get itself", and "These are numbers with only two factors". The incorrect definitions were characterized by *misuse of terms* ("Number whose multiples are one and itself", "Numbers that are either divisible by 1 or themselves") and the use of *unconventional/incorrect terms* ("A number that has two *divisibilities*, that is, one and itself", "Numbers with only two *divisibles*"). However, 20.7% gave "1" as a prime number, including 4.3% of those who provided a correct definition.

Conclusions and Recommendations

Conclusions

1. Low proportion of economical definitions: Only 1.6 % of responses were concise and accurate, reflecting difficulty articulating necessary and sufficient conditions. This reflects a widespread misconception (71.1% of responses were incorrect), showing significant gaps in understanding

parallelogram properties and hierarchical geometric relationships.

2. Students exhibit diverse interpretations of the equal sign, with 55.5% demonstrating relational understanding and 33.3% retaining procedural misconceptions. The hybrid perspective (22.3%) indicates a transitional phase, highlighting progress.
3. The "+" symbol is primarily associated with mathematical operations (51.6%), followed by summation (28.5%), and combining data (19.5%). The "+' role in indicating positive numbers (38.2%) is less prominent, often perceived independently of arithmetic or summation contexts.
4. Most participants (69.1%) accurately defined prime numbers, demonstrating a strong foundational understanding of their mathematical properties. However, misconceptions persist, highlighting gaps in conceptual clarity and terminology.

Recommendations

1. Emphasize conceptual hierarchies: Teach relationships between geometric shapes using visual aids to improve generalization skills
2. Reinforce definitions: Emphasize formal, concise, accurate definitions through examples, non-examples, targeted instruction, and collaborative critique activities to enhance concepts articulation, address misconceptions, and improve communication skills.
3. Stress nonstandard equations like "7 = 2 + 5" to underscore the relational meaning of "=" and reduce procedural misconceptions.
4. Enhance instruction on the "+" symbol's versatility, emphasizing its role in diverse areas (e.g., set theory, vector mathematics) for broader understanding.

References

Asquith, P., Stephens, A.C., Knuth, E.J., & Alibali, M.W. (2007). Middle school mathematics teachers' knowledge of students' understanding of core algebraic concepts: equal sign and variable. *Mathematical Thinking and Learning, 9*(3), 249-272. https://dx.doi.org/10.1080/10986060701360910

Burkhart, J. (2009). Building numbers from primes. *Mathematics Teaching in the Middle School, 15*(3):156-167.

Carter, M., & Quinnell, L. (2012). Jabberwocky: The complexities of mathematical English. *Australian Primary Mathematics Classroom, 17*(2), 3-9. https://files.eric.ed.gov/fulltext/EJ978133.pdf

Cengiz, C., Aylar, E., & Yildiz, E. (2018). Intuitive development of the concept of integers among primary school students. *International Electronic Journal of Elementary Education, 11*(2), 191-199. https://doi.org/10.26822/iejee.2019248599

De Villiers, M. (1994). The role and function of a hierarchical classification of quadrilaterals. *For the Learning of Mathematics, 14*(1), 11-18.

Essien, A.A. (2009). An analysis of the introduction of the equal sign in three Grade 1 textbooks. *Pythagoras, 68*, 28-35.

Govender, R., & De Villiers, M. (2004). A dynamic approach to quadrilateral definitions. *Pythagoras, 58*, 34-45.

Gurefe, N., & Aktas, G.S. (2020). The concept of prime number and the strategies used in explaining prime numbers. *South African Journal of Education, 40*(3). https://doi.org/10.15700/saje.v40n3a1741

Herbel-Eisenmann, B.A., Johnson, K. R., Otten, S., & Cirrillo, M. (2013). Secondary teachers' talk about the mathematics register. In Martinez, M. & Castro Superfine, A. (Eds.). *Proceedings of the 35th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Chicago, IL: University of Illinois at Chicago.

Knuth, E.J., Stephens, A.C., McNeil, N.M., & Alibali, M.W. (2006). Does understanding the Equality sign matter? Evidence from solving equations. *Journal for Research in Mathematics Education, 37*(4), 297-312.

Lankham, I., Nachtergaele, B., & Schilling, A. (2007). *Some common mathematics symbols and abbreviations (with History)*. MAT067, University of California, Davis.

Little, M.E. (2009). Teaching mathematics: issues and solutions. *TEACHING Exceptional Children Plus, 6*(1) Article1. http://scholarship.bc.edu/education/tecphis/vol6/iss1/art1

Marchis, I. (2012). Preservice primary school teachers' elementary geometry knowledge. *Acta Didactical Napocensia, 5*(2), 33-40.

McNeil, N.M., Grandau, L., Knuth, E.J., Alibali, M.W., Stephens, A.C., Hattikudur, S., & Krill, D.E. (2006). Middle-school students' understanding of the equal sign: the books they read can't help. *Cognition and Instruction, 24*(3), 367-385.

Molina, M., Castro, E., & Castro, Enrique (2009). Elementary students' understanding of the equal sign in number sentences. *Electronic Journal of Research in Educational Psychology, 7*(1), 341-368. https://dx.doi.org/10.25115/ejrep.v7i17.1345

National Council of Teachers of Mathematics (NCTM). (2000). Principles and Standards for School Mathematics. Reston, VA: NCTM.

Planas, N., Morgan, C. & Schütte, M. (2018). Mathematics education and language: Lessons and directions from two decades of research. In T. Dreyfus, M. Artigue, D. Potari, S. Prediger & K. Ruthven (Eds.), *Developing research in mathematics education*. Twenty years of communication, cooperation and collaboration in Europe (pp. 196-210). New York: Routledge

Steinbring, H. (2006). What makes a sign a mathematical sign? – An epistemological perspective on mathematical interaction. *Educational Studies in Mathematics, 61*, 133-134. https://doi.10.1007/s/0649-006-5892-z

Toxtle-Colotl, A., Nieto-Ruiz, E., & Juárez-López, J. A. (2025). Multidimensional analysis of conceptual understanding of integer addition and subtraction. *International Journal of Educational Methodology, 11*(1), 97-112. https://doi.org/10.12973/ijem.11.1.97

Vinner, S. (2002). The role of definitions in the teaching and learning of mathematics. In Tall, D. (ed.), *Advanced Mathematical Thinking*. Mathematics Education Library, Vol. 11. Springer: Dordrecht. https://doi.org/10/1007/0-306-47203-1_5

Warren, E. (2007). Exploring an understanding of Equals as quantitative sameness with 5-year-old students. In J.H. Woo, H.C. Lew, K.S. Park, & D.Y. Soe (Eds), *Proceedings of the 31st Conference of the International Group for the Psychology of Mathematics Education*, vol. 4, pp. 249-256. Seoul: PME.

Zazkis, R., & Liljedahl, P. (2004). Understanding Primes: The Role of Representation. *Journal for Research in Mathematics Education, 35*(3), 164-186.

Bridging the Digital Divide; the Influence of Teachers' Perception on Integration of Digital Technologies in Early Years of Education in Kenya

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Abstract
One guiding principles of Kenyan Basic Education Act 2013 is that education should promote innovativeness, inventiveness creativity, technology transfer and an entrepreneurial culture among learners. The objective of this study was to bridge the digital gap by establishing how teachers' perception influences the integration of digital technologies in early years of education in Kisumu Central Sub-County, Kenya. The study adopted Concurrent triangulation design within the mixed method approach. The study was anchored on Davis (1986) Technology Acceptance Model and Preparedness Theory by Seligman (1971). The study targeted 345 teachers from public primary schools in Kisumu Central Sub-County. The study adopted saturated sampling and stratified random sampling to sample 272 respondents. The data collection instruments were structured questionnaires, interview schedules and focus group discussion. Descriptive statistics, Pearson correlation and linear regression were used to analyze quantitative data. The Qualitative data was analyzed using Thematic Analysis Approach. The study findings indicated that that there is a statistically significant ($n=202$; $r=.384$; $p < 0.05$) positive correlation between teachers' perception and integration of digital technologies in early years of education. Teachers were also found to have positive perception towards integration of digital technologies in early years of education. The study concluded that teachers' perception is a predictor of integration of digital technologies in early years of education in Kenya. This means that the information on teachers' perception towards digital technologies is useful information in predicting the level of integration of digital technologies in early years of education. The study recommended that the ministry of education to consider organizing refresher courses for in-service teachers on integration of digital technologies. It was recommended that KICD to re –examine the curriculum content of pre-service teachers training.

Keywords; *perception, teachers, digital technologies, integration, early years*

1.0: Introduction

1.1 Background to the Study

The history of digital technologies in education can be traced back many thousands of years before the first development of reading and writing (Moursund, 2007). The wide spread use of digital technologies has until now influenced all fields in life, among which lies education. Many countries see digital technologies as a potential tool for change and innovation in the education field (Erdogan, 2009) and thus they make large investments in the integration of digital technologies in schools. According to Pelgrum and Law (2003), digital technologies in education became popular in educational policy-making in the early 1980s when consumer market began the sale of cheap microcomputers.

Technology motivates learners to learn, complete tasks that might bore them with pencil and paper, provides creative ways to solve problems and offers a risk free learning environment for learners to explore the world ((Bauer & Kenton, 2011). The Institute of Medicine of the National Academies (IMNA) (2011) recommends that child care settings limit screen time for preschoolers. But the prevalence of electronic media in the lives of young children means that they are spending an increasing number of hours in front of and engage with screens of all kinds including televisions, computers, smart phones, tablets, hand held game devices, laptops and video games among others (Flewit, 2011). National Education for Young Children

(NAEYC) (2012) asserts that technology and interactive media are tools that can promote effective learning and development when they are used intentionally by early childhood educators within the framework of developmentally appropriate practice to support learning goals established for individual children.

Thus the need to use new digital technologies to raise quality and efficiency of education cannot be overemphasized. It is imperative that we expose our children and teachers to ICT to improve quality of education and technical proficiency of our human resources thus leading to increased productivity and accelerated development (Arora, 2010). The ability to display simulated environments through the digital technologies may make it a stimulating instructional tool for eliminating abstract teaching in early childhood years' education. Although digital technologies may still be evolving at all educational levels, the early childhood and education level is better suited for its use (Bauer & Kenton, 2011).

Research shows that crucial factor influencing teacher adoption of technology is the quantity and quality of pre-service technology experiences included in their teacher education programme (Schiller, 2007). Teachers' feelings of preparedness and attitude are important indicators of the extent to which they are prepared to integrate digital technologies in their daily teaching. Research further indicates that teacher preparation knowledge of teaching and learning, subject matter, experience and combined set of qualifications are all leading factors in teacher effectiveness (Sieborger & Terzoli, 2014). On the other hand, Mudasiru (2015) in Nigeria indicated that over 66% of male and female teachers do not have minimum experiences in the use of computers, basic computer operations and the use of application software. Practicing teachers should be given in-service- professional development training in the use of technology and that pre-service teachers should be given basic and advanced training in the use of technology education (Mudasiru, 2015). The rapid rate at which ICT's have evolved since the mid 20thCentury, the convergence and pervasiveness of ICT's give them a strong role in development and globalization (Nwagwu, 2010). Adomi (2010) in Nigerian established that the adoption and use of ICT's have a positive impact on teaching and learning. The survey further revealed that despite the role ICT can play in education, secondary schools in Nigeria have yet to extensively adopt them for teaching and learning.

ICT has brought many opportunities to improve students' learning (Assefa, 2008). Internet allows students to have wider source of information for their learning (Daniels &Pethel, 2005). Teachers are no longer more the only source of information. Assefa (2008) in Ethiopia established that the absence of interrelated contents and mode of presentation that can develop students' knowledge cognitive abilities and behavioral change to adequately enrich problem solving ability and attitude are some of the major problems of ICT integration. Shortage of teachers, schools and other educational logistics were also indicated as serious bottle necks of ICT integration. According to Krumsvik, (2008), teachers' ICT competence is a very trendy theme and in some countries' national curriculum, digital competence is one of the core pillars which are mandatory to take care of in schools. Bukaliya & Mubika (2011) in Zimbabwe established that teachers lack necessary skills and knowledge of computer. In terms of applicability of the packages, teachers' weak knowledge levels showed that their competence in ICT for classroom use still lags behind.

ICT is central to Rwanda's vision 2020 and ICT in education is one of the core pillars of the country's National Information and communication infrastructure policy (NICIP) and plan adopted in (2000). However, Ndayambaje & Orodho (2014) indicated that the investigated information and communication (ICT) facilities, computer and access to internet connectivity were not yet satisfactory and even not deeply integrated into teaching and learning. On the other hand, Mukama (2012) revealed that urban primary schools seemed to be better equipped in terms of human and material resources and infrastructure compared to other public schools from the rural areas. This became more visible when the government of Rwanda had to implement the one laptop per child (OLPC) pilot project in primary schools, Mukama (2012). Osodo, Indoshi & Ongati (2010) in Kenya established that majority of geography teachers and students had a positive attitude towards the use of computer technology in teaching and learning and hence favored the integration of computer simulations into the geography curriculum. Education and training is fundamental to the social transformation envisaged under the social pillar of Kenyan vision 2030. In order to stay on course in the attainment of the desire the sector has planned to integrate information communication technology and training in Kenyan learning institutions. But a report by National Council for Science and Technology (2010) indicated that computer use in Kenyan classrooms is still its early phases. E-learning Readiness survey of Kenyan universities by_Kashorda &Waema_(2014) indicate that universities are not investing sufficiently

in campus backbone and wireless network infrastructure that will make it easier for students to use their own laptops to access learning materials and services.

Otieno (2012) established that only 6.7 % of the respondents were very ready to roll out the e- learning programs in secondary schools. Odera (2014) established that majority of secondary schools did not have enough computers and teachers were not adequately trained in the use of computers. Kenya government has invested a lot of funds in ICT infrastructure including digitization of educational materials through Kenya institute of education for achievement of vision 2030 (Andiema, 2015). A course on ICT integration in education started with a face to face three-day workshop at the center for mathematics science and technology education in Africa. The main aim was to develop Kenyan teachers' skills knowledge deepening and more specifically in applying principles of ICT in education at all levels of education (UNESCO, 2016). According to MOEST (2016) over 66000 teachers have already been trained on how to use the early digital literacy devices for teaching and learning. At the same time, a task Force by (MOEST 2012) on the realignment of the education sector to the new constitution of (2010) and Kenyan vision 2030 mandated Kenya Institute of Education to develop a comprehensive curriculum for Early childhood education to include computer games in-order to introduce and enhance computing skills in young children. Furthermore, one of the core competencies of Kenyan current education system is development of digital literacy among the learners. It's against this background that this study investigated the bridging of digital device and how teachers' perception on integration of digital technologies early years of education in Kenya.

1.2 Statement of the Problem

The Kenyan National ICT Policy (2006) recognizes the fact that there is need to strengthen and streamline the training through promoting ICT in education at all levels by developing ICT curricula and ensuring that teachers/trainers possess the requisite skills. The policy further stipulates that ICT should promote the growth and implementation of e-learning and integrate e-learning resources with other existing resources. However, report from Teacher Performance Appraisal and Development (TPAD) from the ministry of education (Kisumu Central Sub-County) on integration of digital technologies in early years of education shows very low levels of integration of digital technologies in early years of education. And with more and more children encountering digital technologies before going to school, research on influence of teachers' perception for the integration of these digital technologies into classroom teaching remains crucial. This study therefore addressed this gap in literature by focusing on the influence of teachers' perception on integration of digital technologies in early years' of education in Kisumu Central Sub- County.

1.3 Technology Acceptance Model

This study was anchored on Technology Acceptance Model (TAM) originally proposed by Davis (1986). It is a theoretical model helping to explain and predict user behavior of information technology. According to Lagris, Ingham & Collnete (2003), TAM is considered an influential extension of Theory of Reasoned Action, (TRA). According Davis (1986) TAM is proposed to explain why a user accepts or rejects information technology adopting TRA. TAM provides a basic with which one traces how external variables influence belief, attitude and intention to use technology.

Two cognitive beliefs are posited by TAM; perceived usefulness and perceived ease of use. According to TAM, one's actual use of technology system is influenced directly or indirectly by the user's behavioral intentions, attitudes, perceived usefulness of the system and perceived ease of use of the system. TAM assumes that perceived usefulness ("the degree to which a person believes that using a particular system would enhance his or her performance" and perceived ease of use ("the degree to which a person believes that using a particular system would be free of effort") with the influence of pre- existing external variables being the primary determinants for adoption of a new technology. As adopted in the current study, perceived ease of use has direct effect on perceived usefulness and both determine the consumers' attitude towards use, which leads to behavioral intention to use the system and actual use of the system, (Davis, 2002; Lu, 2003). TAM also proposes that external factors affect intention and actual use through mediated effects on perceived usefulness and perceived ease of use. Figure 1.1 depicts original Theory of Technology Acceptance model.

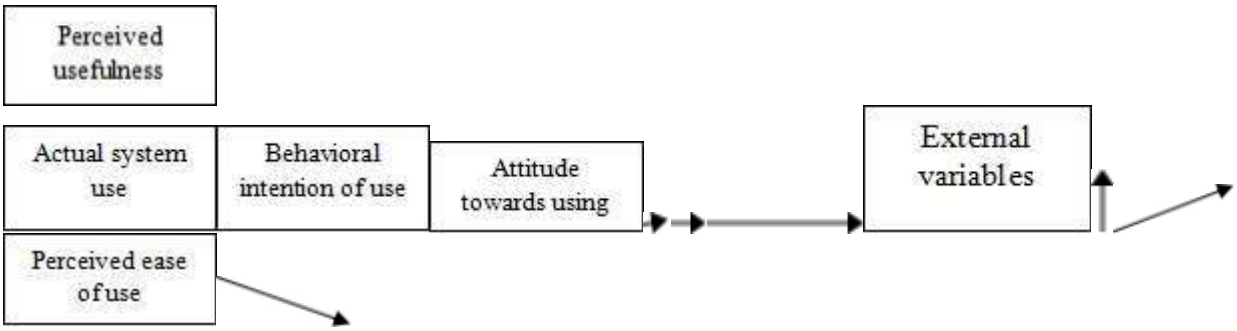

Figure 1.1: Original Technology Acceptance Model (TAM)
Source: Davis (1989) as cited by Nchunge, Sakwa&Mwangi (2012).

This study therefore proposed an integrated theoretical framework of teacher perception on integration of digital technologies acceptance and intention to use based mainly on the technology acceptance model (TAM)

2.0 Literature Review

Teachers' computer experience relates positively to their computer attitudes. The more experience teachers have with computers, the more likely that they will show positive attitudes towards computers, Andoh, (2012). Hennessy, Ruthven and Brindley (2015) conducted a study to investigate influence of teacher perspectives on integrating ICT into subject teaching Commitment, constraints, caution and change in United Kingdom. The paper examined how secondary teachers of the core subjects of English, Mathematics and Science have begun to integrate information and communication technology (ICT) into mainstream classroom practice in English schools. It draws on an analysis of 18 focus group interviews with core subject departments. The findings revealed that there is a statistical significant positive relationship between teachers' perspectives and integration of ICT into subject teaching. Descriptive statistics indicated that teacher accounts emphasized both the use of ICT to enhance and extend existing classroom practice, and change in terms of emerging forms of activity which complemented or modified practice. A gradual process of pedagogical evolution was apparent; teachers were developing and trialing new strategies specifically for mediating ICT-supported learning. The above reviewed study was conducted in secondary schools where students are adolescents unlike the current study where majority of learners are preadolescents. The current study bridged this gap by carrying out an investigation in early years of education thereby filling gap in literature.

Another study in Korea by Cho (2017) analyzed teachers' perception on digital text books use. 119 representative teachers of text books in piloted schools participated in an online questionnaire containing open ended questions. Though there were responses regarding the adverse effects of digital text books such as students' distraction and eye strain, positive feedback regarding the implementation of students' concentration, interest and self -directed learning attitudes outweighed the negative responses. The above reviewed study adopted the quantitative approach, hence it lacked the in-depth information from qualitative data. The current study bridged this gap in literature by employing both quantitative and qualitative approaches thereby filling gap in literature.

Sarfo, and Gyima (2014) investigated the perception of student teachers and education officers in Ghana on the role of computer and the teacher in promoting the five principles of instruction. The study targeted 395 participants who answered questionnaires. Frequency distribution and Chi square tests were employed to analyze data. Results indicated that there is perception dissimilarities among participants on the role of computer and teachers and implementing the first five principles. The reviewed study adopted a quantitative approach hence it lacked the in-depth information from qualitative data. The study also targeted students and education officers who are not teaching in classroom unlike the current study which involved teachers who are using computers in classroom situation. The current study bridged these gaps in literature by

adopting both quantitative and qualitative approaches and targeting in-service teachers thereby adding literature to the existing body of knowledge

Kasoko, Adeyinka (2010) investigated teachers' perception of the contribution of ICT to pupils' performance in Christian religious education (CRE) in Nigeria. The population comprised of 200 primary school teachers selected through census from 15 schools. Questionnaire was used to collect data that was analyzed using percentages and T-Test statistical tools. The results showed that teachers have strong perception that ICT contributes a lot to the performance of the pupils in Christian religious education. Further findings revealed that teachers perceived difference in the pupils' performance when ICT is used to teach CRE than when it is not used. The above reviewed study was conducted in senior secondary school where students are young adults unlike the current study where learners are predominantly young children. The current study bridged this gap in literature by focusing on early years of education thereby adding literature to the existing body of knowledge.

In Rwanda Munyengabe, Yiyi, Haiyan and Hitimana (2017) investigated primary teachers' perception on ICT integration in primary schools. The study employed a qualitative approach where 30 primary school teachers participated through interviews and focus group discussion. The findings established that the one laptop per child program was influential to teachers, learners and stakeholders of primary schools in Rwanda. The study farther showed that for integration to be fruitful, the program requires to help teachers to acquire skills related to technological pedagogical content knowledge. The above reviewed study adopted only a qualitative approach hence it lacked conclusive inferential findings unlike the current study which analyzed both qualitative and quantitative data. The current study bridged this gap in literature by employing both quantitative and qualitative approach thereby filling gap in literature.

Miima, Ondigi & Mavisi, (2013) examined teachers' perception about integration of ICT in teaching and learning of Kiswahili language in secondary schools in Kenya. A survey design technique was adopted. Forty five teachers were selected to be study participants. Questionnaire and interview protocols were used to collect data. The data collected was analyzed through descriptive statistical technique. The study established that most Kiswahili teachers understand the benefit of integrating ICT in teaching and learning of Kiswahili language but they are not willing to adopt it due to various challenges. The study farther showed a statistically negative relationship between the teaching and learning of Kiswahili language and integration of ICT. The above reviewed study was conducted in secondary schools where students are mature unlike the current study where majority of learners are young children. The current study bridged this gap by carrying out an investigation on digital technologies integration in preschool and lower primary schools thereby filling gap in literature

Ang'gondi, (2013) investigated teachers' attitudes and perceptions on the use of ICT in teaching and learning as observed by ICT champions in Kenya. A questionnaire was emailed to 20 randomly selected champions on their Google group forum, ten men and ten women. In order to triangulate the data five ICT champions from one county were also interviewed and another five teachers' non-champion from five different schools in one district was also interviewed. The study indicated that there is a significant negative relationship between teachers' perception and use of ICT in teaching and learning. Farther findings revealed that although teachers were enthusiastic about ICT integration, there were several challenges that were still holding them back from fully utilizing the ICT's. Issues such as inadequate infrastructure, lack of knowledge and skills on how to integrate ICT's, their own attitudes and beliefs and the curriculum. The reviewed study was conducted with a smaller sample size (30) hence its findings were prone to a large margin of error unlike the current study where a reasonable sample size. The current study filled this gap by using a reasonable sample size thereby making the findings as representative as possible.

From the reviewed studies, it is evident that most of them were carried out in contexts that were different from the early years' education level contexts. Moreover, in majority of studies, the approaches used were either qualitative or quantitative. The present study filled in these gaps in literature.

3.0 Research Methodology

The study adopted concurrent triangulation design within the mixed method approach as advanced by Creswell (2014). The design converges or merges quantitative and qualitative data in order to provide a comprehensive analysis of the research problem. In this design, the investigator typically collects both forms of data at roughly the same time and then integrates the information in the interpretation of the overall results (Creswell, 2014). Contradictions or incongruent findings are explained or further probed in this design. The intent in using this design is to bring together the differing strengths and non-overlapping weaknesses of quantitative methods with those of qualitative methods (Creswell & Plano Clark, 2011). The design was found appropriate for this study because the study directly compared and contrasted quantitative statistical results with qualitative findings. The design is presented in Figure 3.1

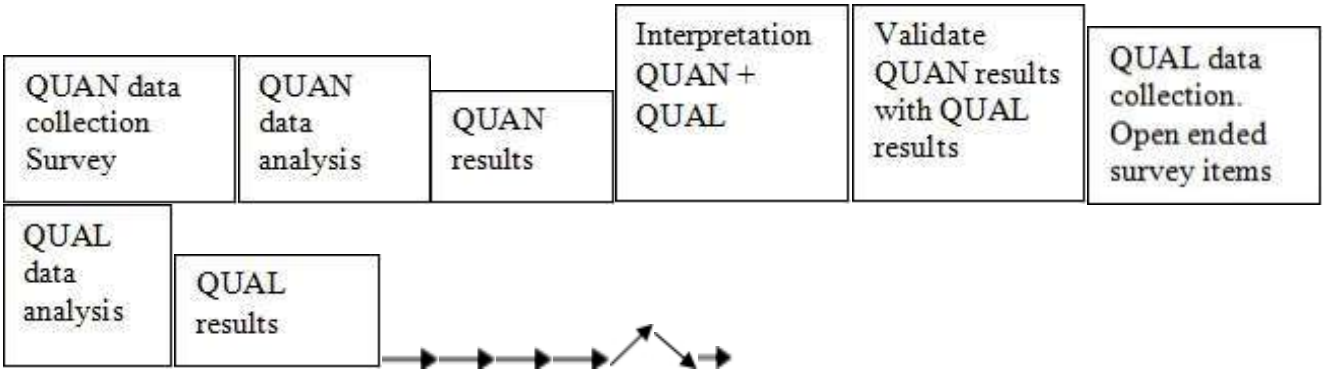

Figure 3.1: Concurrent Triangulation Design: Source; Creswell, 2014)

3.1 Study Participants

Population means all objects and people who share one or some common quality in a special geographical scale, Cooper and Schindler (2009). It is a complete set of individuals, cases or objects with some common characteristics that differentiate it from other population, while target population is the population to which the researcher wants to generalize the results of the study (Orodho, 2005). The target population for the study was 345 teachers consisting of 225 grade 1-3 teachers, 90 preschool teachers and 30 head teachers in Kisumu Central Sub-County (Kisumu County Education office, 2016).

3.2 Research Instruments

Both Questionnaire and Interviews were used to collect data. A Questionnaire was used to collect quantitative data. The questionnaires were administered to the early years' education teachers since they are directly involved in the integration of digital devices. Likerts' scale was used where the respondents were asked to make a choice based on their opinion whether they Strongly Agreed, Agree, Neutral Disagree or Strongly Disagree based on the question asked. In addition, semi structured interviews were used to collect qualitative data from some senior teachers. This was because the number that was sampled under this group was manageable. The interview schedule was appropriate for the study as it provided in-depth information and a detailed understanding of the issue under research. Reliability of the questionnaire was tested using Cronbach's alpha. In the interpretation of the reliability results, the closer Cronbach's alpha coefficient is to 1.0, the greater the internal consistency of the items in the scale. According to (Oso and Onen, 2014), a questionnaire has good internal consistency if the Cronbach's alpha coefficient of a scale is above .6 but not more than .9. All the subscales reached a threshold and were within the range and therefore considered reliable.

4.0 Findings

A bivariate Pearson's Product-Moment Coefficient of Correlation analysis was computed to establish whether there was any statistical significant influence of teachers' perception on integration of digital technologies in preschool and lower primary schools. The SPSS output Table 4.16 shows the correlation results.

Table 4.16: Correlation between Teachers' Perception and Integration of Digital Technologies

		Perception of Teachers on DT	Integration of DT
Perception of Teachers on Digital Technology	Pearson Correlation	1	.384**
	Sig. (2-tailed)		.000
	N	202	202
Integration of Digital Technology	Pearson Correlation	.384**	1
	Sig. (2-tailed)	.000	
	N	202	202

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

Table 4.16 indicates that there is a statistically significant (n=202; r =.384; p < 0.05) positive correlation between teachers' perception and integration of digital technologies in preschool and lower primary schools. Therefore, given that the p-value was less than .05, the null hypothesis that "*There is no statistically significant influence of teachers' perception on integration of digital technologies in preschool and lower primary schools*" was rejected. Hence, it was concluded that there is significant positive influence ofteachers' perception on integration of digital technologies in preschool and lower primary schools. This finding is in agreement with Ali and Semilu (2012) in Turkery whose investigation revealed that there is a significant positive relationship between perception of in-service teachers and technology integration in English language. The finding farther disagrees with Pang, Reinking, Hutchison and Ramey (2015) in South Korea whose findings revealed that there is a significant negative relationship between teachers' perception and integration of information communication technologies. The implication of this finding is that teachers should be encouraged to integrate digital technologies in preschool and lower primary schools. As teachers' with high positive perceptions is associated with more integration of digital technologies in teaching.

This finding was corroborated by qualitative data that was obtained from focus group discussion with standard one teachers and interview with head teachers. It emerged that most of the respondents have a very positive perception towards integration of digital technologies in early years of education. Like one grade one teacher reported that;

> *"Digital technologies are inevitable, we must embrace it, but the government must invest a lot in training of teacher and boosting infrastructure, if full integration has to be achieved, the courses being offered are very short"*..... (FGD 1)

Another one thus said;

> *"The benefits of digital technologies are numerous, the only problem is that teachers are not psychologically prepared for the integration*..... (FGD 3)

On the same note one head teacher had this say;

> *"With digital technologies learning is made interesting and motivating, teachers work is made easier, any analysis is made or done with a lot of ease, generally integration of digital technologies into teaching and learning is a good idea*.....(HT, 3)

This means that teachers believed that digital technologies if effectively used has got a positive influence on both the teacher and the learners. This finding concurs with Ruthven and Brindley (2015) in United Kingdom who reported that there is a statistical significant positive relationship between teachers' perspectives and integration of ICT into subject teaching. Similarly, this study finding further agrees with Mundy, Kupczynski

and Kee (2012) in USA who indicated that teachers who were in the program perceived a significant increase in the areas of students' engagement, students' excitement, students' acceleration of learning and students proficiency with computer technology. On the other hand, the finding is contrary to Modi, (2012) in India whose findings showed that there is no significance difference in the attitude of primary teachers towards computer literacy with reference to their gender and educational qualification. The finding also disagrees with Murat, (2012) in Turkey which reported that majority of respondents who expressed negative attitudes to ICT integration found the nature, level and delivery of the training inadequate and accordingly affirmed that they do not feel sufficiently competent to use ICT in their future subject teaching without having sufficient prior knowledge of ICT dissemination. It further indicates that there is a significant statistical negative relationship between teachers' perception and ICT integration in distance higher education. To further illustrate this relationship, a scatter plot was generated as shown in Figure 4.7.

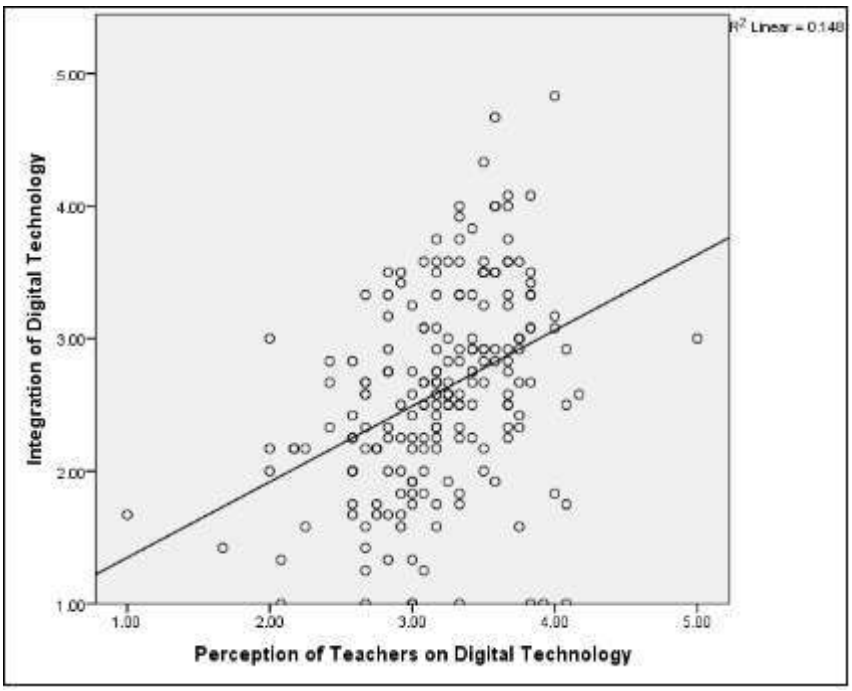

***Figure 4.7**: Scatter plot graph: Teachers' perception and integration of digital technologies in preschool and lower primary schools.*

The scatter plot shows that at least there were some signs of positive correlation between teachers' perception and integration of digital technologies. The pattern of the dots slopes from lower left to upper right, indicating a positive correlation between the two variables. This was further shown by a line of best fit which seemingly its slope reveals a positive relationship between the two variables. In addition, the coordinate points appear to scatter around the line of best fit forming a near visible pattern. However, the fact that the scatters tend to concentrate very close along identity line indicates that the relationship was rather weak. This finding is in agreement with Rhema and Miliszewska (2014) in Libyan university whose finding indicated that there was a significant positive attitudes and the willingness of students on e-learning courses which suggested that there is a great potential for e-learning initiative. The finding farther disagrees with Mwalongo, (2011) in Tanzania whose study indicated that there was significantly negative relationship between teachers' perception and use of ICT for teaching. The implication of this finding is that there should be regular inductions organized by ministry of education to sensitize teachers on the need to change their perception and to embrace integration of digital technologies into their teaching. However, to estimate the level of influence of teachers' perception towards integration of digital technologies in preschool and lower primary, a coefficient of determination was computed. This was done using the regression analysis and the results were as shown in Table 4.17.

Table 4.17: *Model Summary on Regression Analysis of Teachers' Perception on Integration of Digital Technologies*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.384[a]	.148	.143	.70267	2.002

a. Predictors: (Constant), Perception of Teachers on Digital Technology
b. Dependent Variable: Integration of Digital Technology

The model shows that teachers' perception towards digital technology accounted for 14.8%, as signified by R^2=.148, of the variation in Integration of Digital Technologies in early years of education in Kisumu Central Sub-County. This was a significant amount of effect of a predictor on a dependent variable. This finding is contrary to Miima, Ondigi & Mavisi, (2013) in Kenya whose finding showed a statistically negative relationship between the teaching and learning of Kiswahili language and integration of ICT. The finding farther concurs with Nchunge, Sakwa & Mwangi (2012) in Kenya whose finding indicated that user perception is significantly related to ICT adoption for education. The implication of this finding is that teachers' perceive integration of digital technology into teaching positively and therefore should integrate them in teaching preschool and lower primary schools. However, to determine whether teachers' perception towards digital technology was a significant predictor of integration of digital technology, Analysis of Variance (ANOVA) was computed as shown in Table 4.18.

Table 4.18: *ANOVA –Influence of Teachers' Perception towards Digital Technology on Integration of Digital Technology*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	17.102	1	17.102	34.636	.000[b]
	Residual	98.750	200	.494		
	Total	115.852	201			

a. Dependent Variable: Integration of Digital Technology
b. Predictors: (Constant), Perception of Teachers on Digital Technology

The *F*-ratio in the **ANOVA** table (Table 4.18) tests whether the overall regression model is a good fit for the data. The finding of the study reveals teachers' perception towards digital technology statistically significantly predict the integration of digital technology, $F(1, 200) = 34.636$, $p < .05$, revealing that the regression model is a good fit of the data. This means that the information on the teachers' perception towards digital technology is useful information in predicting the level of integration of digital technology in early year's education.

The finding of this study is in agreement with a number of studies in literature, for instance Kinik (2014) in Turkey reported that there is a significant positive perception on technology use and integration. Similarly, the findings concur with Olusola and Olubanke (2013) in Nigeria which revealed that there is a statistically significant positive relationship between teachers' attitude and the use of ICT resources. Additionally, the finding of this study is consistent with Andoh, (2012) in Ghana whose correlation analysis revealed a statistically significant positive correlation between ICT use and teachers' perceptions. However, Pang, Reinking, Hutchison and Ramey (2015) in South Korea study disagrees with this finding as it reported that there is a significant negative relationship between teachers' perception and integration of information communication technologies. On the same note Almekhlafi & Ameqdadi (2010) in United Arab Emirates finding is contrary to this study finding as it reported that there is a significant negative relationship between methods of integration by male teachers compared to their female counterparts.

In a number of ways qualitative data revealed a positive perception towards integration of technologies in early years of education through expressions of standard one teachers and head teachers who were interviewed. One head teacher had the following to say during interview;

> *"Integration of digital technologies in preschool and lower primary schools is good. The training on ICT should begin from teachers training colleges and all teachers in the school should be inducted so that every teacher embraces digital learning"*..... (HT, 3)

Another grade one teacher remarked;

> *"Digital technologies expose children to a wider range of learning environment, it makes learning more interactive, it is a good thing, the only problem is that there a lot of things being introduced to these early grade learners"*..... (FGD 2)

From the excerpts of member of FGD 3 and member of FGD 2, it emerged that teachers believe that integration of digital technologies in early years of education is beneficial to teacher and even to learners. This was revealed by member of FGD 3 who said that technology integrated teaching is a lesson learners' will enjoy most in preschool and lower primary classes. Member of FGD 1 revealed that preschool and lower primary teaching can be superb if their environment is technologically enriched. From these views of standard teachers, it is evident that teachers hold a positive perception towards the integration of digital technologies in early years of education. The focus discussions responses show that teachers associate integration of digital technologies with positive developments on the learner. Digital technology if effectively integrated in teaching and learning will make learning in preschool and lower primary very effective, this was reported by head teachers who opined that integration of digital technologies in early years of education should continue and should be taken more seriously by all stakeholders. One of the head teachers reiterated that;

> *"Digital technologies integration is good because the school will benefit when teachers and learners are enlightened, eventually we are generating learners' who are helping societies in terms of ICT*..... (HT, 2)

Another grade one teacher remarked;

> *"Digital technologies in our schools is a good project, if only it can be embraced by everybody and facilities made available for all learners in the school*.....(FGD 2)

The above excerpts show that teachers perceive the integration of digital technologies in early years of education positively. This finding is supported by Yasir, (2015) in Sudan who revealed that most English language teachers have positive attitudes towards the use of computer technology in English language classroom. The finding further concurs with Nyamota and Yungungu (2015) in Kenya which reported that there was a statistically significant positive relationship between students' perception and computer integration. In addition, the finding agrees with Hennessy, Ruthven and Brindley (2015) in United Kingdom that reported that there is a statistical significant positive relationship between teachers' perspectives and integration of ICT into subject teaching. Similarly, the finding is consistent with Ali and Semilu (2012) in Turkey whose study that indicated that there is a significant positive relationship between perception of in-service teachers and technology integration in English language.

