



BASELINE LEARNING REPORT

**AI Teachers: Improving Teachers
Competencies through an AI
Driven Assessment Program**

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1 Executive Summary

Tanzania's education system faces significant challenges, notably an average pupil-teacher ratio of 61:1, which impedes personalized instruction (BEST, 2023). Consequently, only 31% of Class 3 students can solve Class 2 multiplication problems (Uwezo, 2019). To address these issues, the AI Teachers initiative proposes developing and testing an AI-powered platform to assess students and support 20 teachers in enhancing their instructional practices. This platform aims to provide real-time data, targeted teaching resources, and AI-driven insights to facilitate differentiated instruction and improve numeracy skills among Class 1 and 2 learners. Despite challenges such as limited digital infrastructure and concerns about AI integration, 90% of teachers believe the platform will enhance learner outcomes. The project's feasibility is reinforced by strong collaboration among partners and an evidence-based implementation approach, with 80% stakeholder support indicating high acceptability and readiness. Overall, the AI Teachers program aims to transform instructional practices and improve numeracy outcomes in Tanzanian primary schools.

2.0 Introduction

Across Africa, numeracy remains one of the most pressing educational challenges, with many countries struggling to achieve basic mathematical proficiency among primary school students. Studies by UNESCO (2020) indicate that a significant proportion of African learners do not meet the minimum proficiency standards in mathematics. This situation is compounded by factors such as large class sizes, outdated teaching methodologies, and limited access to modern educational resources, all of which hinder effective instruction and personalized learning.

In Tanzania, these challenges are particularly acute. The Tanzanian education system is characterized by extremely high pupil-teacher ratios, with public schools reporting figures as high as 61:1 (BEST, 2023). Such high ratios severely restrict Teachers' ability to provide individualized attention and support, making it difficult for many students to grasp fundamental numeracy concepts. This is reflected in alarming assessment data: only 3 out of 10 Class 3 students are able to solve a Class 2 multiplication problem (Uwezo, 2019). These statistics underscore a critical need for innovative and scalable interventions to boost numeracy skills among young learners.

Globally, advancements in artificial intelligence have begun to revolutionize the field of education, offering new solutions to persistent problems like low numeracy. AI-powered platforms utilize sophisticated machine learning algorithms to analyze student performance in real time, deliver personalized feedback, and adapt instructional content to meet individual learner needs. Early implementations of these technologies have demonstrated promising results in various contexts by reducing administrative burdens and enhancing the quality of personalized learning experiences (World Bank, 2021).

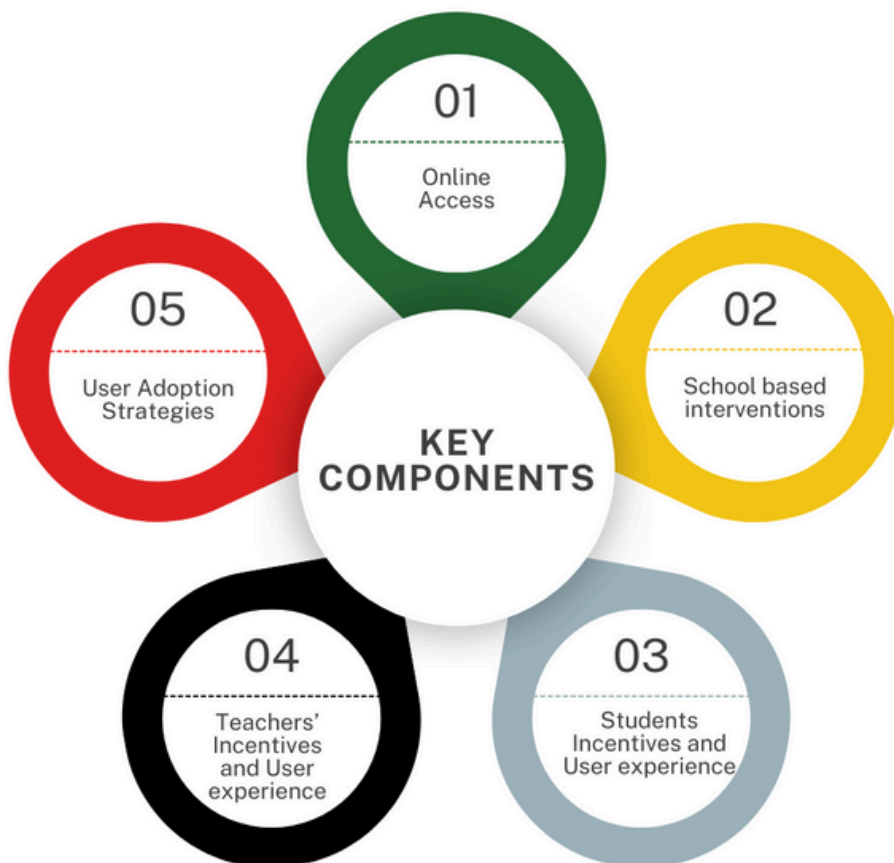
In Africa, pilot projects and research initiatives have started to explore the potential of AI in education, specifically targeting the numeracy gap. These initiatives are driven by the realization that AI can provide educators with actionable data and insights, enabling them to tailor their teaching strategies more effectively. For instance, adaptive learning systems can identify learning gaps promptly, allowing teachers to intervene with targeted support before minor challenges escalate into significant learning deficits. This data-driven approach not only improves individual student outcomes but also helps in refining broader educational strategies across schools.

The AI Teachers intervention is designed as a response to these multifaceted challenges. It aims to develop and test a data-driven, AI-powered platform that will assess student performance, provide teachers with real-time feedback, and offer targeted instructional resources. The platform is intended to support 20 Teachers in delivering high-quality, differentiated instruction to improve the numeracy skills of Tanzanian learners in Grade 1 and 2. Through leveraging adaptive technology, the intervention seeks to bridge the gap between traditional teaching methods and the need for personalized learning, ultimately contributing to enhanced educational outcomes and a more equitable learning environment.

Overall, the integration of AI in education represents a transformative opportunity for regions like Tanzania, where traditional methods have fallen short in addressing the numeracy crisis. This project is positioned at the intersection of technology and education, striving to bring innovative, evidence-based solutions to classrooms burdened by high student-to-teacher ratios and resource constraints. Through continuous evaluation and adaptation, the initiative aspires to not only improve numeracy outcomes but also to lay the foundation for a broader digital transformation in education across Africa.

2.1. Purpose of the Baseline Learning Report

This baseline report aims to provide a clear understanding of current teaching practices, challenges, and teacher readiness in terms of beliefs, competencies and perceptions for integrating AI-powered support into classrooms in Tanzania. The findings will help shape the development of key components essential for successful implementation, including:



1. Online Access

Students and teachers will have access to sign in and use the digital platform based on their registration credentials.

2. School based interventions

The selected schools will have their appointed teachers receive training and both students and teachers engage in the qualitative studies of the use of the tool.

3. Students Incentives and User experience

The student centric approach of the tool will provide students with learning resources for the pilot concepts based on their national curriculum and medium of instruction. The individualized user experience based on their platform interactions will also provide personalized feedback, guidance and system recommendations as per the predictive analysis of the learning experience.

4. Teachers' Incentives and User experience

For teachers, this solution provides value in three aspects, students' knowledge and management support which enables them to navigate the challenges of teaching large size classroom, teaching many levels of classes, low understanding of students' learning processes and behaviors and poor infrastructure to provide the appropriate support to students. The second aspect is access to teaching resources based on individual needs, students' assessments data and teaching facilities in the schools and lastly, the continuous professional development with the platform which continuously supports teachers in their careers to achieve teaching outcomes and becoming a go to resource center for support, learning and a peer-to-peer network as a community of practice.

