Artificial Intelligence Integration and Its Relationship with Skills-Based Instructional Practices of TLE Teachers

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DOI: https://doi.org/10.47772/IJRISS.2026.101000069

Received: 11 October 2026; Accepted: 16 October 2026; Published: 29 October 2026

ABSTRACT

Artificial intelligence (AI) has become a support resource in education. This study determined the extent of utilization and integration of AI in Technology and Livelihood Education (TLE) and its relationship with the skills-based instructional practices of Junior High School TLE teachers in the Schools Division of Camarines Norte. A quantitative descriptive-correlational research design was employed involving 172 Junior High School TLE teachers from 35 public secondary schools in the seven Bicol-speaking districts through total enumeration. Data were gathered using the researcher-developed AI Integration in TLE Instruction Questionnaire (AITLEQ), which underwent expert validation and pilot testing. Weighted mean and ranking were used for descriptive analysis, while Spearman's rank-order correlation was used to determine significant relationships. Findings showed that AI tools were utilized to a great extent, with instructional material preparation receiving the highest rating and feedback provision the lowest. AI integration was practiced across lesson planning, skills demonstration, student practice and engagement, and assessment of skills, with lesson planning obtaining the highest mean. Skills-based instructional practices were demonstrated to a very great extent. General AI utilization was significantly related to lesson preparation and organization, effectiveness of skills demonstration, and facilitation of student practice and engagement, but not to assessment of students' actual skills performance. AI integration in skills demonstration and student practice and engagement showed significant relationships with all four skills-based instructional dimensions, while lesson planning showed no significant relationships. Based on the findings, the AI-TLE SKILLS Guidebook was developed to promote purposeful, validated, contextualized, and responsible AI integration while preserving the hands-on and competency-based nature of TLE instruction.

Keywords: Artificial Intelligence, AI Integration, Technology and Livelihood Education, Skills-Based Instructional Practices, AI-TLE SKILLS Guidebook and

INTRODUCTION

Artificial intelligence (AI) is increasingly used in education to support lesson preparation, instructional delivery, learner engagement, and assessment. In Technology and Livelihood Education (TLE), its use is especially relevant because instruction is competency-based and requires demonstrations, guided practice, hands-on activities, and performance assessment. Philippine education policies, including DepEd Order No. 003, s. 2026, encourage responsible, human-centered AI integration while maintaining teacher oversight and professional judgment. Although AI can assist in generating instructional materials, simplifying technical concepts, designing activities, and preparing assessment resources, its role in evaluating actual skills performance remains limited because practical competence depends on direct observation, safety, accuracy, and quality of output. Despite the growing use of AI in schools, limited local evidence exists on its relationship with skills-based instructional practices in TLE. Understanding this relationship is important in determining how AI can be integrated without weakening the practical, performance-based, and teacher-guided nature of TLE instruction. This study therefore examined AI utilization, AI integration, and their relationship with the instructional practices of public Junior High School TLE teachers in Camarines Norte.

METHODOLOGY

This study employed a quantitative descriptive-correlational research design to examine AI utilization, AI integration, and skills-based instructional practices among Junior High School TLE teachers. The respondents were 172 teachers from 35 public secondary schools in the seven Bicol-speaking districts of the Schools Division of Camarines Norte, selected through total enumeration. Data were gathered using the researcher-developed AI Integration in TLE Instruction Questionnaire (AITLEQ), which underwent expert validation and pilot testing. Weighted mean and ranking were used to describe the variables, while Spearman's rank-order correlation tested significant relationships. Statistical analyses were performed using IBM SPSS Statistics Version 28 for data analysis.

RESULTS AND DISCUSSIONS

Extent of Utilization of Artificial Intelligence Tools in Teaching TLE Subjects. The utilization of AI tools in teaching TLE subjects was generally evident to a Great Extent, with an overall weighted mean of 3.09. Preparing instructional materials obtained the highest rating (3.39), while providing feedback on students' outputs obtained the lowest (2.71). The findings indicate that TLE teachers use AI more extensively for instructional preparation and content development than for functions requiring direct evaluation of learners' actual performance. This suggests that AI is useful in generating and organizing instructional resources, while feedback on practical outputs continues to require direct observation and professional judgment. Navasca (2025) supports this finding, emphasizing that AI can enhance instructional processes in TLE while hands-on learning and teacher judgment remain essential in evaluating practical competencies.

