ENDLINE LEARNING REPORT

TANZANIA

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 tackle this critical challenge, a proposal was developed to design and implement an AI-powered, data-driven platform aimed at assessing students, equipping 20-25 teachers with digital tools to enhance their instructional methods, and ultimately strengthening numeracy skills among Class 1 and Class 2 learners in Tanzania. The *AI Teachers: Enhancing Teacher Competencies Through an AI-Driven Assessment Program* is designed to empower educators with real-time analytics, tailored teaching resources, and AI-generated insights. By leveraging differentiated instruction and adaptive assessments, the initiative seeks to transform teaching practices and improve student learning outcomes in foundational numeracy.

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CHAPTER ONE

1.1.Background

This report evaluates the outcomes of the *AI Teachers: Improving Teachers' competencies through an AI assessment program* project, implemented to enhance numeracy skills among Grade 1 and Grade 2 learners in Tanzania. The project integrated an AI powered platform to improve numeracy learning for Students. Key components of the initiative included the development of a Teacher's Dashboard, Teacher teaching resources and a chatbot-Teacher Kidevu for instantaneous feedback. A Learners' App was equally developed with questions based on Early Grade Mathematics Assessment (EGMA) standards and all in line with the Tanzanian Primary Education Curriculum. A training was organized to train teachers on integrating AI into their Instruction. Following the training, teachers actively utilized this platform in their classrooms, aiming to foster student engagement and enhance mathematical reasoning. This report presents a comparative analysis of baseline and endline data, assessing the project's impact on teaching practices, challenges, and teacher readiness in terms of beliefs, competencies and perceptions for integrating AI-powered support into classrooms in Tanzania, Leaner numeracy outcomes and overall learner engagement outcomes and teaching practices. The findings aim to inform future educational strategies and policy decisions to improve foundational numeracy in similar contexts

1.2.Objectives

1.2.1. Main Objective

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

1.2.2. 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.

1.3.Research Questions

1.3.1. Main Research Question

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

1.3.2. Specific Research Questions

- 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?

1.4.The organization of the report

This section of the report briefly highlights an overview of the overall structure of the Endline report. Section one (1) gives a preview of introductory background information and the objectives of the survey. Section two (2) describes the methodology detailing the overall approach employed in the Endline survey. Key survey findings are presented and summarized in section three (3). Section (4) discusses the findings and interpretation of results. Lastly, Section (5) highlights the conclusion of the report and provides recommendations based on the key findings of the study.

CHAPTER TWO: EVALUATION APPROACH AND METHODOLOGY

2.1 Evaluation Design

This evaluation employed a mixed-methods approach, integrating both quantitative and qualitative techniques to examine the feasibility, impact, and scalability of AI-driven instruction in foundational numeracy among Grade 1 and 2 learners in Tanzania. The methodological approach aligned with global best practices while ensuring responsiveness to the local educational context and teacher needs. To ensure the intervention remained effective, continuous monitoring was conducted throughout the implementation period to track fidelity, identify emerging challenges, and allow real-time refinements. This adaptive feedback mechanism ensured the approach remained dynamic, addressing both teacher and learner needs in a timely manner.

The Endline evaluation was designed to assess changes in teacher practices, learner engagement, and numeracy performance following the introduction of the AI-powered platform. This approach was intentionally selected to generate comprehensive quantitative and qualitative data, enabling the establishment of precise indicators for evaluating project Data triangulation was limited to pre-existing project reports and the baseline findings, enhancing the depth and contextual relevance of the analysis while ensuring coherence with ongoing project activities. Data collection was facilitated by Shule Direct and analysis by *eBASE Africa* leveraging the Kobo collect platform for efficient and reliable online data capture. The use of refined digital tools not only ensured consistency and accuracy in data collection but also streamlined the analysis process, providing actionable insights into the project's impact and progress.

2.1.1 Data Collection Tools and Adaptations

A range of data collection tools were employed to gather insights from teachers, learners, and classrooms, some of which were modified since the baseline to ensure relevance and effectiveness.

Table 1: Key Components of the Evaluation Strategy

Mixed Method Methodology	Quantitative: EGMA Standardized numeracy assessments aligned with the local curriculum to measure learning outcomes in Schools. Audit checklist to explore the number of criteria teachers can adhere to for their numeracy lessons	
	Qualitative Methods: In-depth Key Informant interviews, to capture contextual factors influencing teaching and learning	
Data phase	Baseline, and Endline Surveys: Data collected at two points to compare progress and identify changes in teacher practices, learner outcomes, and engagement.	
Focus on Teacher Training and Compliance	Teachers receive professional development on integrating AI into their pedagogy. Regular feedback and coaching sessions, facilitated by Lead for Ghana and consortium members, ensure ongoing support and adaptation to identified challenges	
Meta-Synthesis of Evaluation Data	Comprehensive review and synthesis of baseline, and endline data, including evaluation reports, learning assessments, and feedback from teachers. Comparative analysis was conducted to identify changes in learner performance, and understanding across intervention Schools.	

.2. Sampling Techniques

The sampling strategy employed for this Endline survey was a purposeful sampling method, designed to select Grade 1 and 2 learners and teachers based on their direct relevance to the intervention. Purposeful sampling allowed for the intentional selection of participants who could provide rich insights into the impact of the AI-driven numeracy program. The selection process prioritized diversity in learner proficiency levels, ensuring the study captured the intervention's effects on students with varying numeracy competencies. Additionally, gender balance was maintained to assess how the program supported both boys and girls equitably.

This targeted sampling approach ensured that data collected was relevant and insightful, directly contributing to tailored intervention improvements. By focusing on learners and

teachers actively engaged in numeracy instruction, the method provided practical insights for refining teaching strategies and scaling the program effectively. Ultimately, this approach enhanced the validity of the findings, offering actionable recommendations for future program enhancements and sustainable impact on foundational numeracy outcomes. The Endline Study was conducted across five schools in Tanzania, involving 20 teachers and 215 learners. The selection process aimed to ensure a diverse representation of educational settings, with a specific focus on Grade 1 and 2 classrooms, where foundational numeracy skills are essential.

2.2.3 Selection of Schools, Teachers and Learners

- **Selection of schools**

For classroom selection, the project targeted Grade 1 and 2 classrooms in five schools. The selection criteria required each school to be a public institution with at least four teachers teaching numeracy in these grades. The focus on early-grade classrooms was intentional, as these grades are critical for developing foundational numeracy skills, such as Number recognition, number relations—skills essential for future academic success. Classrooms were assessed for readiness, with gaps in resources like gadgets, internet connectivity and electricity.

- **Selection of Teachers**

Teachers who teach numeracy in grades one and two were selected from project schools until a total of 20 teachers was reached. Their willingness to participate was also taken into account.This ensured that educators directly influenced by the intervention were engaged, providing valuable insights into the implementation of AI in numeracy. The inclusion of committed educators ensured the project could directly impact classroom practices while informing scalable solutions.

This purposeful sampling method was ideal for the project because it ensured diversity in performance representation, inclusivity, and focused observation. By selecting learners across varied proficiency levels, the approach provided actionable insights for tailoring interventions to different learner needs. Furthermore, engaging teachers directly involved in numeracy instruction strengthened the relevance of the project and provided practical insights for scaling the intervention. This comprehensive sampling strategy provided a robust foundation to evaluate the project's methodologies and make evidence-based adjustments to improve foundational numeracy outcomes.

Learners

The survey sampled 215 Grade 1 and 2 learners from 5 Schools, with 10-14 learners selected per class. A stratified sampling method was used to achieve balanced representation across different performance levels. Learners were categorized into three strata: high-performing, average-performing, and low-performing learners per class. This stratification ensured that insights captured the full spectrum of learner capabilities, facilitating a nuanced analysis of the intervention's impact on engagement and numeracy performance.

2.3 Data Collection Process

The Endline data collection took place from Monday, February 3rd to 14th Friday, February 14th, 2025, under the supervision of Shule Direct and Effective Basic Services (eBASE) staff. The field team comprised three data collectors.

2.3.1 Training and Administration of Tools

The Endline study began with a one-day training workshop for teachers on November 24, 2024. The training aimed to equip teachers with the skills needed to effectively use the Shule Direct platform during the pilot period. It was held in Dar es Salaam, where all participating schools are located, and brought together teachers from project schools. The goal was to introduce teachers to the platform, address challenges identified in an earlier assessment and strengthen their ability to use the platform to improve student learning and numeracy outcomes in Tanzania.

The workshop covered four key areas: content creation, where teachers worked together to develop teaching assessments for the platform; an introduction to the AI platform platform, which included training on the student app and teacher dashboard; data-driven decision-making, which emphasized using student data from the platform to improve teaching methods; and classroom management, which focused on structuring lessons, setting clear expectations, and managing student behavior effectively. Teachers also completed data collection tools to help assess the impact of the training.

