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ACCESS AND USE OF AI TOOLS IN TECHNOLOGY AND LIVELIHOOD EDUCATION: BASIS FOR INSTRUCTIONAL ENHANCEMENT

MARINA O. OLORAZA

Master of Arts in Education-Educational Management, Cagayan Staten University-Aparri Campus

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***Corresponding author:** MARINA O. OLORAZA

Abstract

Access to and integration of Artificial Intelligence (AI) tools play a crucial role in enhancing teaching and learning, particularly in skill-based subjects like Technology and Livelihood Education (TLE). However, many schools—especially in rural areas—face persistent challenges such as limited access to technology, insufficient training, and weak institutional support. Despite the push for digital transformation in education, there is a lack of localized research examining how AI tools are accessed, utilized, and integrated in TLE, and how these factors relate to students' academic performance.

This study investigated AI access, utilization, perceived benefits, instructional practices, institutional support, and challenges among Junior High School learners, teachers, and administrators in the Buguey North District during the School Year 2025–2026. Using a descriptive–correlational design, data were collected from 83 learners, 10 teachers, and 6 administrators through a validated instrument and analyzed using descriptive and inferential statistics.

Findings revealed that AI tools were generally viewed as beneficial for improving understanding, instructional delivery, and efficiency. Teachers demonstrated high levels of integration, while learners showed moderate use. Although administrative support existed, it was not fully institutionalized. Challenges included limited device access, unstable internet, lack of training, and ethical concerns. Results further showed that teachers' AI-related instructional practices significantly influenced learners' GPA, while perceived benefits and challenges did not.

The study concludes that effective integration—not mere availability—of AI tools is essential, emphasizing the need for structured and well-supported implementation in TLE.

Keywords: Artificial Intelligence, TLE, instructional practices, academic performance, AI integration

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INTRODUCTION

Education worldwide is undergoing rapid digital transformation, with artificial intelligence (AI) increasingly shaping teaching and learning. UNESCO (2023) reports that nearly 90% of education ministries are embedding AI-driven platforms into their strategies to enhance access, quality, and equity. While AI holds potential for personalized learning and skill development (World Bank, 2022; OECD, 2021), its benefits are unevenly distributed. Wealthier regions adopt AI more seamlessly, whereas rural and under-resourced communities face connectivity, infrastructure, and teacher readiness gaps, threatening to widen educational disparities. In the Philippines, national assessments such as PISA (OECD, 2023) and EDCOM II (2023) reveal low learner performance, compounded by insufficient classrooms, outdated materials, and weak alignment between instruction and competencies. The COVID-19 pandemic further amplified learning loss (World Bank Philippines, 2021), while disparities in digital access persist, especially in rural areas (Philippine Statistics Authority [PSA], 2022). Although DepEd initiatives like the MATATAG Curriculum and Digital Rise Program aim to integrate AI and strengthen digital literacy (DepEd, 2023), school-level policies on AI remain unclear, resulting in inconsistent classroom practices.

In Region II (Cagayan Valley) and particularly in Buguey, rural schools face pronounced challenges in AI integration. Urban schools benefit from better internet connectivity, digital resources, and trained teachers, whereas remote schools contend with unreliable electricity, limited devices, and overcrowded classrooms (DepEd Region II, 2023; UNESCO, 2023). These conditions restrict meaningful use of AI in Technology and Livelihood Education (TLE), leaving learners with fewer opportunities to develop 21st-century technical and digital skills (OECD, 2022; World Bank, 2023). Existing research highlights the potential of AI in education but often emphasizes urban contexts, with limited focus on rural school policies and instructional practices (De Guia & Solomon, 2024; Villarino, 2025). This study addresses the persistent digital divide in Buguey, examining how access to and use of AI tools in TLE can inform instructional enhancement, strengthen school-level practices, and guide policy development for equitable, technology-supported learning.

Statement of the Problem

This study aimed to examine the access and use of Artificial Intelligence (AI) tools in Technology and Livelihood Education (TLE) and determined their perceived benefits, practices, institutional support, and challenges among Junior High School learners, teacher, and school administrators in the Buguey North District for School Year 2025–2026.

Specifically, it sought answers to the following questions:

1. What is the socio-demographic profile of TLE learners and teachers in terms of:

   Learners:
   a. Age
   b. Grade Level
   c. Sex
   d. GPA
   e. Location
   f. Number of trainings/seminars on AI tool usage

   Educators:
   a. Age
   b. Rank
   c. Years of Experience
   d. Sex
   e. Teaching performance
   f. Number of relevant trainings/seminars on AI tool usage

   Administrators:
   a. Age
   b. Position
   c. Years in service
   d. Sex
   e. Number of trainings/seminars related to AI tool usage.
2. What are the perceived benefits of using AI tools in TLE instruction as described by learners and teachers and school administrators?
3. What is the level of support of the school administration for the integration of AI tools in TLE education in terms of:
   a. Access to AI tools
   b. Encouraged or required use of AI in teaching and learning
4. What are the current practices of learners and educators in the use of AI tools for teaching and learning in TLE programs?
5. What challenges do learners and educators encounter in the access to and integration of AI tools in TLE instruction?
6. Is there a significant difference in the perception of learners, teachers and school administrators regarding the benefits, practices, and challenges in the use of AI tools in TLE instruction?
7. Is there a significant relationship between the perceived benefits, practices, and challenges in the use of AI tools and the first semester GPA of TLE learners?
8. What output may be developed based on the findings of the study?