Table 1 Extent of Utilization of AI Tools in Teaching TLE Subjects

Indicators	Weighted Mean	Interpretation
1. I use AI tools when preparing instructional materials for TLE lessons.	3.39	VGE
2. I use AI applications to generate lesson ideas and learning activities.	3.32	VGE
3. I utilize AI tools to simplify technical concepts for students.	3.27	VGE
4. I use AI tools in preparing demonstrations and visual aids.	3.09	GE
5. I use AI applications to develop assessment materials.	3.03	GE
6. I use AI tools to provide feedback on students' outputs.	2.71	GE
7. I use AI tools to support classroom instruction.	3.13	GE
8. I utilize AI tools to improve learner engagement.	3.17	GE
9. I use AI tools to assist in monitoring students' progress.	2.78	GE
10. I regularly utilize AI tools in my teaching practices.	3.02	GE
Overall Weighted Mean	3.09	GE

Rating Scale: Descriptive Interpretation:

3.20 – 4.00 - Very Great Extent (VGE)

2.40 – 3.19 - Great Extent (GE)

1.80 – 2.39 - Moderate Extent (ME)

1.00 – 1.79 - Low Extent (LE)

Extent of Artificial Intelligence (AI) Integration in the Instruction of TLE Teachers. Artificial intelligence integration in TLE instruction reflects how teachers incorporate AI into different stages of the teaching and learning process.

Lesson Planning. AI integration in lesson planning was generally practiced, with an overall weighted mean of 3.15. The highest-rated indicator was the use of AI to create activity guides or worksheets for student practice, with a weighted mean of 3.31, interpreted as Highly Practiced. This indicates that TLE teachers commonly use AI in preparing structured learning materials that can support student practice and be adapted to specific competencies and learner needs. The lowest-rated indicator was the use of AI platforms to develop step-by-step procedures for skills demonstrations, with a weighted mean of 2.95, interpreted as Practiced. This suggests that teachers are more cautious in using AI for planning technical procedures that require accuracy, proper sequencing, and consideration of safety requirements. To strengthen AI integration in lesson planning, teachers may continue using AI for developing instructional resources while ensuring that generated materials are carefully reviewed, contextualized, and aligned with intended TLE competencies. Greater emphasis may also be placed on validating AI-generated technical procedures before classroom use. Related research by Mishra and Koehler (2024) supports these findings, emphasizing that effective technology integration requires the appropriate combination of technological, pedagogical, and content knowledge in instructional planning.

Table 2 Extent of Artificial Intelligence Integration in the Instruction of TLE Teachers along Lesson Planning

Indicators	Weighted Mean	Interpretation
1. I use AI tools to generate lesson ideas for TLE topics.	3.22	HP
2. I utilize AI platforms to develop step-by-step procedures for skills demonstrations.	2.95	P
3. AI tools help me design instructional materials for TLE lessons.	3.15	P
4. I use AI to create activity guides or worksheets for student practice.	3.31	HP
5. I consult AI tools when planning competency-based tasks for students.	3.01	P
6. AI tools help me organize lesson objectives aligned with competencies.	3.30	HP
7. I use AI to simplify complex technical concepts for students.	3.18	P
8. AI helps me design differentiated learning tasks for students with varying skill levels.	3.24	HP
9. I use AI to find examples or case scenarios related to TLE skills.	3.19	P
10. AI tools support me in preparing assessment tasks during lesson planning.	2.99	P
Overall Weighted Mean	3.15	P

Rating Scale: Descriptive Interpretation:

3.20 – 4.00	-	Highly Practiced (HP)
2.40 – 3.19	-	Practiced (P)
1.80 – 2.39	-	Moderately Practiced (MP)
1.00 – 1.79	-	Not Practiced (NP)

Skills Demonstration. AI integration in skills demonstration was generally practiced, with an overall weighted mean of 2.98. The highest-rated indicator was the use of AI-generated images or diagrams to explain technical skills, with a weighted mean of 3.07, interpreted as Practiced. This indicates that TLE teachers use visual AI resources to clarify technical concepts, components, and procedural sequences before or during actual demonstrations. Such materials help make complex procedures easier to understand and support learners in following the correct sequence of technical tasks. The lowest-rated indicator was the use of AI tools to simulate processes or procedures in TLE, with a weighted mean of 2.89, also interpreted as Practiced. This suggests that

simulations are used less often because TLE instruction remains dependent on actual demonstrations and hands-on performance. To strengthen AI integration, teachers may continue using AI-generated visuals, guides, and simulations as supplementary resources while ensuring technical accuracy, safety, and alignment with established procedures. Teacher modeling, direct observation, and authentic learner performance should remain central to skills instruction. Related research by Ng et al. (2024) supports these findings, showing that AI-supported educational activities can enhance learners' cognitive and affective engagement when used as complementary learning supports.