5. User Adoption Strategies

This project is a research and development project with aims to engage and understand a small percentage of the user segment, students and teachers, on how they can use AI. Therefore, the awareness and adoption are geared towards the selected schools, students and teachers and activities engaging select stakeholders including curriculum development institutions, education officers, quality assurance personnel and CSOs for policy briefs.

2.2 Objectives

2.1.1. Main Objective

To improve Teacher's competencies through an AI Assessment program and enhance foundational numeracy skills among Grade 1 and 2 Learners in Tanzania.

2.1.2. Specific Objectives

- To develop and implement an AI-driven platform that provides teachers with real-time data and targeted resources to improve instructional outcomes.
- To facilitate a positive shift in teacher behavior and attitudes towards integrating AI insights into classroom practices and promoting adaptive teaching strategies.
- To establish a framework for continuous professional development and foster peer collaboration to enhance teachers' capacity to effectively use digital tools.
- To enhance student numeracy outcomes by leveraging data-driven assessments through the AI platform, enabling personalized learning and tailored instruction.

2.3. Research Questions

2.3.1. Main Research Question

How does the implementation an AI assessment program improve teachers' competencies and enhance foundational numeracy skills among Grade 1&2 learners in Tanzania?

2.3.2. Specific Research Question

- How does the integration of an AI-driven platform that provides real-time data and targeted resources affect teacher instructional practices and student outcomes?
- To what extent does the use of AI influence changes in teacher behavior and attitudes within the classroom?
- How do continuous professional development initiatives and peer collaboration support teachers in effectively integrating AI-driven tools into their instructional practices?
- In what ways do data-driven assessments through the AI platform enhance student numeracy outcomes and facilitate personalized learning interventions?

2.4. Key Findings

- Limited use of AI-driven instructional tools, with 75% of teachers indicating they have never integrated AI support in their teaching methods.
- 65% of Teachers have concerns about the use of AI in the Classroom, concerns around data privacy while 55% think it will hamper the development of critical thinking skills in Learners.
- While many teachers are open to adopting AI tools and digital platforms, 80% raise concerns about the challenges they face such as infrastructure limitations, limited resources (no internet connectivity sometimes and gadgets)
- 100% of Teachers affirm their Schools lack the resources to enable them fully integrate AI
- 90% of Teachers think Platform will enhance Learners Outcomes
- Limited use of AI-driven instructional tools, with only 10% of teachers integrating digital support in their teaching methods.
- Only 40% of Teachers say they will use the platform and test numeracy skills of their learners while 35% say they will do it occasionally due to time constraints, limited gadgets and internet connectivity problems.
- Strong collaboration among partners in designing the project and identifying key stakeholders.
- Project feasibility is grounded in evidence, ensuring an informed approach to implementation.
- High level of acceptability and readiness for the intervention, with 80% of stakeholders expressing support.
- 80% of teachers demonstrate effective classroom management, creating a structured and conducive learning environment.

2.5. Relevance to Numeracy Outcomes

This project responds to persistent challenges in numeracy education, including low proficiency in foundational skills. In Tanzania numeracy skills show a downward performance trend, with just 3 out of 10 (31%) Class 3 students able to solve a Class 2 multiplication problem. By the time they reach Class 7, about 3 out of 10 (30%) of students cannot solve Class 2 multiplication. As such, the AI-powered assessment program is out to solve these numeracy challenges by focusing on 5 core competencies of recognizing numbers, recognizing measurements, using number operations, recognizing shapes and recognizing number relationships. Traditional teaching methods often fail to provide personalized instruction, limiting learners' ability to grasp key mathematical concepts. The AI Teachers intervention introduces adaptive learning tools that support teachers with real-time lesson planning, automated feedback, and interactive learning experiences. Through evidence-based instructional approaches, this project seeks to strengthen teacher effectiveness, enhance student engagement, and improve numeracy outcomes in diverse classroom settings.

2.6. Evaluation Framework

The Evaluation Framework for this project is designed to systematically assess how AI-driven tools contribute to enhancing teacher capacity and improving student engagement in numeracy. Through examining the interplay between activities, outputs, and outcomes, the framework highlights key mechanisms of change such as short-term gains in teacher competencies and learner performance that ultimately lead to a more robust and equitable educational system. Grounded in a set of four guiding questions which are;

a) Can the Intervention be implemented effectively?

The successful implementation of the AI-powered instructional platform depends on its seamless integration into classroom instruction, supported by structured teacher training. A key component of feasibility is continuous teacher support, ensuring educators receive ongoing coaching, training, and access to digital resources to confidently integrate AI tools into numeracy lessons. The platform also includes adaptive feedback mechanisms, leveraging AI-generated insights to help teachers refine instructional strategies and provide personalized support to students. Furthermore, the integration of Large Language Models (LLMs), such as chatbots accessible via platforms like WhatsApp, offers teachers on-demand assistance, improving their ability to navigate AI-driven instruction effectively.

b) Are learners demonstrating improvement in numeracy skills?

Student progress is systematically evaluated through structured assessments that measure numeracy competencies. Baseline and Endline assessments are conducted to track improvements in fundamental numeracy skills, such as number recognition, arithmetic operations, measurement, and shape identification. These assessments establish a clear comparison of student abilities before and after the intervention. Additionally, standardized tests play a crucial role in identifying specific learning gaps and guiding targeted, personalized interventions.

c) Are learners engaged in AI-supported numeracy instruction?

Ensuring student engagement is vital to the success of AI-driven numeracy instruction. Real-time learning analytics are used to monitor participation rates, track task completion, and analyze interactive engagement with digital content. This data provides insights into how effectively students are engaging with AI-based learning activities. Additionally, qualitative feedback from classroom observations helps assess learner enthusiasm and responsiveness.

to AI-supported instruction. Gathering these insights allows educators to refine their teaching approaches and make necessary adjustments to enhance student engagement and motivation in numeracy learning.

d) Are Teachers adopting AI-assisted instructional strategies?

Teacher adoption of AI-assisted instructional strategies is assessed through structured observations and data analytics. One key indicator is the integration of AI-generated lessons, which measures how effectively teachers incorporate automated lesson suggestions into their daily teaching. Additionally, adaptive instructional methods evaluate whether teachers use AI-generated feedback to adjust their strategies in response to student needs, ensuring a more tailored learning experience. Lastly, structured teaching practices are assessed to determine how well teachers apply guided practice and interactive methods informed by AI insights. Through monitoring these aspects, the study can determine the extent to which teachers are effectively utilizing AI tools to enhance numeracy instruction