METHODOLOGY

Below are the different methods and procedures as well as the instruments pertinent in the completion and processing of all needed data.

Research Design

This study employed a descriptive–correlational design to examine the access and use of AI tools in Technology and Livelihood Education (TLE) among junior high school learners, teachers, and administrators in the Buguey North District for School Year 2025–2026. The descriptive component assessed socio-demographics, perceived benefits, institutional support, current practices, and challenges, while the correlational component analyzed relationships between learners' perceptions, AI use, and first-semester TLE GPA, as well as differences among stakeholders. Data were collected through structured questionnaires without manipulating variables, providing insights from actual school conditions to guide the development of an AI instructional enhancement.

Participants/Respondents

The study involved junior high school learners, TLE teachers, and school administrators from selected public secondary schools in the Buguey North District for School Year 2025–2026 to assess access to and use of AI tools, as well as perceptions of benefits, practices,

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institutional support, and challenges in TLE instruction. Learners provided data on socio-demographics, AI access, usage practices, perceived benefits and challenges, and first-semester TLE GPA. Teachers reported their professional profile, instructional practices, perceived benefits and challenges, and school support, while administrators shared their demographic profile and perceptions of AI integration and institutional mechanisms. Stratified random sampling (urban/rural) was used for learners, total enumeration for teachers, and purposive sampling for administrators, ensuring representative and reliable data for descriptive, correlational, and comparative analyses.

Research instruments

The study used a researcher-developed survey to collect data on access to and use of AI tools in TLE among learners, teachers, and administrators in the Buguey North District for School Year 2025–2026. Three versions, tailored to each group, captured socio-demographics, perceived benefits, institutional support, AI practices, and challenges, structured around profile, benefits, support, practices, and challenges. The instrument was expert-validated, pilot-tested for reliability, and served as the primary tool for analyzing AI integration and informing instructional enhancements in TLE.

Data gathering procedures

The researcher obtained permission from school authorities and coordinated with school heads and TLE teachers, explaining the study's purpose to learners, teachers, and administrators. Ethical standards, including voluntary participation, confidentiality, anonymity, and informed consent, were strictly observed. The validated questionnaires were administered with clear instructions, personally distributed or coordinated for collection, checked for completeness, and organized for processing, with all data handled confidentially and used solely for research purposes.

Data analysis

Collected data were encoded, organized, and checked for completeness before analysis. Descriptive statistics, including frequency, percentage, mean, and standard deviation, described socio-demographics, perceived benefits, institutional support, AI practices, and challenges. Inferential statistics—independent t-tests, one-way ANOVA with post-hoc tests, and Pearson and Spearman correlations—examined differences and relationships among variables, including learners' GPA. Qualitative interview data were analyzed thematically (Bustamante and Villanueva, 2024) to complement quantitative results and inform the development of an AI instructional enhancement for TLE.

RESULTS AND DISCUSSION

The following are the results, discussion and interpretation of all data that were collected, tabulated and analyzed.

Profile of the Respondents

Learner's Socio-Demographic Profile

Table 1a. *Frequency and percentage distribution of the learners in terms of their socio-demographic profile*

Profile Variables	Frequency (n=83)	Percentage
Age		
12-13	18	21.69
14-15	23	27.71
16-17	42	50.60
18-above years	0	0.0
Weighted Mean	***12.67***	
S.D.	***0.56***	
Grade Level		
Grade 7	***15***	18.07
Grade 8	***16***	19.28
Grade 9	***22***	26.50
Grade 10	30	36.15
Sex		
Male	47	56.6
Female	36	43.4
General Average		
90-100 (OUTSTANDING)	21	25.30
85-89 (VERY SATISFACTORY)	8	9.64
80-84 (SATISFACTORY)	43	51.81
75-79 (FAIRLY SATISFACTORY)	11	13.25
Below 75 (DID NOT MEET EXPECTATION)	0	0.00
Weighted Mean	***81.32***	
S.D.	***8.61***	
Location		
Rural (Sta. Isabel Ext.)	1	1.2
Urban (Main or Dalaya Ext.)	82	98.8
Number of trainings/seminars on AI tool usage		
0	70	84.3
1-2	11	13.3
3-above	2	2.4

Table 1a shows the socio-demographic profile of learners. Most learners (50.6%) are aged 16–17, with a weighted mean age of 12.67 (SD = 0.56). Grade distribution shows 36.15% in Grade 10, 26.5% in Grade 9, 19.28% in Grade 8, and 18.07% in Grade 7. Males comprise 56.6% of the sample. Most learners (51.81%) have a general average of 80–84, with a mean of 81.32 (SD = 8.61). Nearly all (98.8%) come from urban areas. Regarding AI trainings, 84.3% have not attended any, while only 2.4% attended three or more sessions.