Some challenges included limited training time, a lack of necessary resources like devices, and scheduling conflicts with school sessions. However, the training showed the potential of AI to improve numeracy teaching. Recommendations included organizing more frequent training sessions and ensuring access to essential resources like internet and digital devices. Moving forward, teachers were granted access to their dashboards

and received further training on how to use them, as well as how to support students in using the learner app.

One month after the pilot began in five schools, an audit checklist was used to evaluate how teachers were using the platform, the availability of resources, and any challenges they faced. A follow-up session was then conducted to provide feedback and support, helping teachers overcome obstacles in the classroom. This session also allowed teachers to share their experiences, challenges, and ideas for improving the use of AI in their teaching. The discussions helped identify common barriers and develop strategies to enhance teaching methods while staying aligned with the project's goals. Additionally, the session assessed whether teachers were following the recommended teaching approach and highlighted areas where more support was needed. This process was crucial in refining the project and ensuring that the platform was being used effectively in real classroom settings.

2.3.2. Data collection and tools

a) **Teacher Audit Criteria Checklist:** Observations focus on evaluating teachers' familiarity with the application of AI in Class instruction, the classroom environment, teacher-learner interactions, application of AI in numeracy instruction and learners' participation. Specific aspects included the availability and use of teaching resources, learner engagement and participation strategies, and adherence to planned instructional methods.

b) Early Grade Mathematics Assessment-: This assessment is developed by pedagogic instruction to evaluate the learner's grasp of foundational skills. we used it to measure learners' numeracy skills at baseline, and endline. These tests evaluated foundational numeracy competencies of Learners in identifying numbers, number relations and providing data on learning progress and the effectiveness of interventions.

c) **Key informant interviews for teachers:** for this project, the KIIs targeted Grade 1 and 2 teachers who had participated in the Teacher training and implementation. The interviews were conducted using a semi-structured format, allowing for flexibility to probe deeper into specific responses while maintaining a consistent framework across all participants. Questions focused on teachers' perceptions of AI and technology in instruction, its impact on learners' engagement and performance, and the practical challenges encountered in classroom settings.

d) **Survey:** The assessment aimed to evaluate teachers' familiarity with AI-powered educational tools**,** their cultural beliefs and perspectives on AI in education, current teaching practices, and the integration of technology in the classroom. The survey explored teachers' awareness, experience, and confidence in using AI-based technologies, as well as their openness to technological change and perceived cultural barriers or supports. It also examined instructional methods, lesson planning, and assessment strategies, alongside the frequency and effectiveness of existing technological tools in their classrooms since Baseline. Additionally, the assessment gauged teachers' willingness to engage in professional development and collaborate with peers to enhance their competencies in AI and technology-driven education.

2.3.3. **Changes in the Evaluation design and Methodology since the baseline study**

The overarching evaluation design has not changed since baseline, and the fieldwork methodology has only seen minor changes. The endline research was conducted with the same longitudinal sample of learners and teachers that were drawn at baseline and re-contacted at Endline. The changes came in the level of data collection tools.

Table 2: **Changes in data collection tools**

Data collection tool	Baseline	Endline
Early Grade Mathematics Assessment	Used to measure foundational numeracy skills of learners.	Retained to assess progress in numeracy outcomes.
Audit checklist	Used to evaluate teaching practices, AI integration, availability of enabling infrastructure and resources in the classroom	Maintained to track changes on teaching practices, AI integration, availability of enabling infrastructure and resources in the classroom
Survey	Designed to assess teachers' perceptions, digital literacy, and	Modified to include additional questions reflecting teachers' evolving needs and to capture tailored feedback on AI tools.

	instructional challenges.	
KII	Conducted to gather qualitative insights from teachers, on challenges and opportunities in AI integration.	Adjusted with refined questions focusing on teachers' specific needs and their experiences with AI-powered platform.

2.3.4. Data sources

The endline evaluation report for the project draws evidence from diverse data sources to ensure comprehensive and reliable findings. The evaluation framework triangulates data to answer key evaluation questions, providing robust evidence to assess the project's impact and implementation effectiveness.

Table 3: Data sources

Data sources	Categories	Evaluation Questions	Purpose of the data
-Needs Assessment report -KII from teachers -Survey from teachers	Effectiveness	Can the Intervention be implemented effectively?	To assess the level of acceptability and feasibility of the intervention Determine challenges and enablers for implementation Gauge the overall acceptability.
-Learners' Assessment Test	Impact	Are learners demonstrating improvement in numeracy skills?	Evaluate improvements in learner performance
-Audit Checklist for Teachers	Impact	Are Teachers adopting AI-assisted instructional strategies?	Assess the adoption and integration of AI tailored techniques Evaluate shifts in teacher behaviors and attitudes

KII and Surveys from Stakeholders	Sustainability	What evidence supports the scalability and sustainability of the intervention?	Assess institutional buy-in and resource needs - Identify factors critical to scaling the intervention

2.4. Data Analysis Process

The data analysis leveraged Excel Pivot Tables to organize, summarize, and extract insights. Data quality checks ensured accuracy and reliability, while findings were presented through tables, graphs, and figures for clarity.

The analysis process included:

1. Cross-checking data for accuracy and consistency.
2. Comparative analysis of baseline and endline data to measure teacher adoption and student learning gains.
3. Meta-synthesis, integrating findings from project reports, teacher feedback, and student assessments.

2.5. Ethical Considerations

Ethical practices were emphasized and carefully incorporated into all stages of the data collection process. During the pre-data collection training, the data collection team was sensitized on ethical protocols, including the importance of obtaining informed consent. Data collectors were trained to introduce themselves professionally, explain the purpose of the Endline survey, describe how the collected data would be used, and emphasize participants' voluntary participation, including their right to withdraw at any point without consequences. These measures ensured transparency and respect for participants' autonomy. Also, consent was sought from school authorities and parents before engaging learners in the Endline survey. School authorities provided institutional approval, while parents were briefed on the survey's objectives, how the data would be used, and their children's right to voluntary participation.

For teachers, participation was strictly voluntary, and only those who provided informed consent were involved. Teachers were informed about the purpose of the survey, the confidentiality of their responses, and their freedom to withdraw at any point without consequences. This approach ensured transparency and safeguarded the rights of all

participants. Throughout the process, school protocols were respected. The survey team-maintained professionalism and ensured that interactions with learners, teachers, and school authorities were conducted ethically, fostering a positive and respectful environment for data collection. It is equally important to highlight the fact that, **to ensure the privacy and security of participants, all personally identifiable information has been modified. Pseudonyms are used throughout this report.**

2.6. Study Limitations

2.6.1. **Varying Levels of AI Familiarity Among Teachers**

Some teachers had limited knowledge and experience 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 training programs could enhance the reliability of insights gathered.

2.6.2. Limited Availability of Digital Devices

A total of 30 teachers from seven schools were initially selected for the pilot project. However, due to the limited availability of devices, the final retention was reduced to 20 teachers. Some schools lacked functional gadgets or sufficient infrastructure to support the initiative, leading to schools being dropped from the pilot.

2.6.3. Underutilization of the Learner's App

Although the Learner's App demonstrated strong potential for enhancing teaching and learning, its impact was limited due to various constraints. Key challenges included a shortage of digital devices and restricted access, as learners could only use the devices under teacher supervision. Furthermore, the limited number of tablets meant that each device had to be shared among 10–14 learners, significantly reducing individual engagement and interaction with the app.

2.6.4. Ineffective Learning Progression in the App

The design of the app presented additional challenges. It lacked a progressive learning structure, meaning that questions did not increase in difficulty as learners advanced. Instead, they followed a fixed sequence, allowing students to memorize questions and answers rather than engage in deeper learning. To enhance its effectiveness, introducing

randomized question models and an adaptive difficulty system would be necessary to ensure that learners develop critical thinking skills rather than rely on rote memorization.

2.6.5. Sample Size and Generalizability

The project, implemented in five schools with 20 teachers, represents a small, targeted intervention. This limited sampling scope presents challenges in scaling findings and assessing their generalizability across broader educational contexts in Tanzania, while the intervention has provided meaningful insights into teacher practices and learner outcomes, the small sample size limits the statistical power of quantitative analyses and raises concerns about the external validity of the results.

CHAPTER THREE: PRESENTATION OF FINDINGS

3.1. Teacher Compliance to best practices

In this section of the report, we analyze teachers' attitudes and behaviors toward AI-driven instruction and formative assessment, focusing on any shifts observed by the conclusion of the intervention. The goal is to understand how these evidence-based practices have been integrated into teaching methodologies and the extent to which they have become core components of instructional delivery. Additionally, we investigate key factors that have supported or impeded the adoption process, including the quality of training provided, resource availability, institutional support, and classroom dynamics. By examining these elements, the report aims to present a comprehensive analysis of the intervention's effectiveness in transforming teaching practices and its potential for long-term sustainability within the educational system.To measure teacher compliance and practice transformation, **18 audit criteria were employed**, derived from the Joanna Briggs Institute (JBI) Evidence Implementation Model. This model offers a structured framework for the systematic adoption of evidence-based practices, ensuring consistency and fostering high-quality teaching outcomes. It emphasizes the importance of using validated criteria to bridge the gap between research and practical application, aligning teaching strategies with proven methodologies.