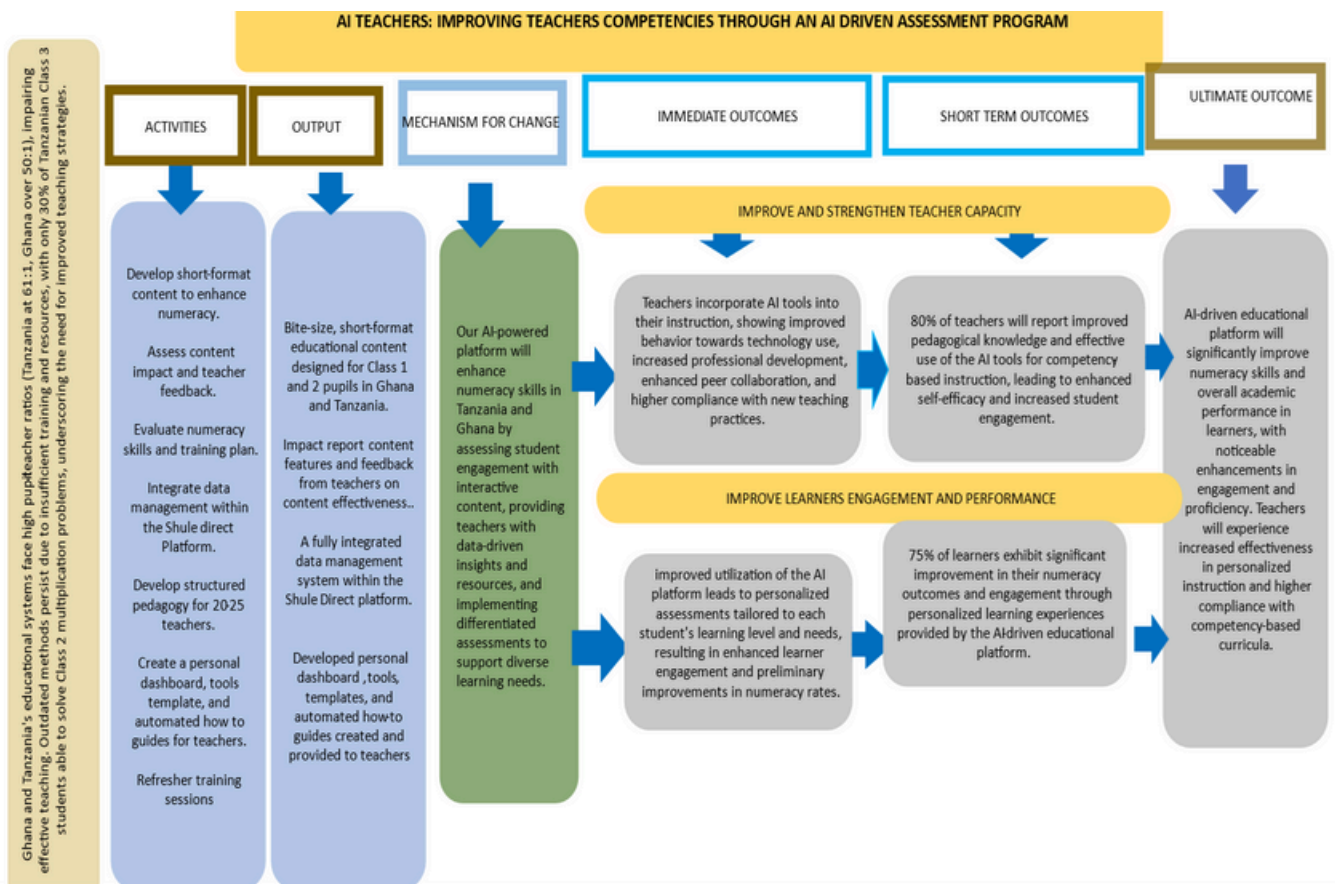


Figure 1: MEL Framework

3.0. Methodology

The data collection approach adopts a mixed-methods design, integrating both qualitative and quantitative techniques to capture a comprehensive view of teaching practices, learning environments, and student outcomes. Qualitative insights are gathered through Key Informant Interviews (KIIs), offering in-depth perspectives on teacher attitudes, challenges, and contextual factors influencing AI adoption. On the quantitative side, surveys collect measurable data on teacher readiness and technology usage, while standardized learner assessments evaluate numeracy proficiency. Additionally, classroom observations provide structured, real-time insights into actual teaching practices and student engagement. Through combining these methods, the project ensures a more nuanced understanding of the intervention's impact, enabling evidence-based refinements and fostering a robust foundation for ongoing monitoring and evaluation.

3.1. Data Collection Tools

i. Classroom Observations

This tool focuses on Teacher-learner interactions, instructional methods, and engagement with AI-supported learning. And tracks the integration of AI-driven resources into lesson delivery.

ii. Teacher Audit Checklist

The Checklist assesses the extent to which Teachers incorporate AI tools into their Lesson planning, instruction and Class management practice.

iii. AI Learning Analytics

The AI Learning Analytics will enable the monitoring of real-time student performance, engagement levels, and learning progress. It's equally to provide automated reports on numeracy competencies and areas requiring additional support.

iv. Early Grade Mathematics Assessment

A standardized Test reflective of the National Curriculum in Tanzania which measures learners' numeracy proficiency at different stages of the intervention. It Focuses on foundational concepts in number recognition, identification and number relations.

v. Key Informant Interview

Qualitative insights are gathered through Key Informant Interviews (KIIs), offering in-depth perspectives on teacher attitudes, challenges, and contextual factors influencing AI adoption.

3.2. Sampling Strategy and Approach

The selection of schools, teachers, and learners was designed to ensure diverse representation across Tanzania, focusing on Grade 1& 2 classrooms where foundational numeracy skills are most critical. Schools, teachers, and learners were selected based on their relevance to the study objectives, ensuring diverse educational contexts were represented. A purposive sampling strategy was employed to select schools based on their existing digital infrastructure. The aim was to target schools that already had some level of digital access specifically, those equipped with gadgets or tablets that could be leveraged for the study. This strategy was chosen to ensure that the intervention would be feasible and that the assessment of AI tool integration could be conducted in environments where digital resources were already present.

a) Selection of Classrooms

- **Criteria:** Not every school in Tanzania with digital resources was included. Instead, a subset of schools was deliberately chosen to represent varying levels of digital access, from moderate to good. The selection process involved reviewing available data on digital infrastructure within schools and identifying those that met the criteria. Schools lacking any digital resources were excluded to maintain the focus on settings where AI-driven platforms could be practically implemented and evaluated.
- **Rationale:** Early-grade numeracy instruction is foundational for long-term academic success, making Grade 1&2 the primary focus.

b) Selection of Teachers

- **Criteria:** Teachers actively involved in numeracy instruction and willing to integrate AI tools into their teaching practices. A total of 20 teachers were selected to ensure a broad range of teaching experiences and instructional approaches.
- **Rationale:** Teacher adoption is central to the success of AI-driven instruction, requiring active participation in using the platform to enhance the numeracy skills of Learners.

c) Selection of Learners

- **Criteria:** Learners were selected using a stratified sampling approach. In each classroom, students were grouped into strata based on their performance levels—high, average, and low to ensure all segments were represented. From each stratum, a fixed number of students were then chosen to achieve a total of 14 learners per classroom, ensuring a balanced representation of varying academic abilities
- **Rationale:** Capturing diverse learning abilities ensures the intervention is tailored to meet various learner needs and provides insights into differentiated instruction.

3.3.Data Collection Instruments

1.Baseline Survey

Purpose: To assess teachers' current familiarity with and usage of AI-powered educational tools, their cultural beliefs and perspectives, existing teaching practices, and integration of technology in the classroom. Components surveyed were:

- AI Familiarity and Usage: Questions to gauge teachers' awareness, experience, and confidence in using AI-based educational technologies.
- Cultural Beliefs and Perspectives: Items exploring beliefs about AI in education, openness to technological change, and perceived cultural barriers or supports.
- Current Teaching Practices: Inquiries into instructional methods, lesson planning, and assessment strategies.
- Technology Use: Assessment of existing technological tools in use, frequency, and perceived effectiveness.
- Professional Development and Peer Collaboration: Willingness to build competencies and share with peers

2. Key Informant Interviews (KIIs) with Teachers

Purpose: To gain in-depth insights into teachers' experiences, attitudes, and challenges related to AI integration, teaching practices, and cultural contexts.

Selection of Informants: Identifying teachers with varying levels of experience, technological proficiency, and cultural backgrounds to capture diverse perspectives. The Key interview Guide encompassed the following:

- AI Integration: Exploring perceptions of AI's role in education, benefits, and potential drawbacks.
- Cultural Context: Discussing how cultural beliefs influence teaching practices and openness to AI tools.
- Professional Development and peer collaboration: Identifying training needs and support systems for effective AI integration.
- Perceived Challenges: Teacher envisaged challenges in using this platform

3.Standardized Student Testing

Standardization Process, Testing Format, and Scope

- Alignment: Test items followed Tanzania's national numeracy framework to ensure relevance. The AI Teachers system adapted assessment content to align with curriculum objectives.
- Pilot Testing: Small-scale trials refined assessment tools for linguistic and contextual appropriateness.
- Administration: Trained facilitators applied uniform instructions and timing to maintain assessment consistency.
- Format: The assessment covered numeracy foundations, including number identification, Number relations, and addition.
- Diagnostic Insights: AI-driven analysis identified gaps, such as difficulties in differentiating objects, constructing patterns, and recognizing shapes, highlighting areas where AI intervention could enhance understanding.