Teacher's Socio-Demographic Profile

Table 1b. *Frequency and percentage distribution of the Teacher's socio-demographic profile*

Profile Variables	Frequency (n=10)	Percentage
Age		
20–29	0	0.00

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30–39	8	80.00
40–49	2	20.00
50-above years	0	0.00
Weighted Mean	***36.50***	
S.D.	***4.22***	
Rank		
Teacher I	4	40.00
Teacher I	2	20.00
Teacher III	4	40.00
Years of Experience		
0–3	0	0.00
4–7	4	40.00
8–11	2	20.00
12-above years	4	40.00
Weighted Mean	***10.50***	
S.D.	***4.98***	
Sex		
Male	4	40.00
Female	6	60.00
Teaching Performance		
Outstanding	6	60.00
Very Satisfactory	4	40.00
Satisfactory	0	0.00
Number of relevant trainings/seminars on AI tool usage		
0	0	0.00
1-2	6	60.00
3-above years	4	40.00
Weighted Mean	***2.50***	

Table 1b summarizes the socio-demographic profile of teachers. Most (80%) are aged 30–39, with a mean age of 36.5 (SD = 4.22). Teacher ranks are evenly split between Teacher I and Teacher III (40% each), with Teacher II at 20%. Experience is highest in 4–7 years and 12+ years (40% each), with a mean of 10.5 years (SD = 4.98). Females comprise 60% of teachers. Teaching performance is predominantly Outstanding (60%), with 40% Very Satisfactory. All teachers attended trainings, with 60% attending 1–2 sessions and 40% attending three or more (weighted mean = 2.5).

School Administrator's Socio-Demographic Profile

Table 1c. *Frequency and percentage distribution of the School Administrator's socio-demographic profile*

Profile Variables	Frequency (n=3)	Percentage
Age		
20–29	0	0.0
30–39	3	50.0
40–49	3	50.0
50-above years	0	0.0
Weighted Mean		
S.D.		
Position		
School Head	3	100.0
Assistant School Head	0	0.0
Department Head/ Coordinator	3	0.0
Years in Service		
0–3	0	0.0
4–7	0	0.0
8–11	0	0.0
12-above years	6	100.0
Weighted Mean		
S.D.		
Sex		
Male	2	33.3
Female	4	66.7
Number of relevant trainings/seminars on AI tool usage		
0	***6***	100.0
1-2	0	0.0
3-above years	0	0.0
Weighted Mean		

Table 1c shows the socio-demographic profile of school administrators. Half (50%) are aged 40–49, with 50% serving as School Heads and 50% as Department Heads/Coordinators. All administrators (100%) have 12+ years of service. Females comprise 66.7%, and none have attended AI-related trainings.

Perceived Benefits of Using AI Tools in TLE Instruction as Described

Learners

Table 2a*. Perceived benefits of using AI tools in TLE instruction as described by the Learners*

Statement	Weighted Mean	Descriptive Value
AI tools help me understand TLE lessons better.	3.89	Agree
AI helps me learn tasks and skills more easily.	3.80	Agree
AI tools give helpful examples and explanations.	4.04	Agree
AI increases my interest in TLE	3.40	Neutral

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activities.		
AI helps me complete tasks and projects efficiently.	3.92	Agree
AI helps improve or correct my work.	3.98	Agree
AI helps me perform better in TLE assessments.	3.82	Agree
Category Mean	***3.83***	***Agree***

Table 2a shows learners' perceived benefits of AI tools in TLE instruction, with an overall mean of 3.83 (Agree), indicating general recognition of AI's usefulness. The highest-rated indicator was "AI tools give helpful examples and explanations" (WM = 4.04, Agree), while the lowest was "AI increases my interest in TLE activities" (WM = 3.40, Neutral). This suggests that learners view AI as effective for supporting understanding and completing tasks, particularly through explanations and guided procedures. However, its lower impact on motivation implies that engagement still relies on other factors, such as teaching strategies and classroom interaction. These results align with Holmes et al. (2019), who emphasized that AI enhances learning through personalized support and immediate feedback; Zawacki-Richter et al. (2019), who highlighted AI's contribution to improved academic performance via adaptive learning environments; and Kulik and Fletcher (2016), who demonstrated that intelligent tutoring systems reinforce understanding and skill development, supporting learners' positive perceptions of AI as a supplementary instructional tool.

Teachers

Table 2b*. Perceived benefits of using AI tools in TLE instruction as described by the Teachers*

Statement	**Weighted Mean**	**Descriptive Value**
AI improves my delivery of TLE lessons.	4.80	Strongly Agree
AI helps students understand complex concepts.	4.80	Strongly Agree
AI assists in demonstrating TLE skills.	5.00	Strongly Agree
AI supports differentiated teaching.	5.00	Strongly Agree
AI improves my productivity in preparing materials.	4.80	Strongly Agree
AI enhances feedback and assessment.	4.80	Strongly Agree
AI increases learner engagement and performance.	4.60	Strongly Agree
Category Mean	***4.83***	***Strongly Agree***

Table 2b presents teachers' perceived benefits of AI tools in TLE instruction, with an overall mean of 4.83 (Strongly Agree), indicating very high agreement. The highest-rated indicators were "AI assists in demonstrating TLE skills" and "AI supports differentiated teaching" (WM = 5.00), while "AI increases learner engagement and performance" had the lowest rating (WM = 4.60). This shows that teachers view AI as highly effective for enhancing instructional delivery, lesson preparation, and addressing diverse learner needs, though engagement still depends on teaching strategies and classroom interaction. These findings are supported by UNESCO (2021), who emphasized AI's role in personalized instruction; Selwyn (2020), who noted its support in managing and delivering content; and Williamson (2020), who highlighted AI's contribution to teacher productivity and instructional innovation.