In addition to the JBI model, the Technology Acceptance Model (TAM) was utilized to support the criteria used for AI-driven instruction in numeracy among early-grade learners. TAM is a well-established framework that assesses how users come to accept and use technology, focusing on perceived usefulness and perceived ease of use as primary determinants of technology adoption. By incorporating TAM, the evaluation encompasses both the practical implementation of AI tools and the teachers' receptiveness to integrating these technologies into their instructional practices.

This dual-framework approach ensures a comprehensive evaluation of the factors influencing the successful integration of AI-driven instruction in early-grade numeracy, providing insights into both the systemic and individual-level determinants of adoption and sustained use.

Row Labels	% Compliance Baseline	% Compliance Endline
School 1	82.22%	86.11%
Teacher 1	94.44%	94.44%
Teacher 2	94.44%	94.44%
Teacher 3	77.78%	77.78%
Teacher 4	66.67%	77.78%
Teacher 5	77.78%	83.33%
School 2	90.00%	94.44%
Teacher 6	88.89%	94.44%
Teacher 7	94.44%	100.00%
Teacher 8	94.44%	94.44%
Teacher 9	94.44%	88.89%
Teacher 10	77.78%	94.44%
School 3	77.78%	94.44%
Teacher 11	77.78%	94.44%
School 4	87.04%	90.28%
Teacher 12	83.33%	88.89%
Teacher 13	83.33%	88.89%
Teacher 14	94.44%	88.89%
School 5	83.33%	94.44%
Teacher 15	61.11%	85.56%
Teacher 16	72.22%	83.33%
Teacher 17	100.00%	88.89%
Teacher 18	100.00%	83.33%
Teacher 19	83.33%	83.33%
Teacher 20	83.33%	88.89%
Grand Total	**85.00%**	**90.06%**

Table 4: Teacher compliance with best practices at Baseline and Endline

a. Compliance per Teacher

High and Stable Compliance

Teachers like Teacher 1,Teacher 2 and Teacher 8 maintained consistent high compliance at 94.44% across both periods, indicating strong initial training uptake and sustained integration of the AI platform into regular practice. Their consistency is a model for sustained teacher engagement and adherence.

Significant Individual Improvements

- Teacher 15 made one of the most substantial jumps, from 61.11% to 85.56%, reflecting a transformative change in teaching behavior and platform usage.
- Teacher 4 improved from 66.67% to 77.78%, and Teacher 16 from 72.22% to 83.33%, showing steady learning curves and greater confidence over time.

These improvements suggest that targeted mentorship, peer support, or increased exposure to the platform helped these teachers overcome initial barriers.

Declines in Compliance

Despite the overall upward trend, a few teachers experienced declines at endline:

- Teacher 17 dropped from 100.00% to 88.89%, and Teacher 18 from 100.00% to 83.33%. These drops might indicate burnout, technical challenges, or shifting school responsibilities during the implementation period.
- Teacher 14 and Teacher 9 also saw minor declines from 94.44% to 88.89%, possibly reflecting similar challenges.

Such declines emphasize the need for continued support and monitoring, even for high-performing teachers, to maintain engagement and performance consistency.

No Observed Change

Teachers like Teacher 3 and Teacher 19 maintained exactly the same compliance levels at both baseline and endline (77.78% and 83.33% respectively). This suggests a need for targeted interventions to help them grow beyond their current plateau, perhaps through peer exchange or differentiated coaching.

Tanzania						
School	Baseline			Endline		
	Total Score	**Average score (i.e. per teacher)**	**% Compliance**	**Total Score**	**Average score (i.e. per teacher)**	**% Compliance**
School 1	74	14.8	82.22%	77	15.4	85.56%
School 2	81	16.2	90.00%	85	17	94.44%
School 3	14	14	77.78%	17	17	94.44%
School 4	47	15.67	87.04%	65	16.25	90.28%
School 5	90	15	83.33%	77	15.4	85.56%
Grand Total	**306**	**15.3**	**85.00%**	**321**	**16.21**	**90.06%**

Table 5: Compliance rate per School

b. Compliance per School

- **School 1**

At School 1, the overall compliance improved from 82.22% to 85.56%. The total compliance score rose from 74 to 77, with an average per teacher increasing from 14.8 to 15.4. This suggests moderate progress in the effective adoption of the AI platform across the school. While the increase may appear incremental, it reflects the gradual strengthening of implementation, potentially influenced by teacher-level variations in engagement.

- **School 2**

School 2 demonstrated high baseline performance with a compliance rate of 90.00%, which increased further to 94.44% at endline. The total score increased from 81 to 85, and the average score per teacher rose from 16.2 to 17. This consistent upward trend signifies a robust commitment to the intervention, likely due to a combination of teacher motivation, prior tech exposure, and strong administrative support. Teachers such as Teacher 6 improved from 88.89% to 94.44%, contributing to the school's overall success.

- **School 3**

School 3 showed one of the most significant improvements, with compliance rising from 77.78% to 94.44%. The total score increased from 14 to 17, with the average per teacher moving from 14 to 17, indicating full alignment at endline. This reflects exceptional adoption by teachers Teacher 10 and Teacher 11, both improving from 77.78% to 94.44%. This leap suggests that with targeted coaching or support, teachers who initially struggled were able to quickly adapt and excel.

- **School 4**

School 4 also improved from an already strong baseline. The compliance rate rose from 87.04% to 90.28%, and the average score per teacher increased from 15.67 to 16.25. Teachers like Teacher 12 and Teacher 13 both progressed from 83.33% to 88.89%, demonstrating steady integration of the platform into their teaching practice. The school's incremental growth reflects consistency and continued dedication, though there may be further room to push toward full compliance.

- **School 5**

School 5 saw an interesting fluctuation in its scores. While the overall compliance rose modestly from 83.33% to 85.56%, the total score dropped from 90 to 77, and the average per teacher increased from 15 to 15.4.

3.2. Learner's Performance

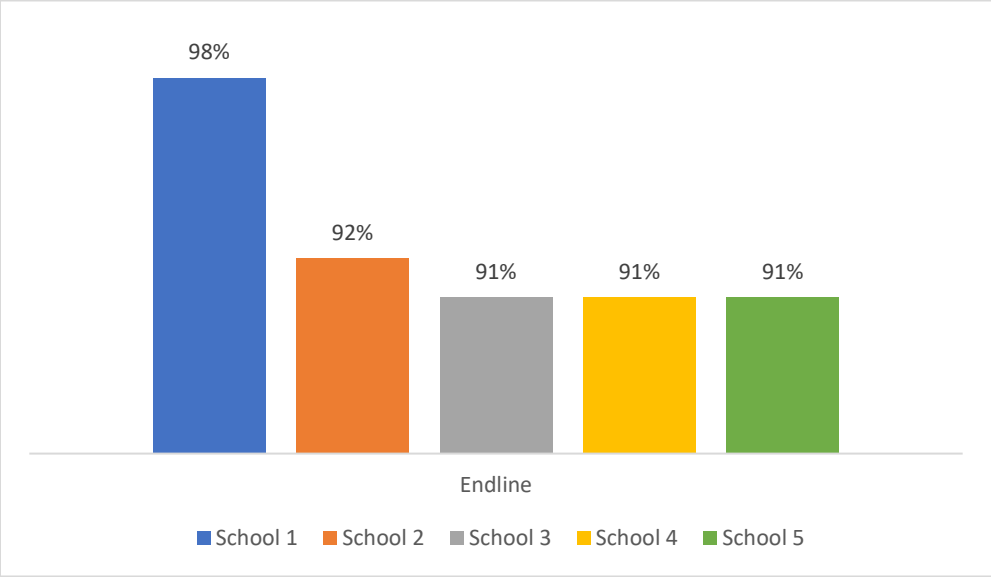

Figure 10:Learners' Assessment Endline

Figure 1 above illustrates the endline performance of the five primary schools in the pilot—School 1, School 2, School 3, School 4, and School 5. The percentages indicate the level of achievement for the Learners' assessment test administered at the conclusion of the study. The results show a high level of consistency across the schools, with some variations in performance. School 1 achieved the highest score at 98%, standing out as the top-performing school in this evaluation. This suggests a strong adoption of the intervention, effective implementation strategies, or better access to resources and support mechanisms compared to the other schools. The exceptionally high percentage indicates that the intervention had a significant impact at School 1, leading to a near perfect score.

Following School 1, School 2 recorded a 92% score, demonstrating strong engagement with the intervention. While its performance remains high, the 6% difference from School 1 might suggest some variation in teacher readiness, student participation, and infrastructural support. Nonetheless, School 2's performance is indicative of successful implementation and positive outcomes in the school. The remaining three schools, School

3, School 4, and School 5, all scored 91%, showing a consistent level of performance across these institutions. The small variation between these schools and School 2 (92%) suggests minimal differences in intervention effectiveness. The identical scores across these three schools indicate similar levels of program adoption and learning progress. However, the fact that these schools scored lower than School 1 suggests that there may have been minor implementation challenges, such as teacher familiarity with AI tools, differences in student engagement, or access to technological resources.