Table 3 Extent of Artificial Intelligence Integration in the Instruction of TLE Teachers along Skills Demonstration

	Weighted Mean	Interpretation
1. I use AI-generated images or diagrams to explain technical skills.	3.07	P
2. AI tools help me present procedures clearly during skills demonstration.	2.92	P
3. I use AI to create visual aids for demonstrating technical tasks.	3.03	P
4. AI resources assist me in explaining the correct steps in performing skills.	2.94	P
5. I use AI tools to simulate processes or procedures in TLE.	2.89	P
6. AI-generated instructional materials help students understand technical demonstrations.	2.95	P
7. AI tools help me provide examples of correct and incorrect procedures.	2.93	P
8. I use AI to generate instructional scripts or guides for demonstrations.	3.01	P
9. AI tools help me clarify safety procedures during skills demonstrations.	3.01	P
10. I use AI-generated content to supplement my demonstrations of technical skills.	3.02	P
Overall Weighted Mean	2.98	P

Rating Scale: Descriptive Interpretation:

3.20 – 4.00 - Highly Practiced (HP)

2.40 – 3.19 - Practiced (P)

1.80 – 2.39 - Moderately Practiced (MP)

1.00 – 1.79 - Not Practiced (NP)

Student Practice and Engagement. AI integration in student practice and engagement was generally practiced, with an overall weighted mean of 3.05. This indicates that TLE teachers incorporate AI in developing activities that provide learners with opportunities to participate, collaborate, practice technical skills, and apply knowledge in meaningful learning situations. AI serves as a useful support in generating exercises, scenarios, and practice materials that teachers can adapt according to specific competencies and learner needs. The highest-rated indicator was the use of AI to design collaborative tasks that encourage student interaction, with a weighted mean of 3.10, interpreted as Practiced. This reflects the usefulness of AI in helping teachers organize group activities that require learners to communicate, cooperate, divide responsibilities, and work toward a common practical output. For example, in Beauty Care, AI can assist in developing a group activity where learners assume roles in preparing materials, performing procedures, observing sanitation and safety practices, and evaluating

the final output. Such activities can promote active participation while strengthening teamwork and practical application of skills. The lowest-rated indicator was the use of AI to create problem-based tasks related to TLE competencies, with a weighted mean of 2.97, also interpreted as Practiced. This suggests that teachers are more cautious in using AI for problem-based learning because generated scenarios must accurately reflect realistic workplace conditions, available resources, safety requirements, and learners' competency levels. To strengthen AI integration, teachers may continue using AI for collaborative and application-based activities while carefully contextualizing problem scenarios before classroom use. Related research by Pelegrino (2025) supports these findings, reporting a significant positive relationship between AI integration and learner engagement among TLE learners, reinforcing the value of AI-supported activities in promoting participation and application of technical competencies.

Table 4 Extent of Artificial Intelligence Integration in the Instruction of TLE Teachers along Student Practice and Engagement

Indicators	Weighted Mean	Interpretation
1. I use AI tools to design practice tasks for students.	3.05	P
2. AI platforms help me create engaging activities for skill development.	3.09	P
3. AI tools assist in generating exercises that allow students to apply learned skills.	3.09	P
4. I use AI to create problem-based tasks related to TLE competencies.	2.97	P
5. AI helps me provide additional practice materials for students.	3.03	P
6. I use AI to design collaborative tasks that encourage student interaction.	3.10	P
7. AI tools help me generate scenarios that require students to apply technical knowledge.	3.03	P
8. I use AI to modify activities based on student learning needs.	3.03	P
9. AI helps me develop tasks that increase student participation during lessons.	3.08	P
10. I use AI to design authentic learning tasks that simulate real-life applications of TLE skills.	2.98	P
Overall Weighted Mean	3.05	P

Rating Scale: Descriptive Interpretation:

3.20 – 4.00 - Highly Practiced (HP)

2.40 – 3.19 - Practiced (P)