School Administrators

Table 2c. *Perceived benefits of using AI tools in TLE instruction as described by the School Administrators*

Statement	**Weighted Mean**	**Descriptive Value**
AI tools enhance the effectiveness of TLE instruction in the school.	4.33	Agree
AI supports the development of learners' technical and practical skills in TLE.	4.33	Agree
AI improves teachers' instructional delivery and productivity in TLE subjects.	4.67	Strongly Agree
AI promotes learner engagement and participation in TLE activities.	4.33	Agree
AI assists in monitoring and improving learners' performance in TLE.	4.00	Agree
AI supports innovative and flexible teaching strategies in TLE.	4.00	Agree
AI contributes to the overall improvement of the TLE program.	3.67	Agree
Category Mean	***4.19***	***Agree***

Table 2c shows school administrators' perceived benefits of AI tools in TLE, with an overall mean of 4.19 (Agree), indicating generally positive perceptions. The highest-rated item was "AI improves teachers' instructional delivery and productivity" (WM = 4.67, Strongly Agree), while "AI contributes to overall program improvement" received the lowest rating (WM = 3.67, Agree). This suggests that administrators view AI as beneficial for enhancing teaching practices and teacher productivity, though its impact on broader program outcomes is less evident. These findings align with Fullan et al. (2018), who emphasized that innovations improve teaching when supported by leadership; Selwyn (2019), who noted AI enhances instruction but requires systemic support for wider impact; and Ifenthaler (2023), who highlighted digital technologies' role in improving instructional effectiveness and productivity.

Summary of Perceived benefits of using AI tools in TLE instruction

Table 2d. *Perceived benefits of using AI tools in TLE instruction*

Statement	**Weighted Mean**	**Descriptive Value**
Learners	3.83	Agree

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Teachers	4.83	Strongly Agree
School Administrators	4.19	Agree
Composite Mean	***4.28***	***Agree***

Table 2d summarizes perceived benefits of AI tools in TLE across learners, teachers, and administrators, with a composite mean of 4.28 (Agree), indicating generally positive perceptions. Teachers had the highest mean (4.83, Strongly Agree), followed by administrators (4.19, Agree) and learners (3.83, Agree). This shows that all groups recognize AI's benefits, with teachers demonstrating the strongest appreciation. These findings align with the European Commission (2020), who noted educators' favorable views of digital technologies; Hwang et al. (2020), who highlighted AI's positive impact on instructional outcomes; and Schleicher (2021), who emphasized differing perceptions of technology among educational stakeholders.

Level of Support of the School Administration for the Integration of AI Tools in TLE Education

Learners

Table 3a. *Level of support of the school administration for the integration of AI tools in TLE education as perceived by the Learners*

Statement	Weighted Mean	Descriptive Value
The school provides access to AI tools for learning.	2.87	Neutral
The school encourages the use of AI in TLE.	2.76	Neutral
The school provides training or activities related to AI.	2.92	Neutral
The school offers technical assistance for digital concerns.	3.64	Agree
The school ensures that digital resources for AI are available.	2.90	Neutral
The school supports innovations using AI tools.	2.71	Neutral
Teachers promote responsible use of AI.	3.34	Neutral
Category Mean	***3.02***	***Neutral***

Table 3a shows learners' perceptions of school administrative support for AI integration in TLE, with a category mean of 3.02 (Neutral), indicating moderate support. The highest-rated item was "The school offers technical assistance for digital concerns" (WM = 3.64, Agree), while "The school supports innovations using AI tools" was lowest (WM = 2.71, Neutral). This suggests that learners experience technical support more than encouragement for AI-based innovation, reflecting uneven administrative support. These findings align with Bond et al. (2021), who emphasized the role of institutional support and infrastructure in digital integration; Lim et al. (2022), who noted limited school support affects technology adoption; and Ifenthaler (2023), who highlighted the need for structured support and capacity-building for effective technology use.

Teachers

Table 3b. *Level of support of the school administration for the integration of AI tools in TLE education as perceived by the Teachers*

Statement	Weighted Mean	Descriptive Value
The school provides access to AI tools for teaching and learning in TLE.	4.40	Agree
The school encourages the use of AI tools in TLE instruction.	4.40	Agree
The school provides trainings, seminars, or capacity-building activities related to AI use.	3.80	Agree
The school offers technical assistance and support for AI-related digital concerns.	3.80	Agree
The school ensures that adequate digital resources and infrastructure are available for AI use.	3.80	Agree
The school administration supports innovation and instructional improvement through the use of AI tools.	4.40	Agree
The use of AI tools in TLE instruction is formally integrated or institutionalized through school policies or guidelines.	4.20	Agree
Category Mean	***4.11***	***Agree***

Table 3b shows teachers' perceptions of school administrative support for AI integration in TLE, with a category mean of 4.11 (Agree), indicating generally adequate support. The highest-rated items (WM = 4.40) relate to access, encouragement, and support for innovation, while the lowest (WM = 3.80) concern training, technical assistance, and digital resources. This suggests that teachers recognize administrative encouragement but see gaps in training and resource provision, reflecting uneven support across areas. These findings align with Ertmer and Ottenbreit-Leftwich (2019), who emphasized leadership's role in technology integration; Howard et al. (2021), who noted limited training and infrastructure affect implementation; and Trust and Whalen (2020), who highlighted the need for sustained institutional support for effective digital integration.