On the contrary, the finding disagrees with Modi, (2012) in India whose study showed that there is no significance difference in the attitude of primary teachers towards computer literacy with reference to their gender and educational qualification. Similarly, a study by Murat, (2012) in Turkey is inconsistent with this finding as it revealed that there is a significant statistical negative relationship between teachers' perception

and ICT integration in distance higher education. Pang, Reinking, Hutchison and Ramey (2015) in South Korea also disagrees with this finding in their study that indicated that there is a significant negative relationship between teachers' perception and integration of information communication technologies.

5.0 Conclusion and Recommendations

The study concluded that teachers' perception is a predictor of integration of digital technologies in early years of education in Kenya. This means that the information on teachers' perception towards digital technologies is useful information in predicting the level of integration of digital technologies in early years of education. The study recommended that head teachers should ensure that teachers integrate digital technologies in their teaching since teachers' perception greatly influence integration of digital technologies in early years of education. The study recommended that; teachers should be encouraged to integrate digital technologies into their teachings since they are sufficiently prepared in terms of their digital literacy and their perception.

Reference

Adomi, E. E. & Anie, S. O. (2006). Assessment of computer literacy skills of professionals in Nigeria university library. *Library Hi Tech News 23* (2):10-14

Almalki, G. & Williams, N. (2012). A strategy to improve the Usage of ICT in the Kingdom of Saudi Arabia.*International Journal of Advanced Computer Science and Application.Vol 3* No 10 pp 42-49

Ang'ondi, E. K. (2013). Teachers' Attitudes and Perceptions on the Use of ICT in Teaching and Learning as Observed by ICT Champions. *X World conference on computers in education. July 2nd – 5th 2013;* Toruri, Poland.

Andema, S. (2014) Promoting Digital Literacy in African Education; ICT Innovation in Ugandan Primary Teachers Colleges.*Unpublished Thesis, MakerereUniversity*, Uganda

Andoh, C. B (2012). Teachers Skills, Perceptions and Practices of ICT in Teaching and Learning. C*ontemporary Educational Technology 3(1)* 36-49

Assefa, T. (2008). *The Integration of ICT in Education.* The Plasma Mode of Education in Ethiopian High Schools.Acts publishers, Ethiopia.

Arora, P. (2010). Hope-in-the-wall. A digital promise for free learning. *British Journal of Educational Technology. Volume 41,* issue 5, pp 689-702

Bauer J & Kenton J (2011) Toward Technology Integration in the Schools: Why It Isn't Happening.*JI. of Technology and Teacher Education 13(4*), 519-546

Bukaliya, R. & Mubika, A. K. (2011). Teacher Competence in ICT. *Implication for Computer Education in Zimbabwe. 1* (4) pp 121-139

Cho, K. (2017) Analysis of Teachers Perceptions of Digital Text books Use in Korea. *International Journal for Educational Media and Technology. Vol 11* No. 1 pp76-81

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology. *MIS Quarterly 13* (3), 319-339

Creswell, J. W. (2014). Research design: Qualitative, Quantitative, and Mixed Methods Approach. *Handbook of mixed methods in social and behavioral research (pp-209-240)* Thousand Oaks, Calfornia: SAGE Publications.

Creswell, J. W & Plano Clark, V. L (2011). *Designing and Conducting Mixed Methods Research.* (2nded.). Thousand Oaks, CA: Sage

Erdogan, B (2009) Collectivism as A moderator of Responses to Organizational Justice. *Journal of Organizational Behavior, 27,* 1- 17

Hennessy, S, Ruthven, K. &Brindley, S. (2015) Teacher Perspectives on Integrating ICT into Subject Teaching: Commitment, Constraints, Caution and change. *Journal of curriculum studies, Volume 23,* 231- 267

Kasoko, G. A. Adeyinka, T. (2010) Teachers Perception of the Contribution of ICT to pupils Performance in CRE.*Journal of Social Sciences 22* (1) 7 -14

Kashorda, M. &Waema, T. (2014). *E-Readiness Survey of Kenyan Universities Report, Nairobi*. Kenya Education Network

Kinik, B. (2014). Teachers' Perceptions towards Technology Use and Integration to Teach English. *International Conference 2014. 'ICT FOR LANGUAGE LEARNING'*.Turkey

Krumsvik, R. (2008). Situated learning and teachers' digital competence in Zimbambwe. *Education & Information Technology, 13,* 279-290

Lagris, P. Ingham, J. &Collenette, P. (2003). Why Do People Use Information Technology? A Critical Review of the Technology Acceptance Model. *Information & Management 40*: 191-220

Miima, F. Ondigi, S. & Mavisi, R. (2013). Teachers perception about integration of ICT in teaching and learning of Kiswahili language in secondary schools in Kenya. *International Journal of Arts and Commerce Volume 2* (3) pp 27-31

Mudasiru, O. Y. (2015). Teachers Self-Efficacy in Implementing Computer Education in Nigerian Secondary Schools. *A Middle School Computer Technology Journal Volume 8,* Issue 2pp 87- 123

Munyangabe, S. Yiyi, Z. (2017) Primary Teachers' Perceptions of ICT Integration for Enhancing Teaching and Learning through Implementation of One Laptop per Child Programme in Rwanda. *Erasia Journal of Mathematics and Science and Technology Education*, 13(11)7193-7204

Murat, H. (2012) Prospective EFL Teachers Perceptions of ICT Integration: A study of Distance Higher Education in Turkey. *Educational Technology & Society,* 15 (1) *185*-196

Modi, J. K. P. (20120. Primary Teachers Attitudes towards Computer Literacy. C*onference Paper Presented At Conference Technology Education. 2012* International Conference, India

Mundy, M. A. Kupcynski, L. & Kee, R. (2012) Teachers Perception of Technology Use in schools. *Sage Journals 56* 119-131

Mwalongo, A. (2011). Teachers' Perceptions about ICT for Teaching, Professional Development, Administration and Personal Use.*International Journal of Education and Development Using Information and Technology.Vol 7* Issue 3, pp. 36-49

Ndayambaje, I. &Orodho, J. A. (2014). *Provision and Usage of Computer and Internet Facilities*.Pine Forge Press, Rwanda.

Odera, F. Y. (2014). Secondary Teachers Use of Computers in Teaching and Learning in Kenya. *International Journal of Information and Communication Technology Research.Vol 4* (5) pp 200- 209

Otieno, C. O (2012). E – Learning readiness and E- learning adoption among public secondary schools in Kisumu County. *Unpublished Thesis, Kenyatta University*.

Orodho, J. A. (2005). *Techniques of Writing Research Proposals and Reports in Education and Social Sciences*.Second Edition, Nairobi.

Osodo, J. Indoshi, F. C. & Ongati, O. (2010). Attitudes of Teachers and Students towards Use of Computer Technology in Geography Education. *Educational research vol*1(5) pp 145-149

Pelgrum, W. J & Law, N. (2003). *ICT in Education around the World: Trends Problems and Prospects UNESCO*- International Institute for Education Planning. Available:www.world.*catlibraries.org/wcpa/ow/02d077080fcf321a19afeb4da09e526.html*.

Sarfa, F. K. & Gyimah, K. A. (2014) The Perception of Students Teachers and Educational Officers in Ghana on the Role of Computer and the Teacher in Promoting the Five Principles of Instruction.*Turkish Online Journal* of Education Technology. Vol 9 issue 385 -89

Seiborger, L. &Terzoli, A. (2014). Enabling and constraining ICT practice in secondary schools: A case study in South Africa. *Int Journal Knowledge and Learning.Voumel3*, 2 (3) PP171-190

Schiller, J. (2007). *The Role of Primary Leaders in Integrating Information*: A Technology Longitudinal Study.in B. Corners &T. D

UNESCO (2015*) Importance of ICT in School Education*.SAGE Publications Maauritius.

Head Teachers' Financial Management Skills and Their Effects on Implementation of Competency Based Education in Junior Schools in Bungoma South Sub County

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Abstract
The study aims to examine how headteachers' financial management skills affect finance management which is a key aspect in implementing the Competency Based Education in junior schools. Domiciling junior school in primary schools has expanded the financial responsibilities of head-teachers. The allocation of relatively high amounts of funds and the rising demand for resources in junior schools pose great challenges to head-teachers with limited knowledge on financial management. Despite training head-teachers and accounts clerks on school financial management, gaps remain in procedures and reporting on the use of finances in junior schools. The study objectives were to establish how head-teachers' financial planning and budgeting skills, procurement skills, and financial reporting skills affect the acquisition of resources necessary for Competency Based Education implementation. The study used a mixed approach design. The study sampled 50 public primary schools' head-teachers, 50 accounts clerks, and 1 schools' auditor. Questionnaires were used to obtain data from all respondents. Qualitative data was analyzed thematically. Quantitative data were collected, formatted and analyzed using descriptive statistics (means and standard deviations) while inferential statistics used in the analysis included the chi-squire test and Pearson correlation. The presentation of findings was done using tables and graphs. The findings established a statistically significant relationship between head-teachers' financial management skills and resource acquisition for CBE implementation. Effective budgeting and financial planning positively correlated with timely procurement and supply of CBE materials. Procurement skills were established to have a positive influence on cost-efficiency and the quality of learning resources acquired. Additionally, financial reporting skills promoted accountability and enhanced stakeholder confidence. In conclusion the study noted that strengthening head-teachers' financial management skills is crucial for the effective implementation of CBE. The study recommends continuous capacity-building of head teachers on school financial management, integration of financial management modules in leadership and management training and formulation of policies for standardized financial management practices in junior schools to ensure effective utilization of funds for successful CBE implementation.

Keywords: *Financial management, planning, procurement, financial reporting, Competency Based Curriculum, Junior school.*

1.0 Background

A report on the Kenyan government funding indicates that, the education sector takes the largest share of the government's budget. Education funding accounts for 35% of the annual government budget (Colclough & Otieno, 2009), this has often led to calls for its reduction. However, the government cannot ignore provision of meaningful education to her people just because of huge expenditure. The education sector encounters new challenges each time depending on changes made on its educational policy (GoK, 2005). The change of curriculum from 8-4-4 system to competency-based education (CBE) account for the continued increase in the education budget. Increased amounts of funds disbursed to primary schools has expanded the financial responsibility of headteachers.

Kenya's education sector receives funds from various sources. The main sources of funds for public primary schools are Ministry of education free primary education (FPE), IGA; Donors KPEELP/GPE, SEQIP by W/Bank, Safaricom foundation; Grants, Gifts and Donations and the NG- CDF

It is a requirement that each year, primary schools' headteachers with the help of their accounts clerks prepare annual budgets, maintain books of account, prepare final accounting records and submit them to the MOE for audit. The aim being to assess the use of school funds and compliance with the financial management procedures and guidelines for schools. Audit reports reveal that headteachers with limited

knowledge on financial management often misappropriate and misuse school funds (MOE, 2025). In some instances, funds disbursed by the government to schools are perceived as "their money" and therefore subject to misuse.

FPE disbursement clearly highlights areas of expenditure (Vote heads) including tuition, repairs, travel and transport, administrative, electricity and water bills, activity fees and non-teaching staff salaries. The task of financial management is vested on the headteacher. Knight (1993) noted that, the main elements for efficient and effective financial management in schools were economy and prudent use of resources.

The recent development by the MOE to take school managers through a financial management training by KEMI, was geared towards achieving efficient financial and resource management practices. The TSC TIMEC policy recently rolled out took keen interest on sensitizing newly appointed institutional administrators on financial management through induction, coaching and mentorship. The Kenya Primary Schools Heads Association (KPSHA) conferences held yearly at sub county, County, Regional and National levels have played a great role in sensitizing school heads on financial management. These intervention strategies help boost the headteachers capacity, knowledge and skills for better financial management to achieve the CBE goals and objectives.

Financial planning and budgeting form a basis for an effective school financial management. Proper planning ensures that schools prioritize spending by aligning the limited resources with school goals (Ngware, 2022). Budgeting is crucial in the context of CBE implementation as it enables schools to allocate funds for the establishment of CBE-compliant infrastructure like ICT and science laboratories and purchase of instructional materials that are in line with competency goals. A well-developed budget is important and supports operational efficiency as well as providing a blueprint for resource acquisition and utilization.

UNESCO, (2021) study acknowledges procurement as crucial component of school financial management since it determines the quality of resources received by schools. Under the CBE framework, timely procurement of materials like ICT devices, textbooks and laboratory equipment is important and head-teachers must be knowledgeable on proper procurement procedures and adherence to public procurement laws and regulations. Incompetent procurement practices by headteachers lead to delays in supply of CBE resources and acquisition of substandard resources which derails CBE implementation in JS.

Headteachers financial reporting is equally crucial as it enhances transparency and accountability in the management of school finances. Proper financial reporting practices is important as it enable head-teachers to monitor school expenditure and income, detect financial irregularities, and make informed financial decisions (Ndung'u, 2015). Additionally, reporting facilitates trust and support from stakeholders that include Boards of Management (BoM), parents and government oversight agencies.

Most studies focus on financial management in secondary and primary schools without examining its effects on curriculum implementation (Mutua, 2020). This study therefore seeks to address that gap by focusing on how specific financial management skills influence the acquisition of resources necessary for CBE implementation in junior secondary schools.

Financial management affects the operations of institutions to meet basic requirements. School funds should be managed properly. Management of funds in primary schools where Junior schools are domiciled is entrusted to headteachers. Headteachers should adhere to the legal and policy framework in financial management of public institutions. They should be guided by various financial management laws, regulations, policies, manuals and circulars. There is need for strategic planning, organization and control of financial resources to ensure effective and efficient utilization of school funds. It is the responsibility of the headteacher to mobilize resources, plan and budget for the available resources, maintain financial records and documents, institute internal control systems, submit financial reports for audit and above all comply with government rules, regulations and procedures on school financial management.

Domiciling junior school in primary schools has expanded the financial responsibilities of head-teachers. The allocation of relatively high amounts of funds for Junior school learners and the rising demand for resources in junior schools pose great challenges to head-teachers with limited knowledge on financial management. Despite the standard procedures and guidelines on financial management of school funds, there was evident casual operations by headteachers that resulted to loss and unaccounted funds. Headteachers often spent money without budgets and approval by the board of management. They purchased goods and services without proper plans and budgets, flaunted procurement procedures and were not keen on evidence and

records of transactions carried out. CBE curriculum requires substantial amounts of funds for establishing and equipping classrooms, laboratories, libraries, learning materials and additional human resource. Financial operations that are not conducted proce durally lead to mismanagement and misappropriation of school funds. If priority areas such as acquisition of basic infrastructure, teaching and learning resources were ignored it affects curriculum implementation.

The study was intended to address the financial management skills of headteachers. Planning and budgeting skills, procurement skills and financial reporting skills of headteachers are key determinants of effective and efficient use of school funds. Successful implementation of CBE curriculum calls for prudent use of the limited school funds, prioritizing key areas of expenditure and use of funds per vote head to ensure availability of basic infrastructure, teaching and learning resources.

The purpose of the study was to establish whether the primary headteachers who are managers of Junior schools are conversant with financial management skills, procedures and policy guidelines, their effects on implementation of competency-based education in junior schools in Bungoma South Sub County and the intervention strategies to improve their financial management skills. The study sought to achieve the following objectives;

i. Assess the effects of headteachers financial planning and budgeting skills on CBE resources acquisition in Junior Secondary schools in Bungoma South Sub County.
ii. Assess the effects of headteachers procurement skills on CBE resources acquisition in Junior Secondary schools in Bungoma South Sub County.
iii. Examine the effect of headteachers financial reporting skills on CBE resources acquisition in Junior Secondary schools in Bungoma South Sub County.

2.0 Methodology

The study adopted a mixed methods research design for a comprehensive exploration of the effects of head-teachers' financial management skills on the implementation of Competency Based Education (CBE) in Bungoma South Sub County. The integration of both quantitative and qualitative methods allows the study to capture in-depth insights on statistical relationships between financial planning, budgeting, procurement, and reporting skills with resource acquisition. Quantitative data provided measurable evidence of trends and correlations, while qualitative data enriched the findings by capturing the lived experiences, perceptions, and challenges faced by head-teachers in financial management practices within the CBE framework. Additionally, the design was the most preferred as it enhanced the validity of findings by triangulating numerical data with rich, descriptive experiences, thereby offering a holistic understanding necessary for informing policy and practice in CBE implementation (Creswell & Plano Clark, 2018)

The study was conducted in Bungoma South Sub County because of the challenges faced in terms of preparedness and effectiveness in rolling out CBE that has been recorded in the region attributed to disparities in financial planning, procurement practices, and financial reporting capacities among school heads (MoE, 2021). Furthermore, understanding how head teachers in this region manage financial planning, procurement, and reporting will provide valuable insights into localized implementation barriers and offer insights that can inform broader education policy and capacity-building efforts across Kenya.

Simple random sampling was adopted by the study for selecting primary schools, head teachers, account clerks, and school auditors. The technique was preferred as it ensures equal chance for every individual in the target population of being selected which minimize selection bias and enhance the representativeness of the sample (Creswell & Creswell, 2018). In line with the need to generalize the study findings from all junior schools in Bungoma South Sub County, the technique allows the inclusion of diverse school settings and personnel, that is crucial for accurate assessment of the relationship between head teachers' financial management skills and the implementation of Competency-Based Education (CBE). Furthermore, this approach supports the reliability and validity of the study by encouraging objectivity in participant selection (Kumar, 2014). The study sampled a total of 101 respondents made up of 50 public primary schools' head teachers, 50 accounts clerks, and 1 schools' auditor.

The study used questionnaires to collect data from head teachers, account clerks, and school auditors because of their effective in collecting standardized information from a large sample within a short time as well as ensuring comparability and consistency of responses that are related to financial management

practices. The instrument is also appropriate for this study because it allow the study to obtain quantitative data on financial planning, procurement, and reporting skills, before systematically analyzing it to determine their effects on the acquisition of resources for Competency Based Education implementation. Furthermore, questionnaires guarantee anonymity for honest and accurate responses from respondents on sensitive financial management issues (Creswell & Creswell, 2018).

Descriptive data was analyzed using mean and standard deviation to summarize and understand trends and patterns of data on head teachers' financial planning and budgeting skills, procurement skills, and financial reporting skills. To determine the relationship between the financial management skills and the acquisition of resources for CBE implementation, inferential statistics were analyzed using Pearson correlation to assess the strength and direction of relationships and regression analysis to determine the predictive power of the financial skills on resource acquisition.

3.0 Findings and discussions

3.1 Effect of Headteachers Financial Planning and Budgeting Skills on CBE Resources Acquisition in Junior Schools

The following responses on the effects of head teachers' financial planning and budgeting on CBE resources acquisition in JS. The level of headteachers financial planning and budgeting skills effects on CBE resources acquisition was assessed using the Likert-itemed questionnaire on agreeableness. Using the five-point Likert scale ranging from strongly agree (5) to strongly disagree (1) the responses were converted into continuous scale ranging from 1 to 5, where higher scores represented very high level of agreeableness, and vice versa. Table 3.1 presents the findings on effects of head teachers' financial planning and budgeting effects on CBE resources acquisition summarized in mean and standard deviation.

Table 3.1: Descriptive Statistics on Effect of Head teachers' Financial Planning and Budgeting Skills on CBE Resources Acquisition in Junior Schools

Statements on M&E (N = 101)	Mean Statistic	Std.Dev. (SD)	Minimum	Maximum
The school has a clear financial plan aligned with CBE implementation goals	2.110	.457	1	5
There is a systematic approach to identifying CBE resource priorities in financial plans	2.142	.618	1	5
The school's financial planning process supports timely acquisition of CBE materials.	2.058	1.523	1	5
Budget allocations for CBE are done transparently and reflect learning needs	2.267	1.682	1	5
	2.343	.467	1	5
The budgeting process is regularly reviewed to respond to CBE implementation changes	2.241	1.546	1	5
Composite values	**2.194**	**1.048**	**1**	**5**

Source: Author, 2025

The results presented in Table 3.1 indicates that all the aspects of head teachers' financial planning and budgeting had a combined weighted mean of 2.194 with the values deviating from the mean to the extent of 1.048. This finding suggests that most head teachers in JS have insufficient competencies on financial planning and budgeting which may interrupt the provision of CBE resources in JS in Bungoma South Sub County.

3.2 Correlation of Head teachers' Procurement Skills and CBE Resources Acquisition in Junior Secondary Schools

To establish if there existed any relationship between head teachers' procurement skills and CBE resources acquisition in JS, Pearson's correlation analysis was done. The study findings were as shown in Table 3.2.

Table 3.2: Pearson's Correlation of Head teachers' Procurement Skills and CBE Resources Acquisition in JSS

	Pearson's Correlation	1	2	3	4	5	6	7
1 The headteacher effectively identifies the resource needs for CBE implementation.	Correlation	1						
	Sig.							
2. The school develops procurement plans aligned with CBE curriculum requirements	Correlation	.572**	1					
	Sig.	.002						
3. The headteacher has sufficient knowledge of public procurement procedures	Correlation	.514**	.498**	1				
	Sig.	.029	.014					
4. The headteacher can effectively prepare procurement documents (e.g., tender forms, quotations)	Correlation	.027	-.123	.036	1			
	Sig.	.665	.806	.795				
5. The headteacher is trained in procurement and financial management practices	Correlation	.712**	.548**	.703**	.418**	1		
	Sig.	.000	.043	.000	.036			
6. The headteacher ensures compliance with procurement regulations.	Correlation	.498**	.135	.143	.260	.314	1	
	Sig.	.035	.780	.977	.642	.503		
7. The school maintains proper procurement records for all CBE-related purchases	Correlation	-.213	.014	-.185	.012	.025	.012	1
	Sig.	.254	.985	.781	.955	.972	.875	

****. Correlation is significant at the 0.05 level (2-tailed)**
Source: Author 2025

Correlation matrix in Table 3.2 shows a correlation between head teachers' procurement skills and CBE resources acquisition. Four items on questionnaires on procurement correlated with CBE resources allocation while two did not correlate and were not used for further data analysis. The positive correlations values ranged from 0.498 to 0.712 at $\alpha = 0.05$ which implied that CBE resources acquisition in JS was likely affected by head teachers' procurement skills.

3.3 Effects of head teachers' financial reporting skills on CBE resources acquisition in Junior schools

$H_0$3: Head teachers' financial reporting skills have no significant effect on CBE resources acquisition in JS. Objective three was to examine the effect of head teachers' financial reporting skills on CBE resources acquisition in Junior schools in Bungoma South Sub County. To investigate the influence of headteachers financial reporting on CBE resources acquisition, the null hypothesis was determined by a Chi-square (χ^2) test, at 0.05 level of significance and at 1 degree of freedom. The findings were shown in Table 3.3 below.

Table 3.3: Results of hypothesis 3

Independent variable	Hypothesis	Chi-sq. value	df	Chi-sq.p value	Sig. Value	Result	Decision
Head teachers' financial reporting skills	$H_0$3	191.27	5	0.000	0.05	0.000<0.05	$H_0$3: rejected

Source: Instruments

Table 3.3 above shows a chi-square test of independence comparing head teachers' financial reporting skills and CBE resources availability in JS in Bungoma South Sub County. The findings indicate significant association between the two variables χ^2 (5) =191.27, $p<0.05$. The null hypothesis of independence was rejected, suggesting that there is a significant influence between head teachers' financial reporting skills and CBE resources acquisition in JS in Bungoma South Sub County. This implied that CBE resources acquisition in JS was statistically influenced by head teachers' financial reporting skills.

4.0 Conclusion

The study findings show that head teachers' financial planning and budgeting skills have significant effect on the availability of CBE resources. Schools under the head teachers who strategically plan their institutions finances, carry out inclusive budgeting and accurately identify CBE resource needs were better responsive and prepared to handle the CBE demands in terms of resources. Teachers in such schools reported enhanced access to CBE instructional materials, infrastructure and teaching aids. In contrast, poor planning and budgeting were linked to deficits in essential resources for CBE which undermines CBE implementation.

The paper established that effective head teachers' procurement skills play an important role in efficient and timely procurement of CBE resources. Strict adherence to the procurement regulation by the head teachers promoted transparency and competitive sourcing of quality CBE resources that support the pedagogy. Adherence to the procurement regulation by the head teachers were associated with cost accountability, cost efficiency and relevance of acquired resources, which ensure that the learning environment meet the competency-based approach of the curriculum. In contrast, inadequate adherence to procurement regulations by head teachers delayed processes which contributed to wastage and supply of substandard and mismatch resources for CBE.

The findings also found that accurate and timely financial reporting played a key role of promoting accountability and informed decision-making in CBE resource management. The study established that head teachers who had proper financial records, updated periodic reports and structured internal reviews mechanism created an institutional culture that was grounded on trust and financial discipline. This transparency enabled schools to effectively track spending against CBE targets, assess resource needs, and mobilize for necessary support from stakeholders. In contrast, poor reporting practices by the head teachers was associated to embezzlement of funds and lack of stakeholder confidence, which negatively affected resource mobilization for CBE implementation.

5.0 Recommendation

According to the findings, the study recommends the Teachers Service Commission in partnership with the Ministry of Education to promote head teachers capacity on financial planning and budgeting through training and structured professional development. Since the study established that poor financial planning and budgeting affects the acquisition of important Competency-Based Education (CBE) resources, school administrators should be equipped with skills on long-term financial planning, resource prioritization basing on the needs and CBE-specific budget alignment to ensure efficient allocation of funds on important infrastructure and instruction materials.

Furthermore, the study indicates that non adherence to procurement regulations contributes to delays and inconsistencies in the supply of CBE resources. It is consequently recommended that head teachers should be

provided with a structured training on public procurement regulations and contract management in the context of JS. Members of the procurement committees in school Boards of Management (BoMs) should also be sensitized on the significance of transparency and compliance with procurement regulations and policies to address wastage and promote value for money in the procurement of CBE teaching and learning materials.

Additionally, the study indicates the existence of gaps in accountability, financial reporting, and financial records keeping, undermine trust and disrupt decision-making in CBE resource allocation. To resolve this, the study recommends the adoption of standardized financial reporting tools by the headteachers for effective financial documentation practices. Regular audits and reviews should be institutionalized to promote accountability and ensure funds are properly utilized for intended purpose. The Kenya Education Management Institute (KEMI) should integrate CBE-focused financial modules in their leadership and management programmes to promote head teachers' sustainable financial management capacity.

Reference

Colclough, C., & Otieno, W. (2009). Financing Education in Kenya: Expenditures, Outcomes and the Role of International Aid. Research Consortium on Educational Outcomes and Poverty (RECOUP), University of Cambridge.

Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (3rd ed.). SAGE Publications.

Kumar, R. (2014). Research methodology: A step-by-step guide for beginners (4th ed.). Sage Publications.

Ministry of Education. (2021). Report on the status of Competency Based Curriculum implementation in Kenya. Nairobi: Government of Kenya.

Ndung'u, J. (2015). Role of financial management on performance of public secondary schools in Kiambu County. Journal of Business and Management, 17(5), 23–30.

Ngware, M., Abuya, B., & Oketch, M. (2022). Teacher preparedness in implementing competency-based curriculum reforms in Kenya. African Educational Research Journal, 10(1), 1–9.

UNESCO. (2021). Education Sector Analysis: Kenya. United Nations Educational, Scientific and Cultural Organization.

Gender Representation in Luhya Popular Songs: A Case of Jacob Luseno, Kennedy Khaemba and Opete Wa Musungu

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Abstract
This paper examines the selected Luhya popular songs of Jacob Luseno, Kennedy Khaemba and Opete wa Musungu with a view to explore the gender issues on women in the Isukha, Bukusu and Tachoni societies. The impetus of this study was borne out of the realization that popular songs whose medium of communication is music have become an important avenue for social communication as a form of text. This study was guided by the research question: How do the popular songs of Jacob Luseno, Kennedy Khaemba and Opete wa Musungu reveal the gender roles and stereotypes in the Isukha, Bukusu and Tachoni societies? Dennis Tedlock and Dell Hymes views on Ethnopoetics and Naoomi Nkaelah's view of feminist literary criticism were useful for conceptual analysis and interpretation of the texts. Feminist literary criticism helped us to understand how women are portrayed in their roles and imagined beliefs in the selected Luhya songs while Ethnopoetics helped us to actualize the seleted oral songs into a written text and in unraveling the meaning and mood in the selected songs. Critical analysis of the songs and mixed method research that uses a sequential exploratory design was useful in collecting data. Purposive sampling was useful in selecting songs that were taken as cultural texts that depict women in their gender roles and stereotypes. The findings of this study show that Luhya popular songs reveal societal gender issues on women. This study shall shed l ight on the societal attitudes towards women in the Isukha, Bukusu and Tachoni societies that these artists come from. This study will help literary scholars, gender activists and musicians to delve further in gender dynamics of communities and improve their areas of concern especially in relation to the entire Luhya community.

Keywords: *Gender, literary text, stereotype, gender role and women.*

1.0 Introduction

Gender issue has been a topic of discussion in modern related discourses for quite some time with scholars attacking societal culture as a source of patriarchal ideals that perpetuate stereotypes on women in various societies. To begin with, Shepherd (1991) viewed that music is a text and therefore it can be thought of as an element of culture (162). His view is supported by Finnegan (1992) in reference to traditional literature when she observed that the oralness of a good literary text is a positive and essential quality of its nature and literary realization (166). Ryanga (2011) sums up our choice of musisc as a literary tool by postulating that Finnegan did debate with regard to performance aspects, but which relate to purely unwritten forms, but when subjected to literary analysis, equally bear literary significance with distinctive stylistic devices (350). This paper agrees with Ryanga's view and observes that literary texts should be recognized from their inherent characteristics that define them.

Wanjiku (2017) observed that gender is socially constructed in that the society finds ways of categorizing the sexes as male and female according to the stipulated behavior (11). Her claim is clarified by Butler (1990) who opines that male and female is usually viewed as binary and opposite of each other; it is not what one is but what one does. Butler's claim contributes to this paper given that the women portrayed in the songs of Luseno, Opete and Khaemba depict certain gender roles and gender sterotypes.

Wood (2011) supports Wanjiku by observing that we are born into a gendered society that guides our understanding of gender and shapes our personal gender identities, i.e. children acquire gendered language and behavior even before they fully comprehend that they are constructing and reproducing gender (160). His argument can be related in appreciating the Abaluhya cultural construction of gender, which means that the very moment a Luhya child acquires *Oluluhya* (luhya language) he/she immediately knows how to differentiate between male (omusacha) and female (omukhasi) in their society.

Wanjohi's (2021) view sums up our argument on gender and society since it is members of a given community/ society who determine the roles/ chores/ assignments and activities to be performed by the

female and male members through socialization where gender is highlighted by voicing the connections and disconnections emergent in gender interrelations (31). Thus in reference to the Abaluhya people, it is the Abaluhya themselves who determine their male and female relations, roles and stereotypes through their socialization.

This study viewed the songs of Luseno, Opete and Khaemba whose medium is music as the Luhya socio-cultural texts and therefore studied them with a view of finding out the gender roles such as procreation and companionship and gender stereotypes such as: sexual object, inferior woman and destructive woman in the Luhya societies under study. This study was also based on the premise that verbal art is subtle organizations of lines and verses, and that the lines and verses were organized in ways that were not only poetic but also displayed a kind of rhetoric of action, and in that, they embody an implicit cultural scheme for the organization of experience.

2.0 Theoretical Framework

This study was guided by Feminist literary criticism and Ethnopoetics as theoretical frameworks for analysis and interpretation of the texts. Dell Hymes strand guided the study in actualizing the oral into a written textual product. Tedlock's approach helped us to unravel the meaning and mood in the songs of Luseno, Opete and Khaemba. Feminist literary criticism helped us to understand the relationships given that our study looks at the perceptions the Luhyia community have on women in a male dominated society. African feminism thus allowed for the illustration of how Luseno, Opete and Khaemba's songs intersect with reality to reinforce the roles of women and their gender differences hence useful in analysis of the Luhyia cultural situation.

3.0 Methodology

This study employed the use of critical analysis of the eight selected songs alongside mixed method. We critically listened to Luseno, Khaemba and Opete's selected song texts on You Tube from top to bottom with an open mind in order to identify the use of language in reference to women in the songs. Mixed method that uses Qualitative and quantitative data was also employed in this study. It specifically used a sequential exploratory mixed design to obtain pertinent information. Focused group interview of members of the audience and Non-participant observation were also employed since the researcher wanted to note the language used in reference to women. Data from primary and secondary sources was synthesized and categorized in line with the objectives of the study. The validity and reliability of the information in this study was enhanced by a triad approach that involved resource persons, multiple analysis and documentary evidence i believe in. Each song was studied to identify and interpret how Luseno, Opete and Khaemba in depict gender roles and stereotypes on women in their songs. Finally, conclusions to the study were drawn and recommendations for further research were made.

4.0 Results and Discussion

Kennedy Khaemba in his song *Amatumwa* (Maize) displays a woman as a procreator. He talks about his wife leaving him and his children, thus making them to become emaciated and resembling ghosts as a result of preparing food for themsalves as seen in the line: *Solili omusacha neumba, vana vafwana sievisieno mayi wee, avana vange vang'aa, vetekhera siavafuvi yaya wee* (I as a man grieved, my children resembled ghosts oh mother, my children lost weight, they prepared meals by themselves like orphans). In the above line the singer brings out the role of women nurturing children by preparing meals for them. The aspect of comparing his children to orphans is to capture the lack of care from the mother who had gone thus children lacking the mother care. Later, the singer talks about the maize maturing and children increasing in weight, but immediately brings in the return of his wife who had gone.

A similar depiction of a woman as a procreator is seen in Opete's song *Mayi Webula* (Mother who gave birth). The singer gives us the various roles a mother plays in a home, he talks about the mother who gave birth being concerned when the child is sick as seen in the line: *Mayi webula, oundi mbao ouli nga mayi, omwana nalwala mayi niye oumanyanga*, (The mother who gave birth, there is no person like mother, she is the one who knows when the child is sick). The singer also points out the bit of mother being pregnant for nine months and going through a lot especially mistreatment from the husband (emiesi tisa nendi munda, mayi yalola kokhuchenya), then explores what Mueni and Omollo (2015) talked about in reference to videos

and reveals a visual imagery of a mother serving food to three children which is then taken away by the father leaving children with nothing. The singer finalizes by presenting the various jobs mother was doing so as to make ends meet for her young children, she was selling tomatoes, omena and fish as justified in the lines:

Mayi yakhupanira nendi mutoro, mayi yanjeta (mother fought for me when I was young, mother assited me)
Yakusianga omena nali samithi ali awe omwana (she was selling small fish while at Samitsi so as to give the child)
*Mayi yakusianga ching'eni nali khukamukuywa ali omwana asom*e (mother was selling fish at Kamukuywa so as to enable the child to read).

He then draws from the motherist tenets and calls for the need to respect mother in whatever state she is in. This is clearly seen when the lead vocalist says: *Yakhava nochumanga munarobi, mayi webula, yakhava noli omuinda, sikira mayi webula, yakhava noli omusikari polisi, mayi webula, yakhava mwalimu, Opete nekhupa litungu ese nekhoeranga sikira mayi,* (even if you are working at Nairobi, mother who gave birth, even if you are rich, it is because of mother who gave birth, even if you are a police officer, mother who gave birth, even if you are a teacher, Opete when I play Litungu I'm happy because of mother).

Luseno on the other hand depicts a woman as a procreator in his song *Khutsi ingo* (Let us go home) through the protagonist, he explores what Mueni and Omollo (2015) say about visual imagery and displays a picture of a man in the door while a woman with a child standing outside. He also displays a picture of a woman with three children standing near a box of clothes as the protagonist commands *woman, pack up your rubbish we go home*. The visual images present in the drama depict a procreating mother who gave birth and is now nurturing her children. The parent to the protagonist also helps us know the roles of a woman in the home when through he reminds him roles of women in a home, *Mwana wanje shindakhuvirakho mukhali shanyali khuvuya ingo, yenya alime, arache tsinuni, arache tsimbande vandu nivalia*. (My child I told you a wife should not vacate the home, she should plough and plant simsim, pea nuts for people to eat). Though the man is mature, he still needs the mother's advice for a better life.

Companionship as a feminine gender role is revealed in Khaemba's *Nafula wa Tingo* and Luseno's *Cecilia* and *Mkangala*. The singer in *Nafula wa Tingo* (Nafula of Tingo) paints a picture of a man searching for the company of her wife (Nafula) who deserted her home to an unknown place as revealed in the lines:

Nafula wa Tingo, tingo ali, Nafula wa Tingo, tingo ali (Nafula wa Tingo, where are you Tingo, Nafula wa Tingo, where are you Tingo)
Nafula wa Tingo, tingo ali (Nafula wa Tingo, where are you Tingo)
walekha okuvati nochia ena ewe mayi, (where did you go after leaving the iron roofed house)
wachula mwiria nochia e ewe mayi, (where did you go after coming from marriage you mother)

Nafula's going is depicted to have affected the husband thus making him to ask where she went and even request her to go back to her children as in the line *Nafula wa Tingo khokole khuvana* (Nafula of Tingo return to children). The mention of children in the song is a call to Nafula to remember the duties of a mother in assisting the husband to bring up well mannered children, hence her absence also makes the husband to look for her in various places such as Bungoma, Kakamega, Nairobi, Nakuru and Bukembe as seen in the lines: *Nachia Bungoma aumayo, yakhava Kakamega, ese ndi munarobi semuona, yakhava Nakuru sianyolekha, Nachia nola eukembe aumayo* (I went to Bungoma, she is not there, even Kakamega, I am not seeing her in Nairobi, even at Nakuru she is not found, I went up Bukembe she is not there). The decicion to sacrifice and search for her in various places is the need for company and the desire not to be referred to as Omusumba (a bachelor) which is demeang in the Bukusu society.

Luseno's *Cecilia* present a man who aspires to be in the company of wives.