Overall, the data suggests that the intervention was widely effective across all schools, with a narrow performance range of 91% to 98%. While School 1 leads with a noticeably higher score, the rest of the schools performed within a close margin, reflecting a generally successful adoption of the intervention.

3.2.3. Learner performance range

Performance	Baseline		Endline		Difference (nber)	Difference (%)	Movement
	Freq.	Percent	Freq.	Percent			
Excellent	49	81.67	51	85	2	4%	↑
Good	4	6.67	9	15	5	125%	↑
Below Average	4	6.67	0	0	-4	-100%	↓
Poor	3	5	0	0	-3	-100%	↓
Total	215	100	215	100			

Table 6: Learner Assessment Performance Range for Baseline and Endline

The learners' assessment performance score for baseline and endline reveals a notable improvement in overall student achievement following the intervention. The data indicates that learners' performance shifted positively, with increases in the number of students achieving "Excellent" and "Good" performance levels and a complete elimination of students in the "Below Average" and "Poor" categories.

At baseline, 81.67% (49 learners) were categorized as "Excellent," while this figure increased to 85% (51 learners) at endline, representing a 4% increase. This improvement suggests that more students achieved mastery of numeracy skills as a result of the intervention. The slight increase in the number of "Excellent" performers indicates that stronger learners continued to progress, benefiting from AI-assisted assessments, personalized feedback, and enhanced teaching methods.

A more significant improvement was seen in the "Good" category, where the percentage of learners increased from 6.67% (4 learners) at baseline to 15% (9 learners) at endline. This represents a 125% increase, showing that a significant number of students moved up from lower performance levels into a stronger competency range. This suggests that students who previously struggled to reach higher achievement levels benefited from improved instructional approaches, better assessment tools, and adaptive learning mechanisms.

The most striking change is the complete elimination of students in the "Below Average" and "Poor" categories. At baseline, 4 students (6.67%) were classified as "Below Average," but by endline, this number had dropped to 0—a 100% reduction. Similarly, the number of students in the "Poor" category decreased from 3 (5%) to 0, also reflecting a 100% reduction. This complete elimination indicates that all previously struggling learners improved significantly, either moving into the "Good" or "Excellent" categories. The data suggests that targeted intervention strategies, including AI-driven assessments and tailored instruction, were highly effective in addressing learning gaps and elevating the lowest-performing students.

These findings demonstrate a substantial positive shift in learner performance. The increase in "Excellent" and "Good" performers, coupled with the complete elimination of "Below Average" and "Poor" categories, indicates that the intervention was highly successful in improving numeracy outcomes across the cohort. The results suggest that instructional methods, digital tools, and personalized learning approaches played a key role in helping students build their mathematical skills and achieve higher performance levels.

3.2.4. Baseline and Endline Results compared per School

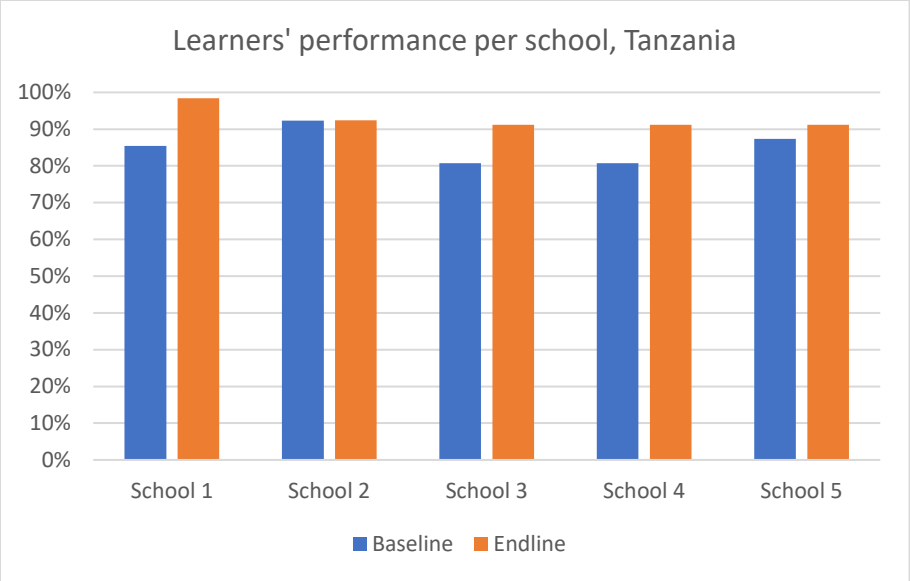

Figure 11: Learners' Assessment- Baseline and Endline Scores combined

Figure 2 above presents the learners' assessment performance scores at baseline and endline across five schools in Tanzania: School 1, School 2, School 3, School 4, and School 5. The comparison between baseline (blue bars) and endline (orange bars) highlights improvements in student performance following the intervention. School 1 showed a significant improvement, with performance increasing from approximately 85% at baseline to nearly 100% at endline. This indicates that students at School 1 made substantial progress, likely benefiting from enhanced instructional methods. School 2 had a high baseline performance, already approaching 95%, and showed a slight improvement at endline. This suggests that students were already performing well before the intervention, and while gains were made, they were relatively small compared to other schools that started at a lower performance level.

School 3, School 4, and School 5 all exhibited a notable increase in performance from baseline to endline. Their baseline scores were lower than those of School 1 and School 2 , but by the endline assessment, their scores were comparable to the higher-performing schools. This suggests that students in these schools particularly benefited from the intervention, possibly due to improved teaching strategies.

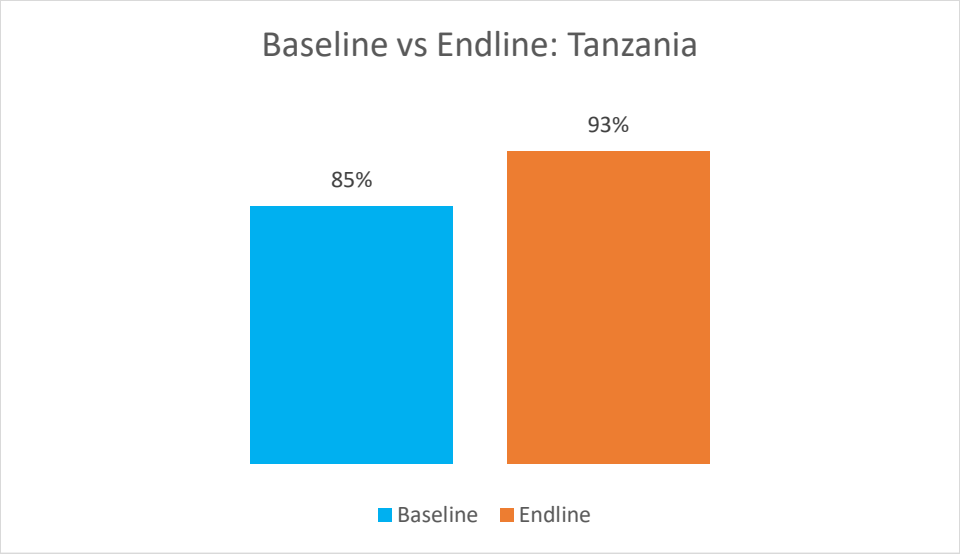

Figure 12: Overall Baseline and Endline Learners' Assessment Score

From figure 3 above, it is evident that, there was an upward shift in the Learners' performance. Schools with lower initial scores showed the most noticeable improvements, while those that already had high baseline performance maintained or slightly enhanced their strong results. This suggests that the intervention was effective in bridging learning gaps and elevating overall student achievement across different school settings.

3.3 Teacher Competencies

The endline survey data from Tanzania highlights significant improvements in teacher competencies after the implementation of the AI-driven assessment program. The following sections outline key data points that demonstrate this progress, followed by a detailed analysis.