1.80 – 2.39 - Moderately Practiced (MP)

1.00 – 1.79 - Not Practiced (NP)

Assessment of Skills. AI integration in the assessment of skills was generally practiced, with an overall weighted mean of 2.97. This indicates that TLE teachers use AI in developing assessment questions, rubrics, evaluation criteria, performance tasks, and other assessment materials. AI serves as a support in organizing assessment processes, while teachers remain responsible for ensuring that assessment activities are aligned with intended competencies and actual performance requirements. For example, a Food and Beverage Services teacher may use AI to draft assessment criteria for table-setting and service procedures, then revise them according to established performance standards. The highest-rated indicator was the use of AI tools to generate assessment

questions related to TLE skills, with a weighted mean of 3.13, interpreted as Practiced. This reflects the usefulness of AI in producing assessment items that can be reviewed, modified, and aligned with technical concepts, procedures, and expected learning outcomes. In Computer Programming, a teacher may use AI to draft questions on syntax, debugging, and programming concepts and adjust them according to the targeted competency and level of difficulty. The lowest-rated indicator was the use of AI to provide feedback on student outputs, with a weighted mean of 2.70, also interpreted as Practiced. This suggests that teachers are more cautious in using AI for feedback because practical performance requires direct observation and professional judgment. In Carpentry, teachers must personally evaluate measurements, tool handling, procedures, safety practices, and output quality. Related research by Hanson and Miller (2025) supports these findings, emphasizing the importance of authentic, performance-based assessment and professional judgment in evaluating practical competencies.

Table 5 Extent of Artificial Intelligence Integration in the Instruction of TLE Teachers along Assessment of Skills

Indicators	Weighted Mean	Interpretation
1. I use AI tools to generate assessment questions related to TLE skills.	3.13	P
2. AI tools help me design rubrics for evaluating students' skills performance.	312	P
3. I use AI to develop performance-based assessment tasks.	2.91	P
4. AI assists me in creating evaluation criteria for technical skills.	2.98	P
5. AI tools help me generate assessment activities aligned with lesson objectives.	3.06	P
6. I use AI to provide feedback on student outputs.	2.70	P
7. AI helps me create varied forms of assessment for student learning.	2.97	P
8. AI tools assist in analyzing student performance in skills activities.	2.79	P
9. AI helps me design authentic assessment tasks for TLE.	3.06	P
10. AI tools assist me in monitoring students' progress in skills development.	2.95	P
Over-all Weighted Mean	2.97	P

Rating Scale: Descriptive Interpretation:

3.20 – 4.00 - Highly Practiced (HP)

2.40 – 3.19 - Practiced (P)

1.80 – 2.39 - Moderately Practiced (MP)

1.00 – 1.79 - Not Practiced (NP)

Level of Skills-based Instructional Practices of TLE Teachers. Skills-based instructional practices reflect how TLE teachers organize, demonstrate, facilitate, and assess learning experiences that develop students' practical competencies.

Lesson Preparation and Organization. Skills-based instructional practices along lesson preparation and organization were demonstrated to a Very Great Extent, with an overall weighted mean of 3.63. This indicates that TLE teachers consistently organize competency-based objectives, prepare instructional materials and tools, sequence procedures, and design activities that support practical learning. These practices help ensure that

lessons are structured and focused on developing technical competencies. For example, a Food Processing teacher identifies the expected competency, prepares the required tools and materials, organizes procedures, and allocates sufficient time for learner practice. The highest-rated indicator was ensuring that lesson objectives are aligned with expected skills outcomes, with a weighted mean of 3.74, interpreted as Very Great Extent. This reflects the competency-based nature of TLE, where instruction is directed toward observable and measurable performance. In Animation, teachers formulate objectives that clearly specify the skills learners are expected to demonstrate or produce. The lowest-rated indicator was preparing alternative strategies to support different learning needs, with a weighted mean of 3.55, also interpreted as Very Great Extent. This suggests that differentiated support is strongly practiced but requires additional planning to address differences in learner readiness, pace, prior experience, and technical proficiency. Teachers may strengthen this area through repeated modeling, simplified instructions, guided practice, and additional performance opportunities. Related research by Arufe-Giráldez et al. (2024) supports these findings, emphasizing the importance of structured preparation, organized procedures, and guided performance opportunities in developing practical competencies.