In *Cecilia*, the singer is displeased with his bachelor state and thus desires to have his wife Cecilia who was taken away by strangers as seen in the lines: *ndiranga Cecilia wanje, varende munuri mukoko,* Luseno is bitter with the rich man who he claims was snatched away from her. The aspect of using particular words *Cecilia wanje* (my Cecilia) shows possession, while *munuri* (forcefully taken away) reveals his feelings towards his state of life at the moment. However, these feelings are clarified when he now says, *Luseno khundiranga muyanzi Cecilia muyinda khuyanula, ipilo yanje ngonanga nendira muyinda yanula*. This line shows that Cecilia is not just a lady but his lover who was taken away by a rich man as depicted in the nice and lovely words used in description such as muyanzi (my lover) and ipilo (my pillow). The choice of such words in reference to

Cecilia is possibly to ignite her cognitive senses and refer to the Luhya culture especially the bedroom register, then realise the effect of lack of a wife's company and make a wise decision. The effect of his wife's absence is so great that he enquires how he will be looked at as depicted in the line: *Cecilia wanje undeshi uri, utsiri khumuinda* (My Cecilia, how are you leaving me? You are going to a rich person). This question is not just rhetorical but it is meant to make Cecilia to empathise with the man and at the same time to draw feelings of sympathy from the audience and enable them to intervene aiming at preventing the man's suffering.

In Luseno's song *Khutsi Ingo* (Let us go home), the singer introduces the song with a dialoque that depicts a wife who is subordinate to her husband as seen below:

I don't know what is wrong with this woman?
She is always making my head to bite me?
She doesn't want us to go home.

In the above statement, though the singer complains about the wife disturbing him and not desiring to go home, the aspect of woman marginalization comes out. The man is depicted as a person who has tried to control the wife for quite some time with fail, thus making him to inquire from his friend what he can do. This wife inferiority is then revealed when the singer explores the use of visual imagery and depicts a man pushing a woman holding a box outside a house as he commands: *vitasi viumi khavishi mwibokisi, ovetsanga uri, manyi shiwenyi khuvuya.* (Wasted clothes are dry, put them in the box, you are always like this, I know you don't want to vacate this place). This claim and the action depict indecision in a woman who has to succumb to male supremacy where force is applied so as to reach the end result which is going back home. The choice of words used on the woman also reveal lack of etiquette thus woman inferiority. The man says *you woman pack up your rubbish we go home* in reference to his wife. Though the singer depicts a feminist woman who refusings to go by responding, *you are a fool kabisa, look you* (you are a fool really), male supremacy is again displayed when the man says, *Isi musatsa wombakha nisi wobolela look you* (I am a man who constructed a house, I'm I the one you are referring to as look you?) This line shows a displeased man who understands Isukha culture and alluding on the norm that women are always supposed to be submissive. Lack of such traits in wives leads to severe consequences such as divorce as realized in the man's statement, *if that is the matter, I will divorce you.*

Opete in *Mukheseibukha inyuma* (You should not look backwards) displays an inferior woman when everybody not to remember the past as seen in the statement: *aaa vana vatata mwavene muulilenge mukheseibukha inyuma* (our children you ought to listen, you should not look backwards). He cautions them that problems abound and therefore they should be firm and decisive even if other people talk about them as realized in the lines: *vana va mayi enywee, inyuma amatinyu kayo, nochenda avandu nivakhuloma, wikhalilikha makhuwa kano kesivala, imbeli ovulayi vuliyo* (My mothers' children, problems exist where we came from, if you walk and people talk ill about you, you perservere because such exists things in the world, we have good things forward). He alludes from the bible the story of Lot's wife and points at the weaknesses in women as seen in the line: *omundu weseibukha inyuma, yakalukhana omwene papa yekera lichina* (A person who looked backwards, turned and became a stone). From our understanding of the bible, it is lot's wife in Genesis: 19: 26 who looked back and turned into a pillar of salt because she could not cling onto the instructions they were given by the lord of moving away from Sodom and Gomor without looking back. This attribute of women weakness is brought in the song by the singer to caution people about the dangers of being weak. The aspect of weakness is further criticized through examples such as: *omwana niyolile okhwibulwa yebulwanga busa lulala, nakalukhayo ava ufwire and watata notakhire esindu, okhakamira khunjira, papa olengera imberi, yakhava noirire omukhasi, okheseibukha inyuma, wakana okhatimasia ori oire oundi ta* (A child who is ready for parturition is borne just once, when it goes back it dies and my friend when you want something my friend do not get stuck on the way, father you focus ahead, even if you'vemarried a wife you don't look back for you will send away with an intention of marrying another one). Though the singer is alluding from the bible, the aspect of women weakness sticks to the audience's mind.

A part from that, Kennedy Khaemba depicts an inferior woman in his song *Amatumwa* (Maize). He presents the wife as one who can't withstand hunger unlike the husband and children as realized in the line: *omukhasi wange ngwwoyo naye, kali kawao vachi ewange okuyala kungi* (my wife had gone home claiming that there is too much famine in my home). Her weakness is clearly justified when she returns when the maize is ready

for harvest and life has normalized as revealed in the lines: *Amatumwa kalava, avana vange vakhomera* and *omukhasi wange owali wachia khokakola* (The maize matured and my children increased weight, my wife who had gone returned). The singer also presents a woman who can't control herself when there is plenty of food, he depicts a woman who is expected to request for maize from the husband before taking maize and flour thus criticizing her for her personal action without consulting as seen in the lines: *Omukhasi khokeva nayirira avewawe ngalu kasima* and *emboko khonapowa, ochi siri va vasakwa vakwa emuliango, omukhasi khokeulila, khokononera okufu mumachi mayi wee* (My wife decided to steal while taking to her relatives the way she likes, as I relaxed, my men love competitors appeared at the door, my wife became happy as she destroyed flour in water eh mother).. This is revealed through the singer's use of harsh language and critical tone when uttering the above lines. The above depiction of female inferiority justifys what Malala (2018) says in her Masters dissertation that one of basic elements that is considered of the female gender is its vulnerability in the world where physical strength matters a lot. The use of harsh langage to demean women also confirms what Malala Salome (2018) says that language is the carrier of negative labels that are used to put woman down, (41).

Secondly, Luseno, Opete and Khaemba depict women as sexual objects in their songs. Kennedy Khaemba in his song *Mukhomwana* (The daughter-in-law) presents a visual imagery of a woman carried on a motorbike as the father-in-law says: *emukhomwana akona evifwo nembona, emukhomwana vatira usa nivacheyi*.(the daughter-in –law indulges in sexual affairs in my vicinity, the daughter-in-law is held and placed aside). The choice of words *vatira usa nivacheyi* (they hold and place aside) invites several questions from the audience. We ask ourselves who are these holding and placing aside. These question is clarified when the father-in-law says *akona evifwo* (indulges in sexual affairs with other men) signaling infidelity, meaning that the daughter-in-law is being used as an object for quenching men's sexual thirst. She is further referred to by the singer as *okupikipiki* (motorbike) and specifically oku susuki (a type of motorbike known to thrive in tough terrains). The use of such nouns on the woman shows how she has adapted to dealing with all types of men that come by. Her sexual behavior is criticized by the singer when he assumes the role of a father-in-law and says:

> *kaola emima uuu* (Oh! She has bad manners),
> *oku susuki venda usa nikuchieyi* (This Susuki is taken and placed there),
> *okupikipiki vatimia usa nikuchieyi* (This motorbike is rode as it goes that way),
> *emukhomwana vatimia usa nikuchieyi* (my daughter-in-law is rode while going that way).
> She is seen as a useless person in the home when the singer takes the role of a husband and says *eng,ombe change chiachia usaa, echiange echi nakhwa chiachia usaa u*, (my animals were wasted, the ones I paid for dowry are wasted).

Luseno depicts a woman as a sexual object in his song *Khutsi ingo* (Let us go home), in the song the singer paints a picture of a defiant woman who doesn't wish to go back to the village but prefers they stay in town. When she is told that she will be divorced, she quickly responds, *if you divorce me I will also divorce you and marry undi good boy* (if you divorce me, I will also divorce you and marry another good boy). Though refusing is an aspect of feminism, the effect on the family is great given that she is married to the man whom she tells as she pushes in the visual imagery, *you old go, uruli hano, tsia nosamushi* (go away you old person, go away with your dirt). These reactions make the husband to categorize the wife for us as a sexual object by saying: *khane mwaivona vasatsa Mombasa mwenya sa khulia, khufuya sa vilenje nimulambira* (You have seen men in Mombasa you just want to eat, wash and sit as you straighten your legs). The husband's statement shows that possibly the wife's behavior results from interacting with several men while the wife's claim of marrying *undi good boy* (another good boy) reveals her acceptance to be used as an object for quenching men's thirst while clinging to staying in Mombasa town.

Opete wa Musungu reveals sexual objects in *Khabusie* (Let it dawn) by exploring Mueni & Omollo's (2015) view on visual imagery and displays women wearing selective costumes unlike men. Though both men and women are participating in the dancing, the women are using pieces of clothe tied around their waist and their breasts while other parts of the body are uncovered. These choice of costumes on women dancers unlike men dancers who are well dressed is aimed at capturing the audience attention. Although his intention might have been to seek attention, what remains in the mind of the reader is that they are displayed as sexual

objects and their use comes at particular points when the singer sends certain messages such as refusal and call on people to share. While saying *shauriako wamwene neundova, vandi navovo vosi vasima* (it is upon you when you disown me, all others that I have love me) the singer displays a single lady in costumes dancing, making us to ask the intention. When saying *mumenyenge mwavene nemwikhoyera, were uno chikhavi alikhuweresia* (You should live as you admire, this God will bless you), the singer displays four women in half dressed costumes. Though, it is realized in the visual imagery in Khabusie, the singer's perception of Khabusie, Khutsi Ingo and Mukhomwana in the song in this study is a representative of how male hegemony is perpetuated on women hence making them be viewed as sexual objects in the Wanga society thus entrenching patriarchy that is defined by Walby (1990) as a social system of social structures and practices, in which men dominate, oppress and exploit women through sexuality as a structure of patriarchy.

Moreover, In *Khutsi Ingo*, Luseno reveals a destructive woman who decides to end the man's marriage just because she has been told they go back to their rural home. The woman is seen as a source of problems thus making the man to complain as revealed in the lines:

> *I don't know what is is wrong with this woman,*
> *she is always making my head to bite me,* (she is always making my head to ache)
> *she doesn't want us to go home.*
> It is realized later that the woman doesn't want to leave Mombasa city for the rural area as revealed in the lines:
> Man: *Eee, you woman, pack up your rubbish we go home* (Eh! Woman, pack your belongings so that we can go home)
> Woman: *You are a fool Kabisa, look you* (You are a real fool).

The woman as depicted in the lines is adamant and abusive. As the dialoque continues, we see a defiant woman who projects her stance, divorces her husband and even assaults him by pushing him away and abusing him as revealed in the lines:

Woman: *If you divorce me, I will also divorce you and marry undi good boy, you go, uruli hano, tsia nosamushi* (If you divorce me, I also divorce you and marry another good boy, can you go, go with your dirt), The woman says so as she pushes the man and throws the box at him.

Kennedy Khaemba also depicts a destructive woman in his song *Mukhomwana*. The singer while alluding at unfaithfulness in marriage displays a visual image of the daughter-in-law being carried on a motorbike as he says:

Emukhomwana uuu, Emukhomwana uuu (Oh! my daughter-in-law, Oh! my daughter-in-law), *ali neloko uuu, ali neloko uuu* (she is a witch, she is a witch) *kakhupa okwiri uuu, kakhupa okwiri uuu* (Oh! she destroyed the anthill, Oh! she destroyed the anthill)

This reference helps us to identify the speaker as the father-in law, however, we wonder why he is using such harsh words on her daughter-in-law whom he is supposed to respect. The answer to our question is revealed through her actions such as chasing the father in law with a club as revealed in the visual image displayed when the singer says: *Katimaka nokuvako khumusala* (She ran with a jembe to the tree). The tree here represents the parents and the act of running with a jembe refers to trying to look down upon the parents. Such an action in Luhya community is heinous and requires clensing by slaughtering a sheep and use of traditional medicine. Mukhomwana is also depicted as destroying the father-in-law's psychological state by her mannerism of washing her inner clothes in the full view of the father-in-law as revealed in the line: *nivili evikuo kosa usa nimbona, eviomukachi kosa usa nimbona* (if they are clothes, she washes them in my vicinity, she even washes the inner clothers in my view). As if this is not enough proof of her effect on the peaceful life of her father-in-law, she is again visibly seen by the father-in-law interacting in sexual affairs with several other men as revealed in the lament: *emukhomwana akona evifwo nimbona, amukhomwana vatira usa nivacha eyi, vakalusania, emukhomwana vakalusania,* (my daughter-in-law sleeps with other men in my view, my daughter-in-law they hold and place aside,, they turn her, they turn my daughter-in-law), *alila usa nimbona, emukhomwana alila usa nimbona* (she cries in my view, my daughter-in-law cries in my view) *venda usa nikuchia eyi, oku susuki vatimia usa nikuchia eyi* (they come to pick as it goes that way, this Susukiis riden as it goes that way.)

The actions of mukhomwana affect the father-in-law much making him to regret as he talks about the dowry he paid as a loss to his family as revealed in the line: *eng'ombe change chiachia usa, echiange echi nakhwa chiachia usa* (my cattle just went, the cattle that I paid as dowry just went).
In Opete's Mukheseibukha Inyuma, though the singer calls for attention and focus on what we are doing, he depicts an image of a destructive woman who leads to a lose in the man's family because of not following instructions given as revealed in the line: *Vana vamayi enywee, inyuma amatinyu kayo, nochenda vandu nivakhuloma, wikhalilikha makhuwa kano kesivala, omundu weseibukha inyuma, yakalukhana omwene papa yekera lichina* (You my mother's children, there are problems at the back, if people talk ill about you as you walk, perservere for that happens on earth, the person who turned back changed and became a stone). The singer alludes from the bibilical story and we as the audience visualize the man sojourning alone after losing his wife who turned into a pillar of salt. This action is criticized in the song because it resulted to lack of company from the wife thus loneliness to the man.

5.0 Conclusion and Recommendations

This paper discussed the gender roles such procreation and companionship, but also gender stereotypes such as the inferior woman, the sexual object and the destructive woman in the in the selected popular songs of Luseno, Opete and Khaemba. It concludes that the selected songs display the women gender roles in the Luhya society, they also capture their society's gender stereotypes thus conforming to Citron's (2000) view that music grows out of a social context; it expresses fundamental assumptions about the culture in which it originates, hence can be argued to be the Tachoni, Bukusu and Isukha society's cultural melting pot and function as a means for the representation of reality that the songwriter wants to convey.

This paper recommends that more scholarly work should be done on the popular songs of other cultures that represent women in good light and bring out new songs in publications in an endeavour to create new discourses. It also recommends for preservation of Khaemba, Opete and Luseno's songs that depict women in a positive light as a form of continuity of the good aspects in Tachoni, Bukusu and Isukha culture. Finally, this paper also calls for future studies on Khaemba, Opete and Luseno's songs using other theoretical frameworks

References

Bullindah, J. Z. (2002). Expectations and Perceived Roles of the Female Musician among the Isukha. Masters dissertation, Kenyatta University.
Citron, M. J. (2000). *Gender and the musical canon*. [New ed.] Urbana: University of Illinois Press.
Finnegan, R. (1992). Oral Traditions and the Verbal Arts: A Guide to Research Practices (1st Ed). Routledge. London. (Doi: https:// doi.org/10.4324/9780203393215).
Hymes, D. (1981). In Vein I Tried to Tell You: Essays on The Nature of American Ethnopoetics. Philadelphia.
Nkealah, N. (2016). (West) African feminisms and their challenges. *Journal of literary studies, 32(2), 61-74*.
Shepherd, J. (1991). Music as Social text. Cambridge: Polity Press.
Tedlock, D. (1983). The spoken Word and the Work of Interpretation. Philadelphia.
Walby, S. 1990. Theorizing patriarchy. Oxford: Blackwell.

Kenyan University Undergraduate Dropout: Trends and Challenges

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Abstract
University undergraduate dropout rate in Kenya is a pressing concern that threaten the achievement of national goals of education, human capital development and the realization of SDG goal number four on quality education. This study assesses the trends and major challenges contributing to the escalating rates of student's attrition in public universities. The research was directed by the ensuing objectives: to institute how curriculum complexity, institutional support and resources availability influence the dropout rates in Kenya Universities. Typically, a descriptive survey design was implemented in the research. The study had a sample size of 300 undergraduate students, 36 chairs of departments and 15 Students Affairs and Counseling Staffs. Data was obtained through document analysis and self-administered questionnaires for the respondents. Quantitative data was evaluated through descriptive and inferential statistics. The findings showed that complexity of academic programmes, inadequate academic preparedness, insufficient mentorship programs and academic counseling and inadequate financial aid and scholarships compel students to drop out of the university. The study concluded that universities should put a lot of emphasis on designing curricula that take into consideration both complexity of the curriculum and practical learning approaches, reinforce institutional support to students through mental and academic mentorship, and implementation of work-study programmes to assist financially disadvantaged students. The study recommends an increase in private and government sector funding, financial aid programs, curriculum redesigning and implementation of student support programmes to address mental health issues and academic mentorship to improve retention rates.

Keywords: *Curriculum Complexity, Dropout Rate, Institutional Support, Resources Allocation*

1.0 Background

University education is central to social, human resource and economic development of a country. Higher education in Kenya has significantly developed over the last decade, the rise in enrollment has been attributed to government initiatives of subsidized secondary education and establishment of more campuses and universities (Waweru & Orodho, 2014). Despite this growth in higher education rise in university dropout rates among undergraduates remain a significant concern that undermine the effectiveness and equity of the higher education system.

High dropout rate from universities leads to wasted investment for the families, students and nations that depends on educated and skilled workforce to drive economic development. Multiple studies have highlighted that students drop out of university due to different interrelated factors, made up of financial struggles, academic challenges, mental health issues and inadequate student support services (Kariuki, 2019; Nganga & Mwaura, 2021). In Kenya, curriculum complexity, socio-economic disparities continue to influence access, retention, institutional support and resources inadequacy plays a crucial role on high undergraduate dropout rates., with students from low-income backgrounds being disproportionately affected.

The undergraduate dropout rates in Kenyan universities differ between programmes and institutions. The Commission for University Education (CUE, 2019) study estimated that 30% of students enrolled in public universities fail to complete their undergraduate programmes within the course timeframe. The rise in the dropout rates have serious repercussions to the economy due to loss of prospective skilled labor while the institutions suffer from decreased funding as well as reputational damage (Kipkebut, 2018). Different researches indicate that the *complexity of curricula* is among the main challenges impacting undergraduate learners' retention. Most of the students struggle to meet the academic demands, particularly in STEM programmes. The complexity of course content, insufficient preparation at high school, together with heavy workloads cause academic failure and eventual withdrawal from the programmes (Mugenda et al., 2019). In some instances, obsolete curricula and rigidity in assessment tactics fail to accommodate learners with diverse learning needs, escalating dropout rates.

Various researches portray that student retention is determined by *institutional support*. This happens by

encouraging academic guidance, peer mentorship, financial aid programmes, and mental health services. The strategies work to improve student's retention among undergraduate students. Normally, the students may feel neglected and encounter mental instability due to inadequate institutional support system, which compels them to terminate their studies (Mwangi & Irungu, 2021). As such, institutions that fail to identify and assist vulnerable students have higher dropout rates. Additionally, *accessibility to educational resources* like laboratories, libraries, learning materials, and internet connectivity affect the capability of learners to thrive academically. In many Kenyan universities, inadequate infrastructure, mainly for learners from rural or marginalized backgrounds adversely affects learner engagement and perseverance (Ng'ang'a & Wekesa, 2019). Inadequate digital infrastructure became evident during the COVID-19 pandemic, which exposed many universities in terms of preparedness for remote learning (Kariuki & Mwaura, 2021).

The causes of the rising trend in undergraduate students' dropout rates is a complex. Initial observations and institutional reports show that academic challenges, insufficient institutional support, and unequal distribution and access to resources may be the primary contributors. Nevertheless, there is insufficient empirical data that focuses on examining how curriculum complexity, institutional support systems, and the availability of academic and financial resources affects undergraduate students' retention. Understanding these dimensions is important in developing data-driven intervention measures to improve student retention and success in Kenyan universities.

The past two decades has witnessed a significant growth in higher education characterized by an increase in student's enrollment and the number of universities. Despite the significant progress in terms of enrollment and the government efforts to improve admission to university learning through the initiatives of Higher Education Loans Board and expansion of public universities funding, this growth has been shadowed by concerning trends of high rate of undergraduate student dropouts. This concern destabilizes the country's human capital development and jeopardizes student aspirations. Evidence from the Commission for University Education and Kenya National Bureau of Statistics confirm that between 2014 and 2024, the undergraduate average completion rate in Kenyan public universities steadily remained around 65–70%. This suggests that about 30–35% of students admitted to undergraduate degree programmes fail to graduate within the stipulated timeframe. Some institutions such as University of Nairobi have recorded higher rate of around 40% among undergraduate students enrolled between 2018 and 2023.

Despite these evidences, a coordinated and comprehensive policy framework to resolve the rising cases of undergraduate dropouts remains elusive. Existing interventions policies are fragmented and reactive in nature, rather than evidence-based and preventative. Additionally, few empirical researches have been carried out to track longitudinal dropout trends.

The research intended to investigate academic challenges contributing to the high undergraduate dropout rate in Kenyan universities. The research was directed by the following Objectives;

1. To examine how curriculum complexity influences the undergraduate dropout rate in Kenyan universities.
2. To assess the role of institutional academic support in mitigating student dropout.
3. To evaluate how the availability and accessibility of academic resources affect undergraduate retention and dropout rates.

2.0 Methodology

The research adopted a descriptive research design since it is the most suitable to systematically describe the prevailing phenomena linked to dropout trends without controlling the study environment. The design permits researchers obtain quantifiable data, which illustrate frequencies, patterns, and relations between variables (Creswell & Creswell, 2018). Further, the design enables examiners to adopt questionnaires, interviews, and document exploration to capture a comprehensive report on dropout rates in different regions as well as institutions (Kumar, 2019). The research was conducted in *MMUST, Kibabii, Egerton and the University of Eldoret*. The selection was meant to ensure regional and institutional diversity and balance, which guarantees the generalizability and profundity of findings. The universities represent a *broad geographical spread in various counties* in Kenya, which allow the research to obtain different regional elements affecting undergraduate dropout tendencies. The establishments also represent diversity with

regard to academic programmes, *student population, as well as funding structures,* which offers a comprehensive comparative ground for understanding the way institutional characteristics affects student maintenance in university. In addition, these universities are *public institutions*, making them perfect for examining dropout trends in relation to government-funded education. The study used stratified sampling to sample public universities basing on institution type and location, undergraduate students were put in stratum basing on the year of study and faculty, chair of departments were selected in reference to academic department since different departments experience varying dropout rates. On the other hand, student affairs and counseling staff were sampled through simple random sampling. The study used a sum of 351 respondents made up of 300 undergraduate students, 36 chairs of the department and 15 student affairs and counseling Staff. The study adopted questionnaires to obtain data from the undergraduate students, chair of departments and students affairs and counseling staffs. The questionnaires had closed ended and open-ended items. Questionnaires were the most preferred since they ensure anonymity for honesty and consistent responses across the respondents (Creswell & Creswell, 2018). Qualitative data was analyzed via content scrutiny where the contents of the instruments were assessed to pinpoint key themes, which arose from replies obtained from respondents. Thematic content assessment was utilized to define the rate of factors causing undergraduate dropout. Tables were utilized to present data. Descriptive statistics, mean and standard deviation, and inferential statistics, that is, linear regression were employed to analyze quantitative data.

3.0 Results and Discussions

3.1 Effect of Curriculum Complexity on Undergraduate Students Retention

The assessment was done by utilizing the associating five factors in order to define if curriculum complexity impacted undergraduate students' dropout rate. To achieve this, a null hypothesis, $H_0 1$; *there is no statistically significant impact of curriculum complexity on undergraduate students' dropout in Kenya* was evaluated. The hypothesis was stated to establish the extent to which curriculum complexity effects undergraduate students' retention in Kenya. A simple linear regression analysis was employed to test the hypothesis at 0.05 alpha levels as shown in Tables 3.1

Table 3.1: The Regression Model Summary for Effects of Curriculum Complexity on undergraduate dropout

Model Summary					
Model	R	R- Square	Adjusted R- Square	Std. Error of the Estimate	p-value
1	.572[a]	.238	.233	.61517	.000

a. Predictors: (Constant), Curriculum Complexity
b. Dependent Variable: Undergraduate Dropout

Source: Author, 2025

Table 3.1 presents the value in R, (r = .572), portraying that there existed a medium positive link between the 2 variables; curriculum complexity and undergraduate student dropout. The coefficient of determination showed adjusted R-Square, (R^2 = .233), discloses quantity of changeability in the undergraduate student's dropout that can be clarified by impacts of curriculum complexity. The adjusted R-squared value is used to decide goodness multivariate regression model. Since this model was created on a single variable, the research utilized R^2 value to define the fraction of student's dropout that can be attributed to impacts of curriculum complexity. As such, the value of adjusted R square (0.233) discloses that 23.3% inconsistency in student's dropout can be described by impacts of curriculum complexity. The assessment portrays that 76.7 % inexplicable difference can be accredited to other influences not encompassed in this model- The R-Squared (R^2).

3.2 Correlation between Institutional Support and Undergraduate Students Retention

To institute the link between undergraduate students' dropout and institutional support, Pearson's correlation analysis was employed to discover if there was an association. The research outcomes are portrayed on Table 3.2.

Table 3.2: Pearson's Correlation of Institutional Support and Undergraduate Students Retention

	Pearson's Correlation	1	2	3	4	5	6	7
1. Counseling services help students manage stress and academic pressure	Correlation	.593	1					
	Sig.	.262						
2. The institution promotes mental health awareness and well-being to address student dropout problem	Correlation	.645	.235	1				
	Sig.	.354	.729					
3. Lack of emotional or psychological support increased student's dropout thoughts	Correlation	.489**	.419**	.310	1			
	Sig.	.008	.037	.525				
4. Financial aid and scholarships helped reduce risk of dropping out.	Correlation	.701**	.521**	.461**	.389	1		
	Sig.	.000	.028	.042	.095			
5. University work study initiative help address undergraduate dropout rate.	Correlation	.512**	.056	.614**	.541**	.405**	1	
	Sig.	.042	.928	.001	.009	.037		
6. Institutional support systems have influence student's decision to remain enrolled	Correlation	.547**	.536**	.423**	.561**	.468**	.289	1
	Sig.	.044	.039	.039	.028	.031	.324	

**. Correlation is significant at the 0.05 level (2-tailed)
Source: Author 2025

Table 3.2 correlation matrix show an existing correlation between institutional support and undergraduate students' dropout in Kenya. The Pearson's correlation between the first *variable counselling services and undergraduate students' dropout* was statistically significant (r =0.593, ρ=0.262) at α= 0.05)). This showed that counselling services as a crucial factor for undergraduate students' retention. The Pearson's correlation between the second variable "*mental health awareness and well-being and student's dropout* was statistically significant (r =-0.645, ρ=0.254) at α= 0.05)). This infers that mental health awareness and well-being is important factor for student's retention. The third variable on "*Lack of emotional or psychological support and increased student's dropout thoughts*" moderately correlated with students' dropout (r =0.489, ρ=0.008) at α= 0.05)), implying emotional and psychosocial support was an important factor in student's retention. The fourth variable "*Financial aid and scholarships*" also strongly correlated with undergraduate students' retention ((r =0.701, ρ=0.0001) at α= 0.05)). The 5th variable "*University work study initiative*" moderately correlated with undergraduate retention ((r =0.512, ρ=0.042) at α= 0.05)). Lastly the sixth variable "*Institutional support systems*" moderately correlated with undergraduate students' retention ((r =0.547, ρ=0.044) at α= 0.05)). This suggests that institutional support helped retain undergraduate students.

3.3 Resource Allocation and Undergraduate Students Retention

The third null hypothesis of the research, $H_0$3 specified that; *Resource availability has no significant impact on undergraduate dropout rates*. The hypothesis was tested to determine the extent to which resources allocation influence undergraduate dropout in Kenya. Simple linear regression analysis was applied to test the hypothesis at 0.05 alpha levels. The study findings are shown on Table 3.3.

Table 3.3: The Regression Model Summary for Effects of Resources Allocation on Undergraduate Dropout

Model Summary					
Model	R	R- Square	Adjusted R- Square	Std. Error of the Estimate	p-value
1	.817[a]	.618	.259	.50751	.000

a. Predictors: (Constant), Resources Allocation
b. Dependent Variable: Undergraduate Dropout

Source: Author, 2025

Table 3.3, shows the value in R, (r = .817), implying a positive link between the 2 variables; resources apportionment and impacts on undergraduate dropout. The coefficient of determination showed adjusted R-Square, (R^2 = .228), tells the extent of inconsistency in resources allocation that can be clarified by effect on undergraduate dropout rate. The model summary reveals that resources allocation accounted for 61.8%, as signified by coefficient R2 =.618, of the undergraduate dropout rate. This finding implies that variation in the level of resources allocation explained about 61.8% of the variability in undergraduate students' dropout. This shows that other factors not considered this objective accounted for to 38.2% of undergraduate dropout in Kenya. This therefore implied that there are other factors other than resources allocation that contribute to undergraduate dropout.

4.0 Conclusion

This study assessed the undergraduate dropouts in Kenyan universities, with a focus on three objectives: curriculum complexity, institutional support and the availability and accessibility of academic resources influence on the dropout rate among undergraduate students. The findings indicate that curriculum complexity shown by rigid course structure, overwhelming academic workloads, and limited academic flexibility contributes to high dropout rate among undergraduate students. Many students feel ill-equipped for the academic demands and lack support to navigate complex academic programmes. The study acknowledges the crucial role played by institutional support systems in addressing dropout rates. Where structured mentoring, counseling and student financial support through work study programme were enforced students had a high probability of completing their studies. Nonetheless, most universities lacked student support systems or inconsistently implemented the programmes, leaving learners without the required guidance.

Findings also indicate that accessibility and availability of academic resources is crucial for undergraduate student retention. The resources comprise internet access, libraries, and learning materials. This is because learners from marginalized families face unequal access to learning materials and scanty infrastructure, leading to their higher dropout rates. Hence, tackling the undergraduate students' dropout rates in Kenyan universities needs a comprehensive strategy, which entails the re-evaluation of curriculum design. Consequently, there will be equitable access to learning resources and strengthened institutional support devices. The insights are critical in guiding administrators and policymakers to institute evidence-based interventions for heightened undergraduate student retention.

5.0 Recommendation

Based on the outcomes, the study proposes periodic reviews and restructurings to the curricula to ensure they are coherent and aligned with students' needs as well as market relevance. Usually, overly complex academic programs overwhelm learners, yielding high rates of dropout. Institutions should encompass faculty and student representatives in curriculum development to guarantee inclusivity and practical design. Likewise, universities should invest in learners' support systems via mentorship, counselling, internal scholarships, as well as work study opportunities to nurture a supportive learning environment, which heightens student engagement. Further, universities' stakeholders should promote impartial access to vital academic resources by furnishing university libraries, ensuring internet connectivity, and investing in digital learning podiums. Normally, the adoption of digital infrastructure and open educational resources helps bridge resource gaps. The study commends investing in robust data collection and checking systems to trace dropout trends and learner progress. Timely detection of students' struggles prompts immediate interventions, improving retention. The universities' management and Ministry of Education should have friendly policies, which support learner welfare. These comprise such matters as mental health wellness, internal scholarships, together with flexible academic pathways. By expanding financial aid programmes via work study initiatives to cushion economically disadvantaged students at risk of dropping helps ease the dropout rates in universities.

References

Chemosit, C. C., & Kiboss, J. K. (2018). Academic stress, coping strategies and mental health among university students. International Journal of Education and Research, 6(2), 45–60.

Commission for University Education. (2019). State of university education in Kenya: A report of the Commission for University Education. Nairobi: CUE.

Commission for University Education. (2022). Status of university education in Kenya: Report 2022. Nairobi: CUE.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Kariuki, M., & Mwaura, L. (2021). Transitioning to online learning in Kenyan universities during COVID-19: Opportunities and challenges. Nairobi Journal of Educational Studies, 5(2), 45–59.

Kipkebut, D. J. (2018). Organizational commitment and job satisfaction among academic staff in public and private universities in Kenya. Journal of Educational Management, 32(3), 41–56.

Kumar, R. (2019). Research methodology: A step-by-step guide for beginners (5th ed.). SAGE Publications.

Mwangi, J. M., & Irungu, C. W. (2021). The role of institutional support in university student retention in Kenya. Journal of Higher Education in Africa, 19(1), 77–92.

Nganga, S. K., & Mwaura, P. N. (2021). Academic and socio-economic factors contributing to dropout among undergraduate students in Kenyan universities. Journal of Education and Practice, 12(5), 45–53.

Ng'ang'a, M., & Wekesa, S. (2019). Infrastructural inequalities and access to learning resources among university students in Kenya. Journal of Educational Research and Reviews, 7(3), 52–60.

Waweru, S. N., & Orodho, J. A. (2014). Management of student affairs in selected universities in Kenya: Issues and challenges. International Journal of Education and Research, 2(1), 1–18.

The Effectiveness of AI-powered Tools on Students Learning Outcomes

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Abstract
The present decade has seen a rise in the use of Artificial Intelligence (AI). The utilization of AI has become popular in different sectors including education. These AI tools have several advantages such as personalized learning, instant feedback and automated learning which could enhance learning outcomes. However, concerns have been raised over the effectiveness of these AI tools on student learning outcomes. The purpose of this study is to assess the effectiveness of AI-powered homework tools on student learning outcomes. The objective of the study was to investigate how AI- powered homework tools affect a learner's academic performance. To guide this research, Cognitive Load Theory (CLT) by John Sweller was applied. The theory explains how the brain processes and stores information. Sweller suggests that the brain's long-term memory is unlimited but the working memory is limited. Thus, it is important that learning is structured effectively by breaking down complex concepts or removing unnecessary information. This study is done on existing research papers and scholarly articles using descriptive research design. 50 articles were found on the topic and from these a sample of 30% was used. Sources suggest that while AI tools can positively affect students' academic performance, care should be taken to avoid overreliance. These findings will contribute to the ongoing discourse on the use of AI in learning, thus, giving insights to policymakers, teachers and educators on how best to enforce the use of AI in a school environment.

Keywords*: Artificial Intelligence, AI-powered homework tools, AI in education, AI and academic performance*

1.0 Introduction

There has been a rise in the development and use of Artificial Intelligence (AI) in the current decade. Various sectors, including education, have been affected by this rise. AI in education encompasses tools and technologies designed to automate, enhance, and personalize learning processes. These include intelligent tutoring systems, learning analytics, and natural language processing tools. AI systems can provide adaptive content, monitor student performance, and recommend learning pathways (Woolf, 2010).

With the growing popularity of AI-powered learning tools, there has been an emerging discourse around the topic. AI-powered homework tools such as ChatGPT, Photomath, Khan Academy, and Grammarly have become very popular among students (Luckin et al., 2016). These tools offer instant feedback, personalized learning, and automated assistance, which can influence student learning outcomes (Luckin et al., 2016).Recent studies argue that AI can improve comprehension and learner engagement thus improving learner performance (Guo et al., 2025).

While AI tools provide convenience, concerns have been raised on their impact on critical thinking, academic integrity, and independent problem-solving skills (Holmes et al., 2022). These researchers argue that overreliance on technology affects learners' problem solving and critical thinking skills (Selwyn, 2019).

AI tools offer immediate, real time feedback, thus enabling timely correction and intervention (Owan et al., 2023). However, these tools may fail to factor in non-cognitive factors, thus necessitating the need for human intervention (Owan et al., 2023). While AI tools may improve student learning outcomes, most scholars argue that these tools should be used moderately and with teacher supervision (Owan et al., 2023, Tamimi et al., 2024, Kilmova & Pikhart, 2025).

There is limited empirical evidence of the outcomes of using AI tools in secondary school education. By analyzing existing literature, this study addresses this gap. This study seeks to investigate the impact of AI-powered homework tools on student learning outcomes by analyzing existing scholarly literature. Through a digital research methodology, the paper aims to synthesize current knowledge and assess the implications of integrating AI into educational practices. The research objective was to evaluate the impact of AI-powered homework tools on student learning outcomes.

2.0 Methodology

This study employed a qualitative research design using systematic literature review. The review used current research findings on AI powered tools in education and their effectiveness in enhancing academic performance and learner engagement. Data was collected through digital databases such as Google Scholar, ERIC, and ScienceDirect. Search terms included "AI in education," "AI homework tools," "student learning outcomes," and "AI effectiveness in secondary schools."

Inclusion and Exclusion Criteria

Inclusion criteria:

- Peer-reviewed articles
- Studies published between 2015–2024
- Studies focused on secondary or tertiary education
- Exclusion criteria:
- Non-peer-reviewed sources
- Articles not available in English
- studies focused on the use of AI in administration not instruction

Out of 50 identified sources, 18 met all inclusion criteria and were used in the analysis. These included empirical studies, theoretical analyses, and review articles.

Data Analysis. A thematic analysis approach was used to identify key themes from selected literature. Themes included effectiveness, academic performance, learner engagement, accessibility and equity, personalized learning, and challenges.

3.0 Findings

Research shows that students using AI-supported tools often outperform peers in traditional settings. A study by Zawacki-Richter et al. (2019) reported improved academic performance and concept mastery among students using intelligent tutoring systems. Furthermore, Photomath users showed a better understanding of mathematical procedures and error correction over time (Zawacki-Ritcher, 2019).

AI- powered tools offer real-time feedback and suggestions, ensuring that students learn instantly (Holmes et al., 2022). Immediate feedback results in immediate corrections, and intervention in cases where teachers are involved. Thus, it is easier to identify where learners made mistakes, and correct them earlier on, as sometimes one mistake might result in greater mistakes. This feedback ensures timely intervention and correction thus making learning faster (Guo, Abdul Halim and Mohd Saad, 2025). Expected learning outcomes can therefore be achieved faster, and accurately, as these tools, if trained well, offer accurate assessments. (Owan et al., 2023)

Furthermore, AI learning tools enhance accessibility to quality learning. Unlike other learning tools, AI tools can be accessed anywhere and anytime, making learning portable (Chisom, Unachukwu, & Osawaru, 2023). This portability ensures that learners who might not have the privilege of physically attending classes still get a chance to learn, thus learning can happen at a learner's convenience (Chisom et al., 2023). This autonomy improves learner engagement and motivation, as learners have more control over their learning conditions (Guo et al., 2025). This motivation directly affects learner performance. However, this access might be limited since most AI tools require reliable internet access (Chisom et al., 2023).