4.Teacher Audit Checklist

Components Audited

- How Teachers incorporated AI-generated lesson plans and interactive content.
- Clarity of explanations, questioning strategies, and real-time adaptation of AI insights.
- Use of AI-powered feedback mechanisms to track learner progress and address misconceptions.
- Pre-class lesson planning, integration of AI-driven teaching prompts, and use of digital resources.
- Application of AI-assisted methods to encourage active participation and conceptual understanding.

Compliance with Best Practices

- Observers assessed teaching practices against predefined evidence-based criteria.
- Compliance was measured through lesson plan reviews, AI tool usage logs, and direct observation.
- Teachers received structured feedback to reinforce effective AI integration and identify areas for improvement.

3.4.Limitations to the Study

- Teacher behavior may have shifted in response to being observed, potentially affecting classroom dynamics.
- Differences in school resources, including access to AI-compatible devices and reliable internet connectivity, may create disparities in implementation. Schools with fewer resources may struggle to adopt AI-based interventions effectively.
- The study may primarily capture the early stages of AI adoption without assessing its long-term impact on teaching practices and student outcomes. A longer observation period would be needed to measure sustained improvements.
- Given the structured school schedule and competing academic priorities, teachers and students may have limited time to fully engage with AI tools during the study period. This constraint may impact the depth of insights gathered.
- Differences in school resources, including access to AI-compatible devices and reliable internet connectivity, may create disparities in implementation. Schools with fewer resources may struggle to adopt AI-based interventions effectively.

4. Findings and Discussion

4.1. Baseline Survey and KII

A. Teacher use of digital tools or AI in their Classroom Instruction practices

The Survey indicates that, an overwhelming majority, 70% (14) Teachers indicate they have never used any digital tools in their Teaching and went further to give reasons for this. while 6 (30%) of respondents indicate they have used digital tools in their instruction.

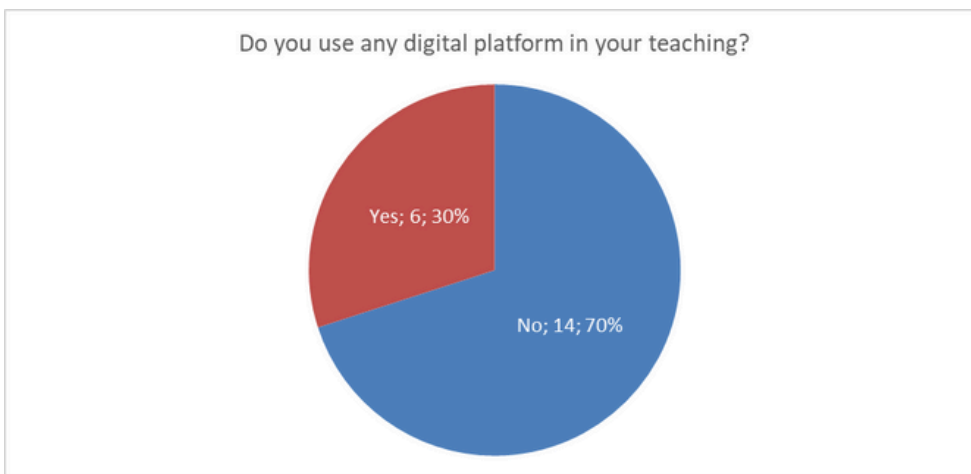


Figure 2: use of digital platforms in Teaching

The chart above presents data on teachers' use of digital platforms in their teaching. It highlights the extent to which educators integrate technology into their instructional practices. From the data, **70%** of teachers (14 out of 20) reported that they do not use any digital platform in their teaching, while **30%** (6 out of 20) indicated that they do utilize digital tools in the classroom. This finding suggests that a significant majority of teachers have not integrated digital platforms into their teaching, potentially due to barriers such as lack of infrastructure, limited digital literacy, or inadequate training. Despite this, the **30%** adoption rate indicates some level of openness to technology, which could be expanded through targeted interventions, professional development programs, and improved access to digital resources. Encouraging the adoption of digital platforms could enhance instructional efficiency and improve student engagement and learning outcomes.

| | Lack of resources | Electricity/power failure | Tight curriculum | Lack of skills and professional development |
|------------|-------------------|---------------------------|------------------|---|
| Not at all | 4 | 6 | 3 | 4 |
| Slightly | 4 | 4 | 4 | 2 |
| Moderately | 1 | 5 | 5 | 3 |
| Very much | 7 | 3 | 7 | 7 |
| Extremely | 4 | 2 | 1 | 4 |

Table 1: Challenges faced by Teachers in using AI and digital resources

The above chart highlights key challenges teachers face in implementing AI-powered instruction, including lack of resources, electricity/power failures, tight curriculum, and limited skills/professional development. The most significant barriers are lack of resources and limited professional development, with 7 teachers rating them as "very much" and 4 marking them as "extremely", indicating an urgent need for better training and infrastructure support. While electricity issues are less prominent, tight curriculum constraints remain a major challenge, as 7 teachers reported "very much" difficulty, suggesting that rigid schedules limit opportunities for AI integration. These findings emphasize the need for improved teacher training, enhanced resource availability, and greater flexibility in curriculum implementation to maximize the benefits of AI-driven instruction.

Other hindrances from using technological tool or resources identified by teachers:

- A large number of students per class
- Internet connectivity issues (and affordability) – major worry by many teachers
- Lack of resources and gadgets for both teachers and students
- Lack of books

B. Changes in Teachers' Behavior and Attitudes in Classroom Practice

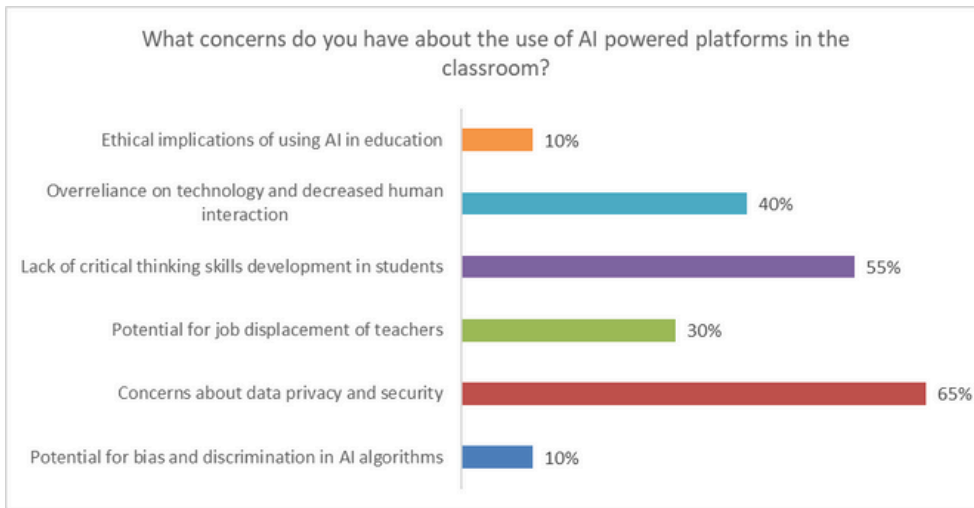


Figure 3: Teacher Concerns in using AI platform in the Classroom

The introduction of AI technologies has begun to influence teachers' attitudes towards instructional methodologies. Educators acknowledge that AI can facilitate more efficient lesson planning and offer adaptive learning opportunities tailored to individual student needs. Despite this recognition, there is a prevalent concern regarding the potential of AI to diminish the human element in teaching, which some educators fear could impact the teacher-student relationship negatively as raised by 55% of the Teachers. 65% of Teachers equally raise concerns about data privacy and security while 30% indicate concerns on the potential for job displacement This apprehension underscores the necessity for balanced AI integration strategies that enhance, rather than replace, the personal interactions fundamental to effective teaching while complementing the work of educators and ensuring data privacy and security.