Table 6Level of Skill-based Instructional Practices of TLE Teachersalong Lesson Preparation and Organization

Indicators	Weighted Mean	Interpretation
1. I clearly organize my lesson objectives based on competencies.	3.69	VGE
2. I prepare instructional materials before conducting skills lessons.	3.65	VGE
3. My lesson plans clearly outline the procedures for skill activities.	3.60	VGE
4. I ensure that lesson objectives are aligned with the expected skills outcomes.	3.74	VGE
5. I prepare tools and materials needed for skills demonstrations.	3.58	VGE
6. I design learning activities that support skills development.	3.67	VGE
7. I structure lessons to allow sufficient time for practice.	3.62	VGE
8. I prepare alternative strategies to support different learning needs.	3.55	VGE
9. I organize lessons to ensure clarity of instructions.	3.58	VGE
10. I ensure that my lesson plans promote mastery of technical skills.	3.60	VGE
Overall Weighted Mean	3.63	VGE

Rating Scale: Descriptive Interpretation:

3.20 – 4.00 - Very Great Extent (VGE)

2.40 – 3.19 - Great Extent (GE)

1.80 – 2.39 - Moderate Extent (ME)

1.00 – 1.79 - Low Extent (LE)

Effectiveness of Skills Demonstration. Skills-based instructional practices along the effectiveness of skills demonstration were demonstrated to a Very Great Extent, with an overall weighted mean of 3.71. This indicates that TLE teachers consistently present technical procedures clearly, systematically, and safely while ensuring that learners understand the correct sequence of steps before performing tasks independently. Effective demonstration provides learners with a strong model for developing practical competencies. In Electrical Installation and Maintenance, for example, a teacher demonstrates the proper use of tools, follows the correct wiring sequence, explains each procedure, and emphasizes safety precautions before learners perform the

activity. The highest-rated indicator was ensuring that demonstrations are aligned with competency standards, with a weighted mean of 3.79, interpreted as Very Great Extent. This reflects the competency-based nature of TLE, where demonstrations must model the specific procedures, techniques, and standards learners are expected to perform. In Shielded Metal Arc Welding, teachers demonstrate proper equipment preparation, tool handling, execution of procedures, and required safety practices according to prescribed competencies. The lowest-rated indicator was highlighting common mistakes students should avoid, with a weighted mean of 3.66, also interpreted as Very Great Extent. This suggests that teachers strongly address possible errors, although greater attention is generally given to demonstrating correct procedures. In Cookery, teachers may point out errors in measurement, tool handling, sequencing, sanitation, and safety. Strengthening this practice can help learners recognize incorrect procedures and avoid repeated mistakes. Related research by Arufe-Giráldez et al. (2024) supports these findings, emphasizing the importance of structured technical instruction, clearly demonstrated procedures, and guided performance in developing practical competencies.

Table 7Level of Skill-based Instructional Practices of TLE Teachersalong Effectiveness of Skills Demonstration

Indicators	Weighted Mean	Interpretation
1. I demonstrate procedures clearly to students.	3.67	VGE
2. I explain each step of the skills demonstration carefully.	3.69	VGE
3. I emphasize safety precautions during demonstrations.	3.73	VGE
4. I provide clear examples when demonstrating technical tasks.	3.69	VGE
5. I encourage students to observe and analyze the procedures.	3.73	VGE
6. I ensure students understand each step before moving forward.	3.71	VGE
7. I allow students to ask questions during demonstrations.	3.76	VGE
8. I repeat demonstrations when students need further clarification.	3.69	VGE
9. I highlight common mistakes students should avoid.	3.66	VGE
10. I ensure demonstrations are aligned with competency standards.	3.79	VGE
Over-all Weighted Mean	3.71	VGE

Rating Scale: Descriptive Interpretation:

3.20 – 4.00 - Very Great Extent (VGE)

2.40 – 3.19 - Great Extent (GE)

1.80 – 2.39 - Moderate Extent (ME)

1.00 – 1.79 - Low Extent (LE)