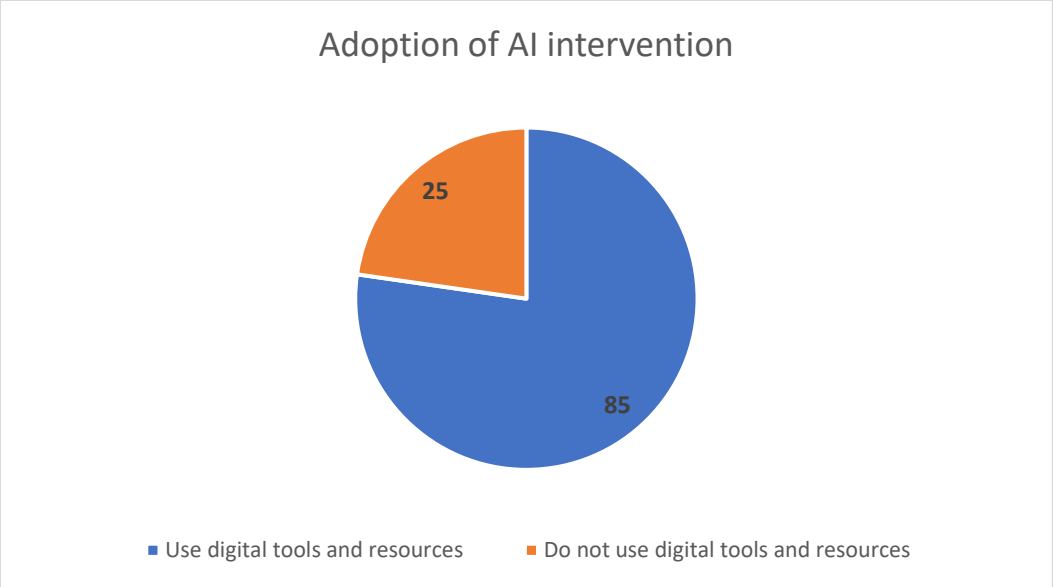

Figure 13: Percentage of Teachers who confirm they use digital tools and AI

Figure 4 above illustrates the adoption of AI intervention among teachers, distinguishing between those who use digital tools and resources and those who do not. The data indicates a significant improvement in AI adoption, with 85% of teachers now incorporating digital tools into their instructional practices. This represents a substantial increase from the baseline, where only 30% of teachers reported using AI-supported tools. The increase suggests that the intervention was effective in equipping teachers with the necessary skills, confidence, and resources to integrate AI-driven assessments and digital learning methods into their classrooms.

The rise in AI adoption can be attributed to several factors, including targeted training, exposure to the AI-powered educational platform, and ongoing support to help teachers become more comfortable with digital integration. The increase from 30% to 85% indicates that teachers were able to shift from traditional teaching methods to more technology-driven approaches, potentially enhancing instructional efficiency and student engagement.

Despite this progress, 25% of teachers still do not use digital tools and resources, indicating that some barriers to full adoption remain. These challenges may include limited access to internet connectivity, insufficient availability of devices, or a need for further training to build confidence in using AI tools. The presence of non-users highlights the importance of continuous professional development, infrastructural support to ensure that all teachers can fully integrate AI into their teaching practices.

3.3.1. Teacher's perception of AI's role in Numeracy Education

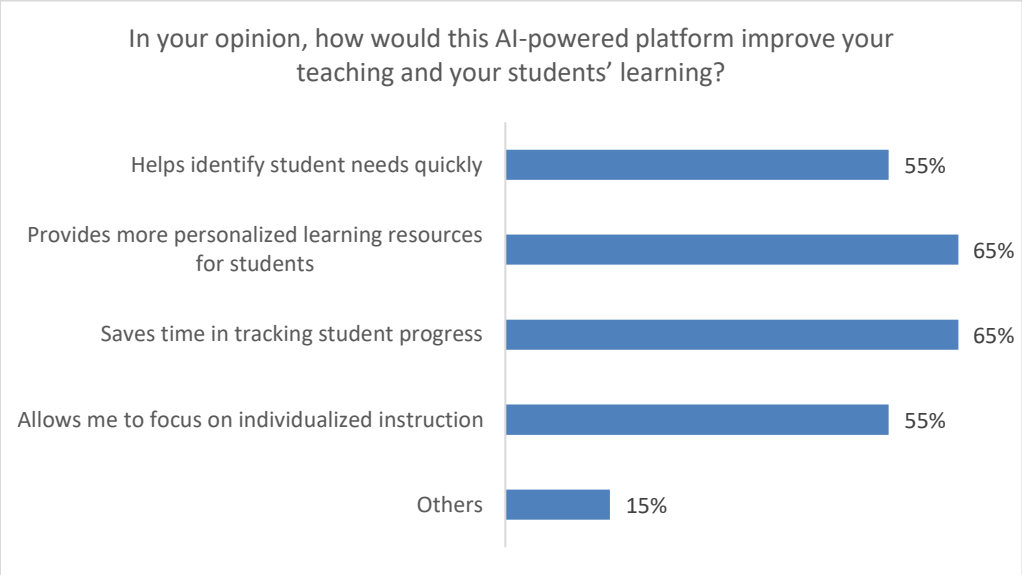

Figure 14: Teachers' perception of Tech and AI in their instruction at Baseline

Others include:

- get resources
- Make students love the subjects
- Provide diverse resources

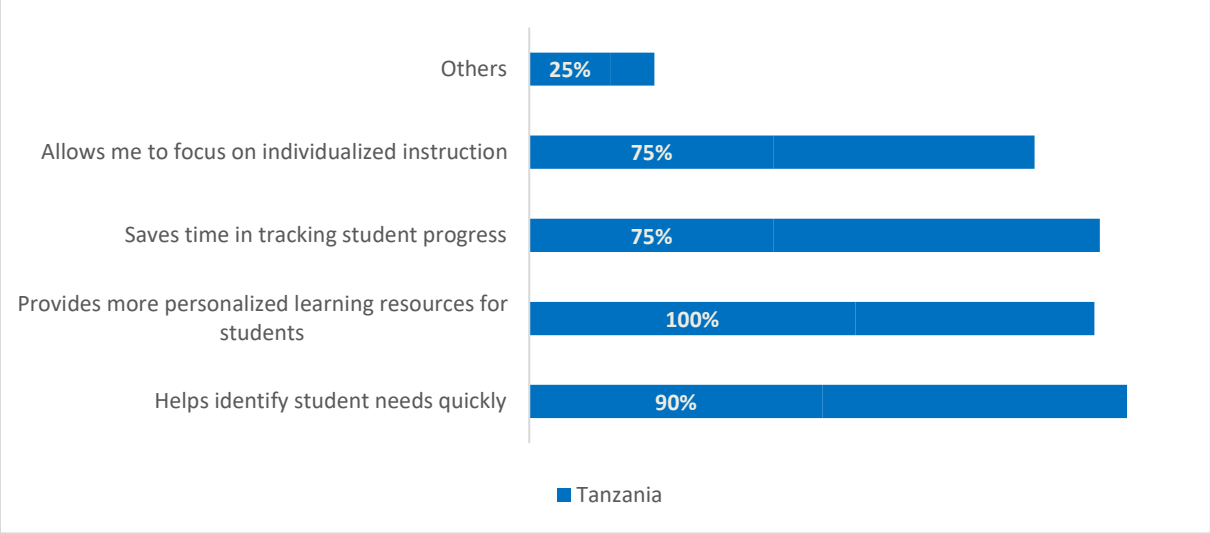

Figure 15: Teachers' perception of Tech and Ai in their instruction at Endline

The data from figure 5 and figure 6 above highlights significant improvements in teachers' experiences with AI-powered platforms, reinforcing the positive impact of integrating AI into numeracy instruction. The findings demonstrate that the AI platform not only met but, in many cases, exceeded initial expectations, particularly in helping

teachers identify student needs, track student progress, provide personalized learning resources, and support individualized instruction. One of the most notable improvements was in the ability of AI to provide personalized learning resources. At baseline, 65% of teachers anticipated that AI would support customized learning materials for students. However, by the endline assessment, 100% of teachers in Tanzania confirmed that AI successfully provided personalized resources. This increase underscores the AI platform's role in tailoring instruction to individual student needs, making learning more engaging and targeted. The endline findings suggest that teachers gained a deeper understanding of how AI can adapt instructional materials based on student progress, an outcome they had not fully anticipated at the start of the intervention.

Another key improvement was in AI's role in identifying student needs quickly. At baseline, 55% of teachers expected AI to help with early identification of struggling learners. However, by the endline assessment, this figure had significantly increased, with 90% of teachers confirming that AI effectively helped in this area. This 35% rise indicates that teachers found AI-powered assessments more efficient in diagnosing learning gaps than they had initially thought. AI's ability to provide real-time insights likely enabled teachers to offer targeted interventions sooner, improving overall student performance.

AI's impact on saving time in tracking student progress was also evident. At baseline, 65% of teachers believed AI would help them monitor student learning more efficiently, and by endline, this number had risen to 75%. While this increase is not as large as in other areas, it still confirms that AI tools streamlined the assessment process, reducing the burden on teachers and allowing them to focus more on instruction. The data suggests that AI's tracking features improved workflow efficiency, allowing teachers to assess student progress in a more structured and data-driven manner.

Another significant improvement was in AI's role in supporting individualized instruction. At baseline, only 55% of teachers anticipated that AI would allow them to personalize learning for students, but by endline, 75% of teachers confirmed that AI enabled them to focus on individualized teaching strategies. This 20% increase suggests that AI provided teachers with tools to differentiate instruction, cater to diverse learning needs, and ensure that students received the necessary support to succeed. The increase in personalized learning experiences likely contributed to the observed gains in overall student performance and engagement.

The percentage of teachers recognizing "other" benefits of AI also increased from 15% at baseline to 25% at endline, suggesting that teachers discovered additional applications of

AI beyond their initial expectations. This increase indicates that exposure to AI-driven teaching methods expanded teachers' understanding of its potential, leading to broader applications in the classroom.