AI tools can easily adapt to a learner's learning preference. Therefore, learning can be personalized for each learner, making learning enjoyable for learners, thus improving learner motivation and engagement (Chisom et al., 2023). Personalized learning also improves learner comprehension and retention which improves learner performance (Luckin et al., 2016). AI tools enable learners to learn at their own pace, offering accessibility tools such as virtual assistants and chatbots, thus accommodating diverse learner needs. This flexibility and adaptability gives learners more autonomy and control over their learning. According to Guo et al. (2025), this autonomy increases learner engagement. Some AI tools have interactive tools with gamification elements that can motivate students and make homework more enjoyable (Nguyen et al., 2020).

Concerns and Limitations

Despite their notable benefits, the use of AI tools raises several concerns. Continued use of AI tools may diminish a learner's self-confidence, as learners fully rely on AI tools for answers, and fear doing their own work (Tamimi et al.). This loss of confidence impaired the learner's ability to think on their own, affecting their creativity and critical thinking skills (Tamimi t al). Learners might become fully reliant on AI tools for all their schoolwork, thus encouraging laziness, as learners put minimal effort in learning, affecting their performance. Prolonged use may lead to overreliance and addiction which affects a learner's problem solving skills and decision making capabilities (Selwyn, 2019).

The use of AI tools may reduce face to face interactions, which affect emotional intelligence and interpersonal skills. Social interactions are a crucial component in learning (Klimova & Pikhart, 2025). As AI powered tools become more popular, there is a concern that these tools might be used as substitutes for social interactions. These substitution may foster antisocial behaviour particularly among students that struggle with social interactions (Klimova & Pikhart, 2025). Extreme self-isolation fosters loneliness, thus affecting a learner's mental health and overall academic performance.

Moreover, AI tools are designed to enhance cognitive learning, focusing on areas such as academic performance and knowledge retention. However, they ignore non cognitive factors such as learner motivation, self-esteem and social interactions (Owan et al., 2023), These factors are better natured through face to face interactions and real life experiences that AI cannot replicate (Chisom et al., 2023) For instance, while AI can offer immediate feedback, it cannot offer encouragement that a teacher or peer might give in a real life setting (Guo et al., 2025).

While AI increases accessibility and inclusivity, the use of most AI tools is dependent on internet connectivity and device ownership (Woolf, 2010). Learners in low income or rural areas might lack access to stable reliable internet, electricity or electronic devices, which creates a digital divide that might further hinder the use of AI in education (Chisom et al, 2025). The cost of acquiring devices and infrastructure may be too high for such parents. Furthermore, access to stable and reliable internet connectivity and electricity may be limited by geographical factors. Therefore, geographical and financial barriers limit the accessibility and use of AI tools (Guo et. al., 2025).

Despite the benefits offered by AI powered homework tools, ethical and legal concerns have been raised. Ethically, fairness and transparency of AI algorithms is a concern, especially if these tools are used in learner assessment or personalized learning. Bias in training data or inefficient algorithms may reinforce existing inequalities, disadvantaging learners (Whittaker et al., 2018). Legally, there is insufficient regulatory insight on the use of AI, with most of them operating in a grey area (Zawacki-Richter et al., 2019).

Concerns have also been raised over learner privacy, as most AI tools collect personal and behavioral data without clear consent and adequate data protection measures (Slade & Prinsloo, 2013). If improperly managed, such data could be misused, leaked, or sold, violating students' rights and undermining trust in educational systems. As such, the integration of AI in education must be accompanied by strict ethical guidelines, transparent policies, and robust data privacy protections to ensure that students' rights and well-being remain safeguarded.

4.0 Discussion

Findings from existing studies indicate a positive correlation between the use of AI- powered homework tools and student learning outcomes. This impact however, fully depends on usage patterns and teacher supervision. When properly integrated into structured learning environments, AI tools may enhance learner engagement, motivation and academic performance. The use of AI tools in learning has several advantages such as increased engagement, learner creativity, accurate assessment, personalized learning, immediate feedback and efficiency.

AI tools can be curated to cater for a learner's immediate needs. This enhances accessibility, diversity and inclusivity especially for learners with special needs. However, accessibility might still be a challenge especially to learners from low income areas as a reliable internet connection and device ownership is a prerequisite to using AI powered tools. Thus financial and geographical factors may hinder learning.

While AI tools can easily adapt to a learner's different needs, AI algorithms can possess inherent bias, due to the nature of training data or the efficiency of the said algorithm. In some cases, the use of AI tools in

assessment of learners may further reinforce the existing inequalities in learning. These tools focus on test performance and content mastery and might ignore non cognitive factors. Thus, reinforcing the need for human input and supervision in learning.

AI tools give students autonomy as students can choose when and where to learn from and in some cases, what to learn. This autonomy gives more room for student engagement as some learners might get intimidated in class settings. AI tools have several features that can make learning more interesting for the learner, improving concentration and performance. However, there is a need for teacher supervision when learners use these tools. This autonomy could have disastrous effects on the quality of learning, leading to superficial learning. Measures should be taken to ensure learners don't fully rely on these tools. Over-reliance might reduce learner confidence, which has a direct correlation to a learner's performance, creativity, decision making, critical thinking and problem solving skills. Full reliance might lead to laziness, thus necessitating a balanced way of using AI tools without causing addiction.

AI tools may improve learner satisfaction and motivation, as their diverse learning needs are catered for. AI tools have features such as self-paced learning, voice assistants, real time feedback that make a learner's experience butter, thus better attitudes towards learning and more learner happiness. AI tools can positively affect a learner's mental health. Conversely, theses tools can have negative impacts to a learner's mental health. Full dependence can lead to loss of confidence, low self-esteem between learners and addiction to technology, making it vital for teachers to critically assess learner's mental health.

AI tools make learning convenient, reducing the need for face to face interactions with learners. While this may increase accessibility, it has adverse effects on the learner's interpersonal skills especially for learners that struggle with human interactions. AI tools focus on academic performance and lack the capability to assess non cognitive factors, thus human input is needed wherever AI tools are used.

AI tools have the capability of effectively curating a user's learning experience, offering customized learning paths and personalized learning. These tools can easily break down complex topics to simple things learners can relate to. However, for them to operate effectively, they have to collect and analyze user data, raising concerns on privacy and data collection. This data may be leaked, sold or misused thus violating user privacy. Proper legal frameworks and measures need to be put to enhance data protection and privacy.

5.0 Conclusion

Effective use of AI powered tools can enhance learning outcomes. These tools have various features such as immediate feedback, personalized learning and automated learning which can improve learner motivation, engagement, concentration and performance. However, the use of these tools should be approached with concern, as this convenience along with the ease of access to these tools, could lead to disastrous outcomes. Learners might easily become overly reliant on these tools, leading to addiction, poor interpersonal skills, loneliness and laziness. These outcomes negatively impact learning outcomes since learner concentration, motivation, engagement are affected.

Therefore, it is necessary that proper measures are put in place to ensure effective use of AI-powered homework tools. Teachers, policy makers and educators need to come together and set up effective strategies pertaining the use of AI in education.

6.0 Recommendations

Educators should be trained on how to effectively integrate AI into teaching. Studies have shown the need for teacher supervision and intervention in the use of AI for learning. These tools have the potential to either build or ruin learners, thus teachers should be aware of how best AI can be used. The use of AI can be beneficial to learners thus teacher training should focus on how best these benefits can be harnessed while simultaneously mitigating the harms.

Policies should ensure equitable access to AI tools across all economic groups. AI has the potential to ensure access to quality education since most digital devices are portable. However, this accessibility is limited to learners with access to stable internet and device ownership. Governments should come up with policies and measures to reduce this digital divide and make AI more accessible. Furthermore, legal frameworks should be set to protect learners as they use these tools. Issues like data protection and learner privacy should be

handled. Thorough testing, monitoring and evaluation should be done on all AI tools by both the developers and relevant authorities to minimize challenges such as misinformation and inherent bias.

Further studies should explore long term effects on critical thinking and problem solving skills. While current studies suggest that these tools affect a learner's cognitive abilities, there hasn't been sufficient empirical evidence to prove these claims as AI is a fairly new technology. There is need for more quantifiable research to be done on the topic.

References

Chisom, O. N., Unachukwu, C. C., & Osawaru, B. (2023). Review of AI in education: Transforming learning environments in Africa. International Journal of Applied Research in Social Sciences, 5(10), 637–654. https://doi.org/10.51594/ijarss.v5i10.725

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340.

Guo, S., Abdul Halim, H. B., & Mohd Saad, M. R. (2025). Leveraging AI-enabled mobile learning platforms to enhance the effectiveness of English teaching in universities. Scientific Reports, 15, 15873. https://doi.org/10.1038/s41598-025-00801-0

Holmes, W., Bialik, M., & Fadel, C. (2022). Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Center for Curriculum Redesign.

Klimova, B., & Pikhart, M. (2025). Exploring the effects of artificial intelligence on student and academic well-being in higher education: A mini-review. Frontiers in Psychology, 16, 1498132. https://doi.org/10.3389/fpsyg.2025.1498132

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence Unleashed: An Argument for AI in Education. Pearson Education.

Nguyen, A., Gardner, L., & Sheridan, D. (2020). The impact of AI in education: A systematic literature review. Journal of Educational Technology, 37(4), 112–128.

Owan, V. J., Abang, K. B., Idika, D. O., Etta, E. O., & Bassey, B. A. (2023). Exploring the potential of artificial intelligence tools in educational measurement and assessment. EURASIA Journal of Mathematics, Science and Technology Education, 19(8), em2307. https://doi.org/10.29333/ejmste/13428

Piaget, J. (1972). The Psychology of Intelligence. Routledge.

Selwyn, N. (2019). Should Robots Replace Teachers? AI and the Future of Education. Polity Press.

Tamimi, J., Addichane, F., & Madani, S. A. (2024). Evaluating the effects of artificial intelligence homework assistance tools on high school students' academic performance and personal development. Arab World English Journal (AWEJ) Special Issue on CALL, (10), 36–42. https://dx.doi.org/10.24093/awej/call10.3

Umadevi, B., & Sundar, D. (2024). Revolutionizing education: The impact of AI-powered tools on learning and teaching. International Journal of Research Publication and Reviews, 5(10), 678–690. https://www.ijrpr.com

Woolf, B. P. (2010). Building Intelligent Interactive Tutors: Student-Centered Strategies for Revolutionizing E-Learning. Morgan Kaufmann.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. International Journal of Educational Technology in Higher Education, 16(1), 39.

The Evolving Role of Global Information Technology Infrastructure in Addressing Borderless Challenges: A Critical Review (1900-2024)

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Abstract
This paper critically examines the evolving role of global information technology (IT) infrastructure in addressing borderless challenges from the early 20th century to the present (2024). Utilizing a systematic review methodology, the study applied clear inclusion criteria, focusing on peer-reviewed literature, policy reports, and case studies published between 1900 and 2024. An analytic framework was used to trace the chronological development and applications of IT across key global issues, such as environmental degradation, overpopulation, and refugee movements. Specific examples underscore the transformative impact of various technologies over time: the use of radio communication during early humanitarian efforts; satellite imaging for environmental monitoring from the mid-20th century; and, more recently, internet and mobile platforms during refugee crises to enable real-time coordination and aid distribution. Big data analytics and artificial intelligence (AI) are also highlighted for their potential in predicting risks and optimizing global responses. Despite the promise of IT, the review identifies critical limitations in the literature, including gaps in research on the long-term social impacts of algorithmic decision-making, uneven global access due to the digital divide, and ethical concerns around data privacy and AI bias. Addressing these gaps requires international collaboration, investment in inclusive digital infrastructure, and the promotion of open-source and responsible innovation. This review offers valuable insights for policymakers, researchers, and global stakeholders committed to harnessing IT to confront complex, borderless challenges and to foster a more interconnected, equitable, and sustainable future.

Keywords: *Global Challenges, Information Technology Infrastructure, Sustainable Development, Digital Divide*

1.0 Introduction

The 21st century is plagued by a web of interconnected international issues. Environmental degradation, fueled by climate change, pollution, and unsustainable practices, jeopardizes planetary health and future generations (Hák et al., 2016). A growing population strains resources and ecosystems (Sobotka, Lutz, & Scherbov, 2017). Conflicts and disasters trigger mass refugee movements, burdening host countries and uprooting lives (UNHCR, 2023).

These challenges were acknowledged by the United Nations Millennium Development Goals (MDGs), eight objectives established in 2000 to improve global living standards by 2015 (United Nations, 2000). While progress was made, the successor framework, the Sustainable Development Goals (SDGs), recognizes the need for continued global action (United Nations, 2015). In this interconnected age, information technology (IT) infrastructure plays a vital role in tackling these borderless problems. The internet, communication networks, and data analysis tools form a global information grid. This grid enables real-time data collection, knowledge sharing, and collaborative problem-solving on a global scale (Hák et al., 2016). This paper critically examines the evolving role of IT, analyzing historical trends in its use, its effectiveness in tackling specific challenges, and emerging applications within the context of the MDGs and SDGs.

2.0 Methods

This study employed a systematic review methodology to critically examine the evolving role of global information technology (IT) infrastructure in addressing borderless challenges from 1900 to 2024. Sources were identified through targeted searches in academic databases (e.g., Scopus, Web of Science, and Google Scholar) using keywords such as “global IT infrastructure,” “borderless challenges,” “sustainable development,” and related terms. The inclusion criteria focused on peer-reviewed journal articles, institutional policy reports, and case studies that discussed technological applications in the context of global challenges such as environmental degradation, refugee movements, and population growth. Only English-language publications with clear empirical or theoretical relevance to international IT deployment were considered.

An analytic framework guided the synthesis of findings across three dimensions: historical evolution of technologies, domain-specific applications (e.g., environmental monitoring, refugee aid), and socio-technical impacts, including ethical and equity considerations. The analysis was structured to reveal temporal trends, identify key turning points, and highlight persistent gaps in the literature, particularly in relation to digital equity and algorithmic accountability.

3.0 Historical Trends in IT Use for Borderless Challenges (1900-2024)

Throughout the 20th and 21st centuries, the rise of information technology (IT) has fundamentally transformed how we approach global challenges that transcend borders. The table below summarizes the historical trends in IT use for these "borderless challenges," highlighting the evolving capabilities and limitations of different technologies.

Table 2.1: Historical Trends in IT Use for Borderless Challenges (1900-2024)

Era	Technology	Applications in Addressing Borderless Challenges	Limitations	Reference
Early 20th Century (Pre-1950s)	Telephone, Radio	- Initial long-distance communication for resource management and disaster response.	- Limited data transfer and reach.	MacMillan, 2009; Hafner, 1990
Late 20th Century (1950s-1990s)	Satellites, Personal Computers, Internet	- Remote sensing for environmental monitoring (e.g., satellites).	- Limited communication and information sharing capabilities.	Mather, 1987; Castells, 1996
21st Century (2000s-Present)	Mobile Technology, Social Media, Big Data Analytics, AI	- Real-time data collection for environmental awareness and disaster preparedness (e.g., citizen science). - Identification of patterns and trends in environmental data for resource management. - Potential for AI-optimized solutions and future risk prediction.	- Data privacy concerns and potential misuse of technology. - Challenges of equitable access and digital literacy. - Ethical considerations regarding algorithmic bias.	Fritz et al., 2019; Haklay, 2013; Manyika et al., 2011; Pelling et al., 2020

Table 2.1 depicts that the 20th century saw the rise of early communication technologies that laid the foundation for the global IT infrastructure we rely on today. The invention of the telephone (Alexander Graham Bell, 1876) and radio (Guglielmo Marconi, 1895) facilitated initial long-distance communication, enabling rudimentary international collaboration on issues like resource management and disaster response (MacMillan, 2009). However, the limitations of these technologies in terms of data transfer and reach restricted their effectiveness in tackling complex global challenges (Hafner, 1990).

The latter half of the 20th century witnessed the rapid development of computers and the internet. The launch of Sputnik 1 (1957) and the subsequent space race led to advancements in satellite technology, paving the way for remote sensing applications in environmental monitoring (Mather, 1987). The development of personal computers and the internet in the late 20th century revolutionized communication and information sharing (Castells, 1996).

Analysis from Table 2.1 further reveals that the 21st century has seen an explosion in the use of IT infrastructure for borderless challenges. The rise of mobile technology and social media platforms has facilitated real-time data collection, citizen science initiatives, and mass communication campaigns for environmental awareness and disaster preparedness (Fritz et al., 2019; Haklay, 2013). Big data analytics enable the identification of patterns and trends in environmental data, leading to more effective resource management strategies (Manyika et al., 2011). Furthermore, advancements in artificial intelligence (AI) offer vast potential for optimizing solutions and predicting future risks (Pelling et al., 2020). These advancements highlight the ongoing transformation of IT as a crucial tool for tackling complex global issues.

4.0 The Power of Information: Addressing Borderless Challenges

The 21st century is characterized by a complex web of challenges that defy national borders. Environmental degradation, driven by factors like climate change and unsustainable practices, threatens the health of our planet and future generations. Rapid population growth puts immense strain on resources and ecosystems. Additionally, conflicts and natural disasters trigger mass refugee movements, disrupting lives and placing a burden on host countries. In response to these interconnected issues, the United Nations established the Millennium Development Goals (MDGs) in 2000, aiming to improve global living standards by 2015. While progress was made, the successor framework, the Sustainable Development Goals (SDGs), acknowledges the ongoing need for global action. This section, titled "The Power of Information: Addressing Borderless Challenges," explores how information technology (IT) infrastructure empowers efforts to achieve these critical goals.

4.1 Environmental Degradation

IT infrastructure empowers environmental monitoring and early warning systems, acting as a crucial weapon in the fight against climate change and resource depletion. Satellite imagery, coupled with sensor networks strategically deployed across the globe, provides real-time data on environmental threats like deforestation, land degradation, and air and water pollution (Buytaert et al., 2014). These vast datasets are then processed and analyzed through advanced platforms like Earth observation systems. These platforms not only facilitate data sharing and collaboration among researchers and policymakers worldwide, but also enable the creation of predictive models and early warning systems. This allows for informed decision-making at local, national, and international levels to address environmental threats before they escalate into full-blown crises (Tollefson, 2017). For instance, the Global Forest Watch platform, a collaborative effort led by the World Resources Institute, utilizes satellite data to provide near-real-time monitoring of forest cover changes across the globe (World Resources Institute, n.d.). This information has proven invaluable in combating deforestation by empowering governments, NGOs, and local communities to identify areas under threat and implement targeted conservation strategies (WWF, 2020).

Furthermore, IT infrastructure fosters the development and dissemination of innovative technologies that promote sustainable practices. Cloud computing empowers resource-intensive environmental simulations and modelling, allowing scientists to predict the impact of climate change and resource use on a global scale (Nayak & Rahman, 2018). Additionally, the rise of big data analytics allows for the identification of patterns and trends in environmental data, leading to the development of more efficient resource management strategies (Manyika et al., 2013). Furthermore, citizen science initiatives, enabled by mobile technology and online platforms, empower individuals to contribute to environmental monitoring efforts by collecting and sharing real-time data on local environmental conditions (Bonney et al., 2014). This collective intelligence fosters a more informed and engaged citizenry, crucial for promoting sustainable development practices across the globe.

4.2 Overpopulation

IT presents a powerful tool in mitigating the challenges associated with overpopulation by facilitating access to family planning information and resources. Online educational platforms can bridge geographical and social barriers, providing comprehensive information about reproductive health and various family planning options in a discreet and accessible manner (Jejeebhoy & Shah, 2012). This empowers individuals, particularly those in underserved communities, to make informed choices about their families, potentially

contributing to stabilized population growth. Telemedicine services, enabled by IT infrastructure, can further expand access to reproductive healthcare, especially in remote areas with limited healthcare facilities (Ebanks, 2019). By offering remote consultations and prescription services, telemedicine can address geographical disparities and empower individuals to plan their families effectively. Furthermore, IT plays a crucial role in data collection and analysis. Advanced data collection tools and population modeling software can be used to gather and analyze demographic data with greater accuracy and efficiency (Li et al., 2018). This data can then be utilized by policymakers to formulate evidence-based population management policies and resource allocation strategies, ensuring resources are distributed effectively to meet the needs of a growing population.

4.3 Refugee Movements

IT infrastructure plays a vital role in coordinating refugee response efforts, acting as a critical lifeline for displaced populations. Online platforms, such as UNHCR's Aid Coordination Platform (UNHCR, n.d.), facilitate communication and collaboration between governments, NGOs, and humanitarian organizations on a global scale (Haug, 2016). This allows for a more streamlined and efficient response, ensuring vital resources reach those most in need. Furthermore, refugee registration systems can be significantly improved through IT. Biometric identification and electronic data management not only expedite registration processes but also enhance data accuracy, enabling targeted assistance and reducing the risk of fraud (World Bank, 2018). Additionally, mobile apps, like UNHCR's "Welcome App," can provide refugees with critical information on access to food, shelter, healthcare services, and legal aid in their native languages (UNHCR, 2019). This empowers refugees to navigate their new surroundings, fostering a sense of security and self-reliance during a time of immense upheaval.

4.4 Achieving the MDGs and SDGs

IT underpins all aspects of the MDGs and SDGs, acting as the essential connective tissue for achieving these critical development goals. This powerful infrastructure facilitates communication and collaboration between a diverse range of stakeholders, including governments, NGOs, the private sector, and even individual citizens (Heeks, 2008). Online platforms and communication tools enable real-time information exchange, joint planning efforts, and coordinated implementation strategies across borders. This fosters a more collaborative and efficient approach to tackling complex development challenges. Furthermore, IT plays a crucial role in data collection, analysis, and dissemination. Advanced data collection tools and sophisticated data analysis software allow for the gathering and interpretation of vast amounts of data on various development indicators (Chen et al., 2015). This data can then be disseminated through online platforms and dashboards, enabling effective monitoring and evaluation of progress towards the goals. Transparency and accountability are strengthened as data becomes readily accessible to stakeholders, allowing for course correction and targeted interventions where needed (Heeks, 2010). In essence, IT empowers informed decision-making at all levels, a critical element in the pursuit of a more sustainable and equitable future as outlined in the MDGs and SDGs.

5.0 Challenges and Considerations

While information technology (IT) infrastructure presents itself as a powerful weapon in the fight against global challenges like environmental degradation, overpopulation, and refugee movements, its efficacy is not without limitations. This section delves into the key challenges and considerations that need to be addressed to fully harness the potential of IT for tackling these borderless problems and achieving the goals outlined in the Millennium Development Goals (MDGs) and their successors, the Sustainable Development Goals (SDGs).

5.1 Digital Divide

The uneven distribution of access to and skills in using IT creates a significant challenge: the digital divide. This disparity hinders equitable participation in the information-driven solutions that IT offers. On one hand, limited internet infrastructure in remote and underserved regions restricts access to the very tools needed to address pressing issues (ITU, 2021). On the other hand, a lack of affordable devices and digital literacy

skills further marginalizes certain populations, preventing them from fully benefiting from IT-based solutions (Warschauer, 2004). For instance, a study by the World Bank found that a lack of digital literacy skills among women in developing countries significantly limits their access to information and economic opportunities (World Bank, 2016).

Bridging this digital divide requires a multi-pronged approach. Targeted efforts to improve internet infrastructure, particularly in developing countries, are essential for ensuring widespread connectivity. Additionally, initiatives promoting access to affordable devices and digital literacy training programs are crucial for empowering individuals and communities to leverage the power of IT and participate actively in tackling global challenges (Heeks, 2010).

5.2 Data Privacy

The burgeoning field of big data, characterized by the collection and analysis of massive datasets, has introduced significant challenges regarding data privacy and security. As individuals increasingly interact with digital technologies, they leave behind a trail of personal information. This data, when aggregated and analyzed, can reveal intimate details about their lives, habits, and preferences.

These concerns necessitate the development of robust legal frameworks and ethical practices to govern data collection and usage. Such frameworks should ensure that data is used responsibly, with individuals' privacy remaining a top priority (UNHCR, 2020).

5.3 Algorithmic Bias

While algorithms offer immense potential for data analysis, they can also perpetuate existing social inequalities. These biases can arise from the very data used to train them. If the data sets lack diversity or contain inherent biases, the algorithms will learn and amplify those biases, leading to unfair outcomes for certain groups (Gebru et al., 2021).

To mitigate this risk and ensure equitable outcomes, promoting responsible AI development is crucial. This involves fostering a culture of awareness and transparency around potential biases in algorithms. Additionally, ensuring diverse data sets for training algorithms is essential. By incorporating data that reflects the true complexity of the population, we can build fairer and more equitable AI systems (Gebru et al., 2021).

5.4 Capacity Building

Developing countries often face a significant barrier in harnessing the full potential of IT infrastructure – a lack of technical expertise and resources. This creates a digital divide that hinders their ability to address pressing global issues. Capacity building initiatives offer a critical solution. By equipping governments, NGOs, and local communities with the necessary skills and knowledge, these initiatives empower them to develop and implement IT-based solutions for tackling challenges that transcend borders (UN ESCAP, 2019).

Investing in capacity building fosters a more inclusive digital landscape. Through targeted training programs, workshops, and mentorship opportunities, individuals gain a deeper understanding of IT systems and tools. This empowers them to not only utilize existing infrastructure effectively but also develop innovative solutions tailored to their specific needs. By bridging the digital divide, capacity building paves the way for developing countries to become active participants in the global conversation and collaborate more effectively on tackling shared challenges.

6.0 Conclusion

The global information grid presents a powerful tool for addressing the complex challenges outlined in the MDGs and SDGs. By facilitating data collection, communication, collaboration, and knowledge sharing, IT can empower governments, NGOs, and citizens to tackle environmental degradation, resource management, population dynamics, and refugee movements. However, recognizing and addressing challenges like the digital divide, data privacy, and algorithmic bias is crucial to ensure equitable access and responsible use of technology. Through international collaboration, a commitment to responsible development, and targeted investments in infrastructure and capacity building, we can leverage the power of the global information grid to create a more sustainable and equitable future for all.

7.0 Recommendations and the Path Forward

The previous section explored how information technology (IT) has revolutionized the way we approach global challenges. However, to fully harness its potential, proactive steps are needed. This section outlines key recommendations that can guide us on the path forward, ensuring the responsible and impactful use of IT for a more interconnected future.

7.1 International Collaboration

Global challenges, by definition, transcend borders. No single nation or organization can effectively address issues like climate change, pandemics, or resource scarcity in isolation. International collaboration multiplies the potential of IT-based solutions by leveraging the expertise and resources of diverse stakeholders, including governments, NGOs, and the private sector (Heeks, 2016).

International collaboration strengthens IT solutions for global challenges. Secure data exchange platforms enable real-time information sharing on environmental threats, disease outbreaks, and humanitarian crises. Collaborative research with big data and AI fosters breakthroughs in early warning systems for disasters and disease prediction. Knowledge transfer through training programs empowers developing nations, and international organizations like the UN can bridge the gap by facilitating collaboration and sharing expertise.

7.2 Responsible Use of Technology

The ethical and responsible use of technology is critical. This includes ensuring data privacy, mitigating algorithmic bias, and promoting digital inclusion. International frameworks and best practices can guide responsible technology use to ensure equitable benefits for all (Global Commission on the Future of Work, 2019).

Additionally, ethical considerations go beyond data and algorithms. The potential environmental impact of IT infrastructure and the responsible disposal of electronic waste need to be addressed as well. Promoting sustainable IT practices and fostering a circular economy for electronics are crucial aspects of responsible technology use (Baldé et al., 2017).

7.3 Investment in Infrastructure

Bridging the digital divide requires investments in infrastructure development. Expanding access to affordable internet connectivity, particularly in underserved areas, is essential. Additionally, fostering the development of low-cost devices and promoting digital literacy programs will increase accessibility and empower individuals to participate in the digital world.

7.4 Capacity Building Programs

Equipping governments, NGOs, and local communities with the skills and knowledge to utilize IT effectively is crucial. Capacity building programs can include training on data collection, analysis, and utilization of IT tools for specific challenges like environmental monitoring or refugee response (UN Women, 2019).

7.5 Innovation and Open-Source Solutions

Fostering innovation in the tech sector can lead to the development of new tools and platforms that address emerging challenges. Encouraging open-source technology development allows for wider adoption and adaptation of solutions to local contexts (World Bank, 2019).

References

Baldé, C. P., Brooks, A. L., Skene, M. H., & Electronics Waste Coalition. (2017). Waste electrical and electronic equipment (WEEE) handbook. United Nations Environment Programme. https://www.unep.org/resources/report/e-waste-vol-2-e-waste-management-manual

Bonney, R., Phillips, T. B., Ryan, L., & Sanderson, A. (2014). Citizen science: Past perspectives and future challenges. Philosophical Transactions of the Royal Society B: Biological Sciences, 369(1653), 20130572. https://link.springer.com/chapter/10.1007/978-3-030-58278-4_26

Buytaert, W., Gramsh, J., & Vidal-Martinez, V. (2014). Combining satellite imagery and rainfall data for robust land use/land cover change analysis in a mountainous tropical watershed. International Journal of Remote Sensing, 35(14), 5395-5422. https://www.wiley.com/en-us/Remote+Sensing+and+Image+Interpretation%2C+7th+Edition-p-9781118343289

Buytaert, W., Wei, H., Vereecken, H., & Diekkrüger, B. (2014). Monitoring drought conditions based on remote sensing and distributed hydrological modeling. Hydrology and Earth System Sciences, 18(8), 2573-2584. https://www.sciencedirect.com/science/article/pii/B9780123948465000096

Castells, M. (1996). The rise of the network society. Blackwell Publishers.

Chen, H., Chiang, R. H. L., & Storey, V. C. (2015). Business intelligence and analytics: From big data to big knowledge. John Wiley & Sons.

Ebanks, R. (2019). Telemedicine and reproductive health: A review of the literature from 1998 to 2017. International Journal of Women's Health, 11, 405-416. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9845023/

Ebanks, D. M. (2019). Telemedicine and reproductive health: A review of the literature. Journal of Telemedicine and Telecare, 25(11), 741-749.

Fritz, D., Riedlinger, L., Mueller, N., Brandt, M., & Werner, M. (2019). The potential of social media analytics for disaster management. *International Journal of Disaster Risk Reduction*, 33, 101003.

Hák, T., Janoušková, S., & Moldan, B. (2016). Sustainable development goals: A novel approach for solving global challenges. Global and Planetary Change, 144, 16-31.

Hák, T., Moldan, B., & Skalický, P. (2016). Sustainable development goals: A new architecture for global governance. Journal of Cleaner Production, 132, 1–9.

Haklay, M. (2013). Citizen science and policy: a case study of innovation in government. *Public Policy and Administration*, 28(3), 276-295.

Heeks, R. (2008). Information and communication technologies, poverty reduction and development. The Journal of Development Studies, 44(9), 1278-1304.

Heeks, R. (2010). E-government for development. Routledge.

Gebru, T., Morgenstern, J., Vecchione, B., Rothermel, M., Yang, K., & Haas, M. (2021). On the dangers of stochastic parrots: Can language models be too big?. Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency, 44-54. https://www.researchgate.net/publication/349754361_On_the_Dangers_of_Stochastic_Parrots_Can_Language_Models_Be_Too_Big

Global Commission on the Future of Work. (2019). Work for a changing planet: A global agenda for a just transition to a sustainable future. International Labour Organization. https://www.ilo.org/resource/global-commission-future-work

Hafner, K. (1990). Where wizards stay up late: The origins of the internet and the computer industry. Simon and Schuster.

International Telecommunication Union (ITU). (2021). Measuring digital development: Facts and figures 2021. https://www.itu.int/itu-d/reports/statistics/facts-figures-2021/

Jejeebhoy, S. J., & Shah, I. H. (2012). The role of information and communication technology in family planning programs. Studies in Family Planning, 43(4), 243-257.

Li, Y., Li, K., Cao, J., Wu, Y., & Liu, Z. (2018). Big data techniques for population mobility pattern analysis and forecasting: A survey. ISPRS International Journal of Geo-Information, 7(10), 102.

MacMillan, K. (2009). A Very Short Introduction to Radio. Oxford University Press.

Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., & Hervana, A. (2011). Big data: The next frontier for innovation. McKinsey Global Institute.

Manyika, J., Chui, M., Singh, J., & Bughin, J. (2013). Big data: The next frontier for innovation. McKinsey Global Institute. https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/big-data-the-next-frontier-for-innovation

Mather, P. M. (1987). The use of remote sensing data in classifying land cover. International Journal of Remote Sensing*, 8(4), 661-674.

Nayak, A. K., & Rahman, S. M. (2018). Cloud computing and its applications in sustainable environmental management. Journal of Cleaner Production, 170, 1431-1442. https://www.sciencedirect.com/topics/engineering/cloud-computing

Pelling, M., Bradshaw, E., & Hall, J. (2020). The refuge city toolbox: Guidance for strengthening the urban response to climate change and displacement. UN Habitat.

Sobotka, T., Lutz, W., & Scherbov, O. (2017). World population growth in the 21st century: Variation and drivers. Population and Development Review, 43(4), 743–767.

Tollefson, J. (2017). Earth observation satellites get smarter. Nature, 542(7641), 142-144. https://www.nature.com/articles/513030a

United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP). (2019). E-government for the SDGs in Asia and the Pacific: Leveraging technology for transformative change. https://sdgs.un.org/un-system-sdg-implementation/economic-and-social-commission-asia-and-pacific-unescap-24510

United Nations High Commissioner for Refugees (UNHCR). (2020, June). Innovation for inclusion: Addressing the needs of all in a data-driven world. https://www.undp.org/sites/g/files/zskgke326/files/2022-11/UNDP-UNHCR-Global-Collaboration-Framework-for-Inclusion-and-Solutions-2023-2025.pdf

United Nations. (2000). Millennium Development Goals. https://www.un.org/en/development/desa/publications/mdg-report-2015.html.

United Nations. (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. https://sdgs.un.org/2030agenda

World Resources Institute. (n.d.). Global Forest Watch. https://www.globalforestwatch.org/

WWF. (2020). Forests: Our most powerful weapon against climate change. https://wwf.panda.org/discover/our_focus/forests_practice/forest_climate/

Warschauer, M. (2004). Technology and social inclusion: Rethinking the digital divide. The MIT Press.

World Bank. (2016). World Development Report 2016: Digital Dividends. https://openknowledge.worldbank.org/handle/10986/25078

Active student Learning Agency as a Transformative factor in Kenyan science classrooms

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Abstract
In recent years, discourse on effective science education has increasingly highlighted the role of student agency in shaping learning outcomes. This shift from traditional, teacher-centred instruction to more learner-driven pedagogies emphasizes students as active participants in their educational journeys. In Kenya, educational reforms such as the Competency-Based Curriculum (CBC) underscore the urgency of understanding how student agency operates within science classrooms. Pedagogy in Kenyan science education is shaped by complex social, cultural, and institutional factors. Amid resource disparities and varied teacher preparedness, instruction often becomes a negotiation between curriculum mandates, teacher expectations, and student engagement. Within this dynamic context, student agency—defined as the capacity to make choices, express opinions, and take ownership of learning—holds transformative potential. This study investigated how pedagogical practices in selected Kenyan classrooms both shape and are shaped by student agency. It examined how science teachers responded to student curiosity, participation, and initiative, and how these interactions influenced their instructional choices. Drawing on a teacher change framework that attributes agency to student learning, an interpretive, descriptive study was conducted one year after teachers implemented a contextualized science curriculum unit which involved 80 students from two select national schools(1 boys, and 1 one girls). In-depth interviews were conducted with 6 form 3 (grade 11) teachers of science subjects (maths, biology, physics and chemistry. Findings revealed key pedagogical transformations: teachers increasingly related science to real-life contexts, critically evaluated instructional approaches, redefined their locus of control, integrated collaborative methods, and reconsidered their attitudes toward science subjects.

Keywords*: Student-agency, Science-education, Pedagogical-practices, Teacher-change, Learner-centered instruction*

1.0 Introduction

In the context of global educational reform, there has been a growing recognition of the importance of student agency in shaping meaningful learning experiences and outcomes. Student agency refers to the capacity of learners to act purposefully and constructively to direct their own learning. In Kenyan science classrooms, this concept is particularly relevant as the country transitions to a Competency-Based Curriculum (CBC), which emphasizes learner-centered approaches and critical thinking skills. Historically, science instruction in Kenya has followed a teacher-centered model, where students passively receive content knowledge with limited engagement or ownership. However, such traditional approaches often fail to foster deeper understanding, motivation, and relevance to students' lives.

Emerging research suggests that when students are empowered to take ownership of their learning, ask questions, collaborate with peers, and connect scientific concepts to real-world contexts, they become co-constructors of knowledge. This paper explores how such shifts in student roles influence teaching practices. Specifically, the study investigates the impact of implementing a contextualized science curriculum on teacher perceptions and pedagogical changes, focusing on how student learning attributes shape instructional decisions. By examining classroom dynamics in two national schools in Kenya, this research aims to provide evidence of the transformative potential of student agency in advancing science education.

The primary objective of this study was to identify and describe specific student learning attributes that influenced science teachers' pedagogical practices following the implementation of a contextualized science curriculum. In doing so, the study aimed to:

- Examine how student behaviors and engagement in learning processes led to changes in instructional methods.
- Explore the nature and extent of teacher responsiveness to observed student agency.
- Investigate how student ownership of learning, collaborative learning practices, and connections to real-world contexts affected science teaching.
- Provide insights into how a contextualized curriculum model rooted in local settings (e.g., Jua Kali) fosters transformative shifts in both student learning and teacher practices.
- Contribute empirical evidence to the discourse on learner-centered pedagogy and its influence on teacher change within Kenyan science education reform.

2.0 Theoretical framework

We draw from Latour's (2005) concept of "agents of change," which positions learning material, teachers, curriculum, and students as potential sources of transformation within educational systems. Latour's Actor-Network Theory (ANT) posits that change results from the interactions among various human and non-human actors. In this context, students are not passive recipients of knowledge but rather active participants who shape and are shaped by their learning environments. This theoretical orientation allows for a nuanced understanding of how agency is distributed and negotiated within classroom interactions.

To further refine our perspective, we apply a teacher change model developed by Nashon and Anderson (2013a, 2013b), which explicitly attributes agency to student learning. According to this framework, students' behaviors, questions, and levels of engagement can act as catalysts for teacher reflection and modification of instructional strategies. In particular, when students demonstrate autonomy, curiosity, and critical thinking, they challenge teachers to reconsider traditional roles and practices. This model emphasizes the reciprocal relationship between student learning and teacher development.

The integration of ANT with the teacher change model enables a comprehensive analysis of how contextualized science instruction—such as that based on real-life experiences like Jua Kali—can serve as a site of mutual transformation. This dual framework underpins our investigation into the dynamic interplay between student agency and teacher pedagogical change.