School Administrators

Table 3c. *Level of support of the school administration for the integration of AI tools in TLE education as perceived by the School Administrators*

Statement	Weighted Mean	Descriptive Value
The school provides adequate access to AI tools for TLE instruction.	3.67	Agree
The school encourages teachers and	4.67	Strongly

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learners to use AI tools in TLE.		Agree
The school has existing policies or guidelines on the responsible use of AI.	3.00	Neutral
The use of AI tools in TLE instruction is formally integrated or institutionalized through school policies.	3.33	Neutral
The school provides training and professional development related to AI integration.	3.00	Neutral
Technical and digital support is available for AI-related concerns.	4.00	Agree
The school allocates resources to support AI integration in TLE.	3.67	Agree
Category Mean	***3.62***	***Agree***

Table 3c shows school administrators' perceptions of administrative support for AI integration in TLE, with a category mean of 3.62 (Agree), indicating support is present. The highest-rated item was "The school encourages teachers and learners to use AI tools" (WM = 4.67, Strongly Agree), while the lowest concerned policies and training (WM = 3.00, Neutral). This suggests that support is stronger in encouragement and operational assistance than in formal structures like policies and professional development. These findings align with Brynjolfsson and McAfee (2017), who emphasized that effective technology adoption requires both support and structured strategies; Ng et al. (2021), who noted leadership must be paired with training and policies; and Selwyn (2020), who highlighted the need for institutional structures for effective integration.

Summary of the Level of Support for the Integration of AI Tools in TLE Education

Table 3d. *Level of support for the integration of AI tools in TLE education*

Statement	Weighted Mean	Descriptive Value
Learners	3.02	Neutral
Teachers	4.11	Agree
School Administrators	3.62	Agree
Composite Mean	***3.58***	***Agree***

Table 3d summarizes the consolidated perceptions of administrative support for AI integration in TLE, with a composite mean of 3.58 (Agree), indicating support is generally present. Teachers reported the highest mean (4.11, Agree), administrators 3.62 (Agree), and learners the lowest at 3.02 (Neutral). This suggests that support is more evident at the instructional level than for learners, reflecting variation in stakeholder experience. These findings align with UNICEF (2021), who emphasized equitable access for digital initiatives; Redecker (2017), who noted that effective integration depends on experienced institutional support; and Sahlberg (2021), who highlighted the importance of stakeholder alignment for successful implementation.

Current Practices in the Use of AI Tools for Teaching and Learning in TLE Programs

Learners

Table 4a. *Current practices of learners in the use of AI tools for teaching and learning in TLE programs*

Statement	Weighted Mean	Descriptive Value
I use AI to search for TLE information.	3.49	Often
I use AI to understand TLE lessons.	3.24	Sometimes
I use AI to help create TLE outputs or projects.	3.42	Often
I use AI to improve or correct my work.	3.49	Often
I use AI for TLE-related practical activities.	3.33	Sometimes
I use AI to study or review.	3.13	Sometimes
I use AI to organize my TLE tasks.	3.27	Sometimes
Category Mean	***3.34***	***Sometimes***

Table 4a shows learners' current practices in using AI tools for TLE, with a category mean of 3.34 (Sometimes), indicating moderate usage. Learners most frequently use AI for searching information and improving work (WM = 3.49) and creating outputs/projects (WM = 3.42), while studying, understanding lessons, and organizing tasks were less frequent (WM = 3.13–3.27, Sometimes). This suggests AI is primarily used for task completion rather than deeper learning, reflecting variation across activities. These findings align with Kasneci et al. (2023), who observed AI use for information retrieval and task support; Dwivedi et al. (2023), who emphasized efficiency-focused use; and Crompton and Burke (2023), who noted that meaningful integration determines AI's learning impact.

Teachers

Table 4b. *Current practices of teachers in the use of AI tools for teaching and learning in TLE programs*

Statement	Weighted Mean	Descriptive Value
I use AI to plan my TLE lessons.	4.80	Always
I use AI to generate examples, visuals, or demonstrations.	4.80	Always
I use AI to design activities or TLE learning tasks.	4.60	Always
I use AI for checking, revising, or improving outputs.	4.60	Always
I use AI for assessments or rubrics.	4.60	Always
I use AI during actual TLE instruction.	4.40	Often

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I guide students on how to use AI responsibly.	**4.80**	Always
Category Mean	***4.66***	***Always***

Table 4b presents the current practices of teachers in using AI tools for teaching and learning in TLE. The category mean of 4.66, interpreted as Always, indicates consistent use. The highest weighted mean of 4.80 (Always) was obtained in planning lessons, generating examples and materials, and guiding students on responsible AI use, while the lowest weighted mean of 4.41 (Often) was recorded in using AI during actual TLE instruction.

The finding means that teachers consistently integrate AI tools in instructional planning and preparation. The implication is that AI is more frequently used in lesson design and material development than in real-time classroom instruction. This indicates variation in AI use across different teaching activities.

These findings are supported by Bing Chiu (2023), who found that AI enhances lesson planning and instructional efficiency. Similarly, Ngoc Nguyen et al. (2023) reported that AI supports the development of learning activities and materials. In addition, Wayne Holmes and Ilkka Tuomi (2022) emphasized the role of teachers in guiding responsible AI use.