C. Continuous Professional Development and Peer Collaboration



Figure 4: Teacher Interest in Professional Training related to the use of AI and e-learning

The chart above illustrates teachers' interest in participating in future professional learning or training sessions related to AI-powered tools and e-learning platforms. The data indicates that an overwhelming **95% of teachers (19 out of 20)** expressed willingness to engage in AI-related training, while only **5% (1 teacher)** indicated no interest. This finding highlights a strong demand for professional development in AI-driven instruction, suggesting that most teachers recognize the potential benefits of AI and e-learning platforms in enhancing teaching practices. However, the current lack of skills and training opportunities may be limiting their ability to effectively integrate these technologies. Given the high interest, investments in structured training programs, hands-on workshops, and continuous teacher support would be crucial to fostering AI adoption in education and improving overall teaching outcomes.

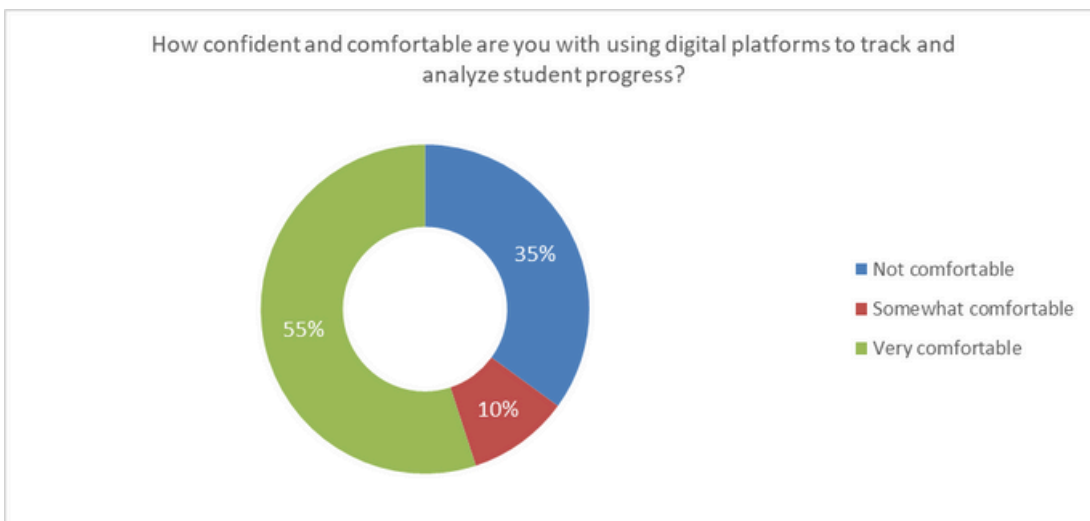


Figure 5: Teacher level of confidence in using AI and digital platforms to track and analyze Student progress

From the data presented, **55% (11)** of teachers express confidence in using digital platforms, whereas **35% (7) report discomfort, and 10% (2)** indicate they are only somewhat comfortable in utilizing these tools to track and analyze student progress. These findings underscore a significant gap in digital proficiency among educators, highlighting the urgent need for continuous training and tailored support programs. Strengthening teachers' digital competencies will not only enhance their efficiency in monitoring student progress but also improve overall learning outcomes through data-driven decision-making.

D. Enhancing Student Outcomes with Data-Driven AI Platforms for Assessing Numeracy

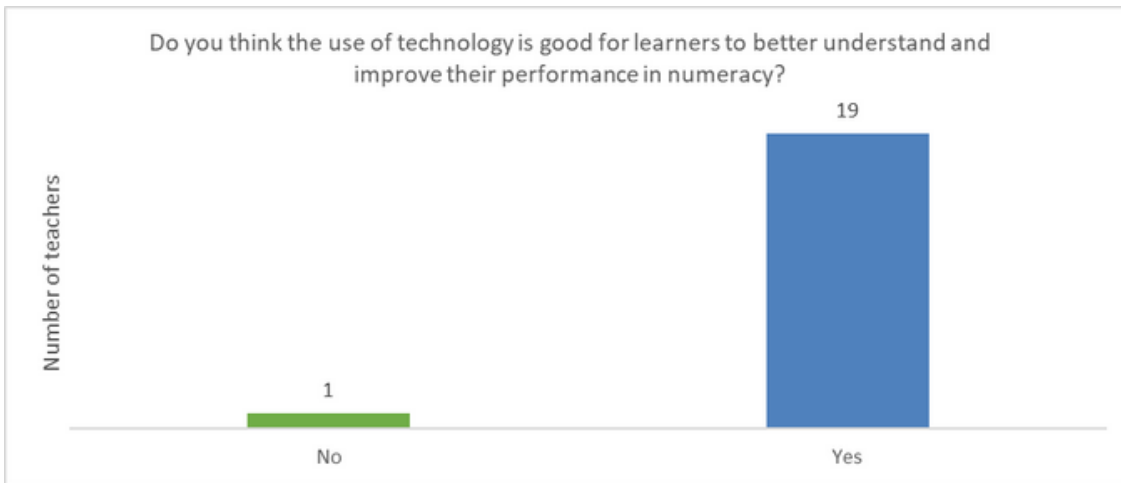


Figure 6: Teachers perception on the use of AI to enhance Learners' numeracy

The data presented in the graph indicates that an overwhelming majority of teachers **19 teachers** believe that the use of technology enhances learners' understanding and performance in numeracy. In contrast, only **1 teacher disagrees**. This strong consensus highlights the perceived value of integrating digital tools into numeracy education. Given this overwhelming support, further investments in technology-driven learning solutions, alongside teacher training programs, could significantly enhance student engagement and achievement in numeracy.

Reasons why teachers think the use of technology is good for learners to better understand and improve their performance in numeracy

- Technology can simplify and facilitate teaching, learning, and understanding of numeracy for learners.
- It engages students, makes learning easier and more fun, and improves their critical thinking and overall performance.
- Technology provides personalized learning experiences tailored to individual needs and learning styles, fostering academic excellence.
- Learners, especially young ones, are eager to use technological tools and this willingness to participate enhances their learning.
- The use of technology in numeracy lessons improves student engagement and independent learning, leading to better overall performance.
- Integrating technology in learning enables students to explore new things, have fun, and improve their learning abilities.