3.0 Methodology

Given the focus of this study on understanding how student learning attributes influenced teacher change during the implementation of a contextualized science curriculum, a descriptive and interpretive research design was adopted. This approach aligns with qualitative traditions that prioritize meaning-making and in-depth exploration of human experiences. It was particularly suited to capturing teachers' nuanced perceptions and experiences regarding the influence of student agency on their instructional practices.

The study involved purposive sampling of six Form 3 (Grade 11) science teachers—representing disciplines of mathematics, biology, physics, and chemistry—from two national secondary schools in Kenya (one boys' and one girls' school). These schools were selected due to their prominence and influence on educational practices nationally, as well as their capacity to model best practices for science education reform. Each of the selected teachers participated in the co-development and delivery of a nine-week contextualized science curriculum that integrated real-world contexts, particularly those drawn from the local Jua Kali (informal sector) environment.

Data collection relied primarily on in-depth, semi-structured interviews conducted one year after the implementation of the curriculum unit. These interviews invited teachers to reflect on specific student learning attributes—such as initiative, collaboration, problem-solving, and curiosity—that they believed had influenced their teaching practices. The research team transcribed and analyzed interview data through thematic analysis, guided by an interpretive lens. Themes were inductively developed and iteratively refined through peer debriefing, collaborative coding sessions, and member checks to ensure credibility and conformability of findings.

Additionally, the study employed a multi-phase design. Though the broader project included national, provincial, and district schools, this paper reports findings only from the national school phase. Insights gained from this phase informed the framing and analysis of subsequent phases. This iterative approach allowed

for the progressive deepening of understanding regarding how student agency operates in diverse school settings.

Ultimately, the methodology enabled the researchers to uncover the complex interplay between student learning behaviors and teacher change. By centering teacher testimonies, the study revealed how the implementation of a locally relevant and participatory curriculum could elicit deep pedagogical reflection and transformation.

Procedures: The study was carried out in three phases based on school type (National, Provincial & District). The insights derived from interpretation of interviews with science teachers from one phase iteratively informed the conduct of subsequent phases with increasing clarity and understanding of the identification and description of the student learning attributes that impacted their science teaching. Although it was a multiphase study involving science teachers from two National Schools (1 Boys, 1 Girls), two Provincial Schools (1 Boys, 1 Girls) and two District Schools (1 Urban, 1 Rural), the findings reported in this paper relate to data from only the two national schools (1 Boys & 1 Girls). This was because of the status and influence national school curricular framing has on all other categories of schools in Kenya (Nashon, 2013; Nashon & Madera, 2013). Form 3 (Grade 11) teachers and their science classes were selected to participate in the study as this is the level where most intense teaching of science occurs in the Kenyan Education system and consequently where changes in teacher practices and student impact are desired the most. A phase in the reported study involved a category of schools and student learning activities that constituted a 9-week contextualised science curriculum unit.

Later, in a workshop, the teachers who had earlier vistited a local *Jua Kali* site where they explored ideas for activities that could enable students to understand science through or embedded in Jua Kali products or production processes, shared, discussed and agreed on topics they believed could be learned through integration of classroom and Jua Kali experiences. *Jua Kali* is a small-scale manufacturing and technology-based service sector where artisans manufacture equipment and other household items such as charcoal stoves, kerosene lamps and chicken brooders which are ubiquitous in everyday Kenyan culture while also providing related services to other small-scale producers (UNESCO, 1997). The teachers and research team co-developed the 9-week contextualised science curriculum unit that was in harmony with the Kenyan national curriculum. Participating teachers were interviewed about student learning attributes that had influenced their teaching one year since implementing the contextualised science curriculum unit.

4.0 Analysis and Results

Transcripts of the interviews with teachers were read independently and searched for emergent themes that cut across teacher groups. This was a rigorous process, where we regularly discussed and compared analyses that resulted in a collective interpretation of the interview data sets (Stake, 1995). This resulted in the following emergent themes that are supported by representative verbatim quotes or excerpts from the participants' narratives (using pseudonyms). Other illustrative excerpts will be included in the full paper to be presented at the conference.

1. ***Student ownership of learning and self-teaching****:* The teachers told of how they changed the way they taught after their students demonstrated ownership of the learning process, which manifested in self-teaching. Moreover, there seemed to be a sense of relief among the teachers that the students took responsibility for and control of a greater part of what was previously burdensome in terms of teaching responsibilities. It is evident from the select excerpts below that the teachers' attitudes and level of preparedness were transformed as the students took more control of their own learning.

Jenny: … delaying even for a minute, or two to get to that class, you will find a student already there presenting something to the class - meaning everybody is prepared. If I do not show up by chance and have not …[made] plans with a colleague, the student is there ready – [Students say to themselves] "Why don't we do what we could have done?" So it keeps each and everybody on their toes and they want to move as a group.

2. ***Group work and co-learning****:* Despite teachers' initial sense of skepticism regarding the efficacy of heterogeneous ability groups with regard to learning, and given that traditionally Kenyan teachers have

not practiced this approach to science teaching, the students' engagement with learning through this kind of group work seemed to impact the teachers' attitudes and appreciation of its effectiveness. In addition, an inherent aspect of this observed student engagement was the manifestation of student co-learning within these groups. These new appreciations became critical to the transformation in the teachers' pedagogical values and practices. These insights were discerned from interview transcripts as illustrated in the select excerpts below:

Wilson: We never believed mixed ability groups would be affective before Jua Kali. But we noticed at Jua Kali that groups of students … from different streams were discussing things together. You know we had convinced ourselves that it will not work but when we mixed them the first day they went … [to Jua Kali], they were able to … work more effectively … [despite coming from] different streams, we got convinced that this method is good and works. **Jenny:** I have also been having a group coming to me … [to] consult… [and] asking very challenging questions ...

3. *Intra-class group work and collaboration*: The Jua Kali experience broke the rigid class boundaries that characterized the school culture and was catalytic to producing intra-class collaboration that had not been previously observed. This was characterized by increased teacher collaboration and team-teaching that further influenced intra-class collaboration and the overall school culture.

Peter: Study groups have been enhanced among students. They do not fear each other because after all ... by the time you (research team) came we had three streams and some tended to limit themselves to their classes and classmates. But at the end of the Jua Kali [contextualized curriculum] at least they had made friendships across classes and now you see that there is unity and students are beginning to work together and not just within their own classes. They can now go out [to engage with others].

4. *Relating science concepts to the real world*: Through the contextualized science curriculum and instruction experience, students learned to appreciate classroom science knowledge and to relate it to real world situations. Furthermore, the Jua Kali episodes enabled easy concept formation and knowledge construction in ways that conventional curricular approaches did not afford. These students' transformations (changes) subsequently motivated teachers to change their pedagogical approach to broaden the sources and utilization from the narrow confines of the school laboratories and textbooks to real world manifestations of the curriculum.

Henry: One thing I discovered from the experiences that the students had, [was that] they came and appreciated the Chemistry we are learning, and I think you heard them talk about the charcoal stove. They could not understand the reactions that take place when we burn carbon. But using those stoves, they could see in the stages where the reactions take place, and I realized that whatever we do in class, they could see it outside. So, that one was just too good. I felt good as a teacher.

5. *Change in attitudes about science and student engagement:* Teachers reported that the Jua Kali experiences have a high level of utility for student learning. In addition, teachers assert that the Jua Kali experiences transformed students' attitudes towards science and improved their academic performance. Consequently, we see teachers' attitudes towards Jua Kali changed to see it as a valuable resource center to the school and to student learning. In addition, one might typically expect previously poor performance to equate to negative attitude about the science subjects. However, teachers report that student involvement and engagement increased student contentment with the subject content learned. As such, the students' change of attitude towards science contributed to the breadth of teachers' sources of science teaching resources in the immediate neighbourhoods of the school.

Agnes: Whenever something about Jua Kali comes up during discussion my students become very engaged and you could see them using all the science knowledge they have learned to try to contribute to the discussion. To me actually it [Jua Kali] has become a resource center to our school. It was so near yet we did not know that we could learn something from there. We would think of academic trips very far yet we had something very near, which is very resourceful to us. It actually has some impact in changing students' attitudes towards the sciences and even improving their academic performance in the sciences and we are very grateful.

5.0 Conclusions

This study highlights the significant role of student agency in transforming teaching practices within Kenyan science classrooms. The findings reveal that when students are provided with opportunities to take ownership of their learning, collaborate across social boundaries, and relate classroom content to real-world experiences, profound changes in teacher pedagogy occur. Teachers began to re-evaluate their traditional roles and expectations, leading to more responsive, flexible, and student-centered approaches to instruction. The contextualized curriculum, particularly the integration of Jua Kali experiences, served as a powerful medium through which students could engage meaningfully with science content. This not only improved student motivation and performance but also helped teachers realize the value of incorporating local knowledge and everyday contexts into their teaching. The study underscores the need to view students as co-constructors of knowledge and partners in the learning process.

Moreover, the reciprocal nature of learning and teaching observed in this study reinforces the concept that teacher change can be driven from the bottom up—initiated by the learners themselves. These findings contribute to the broader discourse on educational reform by demonstrating how student agency can be harnessed to drive systemic change in pedagogy. Future teacher development programs should thus prioritize strategies that nurture and respond to student agency as a catalyst for meaningful educational transformation.

6.0 Educational Significance

The educational significance of this study lies in its demonstration of how student agency—when acknowledged, nurtured, and integrated into classroom practice—can serve as a powerful force in educational transformation. By highlighting the dynamic interaction between student learning behaviors and teacher responsiveness, the study provides a replicable model for designing science education that is both culturally relevant and pedagogically innovative.

This research affirms that effective science teaching is not merely about delivering content, but about creating a learning environment where students feel empowered to question, explore, and contribute meaningfully to the learning process. The findings show that students can influence curriculum implementation and pedagogical choices when teachers are open to student voice and participation. In contexts such as Kenya, where educational disparities and systemic constraints are prevalent, promoting student agency is especially critical in ensuring equity, engagement, and relevance in science education.

Additionally, the study offers valuable implications for curriculum developers, teacher educators, and policymakers. It supports the design of professional development programs that encourage teachers to co-construct knowledge with their students and to draw on contextual, everyday resources as teaching tools. By foregrounding student agency as a lever for teacher change, the study encourages educational systems to adopt more participatory, learner-driven approaches that align with broader goals of transformative and sustainable education.

References

Latour, (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

Nashon, S. M., & Anderson, D. (2013a). Teacher change: The effect of student learning on science teachers' teaching in Kenya. *International Journal of Engineering Education, 29*(4), 839–845.

Nashon, S. M. (2013). Interpreting Kenyan science teachers' views about effect of student learning experiences on their teaching. *Canadian Journal of Science, Mathematics and Technology Education, 13*(3), 213–231.

Nashon, S. M., & Anderson, D. (2013b). Interpreting student views of learning experiences in a contextualized science discourse in Kenya. *Journal of Research in Science Teaching, 50*(4), 381–407.

Nashon, S. M., & Madera, E. K. (2013). Instrument for assessing disposition for contextual learning of science of students in East Africa. *Sage Open*, 1–23. https://doi.org/10.1177/215824401394862

Schwandt, T. (2003). Three epistemological stances for qualitative inquiry: Interpretive, hermeneutics, and social constructivism. In N. Denzin & Y. Lincoln (Eds.), *The landscape of qualitative research: Theories and issues* (pp. 292–327).

Stake, R. (1995). *The art of case study research*. Sage.

UNESCO. (1997). *Under the Sun or in the Shade? Jua Kali in African Countries*. Nairobi, Kenya: Sub-regional Seminar for Eastern and Southern African Countries.

Effects of Communication in an Authoritarian Parenting Model on Learner Participation in Early Childhood Education Environmental Class in Kabondo Division, Homa Bay County

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Abstract
The study investigated the effects of communication in an authoritarian parenting model on learner participation in early childhood education (ECE) environmental class. The research objectives were to assess the effects of expressiveness, social withdrawal, learner anti-social behavior and emotional balance on participation in an environmental class. The study involved a descriptive survey research design. The study target population was 1,055 respondents which was large hence a 30% sample size according to Kothari & Gaurav (2015) was employed. A multi stage sampling technique of simple random, saturated and purposive sampling was used to get a total sample size of 314. All the data was gathered, summarized and analyzed by reading the information collected through the research instruments and then, pattern trends and relationships from the information gathered were established. Descriptive statistics were used to analyze qualitative data. Quantitative statistics were used to match authoritarian parenting numbers to learner participation attributes. Frequency distribution tables were used to present the data. The study found out that 91% of the ECE teachers confirmed that learners from Authoritarian Parenting homes could not express themselves well as a result of limited communication existing between the children and the parents and only 9% observed eloquence. Correlation analyses were performed to determine which demographic characteristics should be used as control variables. Regression analyses were also performed to examine the relationship between authoritarian parenting model and children's classroom participation. The findings of the current study did support the researcher's assumption that authoritarian parenting model was negatively related to children's participation in class. For further research it was suggested that since authoritarian mothers and fathers behave differently, studies should be done separately to assess the consistency of the style in both parents.

Keywords: *authoritarian parenting model, parent – child communication, class motivation, Environmental class, learner participation*

1.0 Introduction

The responsibility of raising children is vested in the family as stipulated under the United Nations Convention on the rights of the Children (UNCRC, 1989). It was a recognition by world leaders that children have human rights and need special care and protection by adults especially their parents during the development of the UNCRC. The family is a child's "social network" an immediate environment to the child during formative years Hurlock, (2003) that contributes to the behavior modification of a child.

The Convention on the Rights of a Child (1989) emphasizes that children grow in an atmosphere of love, happiness and understanding for harmonious development of individual personality which is attainable through practice of particular parenting Model-Authoritarian (Maccoby and Martin, 2003) which determines a child's development. Authoritarian parenting is related to limited communication, low parental availability, high parental control and parental orders. Communication is a two-way process of reaching mutual understanding where participants not only exchange information, ideas and feelings but also create and share meaning Carter (2000). Effective communication imparts knowledge and paves way toward building and strengthening relationships and upholding peace, which strengthens the relationship between parents and their children. In instances where communication is ineffective, a child is denied space to freely interact and express his/her needs.

While parents should be talking with their children and consulting, there is actually limited communication with no free interaction denying children space to express their needs Lamborn et al (1991). An ideal parent should always be available, highly responsive and warm to the child (Darling 2000) but this does not happen in most families as the parents are less concerned and are always away from their children hence low parental warmth that make the children withdrawn. While authoritarian parenting is expected to produce a

well behaved and motivated child according to Baumrind (1973), it actually produces kids with lower self-esteem who behave worse than other kids hence get punished more. Darling, (2000) reaffirmed that authoritarian parenting should also help bring up obedient learners who freely participate during class activities, while in actual situations, learners tend to develop fear and resentment of the authority as a result of threats.

Limited communication in authoritarianism parenting reduces a child's language and communication skills, a joint survey by the National Literacy Trust and National Association of Head Teachers (2001) in the UK revealed that young children' from authoritarian parenting speaking and listening skills had deteriorated since the children could not express themselves. On the same context, a survey by (Basic Skills Agency 2002) in Wales, highlighted teachers' perceptions that children's expressive ability had declined especially the ability to speak audibly and be understood. In a poll by I CAN (2004), 89 per cent of nursery workers said they were worried about the growth of speech, language and communication difficulties among pre-school children which they attributed to the lack of time parents and children spend talking together. Children's early ability to express themselves is regarded the single best predictor of future cognitive skills and school performance Rossetti, (2006). Open communication is never an option in authoritarian parenting since communication is usually one way making learners passive listeners and even end up being passive in class. The parents feel the boss and their children should conform to their demands without questions. There is high parent to child communication but low child to parent communication. A non- interactive model that has serious developmental drawbacks Daniel & Gilligan (1999). This is in tandem with Elizabeth, Gregory, Fosco and Thomas (2010) affirmation that the family is a child's "social network" which offers an immediate environment during formative years that contributes to behavior modification and sustainable development. In support of this position, Samiullah (2016) affirmed that authoritarian parenting style model influences a child's development in line with set standards of conducts which determine nature of communication patterns.

According to Canary (2011) communication is anchored on interaction between individuals for common understanding and exchange of information, ideas and feelings for achieving social skills. Further, effective communication imparts knowledge and paves way towards strengthening attachment and upholding peace for nurturing relationship between parents and children. In support of these sentiments, Knight and Holt (2014) asserted that healthy and appropriate communication between parents and child results in enhanced academic achievements and less behavioral challenges for developing trust, confidence and positive relations. This is in

concurrence with Toombs, Unruh and McGrath (2018) suggestion that positive parenting requires effective communication for developing interpersonal skills and secure attachments that can be passed on to future generations. In instances where appropriate communication is reinforced, tolerance, independence, and personal development is nurtured which in turn assist learners in enhanced participation in class activities. On the other hand, ineffective communication denies children space to freely interact and express own needs therefore weakening participation and disrespect for others.

While parents should be talking to children and consulting, Samiullah (2016) affirmed that restricted communication in authoritarianism parenting style reduces language and communication skills. Inappropriate communication skills are likely to lower self-esteem, confidence and competence among learners therefore creating a barrier to effective participation in class activities. In a study on parenting style and involvement of parents in school activities, Marina, Dragana and Marija (2013) established that children from authoritarian parenthood are less confident and demonstrate difficulty in social interactions due to inadequate freedom in making choices and restricted efforts in communication. As a result, children from authoritarian parents are less resourceful, socially-adept and more likely to be involved in bullying activities which weaken effective participation in school. This supports an earlier argument by Baumrind (1991) that parents make claims on children to become integrated into the whole family by maturity demands, supervision, disciplinary efforts and willingness to confront the child who disobeys. Such parents tend to utilize punishments rather than discipline and are not willing to explain reasons in relation to set rules. More still, Pinquart (2017) established that authoritarian parents control and evaluate behavior and attitudes of children in accordance with a set standard of conduct motivated and formulated by a higher authority as a way of good parenting. Based on this assertion, the parenting model of a parent should influence child's

relationship with others and nurture development of personal strength for effective learner participation in class.

Learner participation is connected to conversation which naturally involves extensive dialogue with the entire class influenced by learner-led communication. As noted by Blazar and Matthew (2017) participation is an effective feature of many course designs that results in insightful comments and interesting connections by learners which foster a high level of energy and enthusiasm for learning. In addition, Peter (2017) in a study on innovation in education indicated that active participation require environments that support free communication where learners can take risks, make errors and be exposed to diverse ways of thinking as part of the learning.

Therefore, reinforcing participation through positive environments allows learners to acknowledge contribution to a shared experience which builds sense of collectivism that nurture communication skills. However, Dawood (2015) opined that reluctance in talking openly is an obstacle to a sound relationship since communication is the heart of participation and sharing of experiences in class situation. Further, in a study on parenting styles and academic achievement, Purification and Alicia (2018) opined that inadequate conversation and motivation to communicate openly like in authoritarian parenting weakens opportunities for learning and participation in class.

In this regard, learners who experience inadequate motivation are likely to feel discouraged, irritated, baffled and embarrassed which inhibits chances of talking and social interactions. Given that the choice authoritarian parents make influences success in school, Checa and Abundis-Gutierrez (2017) commented that this may not hinder having a determining factor on character, personality and competence of learners. Appropriate task of parenting is the socialization of children which requires parental guidance coupled with effective communication skills that encourage learner participation in class. This is because a socially competent child is independent, responsible, achievement oriented and energetic to effectively participate in class activities. In support of this contention, Pinquart and Kauser (2018) indicated that the role of parents should be considered since interaction between a child and a parent has a significant influence on nature of participation. Based on this back ground, the study examined relationship between communication in authoritarian parenting and learner participation in science activities, focusing on language development, social withdrawal, emotional balance and anti-social behavior.

2.0 Methodology

The study involved a descriptive survey research design where qualitative data is collected. According to (Key 1997), descriptive research is used to obtain information concerning the current status of phenomena to describe what exists with respect to variables or conditions in a situation, (Cohen & Manion, 1994) state that survey studies collect data with the intention of determining the relationships existing between specific events or variables. This study sought to use descriptive survey design to collect and analyze data to determine the relationship between authoritarian parenting model and learner's participation in class and further established the effects of the parenting model on learner's classroom participation.

The data collected was qualitative since the techniques and measures used did not produce discrete numerical data Mugenda (2003). Mostly, in qualitative research techniques, the data are in form of words rather than numbers and these words are often grouped into categories. According to Abel (Mugenda and Olive Mugenda, 2003), qualitative research is advantageous in that it permits the research to go beyond the statistical results usually reported in quantitative research. A sample is a small part of the total number that is to be studied Muthee, (2010). This study involved 314 respondents which is recommended by (Krejcie &Morgan, 1970), drawn from the total population including; 60 head teachers, 60 ECE teachers, 70 parents, 4 education officers and 120 ECE learners The parents sample size was reached at by using the snowballing sampling technique. Knowledge generated by qualitative research is significant in its own right Adelman, (1980). This study targeted all the learners in public Early Childhood Centers in the Division, their parents, the teachers, head teachers, the AEOs and the DEO. There were 60 head teachers, 180 ECE teachers and 230 parents in three zones with 400 ECE pupils spread all over the Division including the DEO of the sub county and the 3 AEOs of the three zones. This study population was large therefore it was not possible for the researcher to interact with every element in the population, hence need for sampling. A sample is a small part of the total number that is to be studied Muthee, (2010).

This study involved 314 respondents which is recommended by (Krejcie &Morgan, 1970), drawn from the total population including; 60 head teachers, 60 ECE teachers, 70 parents, 4 education officers and 120 ECE learners The parents sample size was reached at by using the snowballing sampling technique. Data was collected using interview schedules and questionnaires. The selection of these tools was guided by the nature of the collection of data, the time frame and objectives of the study. A pilot study was carried out to ensure the validity of the instruments. The pilot study involved three teachers, three parents and three learners. The samples used in the pilot study were excluded from the final administration of the instruments. The data collected from parents and teachers' questionnaires was analyzed in relation to the researcher's questions. Quantitative data was coded and descriptive analysis done. This was done using frequencies and measures of central tendency. Tables, pie charts and graphs were used to present the findings of the analysis and thereafter the findings of the analysis presented in a report. The data was analyzed with the aid of Microsoft excel.

3.0 Findings and Discussions

Dockrell & Lindsay 2008) posited that children who freely talk to their parents tend to participate more in class activities. On the same vein, (Vygotsky 1962) indicated that children in every culture master the complicated system of their native language learnt from the family members which is critical to cognitive development and learning unless severe deprivation or physical problems interfere.

Table 3.1: Expressiveness and Learner Participation

EXPRESSIVENESS	**ECE TEACHERS**		**HEADTEACHERS**	
	F	%	F	%
Passionate	6	10	7	14
Eloquent	9	15	12	24
Powerful	5	8.33	6	12
Emotional	40	66.67	25	50
TOTAL	**60**	**100**	**50**	**100**

Table 3.1 shows that out of 60 ECE teachers 6 (10%) confirmed that children of authoritarian parents were passionate during class activities especially in science. 7 (14%) out of the 50 head teachers also confirmed that the children were passionate. This supports by Rider, E & Sigelman, (2011) argument that children of authoritarian parents are quick tempered and easily moved to anger. 9(15%) of the ECE teachers observed that the learners were eloquent, this was also confirmed by 12(24%) of the head teachers. This lower percentage of eloquence is in line with (Dockrell & Lindsay's 2008) argument that the development of speaking skills requires fuller and more intensive attention to make sure that children acquire a good stock of words. On the other hand, 40(66.67%) of the ECE teachers observed that the learners were emotional. This confirms the argument by (Rider, E & Sigelman, 2011) that authoritarian children are quick tempered hence very emotional. The question of expressiveness when posed to one respondent-teacher during a discussion yielded several interesting results as captured below;

> *"parents should make themselves available to talk and listen hence be easily approached by their children. They should minimize name calling, criticism, threatening, blaming or minimizing feelings. The goal of communicating openly is not just for children to follow directives but also helps them learn how to express themselves. Effective parent-child communication makes children be self-sufficient and confident fostering healthy self-esteem and reinforcing a sense of safety, acceptance, inclusion and respect at home."*

The data could be presented in a graph as shown below.

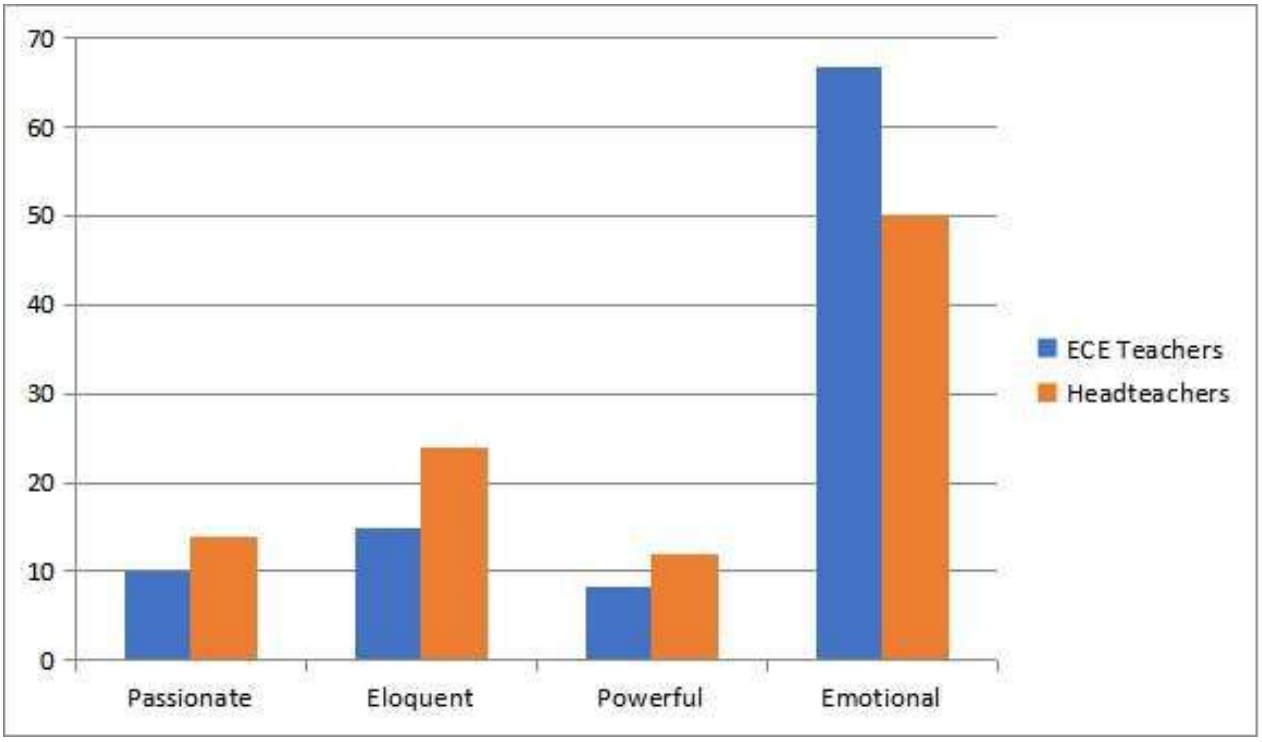

Figure 3.1: Expressiveness and Learner Participation

3.2.2 Social Withdrawal and Learner Participation

Healthy attachment is required between the parent and the baby. It is instinctive for most parents to start the moment their baby is born although one in ten mothers has some levels of post-natal depression, which may affect interaction. According to (Williams *et al.* 2009), Parents should be reminded from time to time to talk, listen and respond to their child and gauge on how to enrich the child's experience.

Table 3.2: Social Withdrawal and Learner Participation

SOCIALLY WITHDRAWN	TEACHERS	
	F	%
YES	42	70
NO	18	30
TOTAL	60	100

Table 3.2 shows that 42(70%) of the ECE teachers observed that learners from authoritarian homes were socially withdrawn when in class. This was attributed to lack of effective social relationship between an authoritarian parent and the child that greatly affects how the child interacts in school. On the same vein, Abraham Maslow indicated that a child's social needs should be met in order to motivate human (child's) behavior. However, one teacher had this to say on social withdrawal that:

> *"a blend of authoritarian parenting model with permissive parenting model tend to have a more inclusive child who participates in and out of school realizing higher learner achievement. This is because these children from authoritarian families tend to be withdrawn in and out of classroom keeping off all the social activities in the presence of peers thus even avoiding participation in class activities".*

However, 18(30%) of the teachers observed that the learners from authoritarian families were not socially withdrawn when in and out of class given that they were able to fit in the harsh home environment or just tried to make good use of the stress free opportunities in school.

3.2.3 Learners Antisocial Behavior and Participation in Class Activities.

Parenting model that exists in a home greatly influences a child's behavior. In homes where authoritarian parenting is practiced, the children tend to behave unreasonably compared to children who are in non authoritarian homes. This is supported by (Knutson et al….2004) who found out that authoritarian, parenting model contributes to antisocial behavior by raising children temperament and could actually be more harmful to children with high behavioral impulse control.

Social learning theory suggests that a child learns behavior from interacting with significant people in their environment, particularly parents and this behavior are maintained through modeling and reinforcement.

Table 3.3 Antisocial Behavior and Learner Participation.

Response	**Teachers**		**Parent**	
	F	%	F	%
YES	44	73.3	9	18
NO	16	26.67	41	82
TOTAL	**60**	**100**	**50**	**100**

Table 3.3 shows that 44(73.33%) or the teachers while 9 (18%) of the parents had observed antisocial behaviors in their children. This was because the parents unintentionally reinforced undesirable behaviors in attempts to appease the children. This is supported by Reti et al.., (2002) who stated that the coercive nature of parent-child interaction results in an increased risk of difficulties when negative spiral patterns of reinforcement involving both the parent and the child go unchallenged. When the patterns are established in an authoritarian environment, they result in an escalation of negative behavior on the part of the child as well as the child's problematic behavior.

However, 41(82%) of the parents as well as 16(26.67%) of the teachers were in agreement that they did not observe any antisocial behavior in their children. This was as a result of parent's education background as shown in table 4.4 where the majority of the parents are primary school leavers and are not keen in child rearing practices while for the teachers it was as a result of shorter periods of stay in their work stations as shown in table 3.1 hence had not studied the learners well.

3.2.4 Emotional Balance and Learner Participation

Emotional and language development occur together in children and affect each other powerfully. This is evident with young children as they learn about different emotions through play. In the early stages of schooling, children learn to share their feelings in words, consider the effects of their actions, reflect on and plan on what they feel, do and say. All these require an appreciation of the emotions and thoughts of other people and the language to put these into words. There are opportunities in the school playgrounds for children to develop skills in managing their emotions appropriately with developed language skills, children can negotiate their roles in play situations, organize activities, clarify their thoughts to others and make it clear when they are unhappy with a situation.

Table 3.4: Emotional Balance and Learner Participation

Emotionally	**Teachers**		**Parent**	
Balanced	F	%	F	%
Yes	60	100	47	94
No	-	-	3	6
Total	60	100	50	100

From table 3.4, 60(100%) of the teachers confirmed that learners did act out of emotions. This was as a result of their developmental stage and because of no proper guidance with the anger that developed as a result of neglect hence the child acting out of inbuilt emotions. This supports (Rider E & Sigelman, (2011) who stated that children of authoritarian parents are quick tempered and are very emotional.

On the other hand, 47(94%) of the parents also confirmed that their children acted out of emotions arguing that the children never want to be corrected hence will always react to any form of correction without reasoning. While 3(6%) of the parents confirmed that their children never acted out of emotions and that it was normal for a child to once in some while release emotions.

4.0 Conclusion and Recommendation

The purpose of the study was to collect data to find out the effects of communication in an authoritarian parenting model on learner participation in ECE science class in Kabondo Division, Homa-Bay County, Kenya. The study involved a descriptive survey design where both qualitative and quantitative data was collected. The researcher used frequency distribution tables to present the data. From the results obtained, the researcher wrote down the findings which gave guidance in drawing conclusions and making recommendations Referring to the first objective of expressivenesss in an authoritarian parenting and learner participation, the study found out that 9% of the ECE teachers observed eloquence in their learners from authoritarian homes. This implied that 91% of the teachers confirmed that the learners could not express themselves well as a result of the limited communication existing in between the children and their parents. From the findings, the researcher concluded that the nature of authoritarian parenting does not allow children free expression. This is due to high manner of controlling, harsh and strict commands. The model does not allow children independent points of view, thus rendering such learners passive in all happens concerning constriction of their own knowledge. This is retrogressive in accordance to the demands of scientific principles. Based on the study findings, the following recommendations were made for research;

Children be exposed to a variety of vocabulary from early ages since it is essential in the learning process and the ability and confidence to ask questions which is a vital skill for provoking and shaping new thinking which automatically enhances participation.

References

Asher, A. J. (2006). *Exploring the relationship between parenting style and juvenile delinquency*. Department of Social Studies and Family

Aswani, J. (1991). *Some of the Home Environment Factors That influence Educational and Occupational Aspirations of Pupils*. **U**npublished M. ED Thesis. Kenyatta University.

Bandura, A. (1979). *Social Learning Theory*. Englewood Cliffs. New Jersey. Prentice Hall.

Baumrind, D. (1989). *Rearing competent children*. In: Damon W, ED. *Child development today and tomorrow*. San Francisco. CA: Jossy-Bass: 349-378.

Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance use. *Journal of Early Adolescence, 11*(1), 56-95.

Berndt, T.J. (1997). *Child Development*. Chicago: Brown and Benchmark.

Blanton, B. (2005). Radical Parenting; *Seven Steps to a Functional Family in a Dysfunctional World*. Mumbai: Magna Publishing Company.

Borg, W. R. and Gall, M.D. (1989). *Educational Research. An introduction*. Longman. New York.

Brutsaert, H. (1990). Changing sources of self-esteem among girls and boys in primary schools. Urban Education.

Camilla, J., Maria, B., & Anders, T. (2016). Parent Programs for Reducing Adolescents Antisocial Behavior and Substance Use. Journal of Child and Family Studies, 25, 811-826. https://doi.org/10.1007/s10826-015-0263-y

Chao, R.K. (1994). Beyond Parental Control and Authoritarian Parenting Style: Understanding Chinese Parenting through the Cultural Notion of training. *Child Development,* 65, 1111-1119.

Cohen & manion (1994) parenting styles and academia achievement

Darling, N. (1999). Parenting styles and its correlates. ERIC DIGEST. EDO-PS-99.3.

Dekovic, M&Gerris (1992) parental reasoning complexity, social class andchild rearing behaviors.

Dockrell&Lindasay (2008) speech, language and communication needs and ECE school aged children.

Elizabeth, A.S., Gregory, M., Fosco, & Thomas, J.D. (2010). Implementing Interventions with Families in Schools to Increase Youth School Engagement: The Family Check-Up Model. School Mental Health, 2(2), 82-92. https://doi.org/10.1007/s12310-009-9025-6

Erin, E.W., & Shelia, M.K. (2017). Young Children's Risk- Taking: Mothers' Authoritarian Parenting Predicts Risk-Taking by Daughters but Not Sons. Child Development Research.

Ganira, K.L., Odundo, P.A., & Mwanda, S. (2015). Influence of psychological needs on Participation of children aged 4-6 years with physical disability in Early Childhood Education classes in Starehe Division, Kenya. Journal of Educational Research and Studies, 3(2), 30-40.

Ganira, K.L., Odundo, P.A., & Ngaruiya, B. (2015). Effects of Emotional Needs on Participation of Children Aged 4-6 with Learning Disability in Early Childhood Centers in Starehe Division, Nairobi County, Kenya. World Journal of Education, 5(3), 79-90.

Ganira, K.L., Odundo, P.A., Kahiga, W.R., Muriithi, M.E., Mwangi, J., & Koring'ura. J.C. (2016). Teacher Sustenance of Emotional Balance among Children aged 4-6 with Disability in Kenya: Addressing Safety, Actualization and Independence. International Journal of Technology and Inclusive Education (IJTIE), 3(I), 948-955.

Ganira, K.L., Odundo, P.A., Ngaruiya, B., & Obae, R. (2015). Impact of Social Needs on Participation of Children Aged 4-6 with Disability in Early Childhood Education Classes in Starehe Division in Nairobi County, Kenya. International Journal of Elementary Education, 4(2), 25-34. https://doi.org/10.11648/j.ijeedu.20150402.12

Gay, L. R. (1992). *Educational Research:* Competence for Analysis and Applications. 94th Ed). New York: Macmillan Publishers.

Gottfried et al (1998) role of cognitively stimulating home environment in children's Academic intrinsic motivation. Huxley, R. (2001). The four parenting styles from the World Wide Web: www.myra.com/relationship/parenting/fourstyles.htm

Hill, N,E (1995) , the relationship between family environment and parenting style,

Knutson, J. F., DeGarmo, D.S., & Reid, J.B. (2005). Care neglect, supervisory neglect, and harsh parenting in the development of children's aggression: a replication and extension. *Child maltreatment.*

Lamborn, SD, Mouris, Ns....., Steinberg..... Dornbusch, S.M (1991) Child development

Leong, P.W L&Kwan, K.S.F (2004) *parenting styles, motivational orientation*

Maccoby, E.E. and Martin, J.A. (1983). Socialization in the context of the family: Parent- child interactions, In: Mussen PH. Hetherington EM, eds. Handbook of child psychology. 4th Ed. New York,

Moffit, T.E. (1993). Adolescent-limited and life-course- persistent antisocial behavior: A developmental taxonomy

Mugenda, O. M., and Mugenda, A.G. (1991). Research Methods: Quantitative and Qualitative Approaches: Nairobi: ACTS Press.

Njega, A., and Kabiru, M. (2001). *In The Web of Cultural Transition:* A Tracer of children in Embu District, Kenya. Bernard Van Leer Foundation.

Onyehahi N.E (2004) Delinguency in children.

Patterson GR (1982). A social learning approach: Coercive family process. Eugene publishing company

Republic of Kenya, (2001). The Children's Act. Nairobi. Government Printers.

Schearer and Barley (2007) family types and the Childs behavior.

Steinberg, L., Dornbush, S.M., & Brown, B. (1992). *Ethnic Differences in Adolescent Achievement: An Ecological Perspective*. American Psychologist, 47.

Thompson, R.A. (1998). Early sociopersonality development. In W. Damon (Gen. Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology:* Vol. 3. *Social, emotional and personality development* (pp. 25-104). New York: Wiley.

Vygotsky.L.S. (1978), *Mind in Society. The development of Higher Psychological Processes*. Cambridge M.A. Harvard University Press.

Yi-Chan, T., & Mei-Ju, C. (2013). Interrelationships between Parenting Styles and Teachers Involvement: From Children's Emotion Regulation Competence Perspective. Journal of Applied Sciences, 13, 1066-1072.