School Administrators

Table 4c. *Current practices of school administrators in the use of AI tools for teaching and learning in TLE programs*

Statement	Weighted Mean	Descriptive Value
I support teachers in integrating AI tools into TLE instruction.	4.33	Often
I encourage the responsible and ethical use of AI among teachers and learners.	4.67	Always
I facilitate or approve trainings related to AI use in TLE.	4.33	Often
I include AI integration in school plans or instructional programs.	3.67	Often
I monitor the implementation of AI use in TLE classrooms.	3.67	Often
I coordinate with stakeholders to support AI integration.	3.00	Sometimes
I promote innovation in TLE instruction through AI tools.	4.00	Often
Category Mean	***3.95***	***Often***

Table 4c presents the current practices of school administrators in using AI tools for teaching and learning in TLE. The category mean of 3.95, interpreted as Often, indicates frequent engagement. The highest weighted mean of 4.67 (Always) was obtained by encouraging responsible and ethical AI use, while the lowest weighted mean of 3.00 (Sometimes) was recorded in coordinating with stakeholders to support AI integration.

The finding means that administrators actively support AI integration through guidance and supervision. The implication is that administrative practices are more evident in promoting ethical use and internal support than in external collaboration. This indicates variation in administrative practices across different areas of AI integration.

These findings are supported by Philip Hallinger and Ronald Heck (2018), who emphasized the role of leadership in guiding instructional innovation. Similarly, Sara Dexter and John Richardson (2020) noted that planning and monitoring are essential for sustaining technology use. In addition, Orit Avidov-Ungar and Alona Forkosh-Baruch (2018) highlighted that stakeholder collaboration is often less developed in school implementation.

Summary of Current Practices in the Use of AI Tools for Teaching and Learning in TLE Programs

Table 4d. *Current practices in the use of AI tools for teaching and learning in TLE programs*

Statement	Weighted Mean	Descriptive Value
Learners	3.34	Sometimes
Teachers	4.66	Always
School Administrators	3.95	Often
Composite Mean	***3.98***	***Often***

Table 4d presents the summary of current practices in the use of AI tools for teaching and learning in TLE among learners, teachers, and school administrators. The composite mean of 3.98, interpreted as Often, indicates general use across all groups. Teachers recorded the highest mean of 4.66 (Always), followed by school administrators with 3.95 (Often), while learners obtained the lowest mean of 3.34 (Sometimes).

The finding means that AI tools are used by all groups, with teachers showing the highest level of usage and learners the lowest. The implication is that AI use is more consistent in instructional practices than in learner activities, indicating variation in usage across stakeholders.

These findings are supported by Rose Luckin et al. (2018), who emphasized that teachers are key drivers of AI integration. Similarly, Xinyu Zhai et al. (2021) found that learners tend to use AI in a more task-oriented manner. In addition, Ralf Scherer et al. (2019) highlighted that alignment among stakeholders is essential for effective technology integration.

Challenges Encountered in the Access to and Integration of AI Tools in TLE Instruction

Learners

Table 5a. *Challenges encountered by learners in the access to and integration of AI tools in TLE instruction*

Statement	Weighted Mean	Descriptive Value
Limited access to devices.	3.54	High
Slow or unstable internet connection.	3.01	Moderate
Lack of skills in using AI tools.	3.17	Moderate
Lack of AI-related training.	2.72	Moderate
Difficulty understanding AI outputs.	2.81	Moderate
Insufficient digital support from	2.88	Moderate

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school.		
Doubts on the accuracy of AI responses.	3.01	Moderate
Difficulty applying AI to hands-on TLE tasks.	3.04	Moderate
Category Mean	***3.02***	***Moderate***

Table 5a presents the challenges encountered by learners in accessing and integrating AI tools in TLE. The category mean of 3.02, interpreted as Moderate, indicates a noticeable level of difficulty. The highest weighted mean of 3.54 (High) was obtained by "Limited access to devices," while other indicators such as internet connection (3.01), lack of skills (3.17), and difficulty in applying AI to tasks (3.04) were rated Moderate.

The finding means that learners experience challenges in accessing and using AI tools, particularly in device availability. The implication is that barriers are evident in terms of access, skills, and application, indicating variation in the types of challenges encountered.

These findings are supported by Jan van Dijk (2020), who emphasized that limited access to devices and connectivity affects technology use. Similarly, Brian Long and Brian Magerko (2020) noted that learners often face difficulty understanding and evaluating AI outputs. In addition, Dirk Ifenthaler (2023) highlighted that limited digital skills can hinder effective AI integration.

Teachers

Table 5b. *Challenges encountered by teachers in the access to and integration of AI tools in TLE instruction*

Statement	**Weighted Mean**	**Descriptive Value**
Limited access to devices for AI instruction.	3.60	High
Slow or unstable internet affects AI use.	3.80	High
Lack of training on AI tools.	4.00	High
Difficulty integrating AI in hands-on TLE tasks.	3.20	Moderate
Difficulty verifying accuracy of AI outputs.	3.60	High
Insufficient school support for AI integration.	3.40	Moderate
Limited digital literacy of learners for AI use.	3.20	Moderate
Safety and ethical concerns in AI use.	4.60	Very High
Category Mean	***3.68***	***High***

Table 5b presents the challenges encountered by teachers in accessing and integrating AI tools in TLE instruction. The category mean of 3.68, interpreted as High, indicates a considerable level of difficulty. The highest weighted mean of 4.60 (Very High) was obtained by "Safety and ethical concerns in AI use," while other high-rated challenges include lack of training (4.00), internet issues (3.80), and limited access to devices (3.60). Moderate challenges were observed in integrating AI in hands-on tasks (3.20) and learner-related factors.

The finding means that teachers experience challenges in using AI tools, particularly in ethical concerns and training. The implication is that barriers are evident in terms of ethics, infrastructure, and skills, indicating variation in the types of challenges encountered.