One Teacher however disagrees, arguing that this is because “there is not enough material for teaching process”

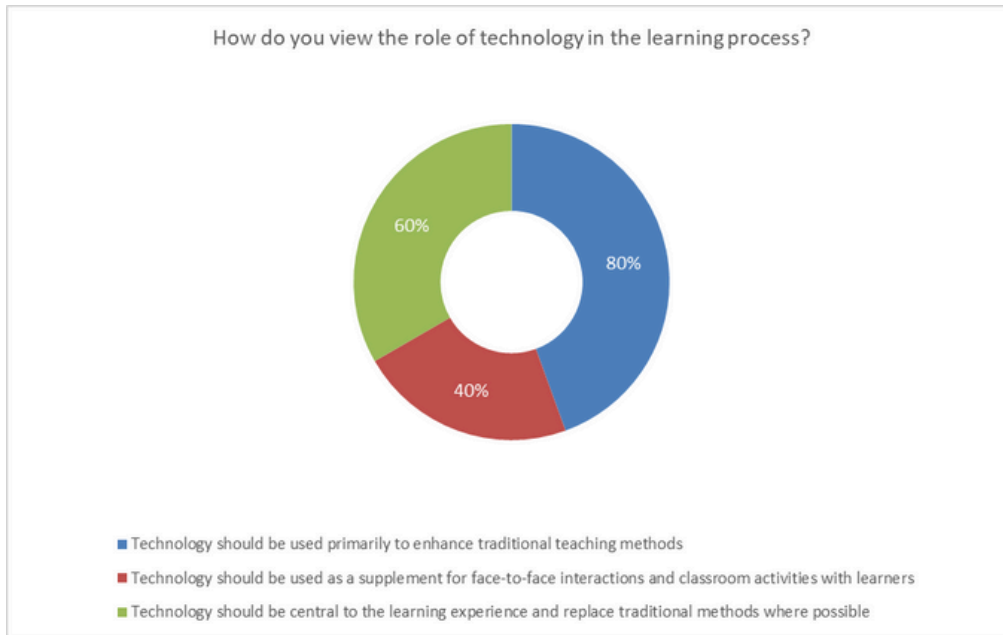


Figure 7: Teachers overall perception on the role of Tech and AI in Education

The data presented in the graph above highlights varying perspectives on the role of technology in the learning process. A significant 80% of respondents believe that technology should be primarily used to enhance traditional teaching methods, indicating strong support for a blended approach where digital tools complement existing instructional practices. Meanwhile, 40% of respondents view technology as a supplement for face-to-face interactions and classroom activities, emphasizing its role in supporting but not replacing direct teacher-student engagement. Additionally, 60% believe that technology should be central to the learning experience, advocating for a shift towards a more digitally-driven education system where traditional methods are replaced where feasible. These findings suggest that while there is strong recognition of technology’s benefits, educators and stakeholders value a balanced integration rather than a complete transition to digital-only learning.

4.2. Learners Assessment Test

A standardized EGMA assessment was conducted in line with the Tanzanian Curriculum across these 5 schools in the pilot, encompassing a diverse cohort of Learners.

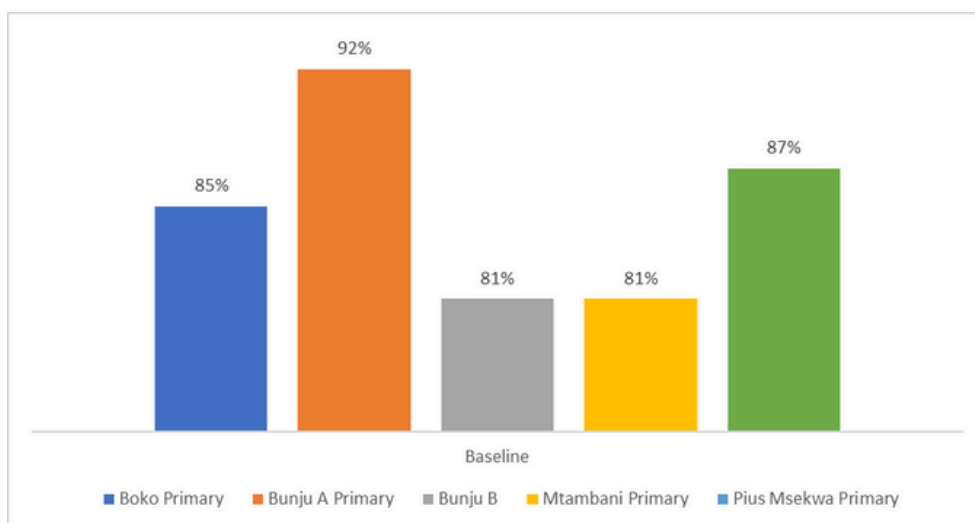


Figure 8: Average score per School

The bar chart illustrates the baseline performance of students across five primary schools. Bunju A Primary recorded the highest performance at 92%, followed by Pius Msekwa Primary at 87%, while Boko Primary achieved 85%. Both Bunju B and Mtambani Primary had the lowest performance, each scoring 81%.

This distribution suggests that while most schools performed within a similar range, there are some variations that may require further investigation. Schools with lower scores might benefit from targeted interventions to improve student performance. Additionally, understanding the factors contributing to Bunju A Primary's high achievement could provide insights for best practices to be replicated across other schools.

4.3. Teacher Compliance with AI Integration and Formative Assessment in Tanzania (Audit Checklist)

The following findings summarize the audit of 20 teachers implementing AI-based learning in Tanzanian classrooms. The analysis focuses on their compliance with best practices in classroom management, interaction with the AI learning platform, and formative assessment strategies. The results highlight areas of strength and identify gaps requiring targeted interventions.

A. Classroom Management and Environment

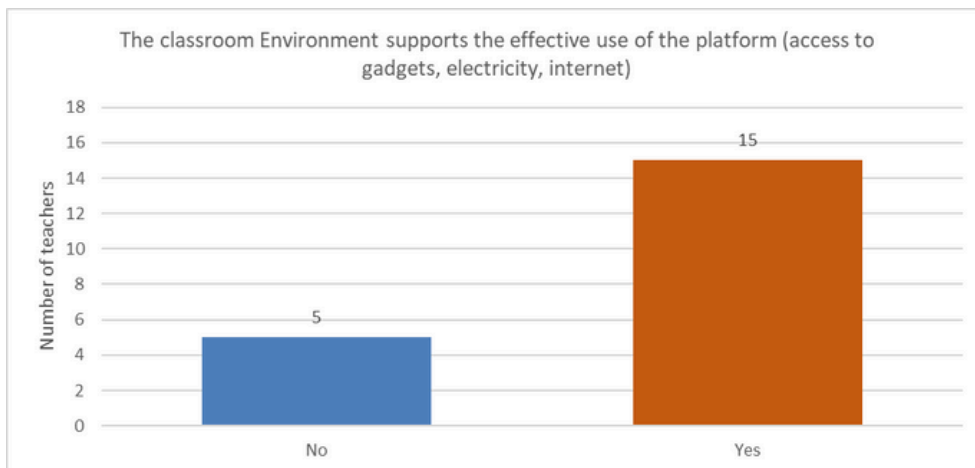


Figure 9: Classroom Environment Observation

The chart above presents data on whether the classroom environment supports the effective use of the platform, considering factors such as access to gadgets, electricity, and internet connectivity. The results show that **15 teachers (75%)** observed ensure classroom environment supports the effective use of the platform, while **5 teachers (25%)** do not. This indicates that the majority of classrooms have the necessary infrastructure to facilitate digital learning, but a significant portion still face challenges related to device availability, power supply, or internet access. The presence of supportive classroom environments suggests promising conditions for the adoption of AI-powered instructional tools, but the remaining gaps highlight the need for targeted interventions to ensure equitable access to digital resources. Addressing these challenges could enhance the scalability and effectiveness of technology-driven learning in classrooms.