"Bridging the Gap: Exploring Community Awareness and Support for Inclusive Education in Gasabo District, Rwanda"

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Abstract
This study investigated the level of community awareness in the implementation of Inclusive Education (IE) in Gasabo District, Rwanda. The study utilized qualitative methodology, 64 stakeholders including headteachers, local leaders, and parents of children with and without disabilities were selected through purposive and convenience sampling. Data were analyzed using thematic, narrative, and interpretive approaches. Findings revealed that limited understanding of Inclusive Education among community members hinders the support and integration of children with disabilities in inclusive education environment. The study recommends sustained community awareness campaigns, engagement of local and religious leaders to address cultural beliefs about disability, and strategies to mitigate financial barriers to access. It also underscores the need for active parent-community collaboration through regular communication and workshops. These findings inform the development of monitoring and evaluation frameworks and advocate for cross-sectoral partnerships to correct misconceptions about disability and promote the benefits of inclusive education to all learners in Gasabo District, Rwanda.

Keywords*: Community awareness, Inclusive Education*

1.0 Introduction

Inclusive education is globally recognized as a fundamental human right, emphasizing the need to accommodate all learners, regardless of their physical, intellectual, social, emotional, linguistic, or other conditions. It aims to eliminate barriers to learning and participation, ensuring that every child, including those with disabilities or special educational needs, is supported within mainstream educational settings. The United Nations Educational, Scientific and Cultural Organization (UNESCO) underscores the importance of inclusive education in achieving Sustainable Development Goal 4, which advocates for equitable quality education and lifelong learning opportunities for all (UNESCO, 2020).

Despite policy advancements and institutional efforts, the successful implementation of inclusive education largely depends on the awareness and engagement of the broader community. Community awareness encompasses the understanding, attitudes, and actions of individuals within a community regarding inclusive practices. When community members, including parents, local leaders, and caregivers, are knowledgeable and supportive of inclusion, they can act as key advocates and collaborators in promoting inclusive school environments (Ainscow, 2020). Conversely, a lack of awareness often leads to stigmatization, resistance, or indifference, hindering the acceptance and support of inclusive practices in schools.

Recent initiatives highlight the significance of community involvement in fostering inclusive education. For instance, the Realising Inclusive and Safe Education (RISE) project, implemented in Rwanda, Malawi, and Zambia, emphasizes community engagement to support children with disabilities in accessing quality education. The project involves training teachers and school leaders, engaging communities, and strengthening government support to ensure inclusive practices are effectively implemented (Chance for Childhood, 2025). Similarly, in Kenya, studies have shown that teachers' involvement in creating awareness among school community members significantly influences the adoption of inclusive education practices (Lumumba et al., 2023).

In Rwanda, community engagement has been pivotal in implementing inclusive education practices. A study focusing on Gasabo District revealed that when communities are informed about the principles and benefits of inclusive education, they become active supporters and advocates. This heightened awareness leads to better cooperation among parents, educators, and policymakers, creating an environment conducive to meeting the diverse needs of all students (Johnson & Kagabo, 2022). Moreover, initiatives like the Special

Olympics Unified Champion Schools program have been instrumental in promoting inclusive education by fostering social integration through sports and other activities, thereby enhancing community awareness and acceptance (Special Olympics Rwanda, 2024).

Technological advancements have also played a role in raising community awareness about inclusive education. Innovative approaches, such as virtual reality experiences, have been utilized to simulate the challenges faced by students with disabilities, thereby fostering empathy and understanding among educators and community members. For example, a study introduced a virtual reality experience aimed at promoting the inclusion of individuals with dyslexia in university settings, offering a novel way to foster empathy by allowing participants to experience firsthand the challenges faced by students with dyslexia (Alcalde-Llergo et al., 2025).

This article aims to explore the role of community awareness in the implementation of inclusive education. It examines current levels of knowledge, beliefs, and attitudes within communities, identifies barriers to awareness, and proposes strategies for increasing community involvement. By highlighting the intersection between community understanding and inclusive educational outcomes, this article contributes to the broader discourse on creating inclusive, resilient, and sustainable education systems that serve all learners.

2.0 Purpose of the Study

The study aimed to explore these issues in-depth, identify best practices, and develop actionable recommendations to strengthen community engagement and promote Inclusive Education in the Gasabo district and beyond.

3.0 Methodology

The study employed a descriptive case study research design to explore the level of awareness and engagement of parents and the broader community with Inclusive Education. This design was chosen to allow for an in-depth understanding of the phenomenon within its real-life context and to present a comprehensive and contextualized perspective on the issue (Creswell, 2014). The research targeted a total of 64 stakeholders, comprising 4 headteachers, 40 parents, and 20 local government officials. Data collection methods included focus group discussions with parents and semi-structured interviews with headteachers and community leaders. A thematic analysis approach was applied to organize and interpret the data, focusing on key variables such as the frequency of community participation in school activities, awareness of Inclusive Education policies, and perceptions of the effectiveness of related initiatives (Bryman, 2016). The use of qualitative methods facilitated the extraction of rich, detailed insights into stakeholder experiences and attitudes. This methodological approach was particularly effective in uncovering the complex, often subtle challenges faced by those promoting and implementing community-based engagement strategies in Inclusive Education (Patton, 2015)

4.0 Research Findings and Discussions

4.1 Presentation of Findings

4.1.1 Community understanding of Inclusive Education

The study revealed a broadly shared understanding among respondents that ***Inclusive Education (IE)*** is designed to offer equitable learning opportunities for all students, regardless of their backgrounds or individual differences. Participants consistently emphasized that inclusive education is fundamentally ***non-discriminatory***, aiming to integrate children across diverse dimensions, including ability, socio-economic status, and gender. One respondent remarked, "Students from poor families study together with students from rich families... also boys study together with girls in the same school environment." This perspective aligns with global definitions of inclusive education, such as those advocated by UNESCO, which promote the integration of all learners into a unified and supportive educational environment.

Despite this general awareness, the study also uncovered *persistent misconceptions*. Specifically, 34 respondents still equated inclusive education primarily with the education of children with disabilities. This narrow interpretation reveals a *conceptual gap*, where inclusion is viewed as a specialized intervention rather than a comprehensive educational approach that benefits all learners. One participant expressed, "It is education for disabled students, as they face problems to study with other children without disabilities, and

in Inclusive Education, students with disabilities have their program designed only for them in line with their difficulties." Such statements suggest that some community members perceive inclusive education as a segregated model rather than one that promotes full participation and equal learning opportunities within mainstream settings.

This misinterpretation reflects an *incomplete understanding* of inclusive education's broader philosophy, which aims not merely to accommodate students with disabilities but to transform the entire educational system to be responsive to the needs of all learners. This includes fostering a culture of acceptance, collaboration, and flexibility in teaching practices, classroom design, and school policies. As such, inclusive education should not be seen as a parallel or remedial system, but as a shared and holistic educational model that values diversity as a strength.

Johnson and Kagabo (2022) underscore the critical role that informed community stakeholders and educational advocates must play in shaping public understanding of inclusive education. They argue that these advocates should occupy "the front space" in awareness-raising efforts, ensuring that communities grasp not only the *definition* but also the *purpose and value* of inclusion. Their findings highlight the importance of *communication strategies and grassroots engagement* in correcting misconceptions and fostering support for inclusive education policies and practices.

To achieve this, continuous community sensitization, inclusive teacher training, and dissemination of inclusive education principles through local leaders and media are essential. Such efforts can help reposition inclusive education not as a service for a specific group but as a commitment to equitable, quality education for all.

Ultimately, while this study indicates growing acceptance of the idea of inclusion, it also calls attention to the *need for deeper conceptual clarity and public education*. Without this, policies and practices risk being implemented based on narrow or incorrect assumptions, thereby undermining the transformative goals of inclusive education.

4.1.2 Sources of Information on Inclusive Education

The study sought to establish source of information about Inclusive Education. The study established that the primary sources of information for most respondents include radio, television, meetings, and training sessions organized by stakeholders. These media channels are accessible, but may not be sufficient in reaching all community members. Focused group discussion with parents revealed that radio and community meetings the most common sources of information on inclusive education, but also admitted that the community at large is not fully informed. While these sources are useful, they seem to lack the depth necessary to ensure that people have a complete understanding of what inclusive education entails. These networks can amplify the voices of parents and community members who advocate for the rights of children with disabilities Byabagambi (2019). This indicates the need for more comprehensive, community-centered awareness programs, especially in remote areas or areas with limited access to formal media.

4.1.3 Community Awareness Level

The present study reveals that there is a generally shared recognition among respondents that Inclusive Education (IE) facilitates equitable educational opportunities for all learners, irrespective of their individual differences or socio-economic backgrounds. Respondents consistently highlighted the *non-discriminatory* nature of IE, emphasizing its commitment to integrating students regardless of ability, gender, or economic status. One participant noted, "students from poor families study together with students from rich families; also boys study together with girls in the same school environment," reflecting an understanding aligned with global frameworks on inclusive education (UNESCO, 2020; Florian & Black-Hawkins, 2019). Such views resonate with the broader principles articulated by Ainscow et al. (2020), who argue that inclusion is about transforming educational systems to accommodate diversity and ensure meaningful participation for all students within a unified learning environment.

However, despite this general awareness, the study identifies persistent conceptual limitations among some respondents. Specifically, a significant proportion—34 respondents—narrowly construe Inclusive Education as an approach exclusively targeting students with disabilities. For instance, one respondent articulated that IE is "education for disabled students, as they face problems to study with other children without disabilities and in Inclusive Education students with disabilities have their program designed only for them in line with

their difficulties." This perspective suggests a *segregationist interpretation* of inclusion, where IE is perceived as a specialized service distinct from mainstream education rather than an integrative, system-wide approach (Armstrong et al., 2021; Mittler, 2020). Such a misunderstanding aligns with findings from other recent studies indicating that misconceptions about IE persist, often limiting the potential for its effective implementation (Loreman, 2022; Ruijs & Peetsma, 2021). This narrow definition overlooks the fundamental tenets of inclusive pedagogy, which emphasize adaptability, equity, and the removal of barriers for all learners (De Boer, Pijl, & Minnaert, 2020).

Johnson and Kagabo (2022) underscore the imperative role of proactive advocacy and community engagement in clarifying the principles and benefits of inclusive education. They argue that *key stakeholders—such as educators, policymakers, and community leaders—must serve as frontline advocates* to disseminate accurate information and foster a deeper, shared understanding within communities. This is supported by other scholars who contend that community awareness and support are critical determinants of successful inclusion, as community attitudes can either facilitate or hinder the full realization of IE policies (Avramidis & Norwich, 2021; Forlin & Sin, 2020). Consequently, continuous community sensitization efforts, supported by well-designed training programs and public awareness campaigns, are necessary to challenge entrenched misconceptions and build a collective commitment to inclusive practices (Kalyva, Papadopoulou, & Tsakiris, 2023). Without such strategic engagement, the transformative potential of inclusive education risks being undermined by persistent misunderstandings and limited conceptual clarity.

4.2.1 Impact of Increased Community Awareness

Despite numerous challenges, the enhancement of community awareness has yielded some positive outcomes in the implementation of Inclusive Education (IE). For example, one headteacher observed that "increased awareness has led to more parents sending their children to school, including those with disabilities," highlighting the role of awareness initiatives in improving school enrollment rates among marginalized groups. However, the Sector Education Inspector cautioned that overall community engagement remains limited, noting that "the level of community initiative is still low." This observation aligns with Slee's (2017) assertion that addressing stigma and fostering understanding through sustained community involvement are critical to advancing inclusive education. Similarly, the Sector Social Affairs office reported that "some parents have begun to provide basic materials to their children after awareness initiatives, but a significant gap remains in more active community support," underscoring the partial and uneven nature of progress.

Furthermore, challenges persist in the actual practices of inclusion; the Social Economic Development Officer cited instances where "parents often send only able-bodied children to school while leaving children with disabilities at home, as seen in the case where one child was left at home due to distance barriers." This illustrates the ongoing structural and attitudinal obstacles that hinder full participation in education for all children. Harper (2018) emphasizes that community engagement is indispensable for the success of IE initiatives in Rwanda, reinforcing the need for intensified efforts to shift community mindsets and norms. Recent research further supports these claims, highlighting that community-based awareness campaigns combined with inclusive policy enforcement can significantly reduce discriminatory attitudes and promote greater parental involvement (Mavuso & Mavuso, 2021; Ndlovu & Rukuni, 2022; Yousaf et al., 2023). Therefore, enhancing community awareness remains a critical strategy for transforming educational landscapes to be more inclusive and equitable.

4.2.2 Initiatives for Raising Community Awareness

The study aimed to examine the presence and effectiveness of initiatives designed to raise community awareness on inclusive education. One representative of people with disabilities at the local cell level noted, "Efforts to raise community awareness have largely been limited to sensitization during community meetings; however, the impact has been mixed, with some individuals resistant to changing their traditional mindsets regarding education and disability." This resistance reflects deeply rooted cultural beliefs and stigma that continue to impede progress toward full inclusion (Kalyva, Papadopoulou, & Tsakiris, 2023; Sharma, 2021). A headteacher emphasized that community engagement is vital for transforming perceptions, noting that school committees and advocacy groups have started to actively involve parents in inclusive education

initiatives. Mugisha and Mutesa (2020) argue that leveraging such local governance structures can significantly enhance the education system's capacity to respond to the diverse needs of all learners.
Socio-economic challenges further complicate efforts to promote inclusive education. For instance, one community member recounted, "In a village, there was a parent who used to carry her physically disabled child to school but stopped due to the long distance and the responsibility of caring for other children." This narrative highlights how economic hardship, combined with entrenched cultural norms, creates substantial barriers for learners with disabilities to access education (Banda & Mdikana, 2021; Ndlovu & Rukuni, 2022). Despite commendable efforts by local leaders and school committees to advocate for inclusion, achieving full community involvement remains an ongoing process that requires sustained commitment and resource allocation. Research underscores that addressing these intersecting barriers through community-based strategies is crucial for fostering inclusive educational environments (Avramidis & Norwich, 2021; Forlin & Sin, 2020).

4.3.1 Challenges facing effective implementation of inclusive education

Traditional beliefs and societal stigmatization continue to significantly constrain the understanding and effective implementation of Inclusive Education (IE). Many community members still perceive disabilities as a source of shame or regard the education of children with disabilities as secondary to that of able-bodied peers. This cultural mindset often results in the exclusion or marginalization of children with disabilities within educational settings and society at large. Davis (2021) emphasizes that Inclusive Education programs achieve greater success in contexts where parental advocacy and active community involvement are strong, highlighting the critical role of societal attitudes in shaping educational inclusion. Echoing this, a village leader noted, "Traditional beliefs lead to lower community expectations for children with disabilities, with many community members concluding that Inclusive Education is primarily for people with disabilities," which limits broader acceptance of IE as a universal approach. Compounding these cultural barriers are resource constraints: financial limitations and inadequate infrastructure continue to impede inclusive practices. Mugisha and Mutesa (2020) highlight that social networks within communities can be harnessed to pool resources and expertise, thus helping to mitigate challenges faced by individual stakeholders. Yet, schools often lack essential materials, trained personnel, and physical accommodations such as ramps, specialized classrooms, and accessible sanitary facilities needed to support diverse learners inclusively (Forlin & Sin, 2020; Loreman, 2022).
Data gathered from local leaders consistently point to the marginalization of children with disabilities not only in schools but also within their families and communities. Economic pressures frequently compel parents to prioritize the education and welfare of children without disabilities, resulting in the further neglect of children with disabilities. The challenge is intensified by long travel distances to schools and a lack of appropriate accommodations, which together deepen educational disparities. A Social Economic Development Officer observed, "In the Cell, a 12-year-old child with physical disabilities remained at home, as the parent was unable to afford necessary support, especially after the partner left due to familial conflict related to the disability." Such familial strain reflects broader psychosocial challenges, where stigma and emotional burdens restrict the full participation of children with disabilities in community life (Smith, 2017; Avramidis & Norwich, 2021). Caring for children with disabilities often places considerable strain on low-income households, sometimes leading to abandonment or shifting of caregiving responsibilities between family members. Community involvement—through fundraising, volunteering, and sharing expertise—has been identified as a vital mechanism to bridge resource gaps and foster supportive environments for inclusive education (Kalyva, Papadopoulou, & Tsakiris, 2023; Harper, 2018). Addressing these intertwined cultural and socio-economic barriers is essential for realizing the goals of truly inclusive education

5.0 Conclusions and Recommendations

5.1 Conclusions

In conclusion, the successful implementation of Inclusive Education is significantly hindered by deep-rooted cultural beliefs, socio-economic challenges, and persistent stigmatization of disabilities within families and communities. Despite isolated efforts to raise awareness and engage communities, misconceptions about the purpose and scope of Inclusive Education remain prevalent, often relegating it solely to the education of

children with disabilities. Furthermore, economic hardships and limited infrastructural support exacerbate the marginalization of these children, leading to their exclusion from mainstream educational opportunities. As research suggests, fostering inclusive environments requires a multifaceted approach that combines community sensitization, strong parental advocacy, resource mobilization, and institutional commitment. Therefore, addressing these barriers through sustained community engagement and targeted policy interventions is essential to create equitable and accessible education systems for all learners.

5.2. Recommendations

From the study findings the study makes the following recommendations:

Strengthening collaboration between schools and stakeholders to consolidate support for inclusive To transform Inclusive Education from policy to practice, a *"Community-Driven Inclusion Model"* should be adopted, one that actively empowers parents, local leaders, and school committees through continuous sensitization, resource mobilization, and inclusive planning. This approach must go beyond awareness to challenge harmful cultural beliefs, promote shared responsibility, and ensure that every child, regardless of ability, is seen, supported, and schooled. Investing in community ownership and inclusive leadership is not just beneficial *but* ***essential for sustainable educational equity.***

References

Ainscow, M. (2020). Promoting inclusion and equity in education: Lessons from international experiences. Nordic Journal of Studies in Educational Policy, 6(1), 7–16. https://doi.org/10.1080/20020317.2020.1729587

Armstrong, D., Armstrong, A. C., & Spandagou, I. (2021). Inclusive education: International policy & practice (2nd ed.). SAGE Publications.

Avramidis, E., & Norwich, B. (2021). Teachers' attitudes towards inclusive education: A critical review of literature. European Journal of Special Needs Education, 36(3), 337–353.
https://doi.org/10.1080/08856257.2020.1762986

Banda, D. R., & Mdikana, A. (2021). Parental involvement in inclusive education: Perspectives from sub-Saharan Africa. African Journal of Disability, 10, 1–9. https://doi.org/10.4102/ajod.v10i0.817

Davis, R. J. (2021). Community participation in inclusive education: A review of practices and outcomes in low- income countries. International Journal of Inclusive Education, 25(8), 936–952. https://doi.org/10.1080/13603116.2019.1694870

Florian, L., & Black-Hawkins, K. (2019). Exploring inclusive pedagogy. British Educational Research Journal, 37(5), 813–828. https://doi.org/10.1080/01411926.2019.1655647

Forlin, C., & Sin, K. F. (2020). Developing inclusive teachers: A framework for professional learning. European Journal of Teacher Education, 43(1), 5–23. https://doi.org/10.1080/02619768.2019.1691992

Harper, C. (2018). Building inclusive communities: Local strategies for inclusive education in Rwanda. UNESCO Policy Brief Series. https://unesdoc.unesco.org

Johnson, P., & Kagabo, J. (2022). The role of advocacy in inclusive education: Perspectives from Rwandan education stakeholders. Journal of Inclusive Education and Development, 4(1), 44–59.

Kalyva, E., Papadopoulou, D., & Tsakiris, V. (2023). Parental and community attitudes toward children with disabilities: A challenge for inclusive education. International Journal of Disability, Development and Education, 70(3), 423–437. https://doi.org/10.1080/1034912X.2022.2037856

Loreman, T. (2022). Pedagogy for inclusive education: Theories and practices. Routledge.
https://doi.org/10.4324/9780429293095

Mavuso, M. P., & Mavuso, N. M. (2021). Teachers' and parents' perspectives on inclusion: A case study in a South African rural setting. South African Journal of Education, 41(2), 1–9. https://doi.org/10.15700/saje.v41n2a1800

Mugisha, F., & Mutesa, L. (2020). Harnessing social capital for inclusive education in East Africa: Policy and community perspectives. African Educational Research Journal, 8(4), 769–777. https://doi.org/10.30918/AERJ.84.20.085

Ndlovu, S., & Rukuni, M. (2022). Community and parental involvement in inclusive education: Lessons from Zimbabwe. Journal of Special Education and Rehabilitation, 23(1), 45–59. https://doi.org/10.46763/JSSR2231045n

Ruijs, N. M., & Peetsma, T. T. D. (2021). Effects of inclusion on students with and without special educational needs reviewed. Educational Research Review, 35, 100395. https://doi.org/10.1016/j.edurev.2021.100395

Sharma, U. (2021). Overcoming barriers to inclusive education in low-income contexts: Lessons from teacher development initiatives. International Journal of Inclusive Education, 25(14), 1550–1564. https://doi.org/10.1080/13603116.2020.1752824

Slee, R. (2017). Inclusive education isn't dead, it just smells funny. Routledge. https://doi.org/10.4324/9781315638843

Smith, J. (2017). Community participation in supporting inclusive schools: What works and why. Journal of Educational Change, 18(3), 243–262. https://doi.org/10.1007/s10833-017-9290-5

UNESCO. (2020). Global Education Monitoring Report 2020: Inclusion and education – All means all. UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000373718

Yousaf, A., Nisar, Q. A., & Shah, H. (2023). Community-based support systems and their impact on inclusive education practices. Journal of Educational Research, 26(1), 55–72. https://doi.org/10.22555/joer.v26i1.634

Resources Allocation and Teachers' Professional Development in Kenya

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Abstract
Strategic resource allocation for teacher's professional growth is a critical initiative in enhancing the education quality in Kenya. The Teachers Service Commission and Ministry of Education initiative to enhance teacher's capacity through mentorship, coaching and Teacher Professional Development (TPD) modules training programmes remains poorly implemented and underfunded, hindering continuous capacity building for teachers. This paper's objectives are to investigate the relationship between resources allocation and quality of professional development programmes and examine how resources availability affects teacher's involvement in continuous professional development activities. A descriptive survey design was utilized. The population that was studied comprised 241 teachers, 91 school administrators, and 29 Subcounty directors of education who were sampled using simple random sampling to come up with a sample of 186 teachers, 28 school administrators, and 13 Sub county Directors of Education from both rural and urban settings. Data from teachers and school administrators was obtained using questionnaires, while interview guides were used to obtain data from Subcounty Directors. Qualitative data was thematically analyzed while quantitative data were analyzed based on the descriptive statistics and inferential statistics (Pearson correlation and chi-square test). The findings were presented in form of tables. In addition, the findings revealed that inadequate funding, insufficient time allocation, and lack of sufficient ICT resources were common challenges to effective teachers' professional development through mentorship, coaching, and capacity building workshops. Strategic resource allocation determines both the participation levels and quality of teachers' professional development in Kenya. Where resources are strategically and appropriately allocated, professional development is more structured and effective. The study recommends the allocation of resources based on a needs assessment to ensure equitable support to schools in rural and marginalized areas where opportunities for professional development are often limited. The Ministry of Education through the Teachers Service Commission should set aside budgets to support the participation of teachers in professional development by covering travel expenses and materials. Additionally, teachers should be actively consulted in planning and decision-making concerning the apportionment of resources to ensure relevance and ownership in their professional development journeys.

Keywords: *Resources Allocation, Professional Development, Capacity Building*

1.1 Background of the Study

Teachers' professional development is recognized as an essential aspect of enhancing the quality of education and enhancing learner outcomes. In Kenya, the education stakeholders put a lot of emphasis on CPD for teachers as a strategic approach in transforming the education sector (Republic of Kenya, 2019). However, the sustainability and efficiency of professional growth programmes depend on the allocation and availability of resources that play a vital part in the planning, execution, and evaluation of professional development programmes (Ono & Ferreira, 2010).

There have been changes by the Kenyan government through the Ministry of Education and Teachers Service Commission to enhance the professional competences of teachers. These include the 2018 Teacher Professional Development framework that advocates for regular and structured CPD for all teachers (TSC, 2018). Despite the policy intervention, reports indicate that many teachers are not able to effectively participate in continuous professional development because of inadequate resources such as funding, training materials, and time allocations (Wasanga et al., 2021). Ngware and Ochieng, (2020) postulate that schools in marginalized areas are more affected with limited access to internet connectivity, professional trainers, and learning infrastructure.

Adequate resources allocation in form of human, financial, material, and infrastructure are important for the successful implementation of professional development programs. A study done by UNESCO in 2017 shows

that teacher development programmes in many sub-Saharan Africa face acute underfunding. As such, there is unreliable and poorly planned professional growth. In Kenya, Ngugi and Mumiukha (2016) hold that this matter is aggravated through regional disparities in education funding whereby rural and marginalized counties are adversely disadvantaged. Consequently, the professional development prospects for teachers become of poor quality.

The value of teacher's professional development packages is linked to the availability of resources. OECD (2016) portrays that effective implementation of TPD requires qualified facilitators, updated training materials, access to ICT tools, conducive training venues, as well as logistical support for teacher participation. In Kenya, despite the TSC initiating compulsory professional development courses such as the TPD modules initiated in 2021 in collaboration with such institutions as Kenyatta University, concerns remain regarding their reach and quality because of insufficient funding and inadequate infrastructure (TSC, 2021).

1.1 Statement of the Problem

Quality education in Kenya is linked to the teacher's professional competencies, which are enhanced through continuous professional development programmes. The sustainability and success of these programmes largely rely on the access and equitable allocation of resources. Despite intervention measures aimed at enhancing teacher quality, disparities persist in terms of finances, human resources and physical resources for professional development.

Over the years, Kenya has witnessed a growing concern about the role of resources allocation on teachers' participation and access to professional development. In addition, studies have shown that quality of teachers professional programmes are affected by inadequate funding and infrastructure and lack of support systems. These raises concerns on the extent to which resource allocation affects the efficiency of professional development for teachers in Kenya.

This paper therefore seeks to explore the relationship between resource allocation and professional development programmes for teachers in Kenya as well as examine how resources availability affects teachers' involvement in professional development programmes. Understanding the relationship and trends is crucial in informing professional development policy decisions and ensuring that the initiative is significant for teachers.

1.2 Purpose of the study

This paper purpose to explore how resource allocation affects the quality of professional development programmes and determine the extent to which resources availability affects teachers' engagement in professional development in Kenya.

1.3 Objectives of the study

The objective of the research was to:

1. To assess the effects of resources allocation on the quality of teacher's professional development in Kenya.
2. To examine how resources availability affects teacher's engagement in professional development activities in Kenya

1.4 Hypothesis

$H_0$1: Resources allocation has no substantial effect on the quality of teacher's professional development programmes in Kenya.

$H_0$2: Resources availability has no consequence on teacher's involvement in professional development activities in Kenya.

2.0 Methodology

The paper adopted a descriptive research design because it allows for a detailed description of the current state of resource allocation. The design help in identifying relationships, patterns and trends in resources allocation without manipulating variables (Creswell 2014). Additionally, descriptive design is the most

preferred in educational study as it is essential for obtaining factual data and analysing the prevailing conditions to inform policy.

2.1 Location of the Study

The research was carried out in Trans Nzoia, Nakuru, and Bungoma counties since they offer a diverse representation of Kenya's educational and socio-economic landscapes for comparative analysis. Trans Nzoia and Bungoma have rural and urban contexts, where resource constraints and disparities in professional development opportunities are more pronounced while Nakuru County is more developed with resources for professional development (Teachers Service Commission 2020).

2.2 Sampling Technique and Sample Size

A simple random sampling was adopted to sample 186 teachers, 28 head of institutions and 13 sub county directors of education from different sub counties. The technique was preferred as it ensures every person in the population have equal chance of being picked of the study. Additionally, the technique addresses the possibility of any selection bias promoting the collection of reliable and valid data that reflect the broader population.

2.3 Research Instrument

The paper adopted questionnaires to collect data from teachers, head of institutions and sub-county directors. They were the most preferred instruments for this study as they allowed collection of data from large sample within a short time. In addition, questionnaires allowed researchers to obtain both quantitative and qualitative data (Creswell & Creswell (2018).

2.4 Data Analysis

The study adopted both descriptive and inferential methods for analysis. Descriptive statistics used mean and standard deviation to summarize and interpret data. Inferential statistics made up of chi-square tests and Pearson correlation coefficients was used to determine the relationships between variables. The chi-square test evaluated the relationship between categorical variables such as types of resources and teacher participation in development activities, while Pearson correlation was used to determine the strength and direction of the relationship between the availability of resources and the quality of professional development programmes.

3.0 Findings and discussions

3.1 Effect of Resources Allocation on the Quality of Teacher's Professional Development Programmes in Kenya

$H_0$1: Resources allocation has no substantial effect on the quality of teacher's professional development packages in Kenya. Objective one was to investigate the effects of resources allocation on the quality of teacher's professional development programmes in Kenya. To investigate the influence of headteachers financial reporting on CBE resources acquisition, the null hypothesis was determined by a Chi-square (χ^2) test, at 0.05 level of significance and at 1 degree of freedom. The findings were shown in Table 3.3 below.

Table 3.3: Results of hypothesis 1

Independent variable	Hypothesis	Chi-sq. value	df	Chi-sq.p value	Sig. Value	Result	Decision
Resources Allocation	$H_0$1	185.17	5	0.000	0.05	0.000<0.05	$H_0$3: rejected

Source: Author, 2025

Table 3.3 above shows a chi-square test of independence associating resources allocation and teacher's professional development in Kenya. The results show a statistically significant relationship between variable,

χ^2 (5) =185.17, $p<0.05$. The significance level (p= .000) is less than the alpha level of .05 justifying the rejection of null hypothesis (H_0), stating that there lacks a significant link between resources allocation and teacher's professional development. The outcomes portray that resource allocation has a statistically substantial effect on teacher's professional development.

To approximate the extent of influence of resources allocation on teacher's professional development a coefficient of determination was computed using the regression analysis and the outcome presented in Table 3.2.

Table 3.2: Model Summary on Regression Analysis of Influence of Resources Allocation on Teachers Professional Development

Model Summary					
Model	R	R- Square	Adjusted R- Square	Std. Error of the Estimate	p-value
1	.471[a]	.447	.418	.61231	.000

a. Predictors: (Constant), Resources Allocation

b. Dependent Variable: Quality of Teachers Professional Development

Source: Author, 2025

Table 3.2 shows the value in R, (r = .471), which designates a medium positive link between the two variables resources allocation and teacher's professional development. It shows the coefficient of determination indicated R-Square, (R^2 = .447), which reveals amount of variability in implementation of teacher's professional development that can be explained by resources allocation. Additionally, it is observed that the value of adjusted R square (0.418) reveals that 41.8 % variability in implementation of teacher's professional development can be explained by resources allocation. The analysis shows that 58.2 % unexplained variation in teachers' professional development can be linked to other factors not part of this model.

3.1.1 Resources Allocation and Quality of Teachers Professional Development.

Descriptive analysis was used to determine the extent to which resources allocation affects the quality of teacher's professional development on a five-point likert scale based on statements related to resource allocation and quality of professional development. These were analyzed using mean and standard deviation and presented in Table 3.3.

Table 3.3: Resources Allocation and Quality of Teachers Professional Development

Statement on Resource Allocation (N = 28)	Mean Statistic	Std. Deviation (SD)	Minimum	Maximum
Improved resource allocation would significantly enhance the outcomes of professional development for teachers.	3.391	.785	1	5
There is a direct correlation between the amount of resources allocated and the effectiveness of TPD programmes.	2.904	1.073	1	5
Inadequate resources are a major barrier to organizing high-quality professional development.	3.167	.588	1	5
The school would implement more frequent or higher-quality TPD if more funds were available.	3.762	.891	1	5
Teachers' participation in TPD programmes increases when resource allocation is sufficient.	3.318	1.423	1	5
Better resource planning has led to noticeable improvements in the quality of our TPD activities	2.703	1.319	1	5
Composite values	**3.207**	**1.013**	**1**	**5**

Source: Author, 2025

The results in Table 3.3 indicate that all the aspects of resources allocation combined had a weighted mean of 3.207 with the values deviating from the mean to the extent of 1.023. in reference to the scale of interpretation the weighted mean show that resources allocation had an effect on the quality of teacher's professional development in Kenya.

3.2 Correlation of Resources Allocation and Teacher's Involvement in CPD

To determine the existence of relationship between resource allocation and teacher's involvement in continuous professional development, Pearson's correlation analysis was conducted. The findings are outlined in Table 3.4.

Table 3.4: Pearson's Correlation of Resource Allocation and Teacher's Involvement in Continuous Professional

	Pearson's Correlation	1	2	3	4	5	6	7
1. Teacher's involvement in continuous professional development	Correlation	1						
	Sig.							
2. I feel more committed to professional development when the school invests in it	Correlation	.715**	1					
	Sig.	.001						
3. When resources are readily available, I am more motivated to participate in professional development	Correlation	.628**	.489**	1				
	Sig.	.038	.042					
4. Lack of resources makes it difficult for me to engage positively in professional development.	Correlation	.613**	.361	.522**	1			
	Sig.	.050	.452	.035				
5. I have sufficient time allocated for participating in training and development programs	Correlation	.014	-.031	.335	.066	1		
	Sig.	.412	.812	.412	.862			
6. I'm more cooperative in training sessions when the sessions are well-funded and organized	Correlation	.504**	.611**	.397**	.422**	.466**	1	
	Sig.	.040	.000	.039	.027	.037		
7. Adequate resources increase my willingness to try new teaching strategies.	Correlation	.423**	.348**	.514**	.622**	-3.76	.580**	1
	Sig.	.036	.031	.044	.000	.423	.007	

** **Correlation is significant at the 0.05 level (2-tailed)**

Source: Author 2025

The correlation matrix in Table 3.4 above shows there is a correlation between resource allocation and teacher's involvement in CPD. Out of the six factors, five factors correlated with the teacher's participation in continuous professional. One factor did not correlate and was not considered for further data analysis. The positive correlations ranged from 0.423 to 0.715 which implied that teacher's involvement in continuous professional development was likely affected by resource allocation.

The Pearson's correlation index obtained on the first factor, "*I feel more committed to professional development when the school invests in it*" was r= 0.715, being positive with ρ= 0.001 which was less than alpha = 0.05 meaning that adequate resources allocation was crucial for teacher's involvement in continuous professional. The second factor, "*When resources are readily available, I am more motivated to participate in professional development.*" strongly correlated with teacher's involvement in teacher's continuous professional development ((r =0.628, ρ=0.038) at α= 0.05)), implying that resources allocation were crucial in teacher's involvement in continuous professional development. The third factor, "*Lack of resources makes it difficult for me to engage positively in professional development.*" ((r =0.613, ρ=0.05) at α= 0.05)) and the fifth, "*I'm*

more cooperative in training sessions when the sessions are well-funded and organized" moderately correlated with teacher's involvement in continuous professional development. ((r =0.504, ρ=0.040) at α= 0.05)). The sixth factor, "*Adequate resources increase my willingness to try new teaching strategies.*" moderately correlated with teacher's involvement in continuous professional development ((r =0.423, ρ=0.036) at α= 0.05)). Nevertheless, correlation between, "*I'm more cooperative in training sessions when the sessions are well-funded and organized*" and teacher's involvement in continuous professional development ((r =0.014, ρ=0.412) at α= 0.05)). This result indicate that funding and organization was not an important factor.

4.0 Conclusion

The study findings conclude that **resource allocation plays a significant part in shaping both the accessibility and quality of professional development programmes for teachers**. Proper funding, adequate infrastructure, access to instructional and ICT resources and human capital are all crucial for ensuring the implementation of teacher's professional growth initiatives to improve teachers' classroom performance and pedagogical skills.

The study highlights a **positive correlation between resource allocation and** teacher's involvement in continuous professional development. Teachers are more likely to take part in development programmes when resources such as funding for training fees, transport, learning resources, internet access, and time allocation are provided. Contrary, resource constraints in rural and underfunded schools pose barriers to consistent and equitable participation in such programmes.

5.0 Recommendation

The government, through the Ministry of Education and the Teachers Service Commission, should prioritize the allocation of adequate and sustainable funding for teachers' professional development programmes by covering direct costs of training, such as facilitators' fees and venue hire, transport reimbursement, meals, accommodation, and teaching resources. Budgeting for teacher's professional growth should be included in the annual education sector planning to ensure it is not sidelined by competing financial priorities. A budget for professional development fund could be established at both national and county levels to promote access to teacher's professional development initiatives.

The government should adopt a needs-based resource allocation model to ensure schools in marginalized and economically disadvantaged areas receive proportionately higher support for professional development. Consequently, this will allow all teachers, regardless of their geographical location or school status to access quality professional development.

To encourage teacher participation in professional development, both the government and school management should have incentives. These comprise recognition arrangements, career progression credits, salary increments, or accreditation tied to successful completion of professional development undertakings. As a result, teachers would be motivated to view professional growth as an important measure for their career growth and performance improvement and not as an optional endeavor.

Moreover, teachers need to be consulted in the planning and decision-making processes linked to professional development. This is because they have firsthand understanding of the gaps in professional development. Involving them ensures resources are directed towards relevant, practical, and high-impact training programmes.

It's also crucial to establish monitoring and evaluation measures to evaluate the effect of resource allocation on the quality and effects of professional development. The mechanisms will offer data-driven insights into what works, permitting continuous improvement and evidence-based policy interventions.

References

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). SAGE Publications.

Ngugi, J. N., & Mumiukha, C. K. (2016). Challenges facing teacher education in Kenya. Journal of Education and Practice, 7(30), 135–143.

Ngware, M. W., & Ochieng, V. (2020). Equity in access to teacher professional development in Kenya. African Population and Health Research Center (APHRC).

OECD. (2016). Supporting teacher professionalism: Insights from TALIS 2013. Organisation for Economic Co-operation and Development. https://doi.org/10.1787/9789264248601-en

Ono, Y., & Ferreira, J. (2010). A case study of continuing teacher professional development through lesson study in South Africa. South African Journal of Education, 30(1), 59–74.

Teachers Service Commission. (2020). TSC annual report 2019/2020. Nairobi: TSC.

Wasanga, P., Ochieng, D., & Ngome, C. (2021). Status of teacher professional development in Kenya. Kenya Institute of Curriculum Development.

World Bank. (2022). Kenya education sector support program: Implementation review and results report. Washington, DC: World Bank.