These findings are supported by Wayne Holmes et al. (2022), who emphasized that ethical concerns are a major challenge in AI integration. Similarly, Jo Tondeur et al. (2017) noted that lack of training and infrastructure limits technology use. In addition, Luciano Floridi et al. (2018) highlighted the importance of addressing ethical risks such as data privacy in AI adoption.

School Administrators

Table 5c. *Challenges encountered by school administrators in the access to and integration of AI tools in TLE instruction*

Statement	**Weighted Mean**	**Descriptive Value**
Limited budget or resources for AI tools.	2.67	Moderate
Insufficient ICT infrastructure to support AI use.	3.00	Moderate
Lack of clear policies on AI integration.	3.00	Moderate
Limited training opportunities for teachers on AI use.	3.00	Moderate
Resistance to AI adoption among teachers or learners.	3.00	Moderate
Difficulty ensuring ethical and responsible use of AI.	3.33	Moderate
Monitoring and evaluating the impact of AI in TLE instruction.	2.67	Moderate
Category Mean	***3.67***	***High***

Table 5c shows that school administrators face considerable challenges in accessing and integrating AI tools in TLE, with a category mean of 3.67 (High). The greatest difficulty was ensuring ethical and responsible AI use (3.33, Moderate), while budget limitations and monitoring AI use were the least challenging (2.67, Moderate). This indicates that administrators struggle mainly with governance, policy, and ethical concerns, with variations across resources, training, and system-level support. These findings align with Williamson and Eynon (2020) on governance readiness, Selwyn et al. (2020) on financial and infrastructure constraints, and Kerssens-van Drongelen (2021) on the importance of monitoring and evaluation.

Summary of the Challenges Encountered in The Access To and Integration of AI Tools in TLE Instruction

Table 5d. *Challenges encountered in the access to and integration of AI tools in TLE instruction*

Statement	**Weighted Mean**	**Descriptive Value**
Learners	3.02	Moderate

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Teachers	3.68	High
School Administrators	3.04	Moderate
Composite Mean	***3.25***	***Moderate***

Table 5d shows that challenges in accessing and integrating AI tools in TLE are present across all groups, with a composite mean of 3.25 (Moderate). Teachers reported the highest difficulties (3.68, High), while learners (3.02) and administrators (3.04) faced moderate challenges. This indicates that challenges vary by role, with teachers encountering more complex issues. These findings align with Zhai et al. (2021) on stakeholder differences, Kimmons et al. (2020) on access, skills, and support barriers, and Ifenthaler (2023) on the need for coordinated strategies to address such challenges.

Relationship between the Perceived Benefits, Practices, and Challenges in the Use of AI Tools and The First Semester GPA of TLE Learners

Table 6. *Correlation between the perceived benefits, practices, and challenges in the use of AI tools and the first semester GPA of TLE learners*

Variables	r-value	p-value	Statistical Inference
Perceived benefits of using AI tools in TLE instruction			
Learners	-0.034	0.760	Not Significant
Teachers	0.005	0.989	Not Significant
Administrators	0.569	0.614	Not Significant
Current practices in the use of AI tools for teaching and learning in TLE programs			
Learners	-0.010	0.929	Not Significant
Teachers	**0.196**	**0.046***	**Significant**
Administrators	0.985	0.112	Not Significant
Challenges encountered in the access to and integration of AI tools in TLE instruction			
Learners	-0.116	0.295	Not Significant
Teachers	-0.400	0.223	Not Significant
Administrators	0.875	0.137	Not Significant

Table 6 indicates that learners' GPA is not significantly related to perceived benefits or challenges of AI tool use ($p > 0.05$), except for current practices as perceived by teachers ($r = 0.196$, $p = 0.046$), showing that only actual teacher-led AI integration significantly influences performance. Perceived benefits alone do not improve outcomes, consistent with Holmes et al. (2019) and Luckin et al. (2016), while challenges also show no direct effect, as adaptability and support systems can mitigate barriers (Bond et al., 2020; OECD, 2021). The significant impact of teachers' AI practices underscores that effective, consistent classroom integration enhances learning (Zawacki-Richter et al., 2019; Chiu et al., 2023). Overall, meaningful instructional implementation—not perceptions—drives academic achievement, supporting Luckin et al. (2016), OECD (2021), and Kraft et al. (2018) that technology improves outcomes only when combined with sound pedagogy and adequate support.

Difference in the Perception of Learners, Educators, and School Administrators Regarding the Benefits, Practices, and Challenges in the Use Of AI Tools in TLE Instruction

Table 7. *Comparison in the perception of learners, educators, and school administrators regarding the benefits, practices, and challenges in the use of AI tools in TLE instruction*

Variables	Mean	f-value	p-value	Statistical Inference
Perceived benefits of using AI tools in TLE instruction				
Learners	3.833	8.836	0.000	Significant*
Teachers	4.829			
Administrators	4.190			
Current practices in the use of AI tools for teaching and learning in TLE programs				
Learners	3.339	11.816	0.000	Significant*
Teachers	4.657			
Administrators	3.952			
Challenges encountered in the access to and integration of AI tools in TLE instruction				
Learners	3.023	4.196	0.018	Significant*
Teachers	3.675			
Administrators	3.042			