The endline results confirm that all key perception indicators improved, demonstrating that AI tools were highly effective in reducing teachers' workload, improving assessment accuracy, and enhancing instructional efficiency. The most significant change was in AI's ability to provide personalized resources (100%), followed by improvements in identifying student needs (90%) and supporting individualized instruction (75%). The findings suggest that teachers initially underestimated AI's full potential, but through hands-on experience and practical application, they recognized its transformative role in numeracy education. These results reinforce the success of the AI Teachers Project in building teacher confidence, improving teaching practices, and fostering a more data-driven approach to learning. Continued training and support will be essential to sustain these gains and ensure the long-term integration of AI in classrooms.

3.3.2. Confidence and comfortability in using AI powered platform

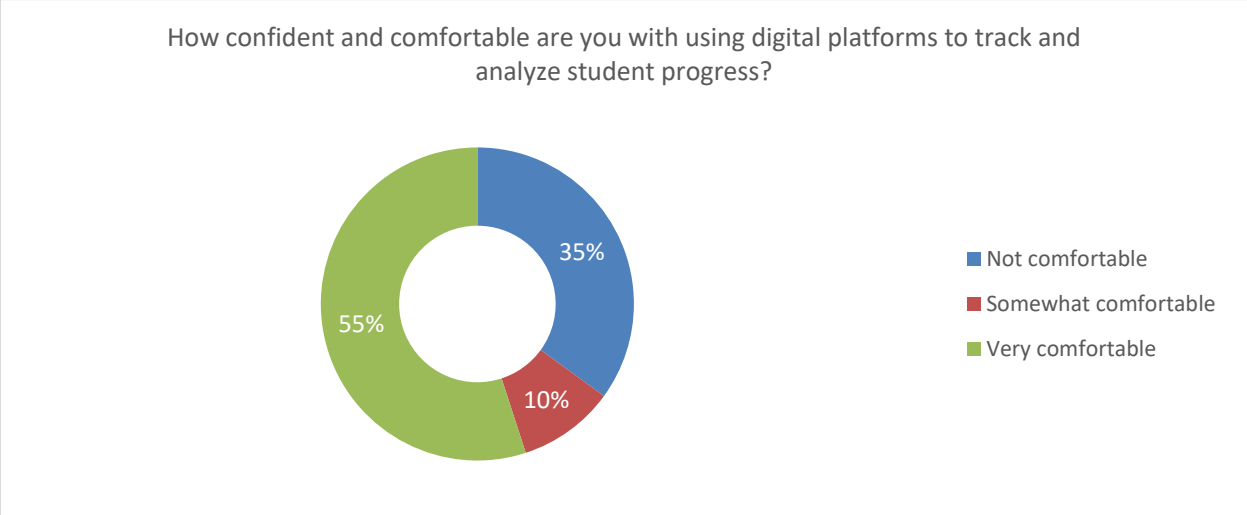

Figure 16: Teachers' level of confidence and comfortability in using AI at Baseline

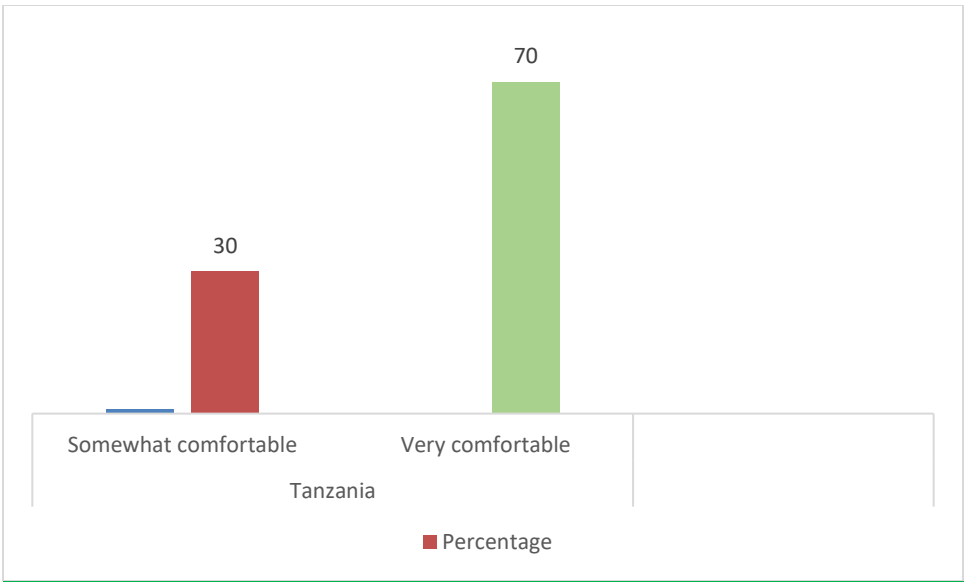

Figure 17: Teachers' level of comfort and confidence in using AI at Endline

At the baseline stage, a significant proportion of teachers (35%) reported being "Not Comfortable" using digital platforms for student tracking. This suggests that over one-third of the teachers lacked familiarity, confidence, or previous experience with AI tools in the classroom. Additionally, only 10% of teachers were "Somewhat Comfortable," meaning very few had partial knowledge or basic skills in using digital tracking platforms. Despite these challenges, 55% of teachers reported being "Very Comfortable" with digital platforms, indicating that slightly more than half of the teachers had a prior understanding or confidence in using technology for student progress tracking. However, the presence of a substantial group of teachers who were either uncomfortable or only somewhat familiar with these tools highlighted a clear need for training and capacity-building.

By endline, the percentage of teachers who were "Somewhat Comfortable" increased from 10% to 30%, suggesting a positive shift in confidence and familiarity after exposure to training and practical use of AI tools. This increase indicates that many teachers who were initially uncomfortable gained enough skills, resources and knowledge to feel moderately confident in using digital tracking platforms. A significant improvement was seen in the "Very Comfortable" category, which rose from 55% at baseline to 70% at endline. This growth suggests that after structured training, hands-on experience, and continuous engagement with AI-driven tools, the majority of teachers became highly confident in integrating digital platforms into their teaching practices. Notably, the "Not Comfortable" category completely disappeared, indicating that all teachers had reached at least a basic level of comfort with the technology by the endline stage.

Key Insights and Conclusion

These findings suggest that training and exposure played a crucial role in improving teachers' confidence in using AI for student tracking. At the start of the project, a significant number of teachers lacked digital literacy skills, but by the endline, nearly all had gained some level of proficiency. The increase in teacher readiness for AI integration highlights the effectiveness of structured capacity-building initiatives in fostering digital adoption in education.

However, while the results are promising, the fact that 30% of teachers remained only "Somewhat Comfortable" at endline indicates the need for continued support and refresher training. Ongoing professional development can help ensure that all teachers become highly proficient and confident in using AI tools effectively. Overall, the intervention successfully enhanced teachers' ability to leverage AI-driven platforms for student tracking and analysis, marking a significant step toward digital transformation in education.

3.3.3. Frequencey of AI platform Usage

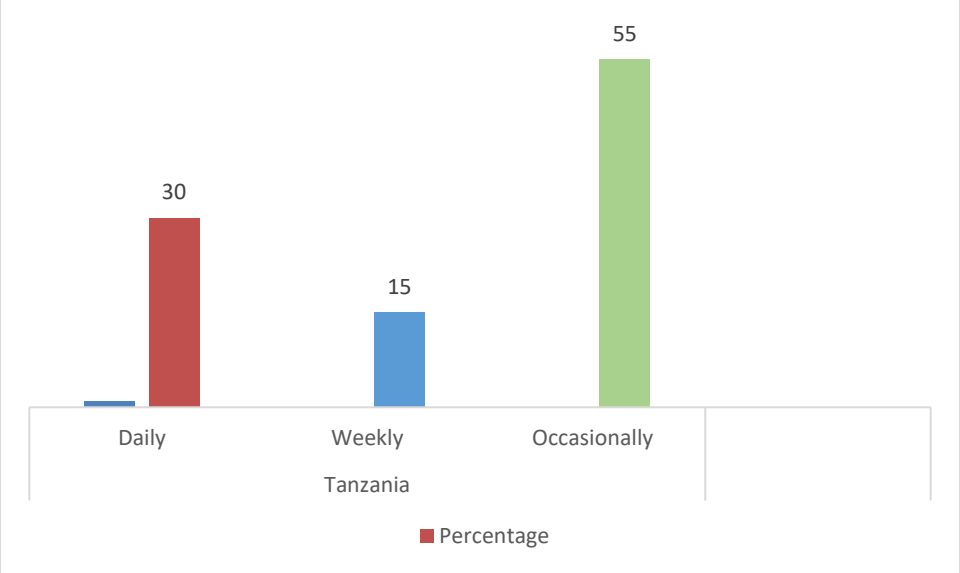

Figure 18: Teacher frequency of platform usage

At the baseline stage, responses were varied, with 40% of teachers indicating that they would use the platform daily, demonstrating strong initial interest in integrating AI into their teaching routine. Additionally, 20% of teachers stated they would use it weekly, while 35% expected to use it only occasionally. A small percentage, 5%, were unsure about their level of engagement, possibly due to unfamiliarity with the technology or uncertainty about its effectiveness. These results suggest that while a significant number of teachers saw potential in the AI platform from the outset, others remained cautious about its adoption in their classrooms.