A Rhetorical Structure in Vice-Chancellor's Inaugural Speeches: A New Rhetorical Approach to Genre Analysis

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Abstract
Inaugural speeches are precisely the first speeches presented by people occupying leadership positions. Such speeches often serve as major means of appealing to people after a major selection, election, or appointment is announced or confirmed, as is the case of the inaugural speeches of Vice-Chancellors and presidents the world over. The presentation of inaugural speeches serves as a diplomatic means of selling new leadership ideas to people. It can also be referred to as Acceptance Speech. Although there are various studies investigating many linguistic attributes in inaugural addresses, there are quite few studies examining them in part of genre analysis and some linguistic features. Additionally, there are not any specific and standard move structures that can be used in order to universally create an inaugural address, since, even all speeches begin with greeting and finish with thanking audience, the body of those speeches is written differently. This study investigated the Rhetorical structure in inaugural speeches in the academic discourse context. Specifically, the study sought to find out the rhetorical moves in the VC's inaugural speeches and linguistic strategies employed. The study adopted the New Rhetorical Approach to Genre Analysis. A total of ten (10) speeches collected from the institutional websites and those published online were collected and analysed. The findings indicate that the rhetorical moves varied slightly across the speeches however, the common moves included Salutation, Pronouncement of Acceptance, Articulating sentiments on the occasion, Making pledges, Announcing institutional vision, mission and values to drive the new leadership, Addressing the expectations, Appealing for support, Resorting to religious power. In terms of the linguistic strategies, the use of personal deixis, especially the plural we, us and ours to create a sense of unity, lexical and syntactic parallelism, lexical chain, citing of other orators are among the commonly used strategies. Each of these strategies is pragmatically used. The inaugural speeches of vice chancellors of universities remain a topmost important discourse in every academic community due to the fact that, like the inaugural addresses of presidents, these speeches present the entirety of the visions of every newly appointed vice chancellor.

Key words*: Genre Analysis, New Rhetorical Approach, Inaugural speeches, Academic Context*

1.0 Introduction

An inaugural address is speech which is held at the beginning of taking on a certain office, such as the professorship at a university, for instance, or to disclose any special event and is usually surrounded by a festive ceremony. Public speeches are delivered orally, and are often well-prepared in writing and presented on formal occasions (Feng and Liu, 2010). Based on the functions and contents, an inaugural speech is a kind of public speech with purposes to influence a certain group of people. Inaugural speeches are precisely the first speeches presented by people occupying leadership positions. Such speeches often serve as major means of appealing to people after a major selection, election, or appointment is announced or confirmed, as is the case of the inaugural speeches of Vice-Chancellors (VC) and presidents the world over. The essence of inaugural addresses is an opportunity for the elected to talk about their future plans and their vision for the institution as well as to point out goals for the nation (check this because it must not be a nation. Indeed, in the same sentence the author has made reference to an institution). Although known as Acceptance or Maiden Speech, it is considered the VC's last campaign speech, since the newly elected VC in a way seeks to persuade and encourage the stakeholders and the people of his/her programme for the institution. Consider using the new VC minus elect/elected since it's not always that they are elected. They could simply be selected in certain jurisdictions. Perhaps aapointed could be an option. For this reason, this kind of speech is often also very persuasive and demanding (cf. Hatford, 1993:xv).

The inaugural speeches of vice chancellors of universities remain a topmost important discourse in every academic community due to the fact that, like the inaugural addresses of presidents, these speeches present

the entirety of the visions of every newly appointed vice chancellor. Inaugural speeches is a distinguished genre which relate to Aristotelian form of epideictic speech or ceremonial rhetoric. Campell and Jamieson claim that in the inaugural addresses numerous epideictic elements can be found. Among these elements are;

i. The delivery of the speech on a ceremonial occasion
ii. The linking of the past and the future in present contemplation
iii. The affirmation or praise of the shared principles that will guide the incoming administration
iv. The encouragement of the audience to look on traditional values
v. The employ of elegant and literary language
vi. The amplification or reaffirmation of what is already known and believed (2008:30)

In addition, they maintain that all inaugurals contain four generic or epideictic elements;
The presidential inaugural 1) unifies the audience by reconstituting its members as 'the people' who can witness and ratify the ceremony, 2) rehearses communal values drawn from the past, 3) sets forth the political principles that will guide the new administration; 4) demonstrates through enactment that the president appreciates the requirements and limitations of executive functions (2008:31).

Inaugural speeches/addresses are among the important pieces of communication that have attracted researchers' attention for the analysis of discourses, and for the study of language. These speeches are expected to communicate purposeful and meaningful messages. People have high interest in such speeches by vice chancellors in the same way that people are interested in presidential inaugural addresses. Analyzing vice chancellors' inaugural speeches will help to expand research on inaugural speeches and rhetorical analysis.

The study findings support a new rhetorical approach to genre analysis, where genres are seen as dynamic, socially embedded practices rather than static forms. They also not only underscore the importance of discourse analysis in leadership studies, especially in contexts where institutional transformation is urgent but also suggest that training in rhetorical literacy could benefit both leaders and evaluators in academic governance.

Earlier studies on VC's inaugural speeches by Asafo-Adjei and Tetteh (2020) looked at the implications of vice chancellors' speeches from a pragmatic perspective using the Gricean Conversational Maxims. Selected investiture speeches from vice-chancellors of selected Ghanaian technical universities were analysed using O'Leary's (2014) eight-step process for conducting document analysis. Findings revealed that the maxims of quality, quantity, and manner were deemed to have been broken in the speeches, even though the audience comprehended the implications of the speech due to the contexts, timing, and culture. Opoku et al. (2022), conducted a textual analysis of modality in a Vice-Chancellor's matriculation speech, from the Kwame Nkrumah University of Science and Technology. The results indicated that the declarative and imperative moods were utilized in the speech, with declarative dominating (86%). The study however found that the speech lacked the interrogative mood, which affects the communicative potential of the speech, because, the interrogative mood is foundational in upholding the interpersonal interaction between the speaker and the listener. Other studies that analyse vice-chancellors' speeches have done so from the angles of CDA (Ibunan, 2023), Rhetorical structure (Abusah, 2023) among others.

Besides, Pederson (2009) mentioned that although there are various studies investigating many linguistic attributes in inaugural addresses, there are quite few studies examining them in part of genre analysis and some linguistic features. Additionally, there are not any specific and standard move structures that can be used in order to universally create an inaugural address, since, even all speeches begin with greeting and finish with thanking audience, the body of those speeches is written differently. The current study explores rhetorical structure in the inaugural addresses of the vice-chancellors in the Kenyan context.

The objectives of this study were the following;

(i) What is the move structure used in the inaugural address?
(ii) What are the syntactic traits used in the inaugural address?

(iii) What are the lexical traits used in the inaugural address?

Analyzing Vice Chancellor inaugural speeches can provide insights into the leadership style, vision, and priorities of a university. By examining the language, structure, and content of these speeches, researchers can understand how a university's leadership communicates its goals and aspirations to its diverse stakeholders. Read this paragraph with my comments on an additional objective in mind to figure out if you can get something from here.

2.0 Theoretical Framework

Genres involve both form and content, which are inseparable (Giltrow, 2002). The form of discourse in a discipline or profession changes along with the changing intellectual content. Within the framework of Rhetorical Genre Analysis, genres are seen as types of discourse originating from 'the interplay between systems of social value, linguistic convention, and the world portrayed. They derive their practical reality from their relation to particular linguistic acts, of which they are both the products and the primary resources (Hanks, 1987).

Genres are both enabling and constraining. In this respect genres conventions constrains writers/speakers by limiting the form, style, language, and content that are appropriate in particular situations. Conversely, conventions enable by suppling templates, genres and topics which can be useful to the writer/speaker at all stages of the communication process. Both aspects tell the language use what is appropriate and acceptable. This study looks at inaugural speeches from a New Rhetorical Structure approach.

The New Rhetorical approach to genre studies allows researchers to concentrate on the ways particular discourses are socially motivated, generated and constrained (Coe and Freedman, 1998) and assists us in defining the possibilities of meaning in discourse (Hanks, 1987). The main argument in this approach is what discourse does, that is, its significance should be judged on the basis of what it does and shifts emphasis away from discourses as representation, which is considered secondary (Coe, Lingard & Teslenko, 2002a). Bawarshi (2000) sums up the New Rhetorical approach by viewing genre as what it allows us to do, the potential that makes the actual possible, the 'con' and the 'text' at the same time (pg.357).

Bakhtin (1986a) defines speech genres as 'relatively stable type of utterances, providing two useful concepts for understanding the nature of genre;

a) The responsive utterance as the analyzable unit of speech (rather than the word or sentence);
b) The addressive nature of speech

For Bakhtin, the responsive utterance is the fundamental unit of analysis of human communication because it occupies a particular definite position in a given sphere of communication (1986, pg.91). This means that words and sentences acquire meaning through the utterances and speakers choose the generic form of the utterance that best meets their speech plan or speech will. The argument that speech is dialogical in nature presupposes the importance of addressivity, that is, the quality of being directed to someone. Without an addressee to whom an utterance is directed, speech loses its dialogical context and turns into a separate statement belonging to nobody. Bakhtin suggests that addressivity is a constitutive feature of genre, noting that each genre has its own typical conception of the addressee, and this defines it as a genre (pg.95). The dialogic nature of speech, the necessity for a change of speaking subjects and respondents, and the process of utterance exchange, all reveal the communicative sense of oral language and writing.

3.0 Methodology

The study adopted a qualitative approach in the analysis of the rhetorical moves and the linguistic strategies employed by VCs' in their inaugural addresses. A total of ten (10) speeches collected from the institutional websites and those published online within and outside Kenya were collected and analyzed thematically. Content analysis of the speeches was done to identify the moves and the strategies. More needed to be said here.

4.0 Results

4.1 Move-structure analysis

Move 1: Salutation

In speech, the salutation of inaugurals formally announces the commencement of the event and routinely direct the attention of the audience to the content of the address. All the selected texts begin with a salutation. Unlike political inaugurals speeches, academic institutional management inaugurals address the audience as saluted respectively in the order of seniority. In some cases, the names of guests are mentioned one after the other, for instance, Dr. Vijoo Ratansi, Chancellor, Prof. Ojiambo, Chair of Council… etc. This appears to be the Kenyan culture as opposed to western culture where titles and names do not matter much. For instance, in one of the inaugurals at the University of Cambridge, the salutation is as follows; 'proctors, members of the Regent House, Distinguished colleagues, ladies and gentlemen….'

Move 2: Pronouncement of Acceptance of office

The new leader usually makes announcement at the beginning of the speech. For instance;

> "I stand here this morning to accept, with humility to be the 1st VC of the Cooperative University." (Cooperative University of Kenya 2018).
>
> "so the task of becoming this university's 346th VC is one that fills me with wonder-and one that I undertake with humility... (University of Nairobi 2020). UoN has not had this number of VCs or am I missing something here?

In some cases, the announcement is done or reiterated at the end of the speech, for instance;

> "I once again accept to be the VC of this great university with great humility as I take the dreams of the founders of this institution" (Cooperative University of Kenya 2018).

Move 3: Articulating sentiments on the occasion

This move is also known as a roll of gratitude or acknowledgements. This is a common move on inaugural ceremonies during which the new leader utter their sentiments on the occasion when they formally assume the responsibility as the VC. From the selected texts, it emerges that in most cases the new leaders express their acknowledgements to the predecessors for what they have done or contributed. For examples;

> "To my 7 predecessors, I salute you. In the larger scheme of things, your individual and collective contributions have borne the fruits that we enjoy today (University of Nairobi, 2020).

Acknowledgment of key people present including family members, for instance;

> "I wish in a special way, to pay tribute to my lovely wife Teresa… You have been a towering pillar of strength and for all these and many years of companionship, I cannot thank you enough!" (University of Nairobi, 2020).

In his address, Prof. Odhiambo of Meru University of Science and Technology thanked the Government of Kenya through His Excellency Hon. Uhuru Kenyatta, C.G.H. on his appointment as the Vice-Chancellor of Meru University of Science and Technology (MUST). He also thanked the Vice-Chancellor search team led by the University's Chairman of Council, Prof. Dulacha Galgalo. He also extended his heartfelt appreciation to members of the University Management Board and staff for the warm welcome accorded to him. Prof. Odhiambo appreciated the former Vice-Chancellor of MUST, Prof. Japhet Magambo, for the hard work which has seen the growth of the University since its inception. He also thanked Prof. Charity Gichuki for her good work for the period she was the Acting Vice-Chancellor of the University.

One common practice in learning institutions is mentorship. New leaders also acknowledge their mentors or teachers for inspiring them in a big way. For instance,

> "I am grateful to my friend and mentor Prof. Peter Gehr for interacting with him in the course of my PhD studies in Switzerland, I got a new appreciation of life… I received the best exposure in my training… (University of Nairobi 2020).
>
> "I extend special thanks to my long-time mentor Ruth Simmons. It was Ruth who, years ago, talked me out of an attractive offer from another university by articulating the global impact that a university leader can exert given the right platform, at the right institution, at the right time. Back then, Ruth asked me to start a distinctive engineering program in a liberal arts environment and "do

it the right way, because women must not accept so marginal a role in so important a field." (University of Cambridge).

Move 4: Making pledges

This move intends to fulfil the expectations of the audience for promise. This is done to assure the stakeholders that you will live to their expectations and should therefore have confidence in the new leadership. For instance;

> "I am neither a magician nor one that can play God. I am just the leader of the band! I promise to serve you with honesty, diligence and humility. I promise to be firm and fair, to lend a listening ear to you and to your concerns and to…make decisions grounded on law.
> How will you fix financial shortfalls: A 5-step approach will be used" i) fix the leaking ship, ii) trim our coat according to our size and iii) grow the topline (University of Nairobi, 2020).

Move 5: Announcing Institutions Principles/Vision/Values etc. to guide the new leadership

This move sets forth institutional principles and values. This is expected by the audience as a gauge to know whether the new leaders understand the institution properly.

Institutions are managed on policies which can also be referenced by the new leadership. For instance,

> "The true purpose of education is to replace an empty mind with an open one. Of necessity, we must regain this foothold in our university and create an environment that fosters intellectual curiosity, one that nurtures the ability to quest and test received wisdom in search for truth and one that accommodates divergent views." (University of Nairobi, 2020).

The new leader then points out problems. In this method, the governing principles are put forth as the solutions to the problems. For instance;

> "In 2016, our Chancellor recommended a visitation of the university, the visitation Panel, in its wisdom, observed that one of the constraints impeding institutional planning and management for productivity, efficiency and results at the university was the absence of coordinated university-wide data management and access system…We need to invest our energies and resources toward setting up a comprehensive and integrated data management system."
> "the university has over the years grown in size and complexity… there is compelling need to refresh our management, administrative, oversight and governance structures…. We need to embark on the path of fit for purpose training. We need to relook at our university course offerings and to assess the level to which they respond to market, industry, society and government needs.
> "it is my humble plea that all concerned parties will act in a manner that best fortifies the twin principles of functional autonomy and academic freedom as enshrined in our statutes." (University of Nairobi, 2020).

Move 6: Appealing to the Audience

There is always a general appeal for aids/help/support or some specific appeal for sacrifice and dedication.

> "…with your collective support, no obstacle will be too high to surround, no barrier too high to overcome, no burden too heavy to bear and no storm too strong to withstand" (University of Nairobi, 2020).
> "externally, we implore the government as the sponsor of public education in Kenya, to deliberately channel more resources into our universities."
> "… I appeal to you staff and students to make every effort to recalibrate our collective culture and attitudes towards team work, upholding discipline and integrity, commitment to entity and scholarship, efficiency and excellence."
> "with your support and dedication of time and energies… we are set to reach the Promised Land and build an ending legacy of academic excellence." (University of Nairobi, 2020).
> "Together, we build a future where cooperative values shape our economy." (Cooperative University of Kenya 2018).

Move 7: Resorting to Religious Power

Every leader will refer to God many times in his/her inaugural speech. The function of this move is to unite the people/stakeholders. Generally, leaders supplicate the help of God by two means:

i) Invoking God for guidance;
ii) Seeking divine blessings

"May God give us grace to serve. Thank you and God bless you all." (University of Nairobi, 2020).

"**May God bless the Co-Operative University of Kenya and God bless Kenya" (Cooperative University of Kenya 2018). Why is this section in bold?**

"Jesus said, 'Let the little children come to me…'" (Daystar University, 2019).

Why use every leader? I would rather, the author contextualises the analysis more by stating how many of the 10 did have specific moves, etc as opposed to the general presentation. Remember that in certain jurisdictions, the aspect of supplicating to God is non existent/not encouraged as they tend to be non religious.

4.2 Rhetorical and Linguistic Strategies

This study also explored the rhetorical and linguistic strategies employed in inaugural speeches. The findings are as follows;

The use of person deixis

Deictic expressions called deixis, can be interpreted only in the context in which they are used. The word deictic derives from the greek language and is used for pointing a subject. Such deixis create an effect of unity on one side and outsiders on the other.

"…***we*** implore the government as the sponsor of public education…)
…with ***your*** support and dedication of time and energies… ***we*** are set to reach the Promised Land."
"***We*** need to invest ***our*** energies and resources…"
"I promise …to ***you*** and to ***your*** concerns and to…make decisions grounded on law."
"**You** registered this sterling performance through extraordinary commitment…"
"…trim ***our*** coat according to ***our*** size…" (University of Nairobi, 2020).

By using the plural We pronoun, the speaker becomes a representative of the people. We, us and ours are pronouns which play their significant role in creating a sense of unity of the speaker with the audience. The speaker does not distance himself from the audience.

By carefully chosen pronouns, the speaker foregrounds the audience, whose ideas the speaker articulates and background the rest who have forgotten what the institution has already done.

We and ***our*** creates a panoramic picture of the institutional achievements, the present state and the future challenges.

Use of Hedges

Hedging strategies play a significant role in shaping how speech is perceived by audiences. Hedging involves using cautious, vague, or tentative language—such as words like "perhaps," "maybe," "somewhat," or phrases like "it seems"—to soften statements and express uncertainty or politeness. Hedges in vice chancellors' inaugural speeches are linguistic strategies used to express uncertainty, politeness, or flexibility—often to soften statements, avoid over-commitment, or diplomatically navigate sensitive topics. Hedges reduce the force of a statement. Common examples include:

a) Modal verbs: *may, might, could*; b) Adverbs: *probably, possibly, generally* and c) Phrases: *it seems, I believe, it is likely* among others.

In his inaugural graduation speech, the VC, University of Eldoret used hedging to frame his transformation agenda by softening the commitment and allowing room for interpretation:

"We ***may*** need to reconsider our approach…"
"Embracing digital technology ***isn't just a goal***; it's an imperative." (University of Eldoret)

"I ***will*** strive to promote and expand the existing capacities and partnerships to enhance self-reliance, and harness opportunities to shape policy and strategy-making discourse within the region." (National Defence University-Kenya).

"We ***may*** need to reconsider our approach…"

"It is ***possible*** that some policies will evolve…" Ghanaian Technical University.

These hedges allowed the speaker to imply future changes without committing to specifics, fostering understanding through cultural and contextual cues. Strategic use of hedging also constructs social reality and align with institutional goals for instance;

"We ***hope to*** build a more inclusive academic environment…"

"There ***might*** be challenges ahead, but we are prepared…" National University of Lesotho.

These expressions helped the VC manage expectations while projecting optimism.

Strategic hedging can soften controversial statements, making them more palatable, and gradually lead the audience to accept new ideas or perspectives. This makes speech persuasive to the audience. In summary, hedging shapes the perception of speakers as cautious, respectful, and considerate, which can foster trust and openness but may also risk diminishing authority if used excessively. The impact largely depends on context, frequency, and the communication style of the speaker.

Citing other orators

This is common in speech making. Speakers choose some quotes to support their argument or set the mood. For instance,

"If you allow, the University of Nairobi is sailing a new tide. And talking of times and their curious ways, Shakespeare couldn't have put it better when he said; *"There is a tide in the affairs of men, which taken at the flood, leads on the fortune. Omitted, all the voyage of their life is bound in shallows and in miseries. On such a full sea are we now afloat. And we must take the current when it serves, or lose our ventures.*" Together, I am confident we can seize the tide and secure our ventures." (University of Nairobi, 2020).

"I want to start by paraphrasing Charles Darwin… *those who are resilient, embrace innovation and are ready for transformation.*" — Kibabii University VC.

The elements of preaching

One of the most common rhetoric is the combination of transcendental and pragmatic themes. Transcendental strain in discourse gives speech an elevating tone, the sort of tone one hears. The speaker can feel inclined to mention the words of the scripture.

"Jesus said, 'Let the little children come to me…'" (Daystar University, 2019)

5.0 Conclusion

These strategies serve to make the speech more engaging, memorable, and persuasive by appealing to emotions, emphasizing key points, and creating a rhythmic flow. Rhetorical awareness enhances leadership communication, evaluate institutional discourse, and shape more transparent, inclusive governance in higher education. Which strategies are you refereeing to? Why are they not mentioned here?

6.0 Research Implications and Higher Education

The implications of these findings go beyond just understanding how Vice-Chancellors speak—they reveal how language actively shapes leadership, institutional identity, and power dynamics in higher education. In this paper, we argue that Inaugural speeches are not merely ceremonial—they are strategic tools for constructing institutional reality. We also argue that the Vice-Chancellor uses discourse to define priorities, values, and expectations, subtly guiding future policy and behavior. This genre not only helps the leader establish moral and intellectual authority, legitimizing their role and vision but also, through rhetorical framing, fosters unity and buy-in from the academic community.

7.0 Recommendations

i) There is need for training in rhetorical literacy to benefit both leaders and evaluators in academic governance.
ii) There is also need to design more persuasive and ethical leadership speeches by use of strategic rhetorical appeals such as a) Ethos, Pathos, Logos, inclusive language among others.
iii) There is also need to evaluate leadership texts critically to identify recurring rhetorical patterns, examine how language constructs leadership identity and institutional priorities and use deconstruction to uncover hidden assumptions, political motives, or strategic ambiguity.
iv) There is also need to train selection committees to assess not just content but rhetorical effectiveness and ethical framing.

References

Adjei, A. A., & Naakpi, R. B. (2024). The Relations of Dependency and Independency in the Inaugural Speeches of Three Vice Chancellors of a Ghanaian University.

Asafo-Adjei. R, Mary, A., & Tetteh, U. S. (2020). Analysis of Implicature of a Vice Chancellor's Speech through the Gricean Conversational Maxim Lenses: A Case of a Selected Ghanaian Technical University. ADRRI Journal of Arts and Social Sciences, 17(7 (5)), 19-45.

Bakhtin, M. M. (1986). Speech genres and other late essays. University of Texas press.

Bawarshi, A. (2000). The genre function. College English, 62(3), 335-360.

Campbell, K. K., & Jamieson, K. H. (1990). *Deeds done in words: Presidential rhetoric and the genres of governance*. Chicago, IL: University of Chicago Press. Needs realigning.

Coe, R. M., & Freedman, A. (1998). Genre theory: Australian and north American approaches. Theorizing composition: A critical sourcebook of theory and scholarship in contemporary composition studies, 136-147.

Coe, R. M., Lingard, L., & Teslenko, T. (2002). The rhetoric and ideology of genre: Strategies for stability and change.

Giltrow, J., & Stein, D. (2009). Genres in the Internet: Innovation, evolution, and genre theory. In Genres in the Internet (pp. 1-26). John Benjamins Publishing Company.

Hanks, W. F. (1987). Discourse genres in a theory of practice. American Ethnologist, 14(4), 668-692.

O'Leary, M. B., Wilson, J. M., & Metiu, A. (2014). Beyond being there. *MIS quarterly*, *38*(4), 1219-1244.

Opoku, N. A., Owusu, E., Adoma, S. K., Yeboah, A. A., Dansieh, S. A., & Appiah, P. (2022). A Textual Analysis of Modality in the 2015 Matriculation Speech of Prof. WO Ellis. *International Journal of Language and Literary Studies*, *4*(3), 144-157.

Pederson, W. D. (2012). Obama's Lincoln. The Obama Presidency: A Preliminary Assessment, 37.

Ethical Dilemmas in the Digital Age: Privacy, Freedom of Speech, and Censorship among Generation Z in Kenya

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Abstract
The rapid digitalization of communication in Kenya has significantly transformed how Generation Z engages with information, expresses opinions, and safeguards personal data. This study examines the ethical dilemmas surrounding digital privacy, freedom of speech, and censorship among Kenyan youth aged 18–27, within the framework of governance and policy innovation. The primary objective is to explore how existing digital governance policies affect the ethical values and digital rights of this demographic, particularly in the context of increasing surveillance, algorithmic control, and online content moderation. A mixed-methods research design was employed, combining quantitative surveys with 312 participants across five counties and qualitative in-depth interviews with 20 key informants, including digital rights activists, policymakers, and ICT professionals. The data were analyzed using thematic analysis and statistical inference methods to identify patterns in digital behavior, perceptions of online freedom, and trust in regulatory institutions. Findings indicate a growing tension between the desire for unrestricted digital expression and concerns over online safety, misinformation, and state surveillance. While 68% of respondents expressed support for free speech online, over 70% also reported incidents of content takedown or account suspension without clear justification. The study further reveals gaps in awareness of digital rights and inconsistent policy enforcement by government agencies. This paper concludes that Kenya's policy frameworks must evolve to balance ethical digital governance with the democratic ideals of privacy and expression. It recommends participatory policy-making processes that include youth voices and the development of transparent, rights-based digital regulations. These reforms are crucial for fostering a digitally just society where innovation does not come at the cost of civil liberties.

Keywords: *Digital ethics, Generation Z, Privacy, Freedom of speech, Censorship, Digital rights*

1.0 Introduction

The digital transformation in Kenya over the past decade has revolutionized communication, information access, and civic participation, particularly among Generation Z—individuals born between 1997 and 2012. With over 60% of Kenya's population under the age of 35, Generation Z represents a digitally native demographic that actively uses social media platforms, mobile applications, and online forums to express opinions, engage in activism, and build communities (Communications Authority of Kenya [CAK], 2023). However, this hyperconnectivity has also introduced complex ethical dilemmas. As Kenyan youth increasingly assert their voices in digital spaces, issues related to data privacy, freedom of speech, and censorship have become more pronounced.

Despite constitutional protections under Article 31 (right to privacy) and Article 33 (freedom of expression) of the 2010 Constitution of Kenya, numerous reports point to rising digital surveillance, arbitrary content moderation, and opaque data harvesting practices by both state and private actors (Kenya Law Reform Commission, n.d.; Freedom House, 2021). These developments have sparked widespread concern, particularly among younger users who often lack the legal literacy or institutional support to navigate digital rights violations effectively. Algorithmic control, misinformation regulation, and cyber-harassment are further complicating the ethical landscape, making it difficult to draw clear boundaries between lawful regulation and digital authoritarianism (Laibuta, 2024).

This study addresses the growing disconnect between Kenya's digital policy frameworks and the lived experiences of Generation Z. Current laws and ethical standards fail to adequately safeguard their digital rights in environments characterized by surveillance, censorship, and inconsistent policy enforcement. This disconnect exposes youth to risks that challenge democratic ideals and human rights in the digital sphere.

The purpose of this study is to examine how ethical dilemmas in privacy, freedom of speech, and censorship manifest among Generation Z in Kenya. It aims to investigate the extent to which current governance and policy practices affect their digital experiences, values, and participation in public discourse. The significance of this research lies in its contribution to digital governance and youth-centered policy innovation. By providing empirical insights into the ethical challenges facing young digital citizens, the study seeks to inform the development of rights-based, inclusive, and transparent policy frameworks. These frameworks are essential for promoting a just and secure digital ecosystem in Kenya, where innovation coexists with respect for civil liberties. This study seeks to: a) Investigate how Generation Z in Kenya experiences digital privacy, freedom of speech, and censorship in online spaces, b) evaluate the effectiveness and ethical implications of current digital governance policies affecting these rights and c) recommend innovative, rights-based digital policy frameworks that promote ethical governance in Kenya's digital transformation.

2.0 Literature Review

Kenya's digital ecosystem has undergone rapid growth, with increased mobile internet penetration and social media use-especially among youth. Generation Z (born 1997–2012) is at the forefront of digital communication, activism, and cultural expression (CAK, 2023). However, this has led to growing ethical concerns, particularly related to online surveillance, data misuse, content moderation, and algorithmic control (Laibuta, 2024).

While the **Constitution of Kenya (2010)** protects privacy (Article 31) and freedom of expression (Article 33), these rights are increasingly under threat due to inconsistent policy enforcement and vague legal thresholds for digital content regulation (KLRC, n.d.). Reports of arbitrary content takedowns and surveillance during political protests highlight the fragility of digital rights in practice (Freedom House, 2023).

Research by RSIS International (2025) on sentiment analysis of Twitter in Kenya reveals that Gen Z youth are vocal about social issues but often face algorithmic suppression and account bans. These digital dilemmas highlight a critical governance gap: the absence of youth-informed, transparent, and ethical digital policies.

3.0 Methodology

A mixed-methods research design was employed whereby in the quantitative Phase, an online survey of 312 Gen Z participants (aged 18–27) across five counties was conducted to assess experiences with digital privacy, freedom of expression, and censorship. In the qualitative Phase, in-depth interviews with 20 stakeholders—youth leaders, policymakers, digital rights activists, and ICT professionals—provided contextual insights. Data Analysis: Survey responses were analyzed using descriptive statistics in SPSS, while interview transcripts were analyzed using thematic analysis to identify key patterns and narratives.

4.0 Results

Key findings from the study include:

- **Digital Privacy**: 64% of respondents feared state or corporate surveillance, with 58% unsure how their personal data was used online.
- **Freedom of Expression**: 73% reported self-censorship when posting about political or sensitive issues due to fear of reprisal.
- **Censorship**: 61% had experienced or observed account suspensions, content deletion, or shadow banning on platforms like Facebook, TikTok, or X (formerly Twitter), often without clear explanation.

Interviews revealed skepticism toward government digital policies and a desire for more youth inclusion in policymaking. Participants expressed concern about the lack of transparency in how digital rights are protected and enforced.

5.0 Discussion

The findings indicate a significant ethical dilemma for Generation Z in Kenya's digital environment. Despite constitutional guarantees, youth experience infringements on privacy and freedom of expression due to opaque governance structures and weak policy implementation. The tension between national security concerns and individual rights is evident, with digital platforms and state actors often operating without clear accountability mechanisms.

The lack of digital rights awareness among youth further exacerbates their vulnerability to privacy violations and censorship. This situation underscores the need for comprehensive digital literacy programs and participatory policy-making processes that include youth voices.

Recommendations

1. **Rights-Based Digital Governance**: Revise data protection and cyber laws to explicitly safeguard freedom of expression and privacy for all users, especially youth.
2. **Youth Participation in Policy Design**: Institutionalize inclusive platforms where Gen Z voices influence digital governance decisions.
3. **Transparency in Content Moderation**: Require digital platforms and government regulators to disclose content takedown criteria and appeal processes.
4. **Digital Rights Education**: Integrate digital literacy and rights awareness into educational curricula and community programs.

6.0 Conclusion

This study reveals critical ethical dilemmas faced by Generation Z in Kenya's digital environment. Despite constitutional guarantees, youth experience infringements on privacy and freedom of expression due to opaque governance structures and weak policy implementation. Addressing these challenges requires a new era of participatory digital governance—one that aligns Kenya's innovation agenda with democratic and ethical values. Ayouth-centered approach to policy reform is vital to ensuring a digitally just and inclusive society.

References

Communications Authority of Kenya. (2023). Quarterly sector statistics report Q1 2023/24. *https://www.ca.go.ke/document/sector-statistics-report-q1-2023-2024/*

Constitution of Kenya. (2010). The Constitution of Kenya, 2010. Kenya Law. *https://www.klrc.go.ke*

Freedom House. (2021). *Kenya: Freedom on the Net 2021 country report.* https://freedomhouse.org/country/kenya/freedom-net/2021(Freedom House)

Freedom House. (2023). Freedom on the Net: Kenya. *https://freedomhouse.org/country/kenya/freedom-net/2023*

Laibuta, M. (2024, July 5). *Gen Z, right to privacy, and a revolution.* https://www.laibuta.com/data-protection/gen-z-right-to-privacy-and-a-revolution/(laibuta.com)

RSIS International. (2025). Gen Z protests and the ethics of AI-generated political images: A sentiment analysis of Kenyan Twitter discourse. *https://rsisinternational.org/journals/ijrias/articles/gen-z-protests-and-the-ethics-of-ai-generated-political-images/*

What Should Change? The Raging Debate on the Implementation of the Mathematics Curriculum at Senior School in Kenya

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Abstract
Mathematics is a core subject in the school curriculum and has been considered a critical filter in learners' career progression. In Kenya over the years mathematics has been considered one of the four subjects used to compute the cluster points for learners selected into different courses at the university. Other than being one of the cluster subjects, it is used when computing the mean grade of students in the Kenya Certificate of Secondary Education examinations. It enjoys the vantage position accorded to two other compulsory subjects English and Kiswahili. Admissibility into teaching profession by the Teachers Service Commission has had considerable focus on the grades a candidate scored in mathematics. For one to be a teacher of science subjects other than mathematics, they must have scored at least a mean grade C in mathematics and a minimum of C plus in each of the two teaching subjects. On the other hand, for one to be a teacher of Arts based subject other than mathematics, they need to have scored at least a D plus in mathematics and a minimum of C plus in the two teaching subjects. The prominence given to Mathematics begs the question why? Therefore, the objectives of this paper will be to define mathematics, identify the reasons why mathematics should be taught and learned at various levels of education, describe the qualities of an effective teacher of mathematics at the various levels of education, and finally discuss whether the subject should be optional at Senior School in Kenya. In the past few weeks of the month of April 2025, there has been a raging debate on whether mathematics should be an optional subject at Senior School come the year 2026 during the transition of grade 9 learners from the Junior School to grade 10 in Senior School. This paper addresses the curriculum changes in mathematics in Kenya dating from the colonial times to date. It will consider a critical review of literature on mathematics education from the global perspective to the local perspective as recorded in research theses, published peer reviewed journal papers, reports from departments and agencies of the ministries of education. In Kenya since independence in 1963, there have been three major curriculum reforms that affected the structure of the education system. The reforms were, the change from the 7-4-2-3 to the 8-4-4 and then lately the from the 8-4-4 to the current 2-6-3-3-3 Competency Based Education (CBE). In this paper emphasis is put on the causes for the curriculum changes and how the changes have impacted on the implementation of the mathematics curriculum and the challenges that have been encountered over the years in the implementation of the mathematics curriculum.

Definition of Mathematics

The Merriam Webster dictionary defines mathematics as the science of numbers and their operations, interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement, transformations, and generalizations. The dictionary identifies algebra, arithmetic, calculus, geometry, and trigonometry as the branches of mathematics.

Mathematics can be defined as the science that deals with the use of numbers for quantification of phenomena. Studying mathematics involves discovering relationships between phenomena and expressing them symbolically. The varied phenomena may have symbol representations and through their interaction can be related using their symbolic forms.

This symbolic representation makes mathematics to have its own unique language of expression that should be mastered by those who engage in it. The language of mathematics may use words from the common English language but carrying a different and distinctly mathematical meaning as opposed to the usual meaning in the common English language.

From the foregoing, mathematics can be seen to have varied definitions based on the experience of the person defining it. Mathematics can be defined as a language that uses carefully defined terms and symbols to express ideas and communicate thought distinct from the common language of communication and many

people use words portent with mathematical meaning but not really understanding the mathematics implied in what they are saying.

Mathematics can also be defined as is an art that reveals certain patterns that have aesthetic value and beauty that creates fun or enjoyment. This definition makes mathematics a key area of application in fields like fine art and in structural design.

The subject is a useful tool for exploring and describing many aspects of our environment, an important tool for trade, commerce and other types of human interaction and communication. In this respect one cannot imagine success in these areas without proper proficiency in mathematics. The subject can be seen as a science that seeks to put things in order by employing systematic observation, measurement and classification. Case in mind include aspects covered in the subject such as sequences and series, statistics, and other procedures for calculating mathematics sums that present logical and orderly information on phenomena in real life situations and experiences.

Why should mathematics be taught in the school curriculum?

Mathematics is only one of the many subjects, which is included in the school curriculum; and yet there is greater pressure for children to succeed at it. This suggests in some way that mathematics is thought to be of special importance. Learners should study mathematics because it is a foundational skill for many aspects of life, from everyday tasks like managing the resources that God has given to us. We have a plethora of resources that are meant to help us in our life pursuits and mathematical knowledge can facilitate us to sustainably manage these resources for our good. Land, water, air, trees, animals, minerals, time, money and many more other resources.

Mathematics is a powerful means of communication; Mathematics can be used to present information in many ways, not only by means of figures and letters but also through use of tables, charts and diagrams as well as graphs; and geometrical or technical drawings. The versatility of mathematics is such that figures and other symbols used in the subject can be manipulated and combined in systematic ways to permit make deduction further information about the situation to which mathematics relates.

It is fundamental subject required for the studying of physical sciences and engineering of all kinds, medicine and biological sciences, in geography and economics, in business and management studies. The subject is essential to the operation of industry and commerce in both office and workshops.

The subject is key in the development of powers of problem solving, critical thinking and logical reasoning, accuracy and spatial awareness and as such holds instrumental importance since competence in the subject could become a ticket to career opportunities in diverse fields leading to economic benefits that accrue to studying mathematics.

A strong foundation in mathematics can therefore lead to career opportunities in fields like finance, engineering, and data science, where mathematical competence is highly valued. The ability to analyse data and identify patterns is highly sought after in the data science field, which relies heavily on mathematical principles.

History of Mathematics Education Curriculum in Kenya

In Kenya several curriculum reforms have been attempted in mathematics education over the years. The reforms have ranged from reforms in pedagogical approaches of teaching mathematics, mathematics content being taught at different levels in school, the use of various resources in the teaching and learning of mathematics. Mathematics education in Kenya dates back to precolonial times. There was a form of mathematics that was used and was passed over from one generation to another even before written records were kept. The teaching and learning then was done informally and through intuition. The mathematics served the immediate need in the society by managing the resources that the people owned. The mathematics then involved matching the wealth such as herds of cattle, sheep, goats, that one had with objects such as stones or sticks. This was the concept of equality and correspondence.

The coming of missionaries and settlers in Kenya caused changes the learning of mathematics from the informal mode to a more formalized system. The formalized system sought to equip the African natives to provide cheap labour on the Europeans' farmlands. This was in terms manual labour and simple clerical work. The traditional curriculum that was offered was characterized as the 3-Rs that involved Reading,

Writing and Arithmetic. The mathematics curriculum had three segments, Geometry, Algebra and Arithmetic. The purpose of exposing the native Africans to this curriculum was to equip them to be useful on the European farmlands. The teaching methods was by drill and practice and rote learning. In this method of teaching learners were expected to memorize large chunks of information. The learners never developed skills to apply the knowledge gained in real life situations (Mutunga and Breakel, 1992).