B. Student Engagement with the AI Learning App

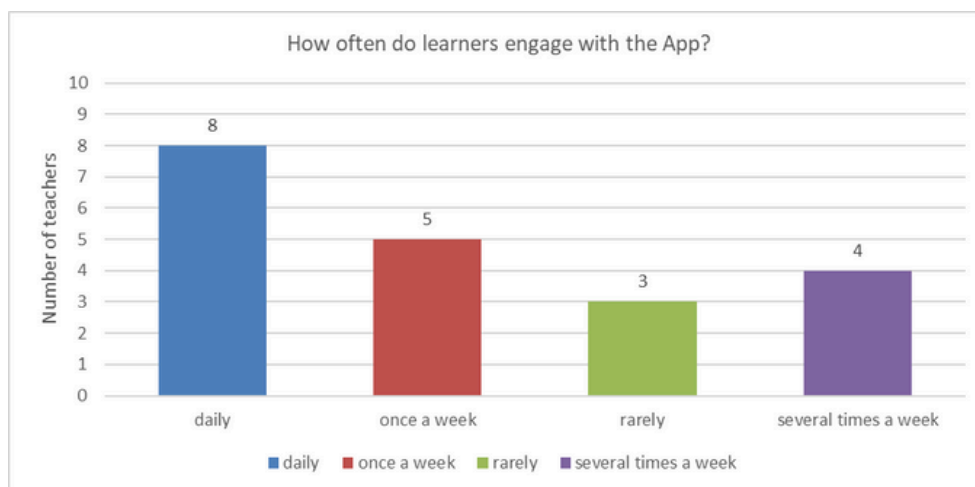


Figure 10: Number of times Learners engage with the Learners' App

The chart above presents data on how often learners engage with the app, as reported by teachers. It highlights the frequency of usage, which is a key indicator of the platform's adoption and effectiveness in supporting learning. From the data, it is observed **8 teachers** ensure learners engage with the app daily, making it the most common usage pattern. **5 teachers** are observed to use the app once a week, while **4 are observed** for Learner usage several times a week. A smaller proportion, **3 teachers**, stated that learners engage with the app rarely. This distribution suggests that while a significant number of learners engage with the app regularly, some still have limited exposure to digital learning tools. The variation in engagement levels could be influenced by factors such as access to devices, internet availability, and teacher facilitation. Encouraging consistent interaction with the app through structured lesson plans and teacher support could help maximize its impact on student learning outcomes.

C. Teacher Support in AI Utilization

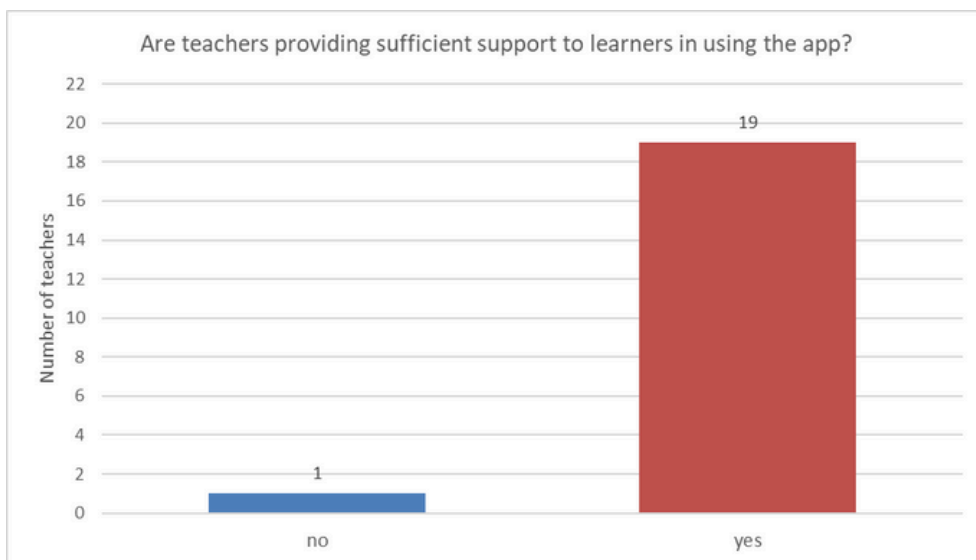


Figure 11: Teacher support to Learners to use Learners App

The above chart illustrates whether teachers are providing sufficient support to learners in using the app. The data reveals that **19 teachers (95%)** are observed to be providing adequate support, while only **1 teacher (5%)** is observed not to. This overwhelmingly positive response suggests that teachers are actively involved in guiding students through the use of the app, ensuring they can effectively navigate and engage with the platform. The strong level of teacher support is crucial for the successful adoption and integration of technology in learning, as teacher guidance enhances student engagement and learning outcomes. However, ensuring that the small percentage of teachers who feel less confident receive additional training and support could further strengthen the effectiveness of the intervention.

D. Time Allocation for AI-Based Learning

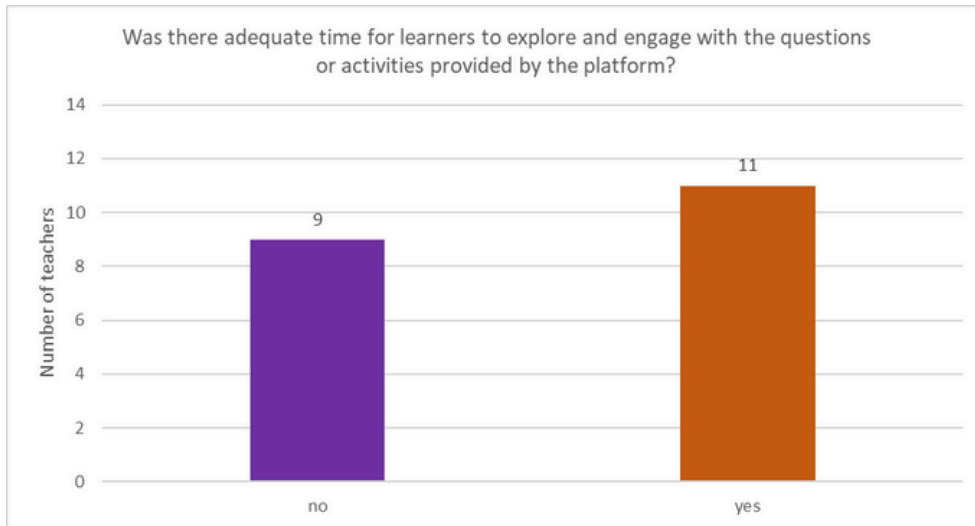


Figure 12: Observation on time to use platform

The data reveals that 55% (11 teachers) believe learners had adequate time to explore and engage with platform activities, while 45% (9 teachers) disagree. Several factors contributed to this divide:

- Students had to share tablets, reducing individual interaction time and hindering personalized learning experiences.
- Some sessions were restricted to just 10 minutes, significantly limiting engagement and preventing in-depth exploration of AI learning materials.
- Schools juggling multiple academic demands struggled to allocate sufficient time for AI-based learning, impacting the consistency and depth of student engagement

These insights highlight the need for increased access to devices, extended session durations, and better integration of AI learning into school schedules to optimize student learning experiences.

E. Types of Formative Assessment Used by Teachers

| What types of formative assessments does the teacher use? | Number of teachers | Percent |
|--|--------------------|---------|
| Oral questions | 20 | 100% |
| Pair/group assessment | 7 | 35% |
| Independent work | 15 | 75% |
| Quizzes (such as multiple-choice, short answer, or quick checks, to gauge student comprehension) | 10 | 50% |

Table 3: Types of Formative Assessment used by Teachers

The table presents data on the types of formative assessments teachers use to evaluate student learning and comprehension. The findings indicate that all teachers (**100%**) use oral questions, making it the most commonly employed method. This suggests that teachers rely heavily on verbal interaction to check students' understanding. Independent work is the second most used assessment method (**75%**), showing that many teachers encourage students to work individually to demonstrate their learning progress. Quizzes (**50%**) are also frequently used, allowing teachers to gauge comprehension through structured assessments such as multiple-choice and short-answer questions. However, pair/group assessments are the least used method (**35%**), indicating that collaborative learning strategies are less emphasized in formative assessments.