By the endline stage, usage patterns shifted. The percentage of teachers who planned to use the platform daily dropped from 40% to 30%, and weekly usage decreased from 20% to 15%. However, the largest shift occurred in the "occasionally" category, which increased from 35% to 55%. This suggests that, while teachers gained more practical experience with the platform, many preferred to use it periodically rather than on a daily or weekly basis. This shift could indicate challenges in sustained daily usage, such as time constraints, accessibility issues, and the need for additional support. Notably, the "not sure to use" category disappeared, implying that all teachers had developed at least some level of confidence and clarity regarding the platform's application in their teaching.

Thus, the findings show a change in expectations regarding the frequency of AI platform usage. While enthusiasm for daily use declined, more teachers found occasional use to be a practical and sustainable approach. This suggests that while AI-based tools are valuable in enhancing numeracy skills, their integration into classroom routines depends on factors such as accessibility, training, and the alignment of digital tools with existing teaching methods. Further efforts may be needed to address barriers to more frequent usage and ensure that teachers maximize the platform's potential in improving student learning outcomes.

3.3.4. Significant changes in Teaching practice and impact on learners' perception of numeracy

Observed Change	Percentage
Improved student learning	62.5%
Enhanced teaching skills	75%
Increased student engagement	37.5%
Simplified teaching process	37.5%
Professional growth for teachers	50%

Table 7: Key changes in Teacher practices since they started using the platform

Based on the above table 7, a majority of teachers (62.5%) observed **improved student learning**, indicating that the platform enhanced students' comprehension and overall academic performance. One teacher noted, *"I've noticed that my students now grasp mathematical concepts more quickly, and they are excited to solve problems on their own."* This suggests a shift in students' perception of numeracy, making it more engaging and accessible.

The most notable change was in **teaching practice**, with 75% of teachers reporting **enhanced teaching skills** as a direct result of using the platform. Teachers incorporated new strategies and approaches to explaining complex concepts, making lessons more interactive and effective. A teacher shared, *"I have learned better ways to introduce complex topics, and the AI platform gives me new approaches to teaching. "*Additionally, **37.5% of teachers** noted **increased student engagement** in numeracy lessons, though engagement levels varied. Some students adapted quickly, while others needed more time to become comfortable with digital learning. One teacher explained, *"Some students were eager to use the app, but others took time to adjust. Once they became comfortable, their participation in class improved."*

A similar proportion (37.5%) of teachers reported that the AI platform **simplified the teaching process**, making it easier to plan lessons and track student progress. A teacher reflected, *"I used to spend so much time preparing exercises manually, but now I can easily track my students' performance and adjust my lessons accordingly."* This shift enabled teachers to focus more on individualized instruction, ensuring that students received the support they needed. Half of the teachers (50%) reported **professional growth**, emphasizing how the program expanded their teaching capacity and digital literacy skills. The platform encouraged teachers to reflect on their instructional methods and student outcomes. One teacher stated, *"I feel more confident as a teacher because I am now using modern teaching tools. This experience has made me a better educator."*

As such, the data suggests that the AI-powered platform transformed teaching practices and positively influenced students' perception of numeracy. Teachers gained new pedagogical skills**,** while students became more engaged and confident in their mathematical abilities. However, the varying levels of engagement highlight the need for **continuous training and classroom support** to maximize the platform's effectiveness.

3.3.5 How Teachers' Perception of AI has evolved

Most teachers (75%) now view AI as a **valuable complement** to their teaching efforts, simplifying tasks and improving outcomes. Many recognize AI's potential but stress the need for **more training** and **sustainable practices** to maximize its benefits. A small group is still in the early stages of exploring AI tools.

Perception	% Baseline	% Endline
Positive reinforcement (AI as a complement)	45%	75%
Recognition of AI's potential	50%	62.5%
Need for sustainability (training, practices)	40%	25%
Initial exploration (still learning)	75%	12.5%

Table 8: Key changes in Teacher practices since they started using the platform

3.3.6. Teachers' Perception on Learners' Engagement in numeracy lessons

All the teachers (100%) reported improvements in students' numeracy skills. The most commonly observed improvements were in **number recognition** (62.5%) and **student engagement** (50%). Teachers highlighted the role of interactive and gamified features in making learning more effective, especially for slow learners.

Improvement Area	Percentage
Number recognition	62.5%
Engagement and interest	50%
Mathematical understanding	37.5%
Performance improvements	37.5%

Table 9: Teachers' Perception on Learners' Engagement in numeracy lessons

The findings highlight key areas of improvement in students' numeracy skills and engagement levels following the integration of AI-powered learning tools. Teachers observed notable progress in number recognition, engagement, mathematical understanding, and overall performance, indicating that the platform contributed to enhanced learning outcomes

Significant Gains in Number Recognition

The highest improvement was observed in number recognition, with 62.5% of teachers reporting noticeable progress in students' ability to identify and work with numbers. This

suggests that the AI-powered platform has been particularly effective in strengthening foundational numeracy skills, which are critical for early mathematical development. One teacher noted, *"Students who previously struggled to recognize numbers can now confidently identify and differentiate them."* This foundational improvement lays the groundwork for more advanced mathematical concepts and boosts students' confidence in numeracy.

Enhanced Engagement and Interest in Learning

Half of the teachers (50%) observed increased student engagement and interest in numeracy. The interactive nature of the AI tools made learning more dynamic, encouraging students to participate actively in lessons. One teacher remarked, *"Students are more eager to learn because of the app. They get excited when they use it, making lessons more enjoyable."* This shift in attitude towards learning suggests that technology-enhanced instruction has helped transform numeracy from a traditionally challenging subject into an engaging experience.

Growth in Mathematical Understanding

37.5% of teachers reported improvements in students' mathematical understanding, indicating that beyond basic number recognition, the AI platform has helped students grasp more complex numerical concepts. Teachers observed that students are becoming more analytical in their approach to solving problems and are beginning to develop critical thinking skills in mathematics. One teacher noted, *"Students are now more willing to tackle mathematical problems beyond simple addition and subtraction."* This shift suggests that the AI-powered platform is not only improving rote memorization but also fostering deeper comprehension.

Performance Improvements in Numeracy

Another 37.5% of teachers observed general performance improvements in students' numeracy skills. This suggests that while foundational skills like number recognition saw the most significant gains, the AI-powered tools also contributed to overall academic progress in math. One teacher explained, *"Students' ability to solve mathematical problems has improved. They calculate faster and are more confident in class."* However, given that performance improvements were reported at a slightly lower rate than number recognition and engagement, it suggests that sustained use of the platform and additional support may be needed to further enhance student performance outcomes.

3.3.7. Barriers to AI Adoption and professional development needs

Challenge	% Baseline	% Endline
Lack of infrastructure (electricity, devices)	85%	87.5%
Limited or no internet connectivity	100%	75%
Lack of training	100%	50%
Time constraints (timetable issues)	60%	25%
Crowded classrooms/high student-teacher ratios	65%	25%

Table 10: Barriers to AI Adoption

87% of Teachers reported that their schools lack the necessary infrastructure and resources to support the use of AI technology in learning. A significant challenge is the absence of reliable electricity, with one teacher noting that "**not all classes have electricity**" and another mentioning that some classrooms are entirely without power. Internet connectivity is another major issue, as schools often rely on teachers' personal internet connections rather than having school-wide access. For example, one teacher stated that "**we rely on teachers' connectivity (personal internet),**" highlighting the lack of institutional support.

Additionally, there is a severe shortage of digital devices such as tablets, laptops, and projectors. One teacher emphasized that their school has a "**limited number of tablets and no laptops at all for teachers and students,**" while another pointed out the absence of projectors for classroom presentations. Financial constraints further exacerbate these challenges, with teachers often using personal resources to cover costs. Technical support and training are also lacking, as schools do not have staff with the expertise to assist teachers in using AI tools. Overall, while some schools have basic infrastructure like electricity, the lack of devices, internet, and training makes it difficult to effectively integrate AI into teaching and learning.

CHAPTER FOUR: INTERPRETATION OF FINDINGS

4.1. To What Extent Did Teachers Adopt AI in Their Instructional Practices?

The adoption of AI into instructional practice was widespread and deepened over the course of the intervention. The percentage of teachers actively using digital tools and AI-powered platforms increased from 30% at baseline to 85% at endline. This signals a substantial behavioral shift in teaching practices, underscoring the effectiveness of training, continuous support, and the usability of the platform itself. Audit compliance scores, which measured alignment to AI-integrated best practices using the Joanna Briggs Institute model and Technology Acceptance Model (TAM), improved from an average of **85.00% at baseline to 90.06% at endline** across all schools. Individual teachers like Teacher 15 moved (from 61.11% to 85.56%) and schools like School 3 moved (from 77.78% to 94.44%) demonstrated transformative growth, indicating successful capacity building.