In 1961 the conference of African states on development of education was held in Addis Ababa Ethiopia sought to realign the educational content and practice to be in line with the development needs of African countries. It was found out that the education content and practice was not in line with the existing conditions of the development needs of African countries and that the education being offered was not providing room for the African children's intellectual development (Shiundu and Omulando, 1992). The conference recommended that African governments should revise their education systems and curriculum to suit their physical, social and economic needs. In Kenya in 1964, the Ominde Commission report recommended provision of equal chances in access to education by all citizens irrespective of race or colour. This was in view of the fact that education was seen as a means to foster quick socio-economic development of the nation (RoK, 1964).

In line with the changes taking place in the western world, New Mathematics curriculum was developed in 1967 in Kenya and in 1970 when the ministry of education was satisfied with the results of the experimental New Primary Mathematics Programme, it was rolled out in all primary schools in Kenya in 1971. The curriculum laid emphasis on the role of technology in developing learners' competencies and understanding of mathematics concepts. This led to discarding of traditional mathematics and giving way to a new curriculum that would guarantee more and better trained graduates from the school system. The focus of curriculum changes in mathematics education have focused on changes in the teaching approaches from rote learning to more learner- centred approaches that enhance learner competence in skills and understanding of mathematics concepts (Mutunga and Breakel, 1992). The other motivation for curriculum changes in mathematics education has been to bring the school mathematics curriculum course in line and synch with the trends in further education and training so as to meet the increasing demand for mathematics; skills and competencies in commerce and industry. Later it was found that the New Mathematics was too rigorous placing a lot of emphasis and demand on both the teacher and the learner. This result in disinterest by the learners in the mathematics being taught in school because of the syllabus and core texts were found far too difficult for the learners, the content was demanding to both the teacher and the leaner and there was no much link between the content taught and the real-life experiences in the learners' environment. Some of the complaints were that the syllabus was too overloaded due to inclusion of new topics therefore teachers had no time to plan and execute the instructional programmes effectively.

It was also noted that there was no time for the teacher to learn the new content that they had not learned before yet they were expected to teach it. The language used in the in the texts was far too difficult for the users thus inhibiting understanding of subject matter. Cumulatively, therefore the learners lost interest in the subject. The outcome of this was the Presidential Working Party on the Establishment of a Second University in Kenya in 1981 resulted in a presidential decree to review the mathematics curriculum with the view of introducing appropriate mathematics that was a blend of traditional mathematics and new mathematics. This resulted in the change of the educational system from the 7-4-2-3 to the 8-4-4 system of education in 1985. The 8-4-4 curriculum of mathematics education aimed at enabling the learners to solve problems related to their day to day life experiences. In the 7-4-2-3 system of education mathematics was compulsory up to form four but beyond form four as one proceeded to A Level, those who pursued science subject combinations that did not involve mathematics undertook subsidiary mathematics. The taking of subsidiary mathematics ensured that students had exposure to the mathematics that would later help them in their career and further training. Additionally, all students who proceeded to A level irrespective of whether they were taking sciences or Humanities were to enrol for general paper in which one would be examined and pass at subsidiary level and one of the content areas to learn were basic statistical computation and data handling on issues in real life situations. All this points to the value of some form mathematics that persons should be exposed to.

In the 8-4-4 system of education mathematics is a compulsory subject up to form four. Persistent low attainment in mathematics led to stat of two tracks of mathematics in 2009. The two tracks were referred as

Alternative A and Alternative B. Alternative B is a simplified option that would appeal to learners who had challenges mastering the advanced concepts of Alternative A. The Alternative B mathematics is normally meant to be handled from form three until form four. However, stereotypes and other factors have negatively impacted on enrolment of students to the Alternative B track of mathematics. With the advent of the Competency Based Education and Training there have been significant changes in the design of the curriculum being offered in schools. With the aim of developing learners' competences rather than the accumulation of subject matter content for purposes of regurgitating it during examinations. In this new curriculum a number of learning areas have been developed and three major learning pathways namely; Science, Technology, Engineering and Mathematics (STEM), Social Sciences and Arts and Sports pathways. A pathway is a learning route that a learner selects as he/she prepares to specialise depending on personal interests, ability, and aptitude. At Junior School that runs grades 7, 8 and 9 students are prepared to take on the pathways when they transit to the Senior School in grade 10 and run through grade 11 and 12 before proceeding to University or Tertiary Education and Training.

Despite the concerted efforts to address the challenges facing the mathematics education curriculum over the years, student performance in mathematics at all levels has been dismal. The interest and attitude of learners in the subject has consistently been negative. The poor performance has partly contributed to the ever-increasing demand for reforms and the subject to be made optional. It is worth noting that most of the jobs of today demand much more than the ability to perform rote calculation but require more of creative problem-solving skills that lead to deeper conceptual understanding. In order to produce the problem solvers of tomorrow without fear of using their creativity to tackle unknown, incomprehensibly challenging problems in whichever field of practice, there is need to change the mathematics education curriculum to offer appropriate mathematics relevant to each practitioner in their field of practice. This will build learners' motivation as they prepare to navigate their career paths in the 21st century.

Who should teach mathematics?

One of the reasons for the low interest in mathematics has been attributed to poor teaching methods resulting from inadequate teacher preparation. The most effective mathematics teachers should be those who possess a strong foundation in mathematics, coupled with pedagogical skills to promote student understanding and engagement. They should be knowledgeable about the subject matter, able to make connections between abstract concepts and real-world applications, and effectively manage the learning environment. *The strong mathematical knowledge make th*e teacher to have a deep understanding of the subject matter that is crucial for accurately teaching concepts and fostering student comprehension. Such a teacher coupled with firm pedagogical expertise understands how students learn and can effectively use a variety of teaching methods and adapts the approaches of teaching and meeting varied learners needs. As communicators of mathematical facts, teachers convey mathematical ideas with the aim of ensuring learners have a deeper grasp of the content taught. Such a teacher will inspire the learners to view learning of mathematics interesting and relevant to their lives. The teacher will be able to create a positive and conducive learning environment that is interactive and engaging to facilitate success in learning. The ensure currency and being up to date the teacher needs to keep updating their skills and knowledge in the subject and in education due to the ever changing and dynamic nature of the profession.

Should mathematics be optional at Senior School?

One of the reasons that upper secondary education provides greater choice and diversity is because it is the moment when students are expected to start defining their interests and developing deeper and specific skills in areas that correspond with their future career ambitions. Students intending to study science, technology, engineering and mathematics (STEM) or humanities and social sciences and those to pursue Creative Performing Arts and Sports in post-secondary education are likely to have different needs in terms of the depth and breadth of their mathematics knowledge and skills. Therefore, providing these students with choice of the level and type of mathematics that they need to pursue in further levels of education enables them to develop mathematics competencies in line with their broader career ambitions. The differentiated mathematics options will enable students to exercise choice in Senior School linked to their future pathways noting that while all students will need some mathematics in life after school. Only those

intending to pursue post-secondary education and careers with high levels of mathematical content will need very deep or broad mathematics. Differentiated options create the space to provide dedicated mathematics options, perhaps with a different pedagogy, for students entering senior secondary with fragile mathematics skills. Therefore, mathematics should not be optional but there is need for having differentiated mathematics for the varied career pathways so that different pathways have the relevant mathematics that suits their practice.

Recommendations for the mathematics education reforms in the country

From the afore mentioned information this paper makes the following recommendations on the mathematics education curriculum

i. The subject should be taught to all learners to equip them with the necessary competence to use it in daily real-life situations without putting much premium on the learners' performance in the subject to determine access to further studies and employability.
ii. There should differentiated mathematics for varied learners with focus on having mathematics that meets the utilitarian value of the subject in the respective career pathway.
iii. There is need for continuous teacher professional development in the mathematical knowledge to build a firm foundation of mathematics and better pedagogical approaches to help them be effective in creating positive learning environments that stimulate learning and positive attitudes to the subject.

References

KICD (2017) Basic Education Curriculum Framework [Techreport]. Kenya Institute of Curriculum Development.

Masibo E.N., Kafu P. A. and Too J. K. (2013). Effect of the Mathematics Teachers' Beliefs about Mathematics on the Use of Technology in classroom Instruction in Secondary Schools in Bungoma, District, Kenya: An Unpublished Doctorate Thesis. Moi University, Eldoret, Kenya.

Merriam- Webster's Collegiate Dictionary (11th ed., 2003)

Mutunga, P. and Breakel, J. (1992). Mathematics Education, Educational Research and Publication (ERAP). Nairobi, Kenya

(Shiundu, J. S. and Omulando, S. J. (1992). Curriculum Theory and Practice in Kenya. Nairobi: Oxford University Press

RoK (1964). The Kenya National Education Commission (Ominde Report) Nairobi: Government Printer.

RoK (1981). Second University in Kenya (Mackay Report). Government Printer, Nairobi.

The Multilayered Structure of Community Knowledge and Perceptions of Flood Risk in the Lower Gucha-Migori River Basin, Kenya

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Abstract
Community perceptions of flood risk and knowledge of disaster risk management frameworks are critical determinants of effective flood mitigation and adaptation in vulnerable river basins. This study examined the multilayered structure of community knowledge and perceptions regarding flood risk management in the Lower Gucha-Migori River Basin, Kenya, where recurrent flooding threatens livelihoods and infrastructure. Using a mixed-methods approach with 357 household respondents, we assessed community perceptions of the Integrated Flood Management (IFM) framework effectiveness, identified key flood vulnerability issues, and documented community preferences for flood risk reduction strategies. Results revealed that 88.8% of respondents perceived the IFM approach as adequate, yet significant gaps persist in implementation, with 26.9% reporting lack of knowledge about flood risk management and 27.6% citing limited organizational capacities. Community preferences for flood protection standards reflected high risk aversion, with 54.3% favoring a 1-in-200-year flood standard. Proposed strategies for risk reduction emphasized structural interventions (shifting houses from high-risk areas, mean score 4.52) and nature-based solutions (increasing natural buffers, mean score 4.42). The study reveals that community perceptions are shaped by lived experiences, socioeconomic factors, and access to information, with significant disparities in risk tolerance across income groups. These findings underscore the necessity of participatory approaches that integrate community knowledge with technical expertise to enhance the effectiveness and equity of flood management strategies in the Lower Gucha-Migori Basin and similar flood-prone regions across East Africa.

Keywords: *flood risk perception, community knowledge, integrated flood management, disaster risk reduction, Kenya, participatory approaches*

1.0 Introduction

Flooding represents one of the most destructive natural hazards globally, with increasing frequency and magnitude driven by climate change, land-use modifications, and urbanization (Kundzewicz et al., 2014; Hirabayashi *et al.,* 2013). In East Africa, recurrent flooding has become a defining feature of the hydrological landscape, particularly in river basins characterized by high rainfall variability and inadequate drainage infrastructure. The Lower Gucha-Migori River Basin in western Kenya exemplifies this vulnerability, experiencing repeated flood events that displace communities, destroy agricultural lands, and undermine economic development (Ogallo *et al*., 2024).

Traditional approaches to flood management, which prioritized engineering solutions and top-down policy implementation, have demonstrated limited effectiveness in addressing the complex, multifaceted nature of flood risk (Merz *et al.,* 2010). Contemporary scholarship increasingly recognizes that successful flood risk management requires integration of multiple knowledge systems, including scientific expertise and community-based understanding rooted in local experiences and cultural contexts (Agrawal, 2002). The Integrated Flood Management (IFM) framework emerged as a response to these limitations, emphasizing holistic approaches that balance structural and non-structural interventions while promoting stakeholder participation and adaptive management (World Meteorological Organization & Global Water Partnership, 2004).

However, the effectiveness of IFM frameworks depends critically on community understanding, acceptance, and engagement (Cumiskey *et al.,* 2017). Community perceptions of flood risk are not merely reflections of objective hazard characteristics; rather, they are socially constructed through lived experiences, cultural beliefs, socioeconomic circumstances, and access to information (Slovic, 1987; Wachinger *et al.,* 2013). These

perceptions, in turn, shape community responses to flood risk, influencing decisions about settlement location, property investment, disaster preparedness, and participation in risk management initiatives (Grothmann & Reusswig, 2006). Despite increasing attention to flood hazards in Kenya, most studies have focused on flood occurrence, hazard mapping, vulnerability assessment, and climate change impacts. Limited research has examined how communities perceive Integrated Flood Management (IFM), evaluate the effectiveness of implementing institutions, and prioritize flood risk reduction interventions. Understanding these perceptions is critical because community acceptance and participation significantly influence the success of flood management initiatives. This study addresses this gap by examining community knowledge, perceptions, and preferences regarding flood risk management in the Lower Gucha–Migori River Basin, Kenya.

1.1 Research Objective

This study aimed to examine the multilayered structure of community knowledge and perceptions regarding flood risk and integrated flood management in the Lower Gucha-Migori River Basin.

1.2 Study Area Significance

The Lower Gucha–Migori River Basin is located in southwestern Kenya and covers parts of Kisii, Nyamira, Migori, and Homa Bay counties. The basin is drained primarily by the Rivers Gucha and Migori, which originate from the Kisii Highlands and flow westwards into Lake Victoria (Ogallo *et al.,* 2024). The area experiences a bimodal rainfall regime, with long rains occurring between March and May and short rains between October and December, receiving annual rainfall ranging from approximately 1,200 mm to 2,000 mm (Republic of Kenya, 2025; Kenya Meteorological Department, 2023). These climatic conditions contribute to seasonal flooding, which is further exacerbated by catchment degradation, encroachment on riparian zones, sedimentation, inadequate drainage infrastructure, and increasing settlement within flood-prone areas (Ogallo *et al.,* 2024; Republic of Kenya, 2025). Smallholder agriculture and fishing constitute the dominant livelihood activities within the basin, exposing communities to substantial socioeconomic losses during flood events (Nyakundi *et al.,* 2010; Republic of Kenya, 2025). Recurrent flooding has resulted in displacement, destruction of property, disruption of livelihoods, and environmental degradation, making the basin an appropriate setting for examining community perceptions of flood risk and flood management (Nyakundi et al., 2010; Ogallo *et al.,* 2024).

1.3 Theoretical Framework

This study is grounded in the Social Amplification of Risk Framework (SARF) and Protection Motivation Theory (PMT), which provide complementary perspectives on how individuals perceive and respond to environmental hazards (Kasperson *et al.,* 1988; Rogers, 1983). SARF posits that risk perception is amplified or attenuated through social processes, including media coverage, institutional trust, and community discourse (Kasperson *et al.,* 1988). PMT suggests that protective behavior is motivated by perceived threat severity, perceived vulnerability, and efficacy of protective responses (Prentice-Dunn & Rogers, 1986). Together, these frameworks illuminate how community perceptions of flood risk are shaped by both individual cognitive processes and broader social contexts, and how these perceptions influence adoption of protective measures.

2.0 Literature Review

2.1 Flood Risk and Community Vulnerability in East Africa

East Africa experiences heightened flood vulnerability due to the convergence of physical and social factors. Physically, the region's complex topography, variable rainfall patterns, and limited water retention capacity create conditions conducive to rapid runoff and flooding (Milly *et al.,* 2002). Socially, rapid urbanization, poverty, and limited institutional capacity for disaster risk management amplify vulnerability, particularly among low-income populations in informal settlements (Wisner et al., 2004). Kenya's National Disaster Risk Management Strategy recognizes flooding as a priority hazard requiring integrated, multi-stakeholder approaches (Republic of Kenya, 2025).

2.2 Community Perceptions of Flood Risk

Research on flood risk perception demonstrates that communities do not perceive risk uniformly or objectively (Slovic, 1987). Instead, perception is mediated by multiple factors including prior flood experience, socioeconomic status, age, education, and cultural beliefs (Wachinger *et al.,* 2013). Studies in South Africa, Uganda, and Kenya document that communities often hold nuanced understandings of flood risk that differ from technical assessments, incorporating local ecological knowledge, spiritual dimensions, and socioeconomic considerations (Nyakundi *et al.,* 2010; Mashi *et al.,* 2020; Adelekan, 2011).

Notably, lived experience with flooding does not automatically translate to higher risk perception or adoption of protective measures (Grothmann & Reusswig, 2006). Recent traumatic flood events can dramatically elevate risk perception and motivate protective action (Grothmann & Reusswig, 2006). These dynamics highlight the complexity of risk perception and the necessity of understanding community-specific contexts.

2.3 Integrated Flood Management Frameworks

Integrated Flood Management represents a paradigm shift from traditional engineering-focused approaches toward holistic strategies incorporating structural and non-structural measures, ecosystem-based solutions, and participatory governance (World Meteorological Organization & Global Water Partnership, 2004). Key elements include flood hazard mapping, early warning systems, land-use planning, structural defenses, emergency response systems, and community engagement (Global Water Partnership, 2006). The effectiveness of IFM depends on coordination among multiple agencies, adequate resource allocation, and sustained community participation (Cumiskey *et al.,* 2017).

However, implementation of IFM frameworks in developing country contexts faces significant challenges. Studies document gaps between policy frameworks and on-the-ground implementation, inadequate funding, institutional coordination failures, and limited community engagement (Osti & Bhattarai, 2011). In Kenya specifically, despite adoption of IFM principles in national policy, implementation remains fragmented, with coordination challenges between national and county governments, inadequate resources for community-level interventions, and limited mechanisms for incorporating community knowledge into planning processes (Kariuki & Njoroge, 2018).

2.4 Community Participation in Disaster Risk Management

Participatory approaches to disaster risk management recognize communities as active agents rather than passive beneficiaries of external interventions (Cannon & Müller-Mahn, 2010). Evidence demonstrates that community participation enhances the cultural appropriateness, sustainability, and effectiveness of disaster risk reduction initiatives (Twigg, 2007). Participatory approaches facilitate knowledge co-production, wherein technical expertise and community knowledge are integrated to develop locally relevant strategies (Agrawal, 2002).

However, meaningful participation faces barriers including power imbalances, limited resources, institutional resistance, and competing priorities (Cooke & Kothari, 2001). Achieving genuine participation requires institutional commitment, adequate resources, and deliberate efforts to amplify marginalized voices.

2.5 Community Preferences for Flood Risk Standards

Community preferences regarding acceptable flood risk standards reflect complex trade-offs between safety, cost, and socioeconomic considerations (Plate, 2002). Research in developed countries documents variation in risk tolerance, with some populations preferring stringent protection standards while others accept higher risk in exchange for reduced costs (Plate, 2002). In developing country contexts, limited research exists on community preferences for flood risk standards, though studies suggest that low-income populations may have constrained choices, accepting higher risk due to economic necessity rather than preference (Adelekan, 2011).

3.0 Methodology

3.1 Study Design

This study employed a mixed-methods research design combining quantitative household surveys with qualitative insights from focus group discussions and key informant interviews. The mixed-methods approach enabled triangulation of data sources, enhancing validity and providing comprehensive understanding of community perceptions (Creswell & Plano Clark, 2017).

3.2 Study Area and Population

The study was conducted in the Lower Gucha-Migori River Basin, located in southwestern Kenya at approximately 0.62°N, 34.52°E, at an elevation of 1,509 meters. The basin encompasses approximately 2,500 km² and includes communities in Kisii and Nyamira counties. The basin experiences a bimodal rainfall pattern with annual precipitation ranging from 1,200 – 1,800 mm. The population comprises approximately 150,000 individuals, predominantly engaged in smallholder agriculture and fishing. The region experiences recurrent flooding during heavy rainfall periods, with significant flood events documented in 2018, 2020, and 2023.

3.3 Sampling and Data Collection

A stratified random sampling approach was employed to select 357 household respondents from flood-prone communities across the Lower Gucha-Migori Basin. Stratification was based on proximity to the river (high-risk, medium-risk, low-risk zones) and community size. Household surveys were administered by trained enumerators using structured questionnaires covering: (1) household demographics and socioeconomic characteristics; (2) flood experience and risk perception; (3) knowledge of and attitudes toward the IFM framework and implementing agencies; (4) preferences for flood protection standards; (5) proposed strategies for flood risk reduction; and (6) barriers to effective flood management.

The questionnaire was pre-tested in a neighboring flood-prone community to assess clarity, reliability, and validity. Internal consistency of Likert-scale items was assessed using Cronbach's alpha, which exceeded the recommended threshold of 0.70, indicating acceptable reliability. Surveys were conducted between January and March 2024, capturing the tail end of the long rains season when flood risk was elevated. Respondents were selected through systematic random sampling within each stratum, with replacement of non-responsive households. Survey administration required approximately 45 minutes per household, with informed consent obtained prior to interview commencement. Supplementary data were collected through six focus group discussions (FGDs) with community leaders, disaster risk management officials, and affected households, and ten key informant interviews with government officials, NGO representatives, and technical experts involved in flood management. FGDs and interviews explored contextual factors influencing community perceptions, implementation challenges, and recommendations for improving flood management effectiveness.

3.4 Data Analysis

Quantitative survey data were analyzed using descriptive statistics (frequencies, percentages, means). Responses regarding stakeholder performance and proposed strategies were analyzed using Likert scale analysis, with mean scores calculated to rank priorities. Missing data were minimal (<2%) and handled through listwise deletion.

Qualitative data from FGDs and interviews were transcribed, coded thematically, and analyzed using content analysis to identify recurring themes, patterns, and contextual factors influencing community perceptions. Qualitative findings were integrated with quantitative results to provide comprehensive interpretation.

4.0 Results

4.1 Respondent Characteristics

The survey included 357 respondents from flood-prone communities in the Lower Gucha-Migori Basin. The sample comprised 52% male and 48% female respondents, with a mean age of 42 years (SD = 15.3). Educational attainment varied, with 28% having completed primary education, 45% secondary education, and 27% post-secondary education. Household size averaged 5.2 persons (SD = 2.1). Approximately 68%

of respondents were engaged in agriculture as a primary livelihood, 18% in pastoralism, and 14% in other occupations. Mean annual household income was approximately 120,000 Kenyan Shillings (USD 900), with significant variation (SD = 95,000).

4.2 Community Perception on Effectiveness of IFM Framework

4.2.1 Overall Assessment of IFM Approach

Community perception of the IFM framework's effectiveness was predominantly positive, with 88.8% (n=317) of respondents viewing the IFM approach to flood risk management as adequate, while 11.2% (n=40) viewed it as inadequate. This high level of support reflects community recognition of the need for integrated, multi-stakeholder approaches to flood management.

4.2.2 Performance Assessment of Implementing Agencies

Respondents were asked to rate the performance of various agencies responsible for implementing flood risk management measures. Results are presented in Table 1.

Table 1: Community Ranking of Disaster Risk Management Agencies and Stakeholders

Organization/ Agency	Ranking					
	Excellent	Very Good	Good	Fair	Poor	Mean
County ministry charged with DRR responsibilities (Special Programmes)	25.2%	52.1%	22.4%	0.3%	0%	4.02
National Government Administrative Officers (NGAOs; CC, DCCs, ACCs, NPS, Chiefs)	2.8%	1.4%	37.8%	43.7%	14.3%	2.35
Public Health and Sanitation Department	13.2%	40.6%	33.1%	10.6%	2.5%	3.51
Government Hospitals/ Health Centres/ Clinics	25.2%	45.1%	20.4%	3.9%	5.3%	3.81
NGOs engaged in DRR activities	67.8%	11.8%	10.6%	9.8%	0.%	4.35
Other government Departments/Ministries	33.9%	10.9%	8.7%	23%	23.5%	3.09

Source: *Field data, (2024)*

Non-governmental organizations (NGOs) engaged in disaster risk reduction received the highest mean performance rating (4.35), with 67.8% of respondents rating them as excellent. County ministries charged with disaster risk reduction responsibilities received a mean rating of 4.02, with 25.2% rating them as excellent and 52.1% as very good. National government administrative offices received the lowest mean rating (2.35), with only 2.8% rating them as excellent and 43.7% rating them as fair.

These findings suggest that communities perceive local and community-based organizations as more effective than national government structures in implementing flood risk management measures. This perception may reflect greater accessibility and responsiveness of local organizations, as well as frustration with national government coordination challenges.

Qualitative findings reinforced the survey results. Participants generally expressed greater confidence in community-based organizations and NGOs due to their proximity and responsiveness during flood emergencies.

One focus group participant observed:

> *"The NGOs usually come quickly when floods occur, while government support often takes longer to reach affected households."*

Another participant emphasized the importance of local participation:

"Flood management works better when community members are involved in planning because they understand the areas most affected."

4.2.3 Hindrances to Effective Flood Risk Management

Respondents identified multiple barriers to effective community-level flood risk management. Results are presented in Table 2.

Table 2: Hindrances to Effective Flood Risk Management at the Community Level

Hindrances	Frequency	%
Lack of knowledge about flood risk management by the community	148	26.9
Limited organizational capacities	152	27.6
Corruption and lack of effort by government and other relevant agencies	128	23.2
Weak collaboration between agencies (GoK, NGOs, FBOs etc) in community disaster awareness creation	123	22.4

Source: Field data, (2024)

The most frequently cited hindrances were limited organizational capacities (27.6%) and lack of knowledge (26.9%), suggesting that implementation challenges stem from both institutional limitations and information gaps. Corruption and lack of government effort were cited by 23.2% of respondents, indicating concerns about institutional integrity. Weak inter-agency collaboration was identified by 22.4% of respondents, reflecting the coordination challenges documented in the literature.

4.3 Community Preferences for Flood Protection Standards

4.3.1 Acceptable Flood Frequency for Residential Properties

Respondents were asked about their preferences for acceptable flood frequency standards for residential properties. Results are presented in Table 3.

Table 3: Community Preferences for Acceptable Flood Frequency Standards

Flood Frequency Standard	Frequency	Percentage
1-in-200-year event (0.5% annual probability)	194	54.30%
1-in-100-year event (1% annual probability)	84	23.50%
1-in-50-year event (2% annual probability)	32	9.00%
1-in-20-year event (5% annual probability)	27	7.60%
No clear opinion	20	5.60%

Source: *Field data, (2024)*

Community preferences revealed strong support for stringent flood protection standards, with 54.3% of respondents favoring a 1-in-200-year flood standard (0.5% annual probability), and an additional 23.5% supporting a 1-in-100-year standard (1% annual probability). Together, these two preferences account for 77.8% of respondents, indicating widespread preference for high levels of protection. Only 16.6% of respondents accepted flood frequencies greater than 1-in-50-year events.

These findings suggest that communities in the Lower Gucha-Migori Basin prioritize safety over cost considerations, likely reflecting the severe impacts of recent flood events and limited economic resources for recovery. This preference for stringent standards has important implications for infrastructure investment and land-use planning.

4.3.2 Acceptable Flood Frequency for 50-Year Residential Property Lifespan

Respondents were asked about acceptable flood frequencies over a 50-year residential property lifespan. Results are presented in Table 4.

Table 4: Acceptable Flood Frequency for Residential Properties over 50-Year Lifespan

Number of Flood Events	Frequency	Percentage (%)
Zero flood events	226	63.3
One flood event	119	33.3
Two or more flood events	12	3.4
Total	357	100

Source: Field data, (2024)

Results demonstrate extremely high risk aversion, with 63.3% of respondents preferring zero flood events over a 50-year period. An additional 33.3% accept a single flood event, while only 3.4% tolerate two or more events. These preferences align with the stringent annual frequency standards documented above, indicating consistent community preference for high protection levels.

4.4 Equity Considerations in Flood Protection

4.4.1 Protection of Houses to Flood Risk

Respondents were asked whether all houses should receive equal flood protection or whether protection should be prioritized based on specific criteria. Results are presented in Table 5.

Table 5: Community Perspectives on Flood Protection Equity

Protection Approach	Frequency	Percentage
Yes, all houses should receive equal protection	220	61.50%
No, protection should prioritize high-value properties	29	8.20%
No, protection should prioritize low-income households	24	6.70%
No, protection should prioritize high-income households	19	5.50%
No, some suburbs should receive more protection	35	9.80%

Source: *Field data, (2024)*

A strong majority (61.5%) of respondents endorsed universal flood protection, reflecting egalitarian principles and recognition that all community members deserve protection. However, 38.5% of respondents supported differentiated protection approaches, with 9.8% suggesting geographic prioritization (specific suburbs), 8.2% advocating for high-value property protection, 6.7% supporting low-income household prioritization, and 5.5% favoring high-income household protection.

These results suggest tension between egalitarian principles and practical considerations regarding resource allocation. The significant minority supporting differentiated approaches reflects recognition of economic constraints and competing priorities, though the majority position emphasizes equity.

4.5 Community-Proposed Strategies for Reducing Flood Risk

Respondents were asked to rate proposed strategies for reducing flood risk in the Gucha-Migori River Basin. Results are presented in Table 6.

Table 6: Community Preferences for Flood Risk Reduction Strategies

Strategy	Most Important	Very Important	Important	Fair	Least Important	Mean Score
Raising soak-pits	20.20%	44.30%	31.40%	4.20%	0%	4.3
Deepening river channels	25.20%	35%	23.20%	9.50%	7%	3.62
Improving storm water network	53.80%	43.10%	1.70%	1.40%	0%	4.49
Shifting houses away from high-risk areas	57.40%	38.10%	3.10%	1.40%	0%	4.52
Increasing buffers (natural vegetation)	46.20%	50.70%	1.70%	1.40%	0%	4.42
Early warning systems	34.50%	47.30%	16.20%	1.70%	0%	4.15
Modifying buildings (raise floor levels)	32.80%	51.30%	14.60%	1.40%	0%	4.15
Restricting new buildings in high-risk areas	41.10%	42.90%	16.20%	0.80%	0%	4.22
No action needed	5.60%	12%	11.50%	43.10%	27.70%	2.25

Source: *Field data, (2024)*

Community preferences for flood risk reduction strategies revealed strong support for relocation (shifting houses away from high-risk areas, mean = 4.52) and nature-based solutions (increasing natural vegetation buffers, mean = 4.42). Structural interventions including improved storm water networks (mean = 4.49) and raising soak-pits (mean = 4.30) also received strong support. Early warning systems and building modifications received moderate support (mean = 4.15 for both). Only 5.6% of respondents believed no action was needed.

These preferences align with evidence-based flood risk reduction strategies documented in the literature, suggesting that communities have developed informed perspectives on effective interventions. The strong preference for relocation reflects recognition that some areas are inherently unsafe for habitation, while support for nature-based solutions indicates appreciation for ecosystem-based approaches.

5.0 Discussion

The findings reveal strong community confidence in the Integrated Flood Management (IFM) framework, with most respondents recognizing the value of coordinated and multi-stakeholder approaches to flood risk reduction. This supports the principles of IFM, which emphasize collaboration among institutions, communities, and ecosystems in addressing flood risks (World Meteorological Organization & Global Water Partnership [WMO & GWP], 2004; Cumiskey *et al.,* 2017). However, persistent implementation barriers, including limited organizational capacity, inadequate knowledge, weak inter-agency coordination, and concerns over governance and accountability, suggest that effective flood management requires not only sound policy frameworks but also substantial investments in institutional strengthening and community education (Osti & Bhattarai, 2011; Cooke & Kothari, 2001). The higher levels of trust accorded to NGOs and community-based organizations compared to centralized government institutions further highlight the importance of participatory and locally driven approaches (Agrawal, 2002; Twigg, 2007). The study also demonstrates a high degree of community risk aversion, reflected in preferences for stringent flood protection standards and minimal tolerance for flood occurrences. These perceptions are likely shaped by recurrent flood experiences and limited economic capacity for recovery, consistent with Protection Motivation Theory (Rogers, 1983; Prentice-Dunn & Rogers, 1986). Strong support for relocation from high-risk areas, nature-based solutions, improved drainage systems, and stormwater management aligns with contemporary evidence-based flood risk reduction strategies (Kabisch *et al.,* 2016; WMO & GWP, 2004). Overall, the findings demonstrate that community flood risk perceptions are shaped by lived experiences, socioeconomic conditions, institutional trust, and information access, supporting the Social Amplification of Risk Framework and Protection Motivation Theory as useful lenses for understanding community responses to flood hazards (Kasperson *et al.,* 1988; Slovic, 1987; Wachinger *et al.,* 2013).

6.0 Conclusions and Recommendations

This study examined community knowledge and perceptions of flood risk and integrated flood management (IFM) in the Lower Gucha-Migori River Basin. Communities hold informed perspectives on flood risk, with 88.8% supporting IFM approaches while identifying implementation barriers. Findings reveal that community perceptions are shaped by physical hazard exposure, lived experiences, socioeconomic conditions, and institutional trust. Communities perceive NGOs and community-based organizations as more effective than government agencies. Respondents prefer evidence-based interventions (relocation, nature-based solutions, improved drainage) but demand stringent protection standards that exceed practical resource constraints. The study recommends strengthening participatory mechanisms, supporting community organizations through capacity building, expanding education programs, and establishing dialogue between communities and technical experts to develop realistic protection standards. Priority interventions include relocation from high-risk areas, riparian ecosystem restoration, equity-focused protection, improved coordination between government levels, and adaptive monitoring frameworks. Dissemination of findings to stakeholders is critical for evidence-based policy.

References

Adelekan, I. O. (2011). Vulnerability of poor urban households in the face of climate variability and change in Lagos, Nigeria. Environment and Urbanization, 23(1), 207-224. https://doi.org/10.1177/0956247810391857

Agrawal, A. (2002). Indigenous knowledge and the politics of development. Critique of Anthropology, 22(2), 141-164. https://doi.org/10.1177/0308117502022002060 1

Cannon, T., & Müller-Mahn, D. (2010). Vulnerability, resilience and development discourses in relation to climate change. Natural Hazards, *55*(3), 621-635. https://doi.org/10.1007/s11069-010-9499-4

Cooke, B., & Kothari, U. (Eds.). (2001). Participation: The new tyranny? Zed Books.

Creswell, J. W., & Plano Clark, V. L. (2017). Designing and conducting mixed methods research (3rd ed.). SAGE Publications.

Cumiskey, L., Foley, A. M., Hermans, K., et al. (2017). A framework to assess integration in flood risk management: Implications for governance, policy, and practice. Ecology and Society, 22(4), 34. https://doi.org/10.5751/ES-09741-220434

Douglas, I. (2021). Nature-based solutions for urban flood management. *Philosophical Transactions of the Royal Society A*, 379(2195), 20200211.

Global Water Partnership. (2006). Integrated Flood Management Plans. GWP Technical Committee Background Papers.

Grothmann, T., & Reusswig, F. (2006). People at risk to flooding: Why some residents take precautionary action while others do not. Natural Hazards, 38(1), 101-120. https://doi.org/10.1007/s11069-005-8603-7

Hirabayashi, Y., Mahendran, R., Koirala, S., et al. (2013). Global flood risk under climate change. Nature Climate Change, 3(9), 816-821. https://doi.org/10.1038/nclimate1911

IPCC. (2023). *Climate Change 2023: Synthesis Report*. Intergovernmental Panel on Climate Change.

Kabisch, N., Korn, H., Stadler, J., & Bonn, A. (Eds.). (2016). *Nature-based solutions to climate change adaptation in urban areas*. Springer.

Kariuki, J. M., & Njoroge, J. M. (2018). Challenges in implementing integrated flood management strategies in Kenya: A case study of the Tana River Basin. Journal of Eastern African Studies, 12(2), 245-263. https://doi.org/10.1080/17531055.2018.1446449

Kasperson, R. E., Renn, O., Slovic, P., et al. (1988). The social amplification of risk: A conceptual framework. Risk Analysis, 8(2), 177-187. https://doi.org/10.1111/j.1539-6924.1988.tb01168.x

Kenya Meteorological Department. (2023). *State of Kenya climate report 2023*. Government of Kenya.

Kundzewicz, Z. W., Kanae, S., Seneviratne, S. I., et al. (2014). Flood risk and climate change: Global and regional perspectives. Hydrological Sciences Journal, 59(1), 1-28. https://doi.org/10.1080/02626667.2013.857411

Mashi, S. A., Inkani, A. I., Obaro, O., & Asanarimam, A. S. (2020). Community perception, response and adaptation strategies towards flood risk in a traditional African city. Natural Hazards, 103, 2089–2108. https://doi.org/10.1007/s11069-020-04052-2

Merz, B., Kreibich, H., Schwarze, R., & Thieken, A. (2010). Assessment of models and data for flood risk management. Natural Hazards and Earth System Sciences, 10, 1883-1892. https://doi.org/10.5194/nhess-10-1883-2010

Milly, P. C. D., Wetherald, R. T., Dunne, K. A., & Delworth, T. L. (2002). Increasing risk of great floods in a changing climate. Nature, 415(6871), 514-517. https://doi.org/10.1038/415514a

Nkomo, S. T., Nyong, A. O., & Kulindwa, K. (2006). The impacts of climate change in Africa. In M. L. Parry, O. F. Canziani, J. P. Palutikof, J. P. van der Linden, & C. E. Hanson (Eds.), Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (pp. 433-467). Cambridge University Press.

Nyakundi, H., Mwanzo, I., & Yitambe, A. (2010). Community perceptions and response to flood risks in Nyando District, Western Kenya. *Jàmbá: Journal of Disaster Risk Studies, 3*(1), 1-8. https://doi.org/10.4102/jamba.v3i1.51

Ogallo, S. N., Mwikali, V. K., & Oteng'i, S. B. (2024). Flood risk mapping in the Lower Gucha-Migori River Basin: Integration of satellite data and community knowledge. Environmental Monitoring and Assessment, [in press].

Osti, R., & Bhattarai, T. N. (2011). Integrated flood management in South Asia: A review of approaches and practices. Natural Hazards, 58(1), 405-425. https://doi.org/10.1007/s11069-010-9625-3

Plate, E. J. (2002). Flood risk and flood management. Journal of Hydrology, 267(1-2), 2-11. https://doi.org/10.1016/S0022-1694(02)00135-X

Prentice-Dunn, S., & Rogers, R. W. (1986). Protection motivation theory and preventive health: Beyond the health belief model. Health Education Research, 1(3), 153-161. https://doi.org/10.1093/her/1.3.153

Republic of Kenya. (2025). National Disaster Risk Management Strategy 2025-2030. Ministry of Interior and Coordination of Public Security.

Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), Social psychophysiology (pp. 153–176). Guilford Press.

Slovic, P. (1987). Perception of risk. Science, 236(4799), 280-285. https://doi.org/10.1126/science.236.4799.280

Twigg, J. (2007). Characteristics of a disaster-resilient community: A guidance note. Benfield UCL Hazard Research Centre, University College London.

United Nations Office for Disaster Risk Reduction (UNDRR). (2023). *Global Assessment Report on Disaster Risk Reduction 2023*. UNDRR.

Wachinger, G., Christin, R., Juhola, S., & Kruse, S. (2013). The risk perception paradox-Implications for governance and communication of natural hazards. Risk Analysis, 33(6), 1049-1065. https://doi.org/10.1111/j.1539-6924.2012.01942.x

Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). At risk: Natural hazards, people's vulnerability and disasters (2nd ed.). Routledge.

World Meteorological Organization & Global Water Partnership. (2004). Integrated Flood Management Concept Paper. WMO Technical Report No. 1.

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