4.4. Discussion of Findings

The Survey and KII baseline data reveals a notable correlation between teachers' familiarity with AI-driven platforms and improved student outcomes. Educators proficient in AI tools can personalize learning experiences, effectively addressing individual student needs and enhancing overall performance. Conversely, a lack of AI awareness among teachers may hinder the adoption of innovative teaching methods, potentially limiting student engagement and achievement. This underscores the critical need for comprehensive AI-focused professional development to bridge knowledge gaps and promote effective technology integration in education

Identified Gaps and Opportunities

I. The data indicates a significant gap in training programs dedicated to AI and digital integration in teaching. Addressing this through targeted workshops and continuous learning opportunities can empower educators to utilize AI tools confidently, fostering more dynamic and effective classroom environments.

To address this gap, the Lead for the Shule Direct team organized a one day Training of Teachers, focusing on key challenges, including enhancing knowledge and skills in AI integration. Additionally, they established a WhatsApp forum to provide ongoing virtual support for the teachers.

II. Limited access to AI technologies and supporting infrastructure in certain educational settings like gadgets, internet connectivity hampers the potential benefits of AI integration. Investing in necessary technological resources and ensuring equitable distribution can provide all teachers and students with the tools required for success.

To bridge this gap, a strategic approach was implemented by providing gadgets to select schools. The Shule Team added 4 Gadgets to the existing available Gadgets in the Schools.

III. Some educators expressed concerns about AI diminishing the human aspect of teaching. Initiatives that demonstrate AI as a complement to, rather than a replacement for, traditional teaching can help shift perceptions and encourage acceptance.

The Teacher training Workshop addressed these challenges and adequately ensured Teachers understand how the platform was to work more as a complementary factor

IV. AI platforms can facilitate better communication and collaboration among educators, enabling the sharing of best practices and resources. Leveraging AI to create professional learning communities can enhance teaching strategies and student learning experiences.

5. Challenges

One of the key challenges encountered during data collection in schools was unstable or limited internet connectivity. This affected the ability of data collectors to access and upload survey responses in real time, causing delays and disruptions in the process. Schools with poor network infrastructure faced additional difficulties in utilizing digital tools for data collection, leading to inefficiencies and gaps in the data gathered.

The data collection process coincided with schools preparing to go on break, which posed a significant challenge. As schools focused on wrapping up academic activities, students and teachers were less available for participation. This timing constraint led to difficulties in scheduling interviews and administering surveys, ultimately impacting the completeness and accuracy of the data.

Teachers had limited availability to fully engage in data collection activities such as surveys and key informant interviews (KII). Their packed schedules, coupled with ongoing academic responsibilities, restricted their participation, leading to rushed or incomplete responses. This constraint affected the depth and quality of insights gathered during the process.

In some instances, teachers had varying levels of familiarity with AI-related topics, making it challenging to obtain detailed responses. The need for additional explanations and clarifications extended data collection time and, in some cases, may have influenced the accuracy of responses. Addressing these knowledge gaps in future data collection efforts could enhance the reliability of insights gathered.

A total of 25 teachers from 7 schools were initially selected for the pilot project. However, due to limited availability of devices, the final retention was reduced to 20 teachers. Schools were carefully selected based on their existing resources and capacity to support the project. However, technical challenges arose, including device malfunctions and insufficient hardware support, making it difficult for some schools to sustain the program. As a result, schools that lacked functional gadgets or the necessary infrastructure to effectively implement the initiative had to be dropped from the pilot.

6. Conclusion

The baseline assessment demonstrates both significant challenges and promising opportunities for integrating AI-powered tools in primary education. Although resource constraints, infrastructure issues, and limited prior exposure to digital tools pose obstacles, teachers are optimistic about the transformative potential of AI. With targeted professional development, improved infrastructure, and robust technical support, the AI Teachers initiative can enhance personalized learning, streamline instructional processes, and ultimately improve numeracy outcomes. The collaborative efforts among educators, administrators, and partners will be essential in realizing these goals and ensuring sustainable, long-term impact.

7. Recommendations

Based on the data collected from the baseline survey, Key Informant Interviews (KIIs), and the Baseline Observation Checklist for Teachers, the following recommendations are proposed to enhance the integration of Artificial Intelligence (AI) in teaching practices:

1. Professional Development

a) Training and continuous support: Develop and implement a structured professional development initiative that focus on equipping teachers with the necessary skills to integrate AI tools into their teaching practices. These programs should cover:

b) Foundational AI Concepts: Providing educators with a clear understanding of AI, technology and their applications in education.

c) Practical Application Workshops: Offer hands-on sessions where teachers can engage with AI tools, explore their functionalities, and develop lesson plans that incorporate these technologies.

d) Time Management Strategies: Address concerns about time constraints by training teachers on efficient methods to seamlessly integrate AI into existing curricula without overburdening their schedules.

e) Flexible Learning Opportunities: Offer online resources that allows teachers to learn at their own pace, accommodating their schedules and reducing time-related barriers to professional development.

f) Peer Collaboration and Support Networks: Establish communities of practice where educators can share experiences, challenges, and best practices related to the AI integration in their instruction. This collaborative approach fosters continuous learning and collective problem-solving.

Contract delays had a significant impact on the Baseline Study. Initially, 25 teachers were expected to participate in the pilot study. However, due to prolonged negotiations over certain contract clauses between Lead for Ghana and Shule Direct, the final signing was delayed until around the Christmas break. As a result, many of the originally selected teachers had already become unavailable, making it difficult to reach and engage them effectively. These delays hindered the smooth implementation of the study and limited the intended teacher participation

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- f) Peer Collaboration and Support Networks: Establish communities of practice where educators can share experiences, challenges, and best practices related to the AI integration in their instruction. This collaborative approach fosters continuous learning and collective problem-solving.

2 Resource Allocation

- a) Address the lack of gadgets by ensuring each Teacher and Student has access to a personal device suitable for digital learning.
- b) Support Teachers with Data bundles to switch to other networks during the duration of Implementation when there are connectivity challenges.

3. AI Platform

- a) Ensure the creation of e-learning resources that reflect local contexts, cultures, and languages.
- b) An increase in the number of questions on the Learner's App, coupled with a progressive difficulty adjustment as the learner advances, ensuring a more dynamic and adaptive learning experience.

The baseline assessment has provided a comprehensive understanding of the current landscape regarding the integration of Artificial Intelligence (AI) in educational practices. Through a combination of surveys, Key Informant Interviews (KIIs), and classroom observations, several critical insights have emerged:

- A significant number of educators exhibit limited familiarity and confidence in utilizing AI-driven platforms, underscoring the necessity for targeted professional development programs.
- Challenges such as inconsistent internet connectivity, insufficient access to digital devices, and a scarcity of locally relevant AI educational content impede effective AI adoption in classrooms.
- Educators face considerable time constraints, making it difficult to incorporate AI tools into their lesson planning and delivery effectively.

Addressing these challenges is imperative to harness the potential of AI in enhancing teaching methodologies and improving student outcomes.

8. Next Steps

Building upon the findings of this baseline assessment, the following actions are to ensue:

- The development of comprehensive training modules is essential to equip teachers with the necessary skills to integrate AI tools into their pedagogy effectively. These modules should ensure that educators understand fundamental AI concepts and their practical applications in education, enabling them to make informed decisions about technology use in the classroom. Providing hands-on experience with AI tools will help teachers gain confidence and facilitate seamless integration into their instructional practices. Additionally, training should include techniques that allow educators to incorporate AI-driven solutions efficiently without overburdening their existing schedules, ensuring a balanced approach to technology adoption
- Provision of necessary gadgets for both teachers and students.
- Creating and curating AI educational materials that are culturally relevant and available in local languages.
- Continues improvement of Teachers' Dashboard and Learners' App
- Ongoing deployment of Pilot in Schools.

APPENDIX

1. Baseline Survey Results:

2. Teachers' Audit Survey Results:

3. Learners' Assessment Test:

Learners' Assessment Test:

4. KII Results