Moreover, the complete elimination of teachers reporting "not comfortable" with AI at endline, down from 35% demonstrates an increased sense of ease and readiness. While daily usage dropped slightly from 40% to 30%, the rise in occasional use (from 35% to 55%) suggests that AI has become a sustainable, flexible support tool rather than an everyday necessity for all teachers. The results show that teachers are not only adopting AI but integrating it in ways that suit their context and instructional rhythms.

Key Implications:

- Teachers are open and responsive to AI integration when provided with proper training and support.
- Compliance and adoption are scalable with localized, user-friendly platforms.
- Flexible usage patterns (occasional vs. daily) can still yield strong results if tied to instructional need.
- Continued technical assistance and the provision of resources are crucial to sustaining momentum

4.2. How Has the Use of AI Affected Learner Performance in Numeracy?

The use of AI-powered tools had a strong, positive impact on learner performance in numeracy across all participating schools. Endline assessment data reveals that average learner achievement rose significantly, with most schools scoring between **91% and 98%** on the final numeracy assessment. The most notable gains were observed at School 1, which improved from 85% to 98%, suggesting highly effective implementation. Even schools that started with lower baseline scores, such as School 3 and School 4, achieved

parity with higher-performing schools by endline. Additionally, the learner performance range shifted upward: the number of learners in the "Excellent" category increased from 49 to 51, and those in the "Good" category rose from 4 to 9—. Critically, all learners previously categorized as "Below Average" or "Poor" improved, eliminating these two categories entirely at endline. This suggests that AI-supported instruction, particularly through adaptive assessments and feedback mechanisms, effectively closed performance gaps.

Teachers consistently linked these outcomes to increased engagement and improved conceptual understanding. One teacher remarked, *"Students who previously struggled to recognize numbers can now confidently identify and differentiate them."* Others noted a visible increase in critical thinking and collaboration among students. These findings confirm that AI integration contributed to not only improved test scores but deeper learning outcomes.

Key Implications:

- AI-powered platforms can significantly enhance student numeracy performance.
- Real-time feedback and adaptive assessments contribute to learning gains.
- Increased student engagement leads to improved attendance and motivation.

4.3. What Were the Key Changes in Teachers' Perceptions, Competence, and AI Adoption?

Teachers' perceptions of AI and their own digital competence evolved significantly over the course of the intervention. Initially, Teachers were skeptical. By endline, 75% of teachers viewed AI as a positive complement to their instruction, and 62.5% acknowledged its potential to transform teaching and learning.There was a significant increase in the perceived usefulness of AI for providing personalized learning resources (from 65% to 100%) and identifying learner needs (from 55% to 90%). Teachers reported that AI tools helped streamline their planning and made it easier to offer tailored support. Confidence levels in using AI also improved substantially, with "very comfortable" teachers rising from 55% at baseline to 70% at endline.Audit and survey data showed that 75% of teachers felt their teaching strategies had improved, and 50% reported professional growth, including enhanced digital literacy and reflective practice. Teachers also embraced new approaches to lesson planning, student assessment, and differentiated instruction. However, about 30% of teachers remained only "somewhat comfortable" by endline, highlighting the need for ongoing professional development.

Barriers such as poor internet, limited devices, and time constraints remain significant, with 87.5% of teachers reporting infrastructure as a major hurdle. This indicates that while mindsets and competencies have shifted positively, structural support will be crucial for long-term sustainability.Teachers began to see AI not as a threat or burden but as a supportive teaching assistant. The platform encouraged reflection on pedagogy, as teachers monitored performance dashboards and adjusted methods accordingly. One teacher noted, *"I now check student performance daily and ask myself whether the teaching methods I used were effective."*Some teachers also acknowledged a **mindset shift**—moving from resistance to active curiosity about AI's potential. There was growing interest in digital instruction, and teachers felt more empowered to navigate technology in classrooms, despite infrastructural limitations.

Key Implications

- 75% of teachers viewed AI positively.
- 70% reported being "very comfortable" using AI platforms, up from 55%.
- 75% said their teaching strategies had improved through the intervention.
- 50% attributed their professional growth to participation in the project

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The AI Teachers' Project piloted in selected Tanzanian primary schools demonstrates that artificial intelligence can play a transformative role in improving numeracy outcomes and teacher effectiveness, even in resource-constrained contexts. Over the course of the intervention, teachers transitioned from limited familiarity with digital learning platforms to meaningful and consistent integration of AI into classroom practices. At endline, 85% of teachers were actively using the AI-powered tools, compared to just 30% at baseline. Compliance scores across all schools increased from 85.00% to 90.06%, reflecting improved teacher alignment to the intervention model. Learner performance in numeracy showed marked improvement. Assessment results at endline indicated a clear upward trend across all performance categories, with a significant increase in the number of learners performing at "Excellent" and "Good" levels, and a complete elimination of learners classified as "Poor" or "Below Average." This improvement was largely attributed to the AI platform's interactive and adaptive features, which fostered engagement, critical thinking, and continuous feedback.

Furthermore, teachers reported enhanced professional growth, instructional confidence, and a renewed enthusiasm for teaching. The intervention also shifted teacher mindsets—many of whom initially resisted or were unfamiliar with digital tools—toward a more open, innovative, and reflective teaching approach. Despite these gains, challenges such as limited internet connectivity, inadequate devices, and time constraints impacted the consistency of usage and hindered full-scale implementation in some schools. Additionally, while teachers demonstrated growth in AI competence, approximately 30% remained only "somewhat comfortable," highlighting the need for ongoing technical and pedagogical support. The project affirms the feasibility, relevance, and potential scalability of AI-powered platforms in foundational education, particularly for enhancing numeracy instruction and teacher development.

5.2. Recommendations

To ensure that the integration of AI into classrooms delivers its full potential and remains sustainable over time, several strategic improvements are necessary. These recommendations are based on teacher experiences, endline evaluation findings, and observed implementation challenges.

1. Improve Access to Digital Devices and Learning Tools

One of the main barriers to effective AI use in classrooms was the limited number of available devices. In many cases, learners had to share tablets, which hindered individual engagement and made it difficult to maintain personalized learning experiences. Ensuring that each learner has regular access to a device would allow for more consistent interaction with the platform and foster a deeper connection to learning.*"It was hard for every child to get their turn. If we had more tablets, students could use the platform even at home,"* shared a teacher from School 1 .Providing sufficient digital tools will not only enhance the quality of instruction but also support learning continuity beyond the classroom environment.

3. Ongoing Platform Improvements for Optimal Performance

During the implementation phase, occasional teachers encountered technical challenges such as login difficulties, delays in AI responses, and glitches in question display. While some of these issues may have been influenced by internet availability, they nevertheless caused frustration among teachers and disrupted the learning flow for students. To address this, regular system updates, and reliable user support are essential. *"Sometimes we couldn't even log in. And when we did, the AI response lagged or got stuck,"* noted a teacher from School 3. Improving the platform's stability and responsiveness would go a long way in building user trust and encouraging consistent use.

4. **Increase Student Engagement Through Interactive Features**

Maintaining student interest over time is critical, especially for younger learners. Teachers recommended enhancing the app's engagement features by incorporating more visuals, sounds, and game-like elements. Such improvements would make the learning experience more interactive and enjoyable, helping to sustain motivation throughout numeracy sessions.Thoughtfully designed engagement features can help learners feel more connected to the material and motivated to practice independently.

5. Provide Continuous Teacher Training and Support

While initial training sessions were beneficial, many teachers expressed a need for ongoing support. Beyond technical skills, they desired deeper guidance on how to incorporate AI into their daily lesson planning and use the data for improving instruction. Regular refresher sessions, peer support mechanisms, and coaching would help solidify their confidence and competence. *"The training helped, but we still need more*

guidance" explained one teacher from School 1. Equipping teachers with both digital fluency and pedagogical strategies is key to long-term adoption and instructional impact.

6. Structure the Question Bank to Be Adaptive and Progressive

Another recurring concern was the predictability of the questions and lack of progression in difficulty. Teachers suggested that the platform should present questions in a randomized order and adjust to each learner's level over time. An adaptive question bank would better reflect the diversity of learners in the classroom and encourage deeper thinking.Building this functionality into the system would enhance the platform's relevance for learners at different stages of mastery.

7. Expand the Project to Reach More Schools

Given the visible improvements in learner performance and positive teacher feedback, there is a strong case for expanding the intervention. Teachers were unanimous in their desire to see the project scaled up both within their own schools and across neighboring institutions. However, expansion must be matched with investment in infrastructure, training, and support systems. *"This platform has made a big difference. I hope more schools and more students can benefit from it,"* shared one teacher from School 3. As such, if the project scales, engagement with government and education stakeholders will be crucial to align it with national goals and ensure policy support.