Table 7 shows significant differences in perceptions of learners, teachers, and administrators regarding the benefits, current practices, and challenges of AI use in TLE instruction ($p < 0.05$). Teachers reported the highest perceived benefits ($M = 4.829$), followed by administrators ($M = 4.190$) and learners ($M = 3.833$), reflecting greater awareness due to direct instructional involvement (Zawacki-Richter et al., 2019; Chiu et al., 2023). For current practices, teachers again scored highest ($M = 4.657$), indicating more active engagement in AI integration compared to administrators ($M = 3.952$) and learners ($M = 3.339$), aligning with Holmes et al. (2019) and OECD (2021) on consistent use and access. Regarding challenges, teachers perceived the greatest barriers ($M = 3.675$), highlighting technical and pedagogical difficulties, while administrators ($M = 3.042$) and learners ($M = 3.023$) reported lower levels, consistent with Bond et al. (2020) and Ertmer & Ottenbreit-Leftwich (2019). Overall, perceptions vary by role, exposure, and experience, with teachers consistently reporting higher levels of benefits, practices, and challenges, confirming stakeholder differences in AI integration (Zawacki-Richter et al., 2019; OECD, 2021).

Proposed AI-Integrated Instructional Design and Policy Recommendations for Equitable AI Access and Use in TLE Programs

Based on the findings, a proposed AI-Integrated Instructional Design and policy framework was developed to promote effective, ethical, and inclusive AI integration in TLE programs. The results showed that teachers demonstrated very high AI utilization and positive perceptions, while learners had only moderate engagement and limited exposure, and administrators exhibited gaps in policy,

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training, and institutional support. Furthermore, only teachers' actual AI practices were found to significantly influence learners' academic performance, while perceived benefits and challenges did not. These findings underscore the need for a structured framework that strengthens teacher-guided integration, enhances learner engagement, ensures equitable access to resources, and improves institutional support, anchored on AI-supported instructional design, capacity-building initiatives, and policy development aligned with TLE competencies and digital learning standards. The proposed AI-integrated instructional design and policy recommendations consist of the following key components:

1. **AI-Integrated Instructional Design Framework**
   Teachers are guided in embedding AI tools into lesson planning, demonstration of skills, assessment, and feedback. This includes the use of AI for generating instructional materials, step-by-step procedures, and contextualized examples in TLE. The framework ensures that AI is used not only for preparation but also as part of actual instruction to improve learning outcomes.

2. **Capacity-Building and Training Program**
   Regular training sessions and workshops are conducted for teachers, learners, and school administrators on the effective and ethical use of AI tools. This component addresses the identified lack of skills and training, particularly among learners and administrators, and strengthens teacher competence in integrating AI into instruction.

3. **Equitable Access and Resource Provision**
   The program promotes the provision of necessary resources such as devices, stable internet connectivity, and access to AI platforms. Schools are encouraged to develop strategies that ensure all learners, especially those in rural areas, have equal opportunities to utilize AI tools in their learning.

4. **Policy Development and Institutionalization of AI Use**
   Clear school-based policies and guidelines on the responsible, ethical, and academic use of AI are developed and implemented. This includes rules on proper usage, data privacy, academic integrity, and monitoring mechanisms to ensure safe and appropriate use of AI technologies.

5. **Learner Engagement and Utilization Enhancement Activities**
   Learners participate in structured activities that promote meaningful and consistent use of AI tools, such as guided tasks, project-based learning, and problem-solving activities. These activities aim to move learners from occasional to regular use of AI for deeper learning and skill development.

6. **Ethical and Responsible AI Use Program**
   Focused sessions are conducted to educate both teachers and learners on the ethical implications of AI use, including issues on accuracy, bias, plagiarism, and responsible decision-making. This component addresses the very high concern on ethical issues identified among teachers.

7. **Monitoring, Evaluation, and Continuous Improvement System**
   A monitoring and evaluation mechanism is established to assess the effectiveness of AI integration in TLE instruction. Regular feedback, performance tracking, and program reviews are conducted to ensure continuous improvement and sustainability of AI initiatives.

Conclusion

The study concluded that while learners, teachers, and school administrators in the Buguey North District demonstrated positive perceptions and use of Artificial Intelligence (AI) tools in Technology and Livelihood Education (TLE), these did not significantly influence learners' academic performance, thereby addressing the research problem on the relationship between AI utilization and GPA. The findings revealed that although AI tools were perceived as beneficial and were actively used, such perceptions and access alone were not sufficient to produce measurable improvements in academic outcomes. This implies that learner performance is influenced by more complex factors such as instructional quality, resource availability, and implementation effectiveness. Furthermore, only teachers' actual instructional practices in integrating AI tools showed a significant relationship with learners' performance, highlighting a gap between perception and meaningful application. Hence, the study underscores the need for AI integration to focus on structured, practice-oriented strategies supported by strong institutional support to ensure improved learning outcomes.

Recommendations

In light of the study's findings, it is recommended that TLE teachers be supported in progressing from basic AI use to sustained classroom integration through opportunities to apply AI strategies in real contexts, while school heads and instructional leaders implement structured, practice-oriented training with coaching and follow-up support. Capacity-building programs should be continuous and focused on practical applications and ethical use, alongside the establishment of clear school policies on responsible AI integration. Schools must also provide adequate resources, including devices, stable internet, and technical support, and ensure learners are guided in developing digital literacy and responsible AI skills. Monitoring and evaluation systems should be strengthened to support data-driven improvements, while partnerships with ICT experts and organizations should be fostered to enhance innovation. Future research may further explore the effectiveness of AI integration across instructional and institutional factors.

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The author declares no conflict of interest in the conduct and publication of this study.

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