Facilitation of Student Practice and Engagement. Skills-based instructional practices along the facilitation of student practice and engagement were demonstrated to a Very Great Extent, with an overall weighted mean of 3.72. This indicates that TLE teachers consistently provide opportunities for learners to participate actively, practice technical skills, receive guidance, and improve their performance through hands-on activities. In Caregiving, for example, learners perform a basic procedure after the teacher's demonstration while receiving monitoring, assistance, and corrective feedback throughout the activity. The highest-rated indicator was ensuring that students are actively engaged during skills activities, with a weighted mean of 3.80, interpreted as Very Great Extent. This reflects the performance-oriented nature of TLE, where learners develop competencies through direct participation in practical tasks. In Fish Capture, learners prepare and use fishing gear, follow prescribed procedures, observe safety practices, and complete assigned tasks under teacher supervision. Active

engagement allows learners to apply technical knowledge and strengthen procedural understanding through actual performance. It also promotes learner confidence and reinforces the connection between classroom instruction and actual task performance. Sustained participation in skills activities provides repeated opportunities for learners to refine techniques and develop greater independence in performing competencies. The lowest-rated indicator was providing students with adequate opportunities to practice skills, with a weighted mean of 3.65, although still interpreted as Very Great Extent. This suggests that practice opportunities are strongly provided but may be influenced by limitations in time, equipment, materials, and workspace. In Computer Systems Servicing, repeated practice in assembling and troubleshooting computers depends on the availability of sufficient units, tools, and instructional time. Teachers may strengthen this area through effective scheduling, grouping, and resource management. Related research by Dela Cruz and Panganiban (2025) supports these findings, emphasizing the value of practical and technology-supported learning experiences that actively involve learners in skills application and repeated practice.

Table 8Level of Skill-based Instructional Practices of TLE Teachersalong Facilitation of Student Practice and Engagement

Indicators	Weighted Mean	Interpretation
1. I provide students with adequate opportunities to practice skills.	3.65	VGE
2. I guide students while they perform technical tasks.	3.69	VGE
3. I encourage students to collaborate during skills activities.	3.76	VGE
4. I motivate students to actively participate in practice sessions.	3.72	VGE
5. I monitor students while they perform technical tasks.	3.78	VGE
6. I provide assistance when students encounter difficulties.	3.70	VGE
7. I encourage students to reflect on their performance.	3.75	VGE
8. I allow students to repeat activities to improve their skills.	3.71	VGE
9. I provide constructive feedback during practice sessions.	3.68	VGE
10. I ensure students are actively engaged during skills activities.	3.80	VGE
Overall Weighted Mean	3.72	VGE

Rating Scale: Descriptive Interpretation:

3.20 – 4.00 - Very Great Extent (VGE)

2.40 – 3.19 - Great Extent (GE)

1.80 – 2.39 - Moderate Extent (ME)

1.00 – 1.79 - Low Extent (LE)

Assessment of Students' Skills Performance. Skills-based instructional practices along the assessment of students' skills performance were demonstrated to a Very Great Extent, with an overall weighted mean of 3.74. This indicates that TLE teachers consistently assess learners through actual performance, direct observation, quality of outputs, correct execution of procedures, and feedback for improvement. These practices help ensure that assessment focuses on demonstrated competencies rather than theoretical knowledge alone. In Housekeeping, for example, a teacher evaluates a room-servicing task by observing proper sequencing, use of materials, safety and sanitation practices, and the quality of the completed work. Such performance-based assessment provides concrete evidence of whether learners can apply acquired knowledge and skills accurately, safely, and independently in practical situations. The highest-rated indicator was encouraging students to improve their skills based on assessment feedback, with a weighted mean of 3.85, interpreted as Very Great Extent. This reflects the developmental nature of TLE assessment, where feedback helps learners recognize errors, refine techniques, and improve performance toward mastery. In Computer Programming, teachers

identify errors in learners' programs, explain needed corrections, and require revision and testing until the intended output is achieved. This practice shows that assessment is not limited to assigning scores but also serves as a continuous process for improving learners' technical performance. Constructive feedback guides learners in identifying specific aspects that require improvement and encourages them to take greater responsibility for developing their competencies. The lowest-rated indicator was the use of rubrics to assess students' technical skills, with a weighted mean of 3.67, also interpreted as Very Great Extent. This suggests that rubric-based assessment is strongly practiced but requires careful preparation of criteria that accurately represent practical performance. In Landscape Installation and Maintenance, rubrics may assess plant placement, tool use, procedures, safety, and output quality. Strengthening the consistent use of competency-based rubrics can further improve transparency, fairness, consistency, and objectivity in evaluating learners' performance. Related research by Catubig and Dagohoy (2025) supports these findings, emphasizing the importance of authentic and performance-based assessment through observable performance, clear criteria, and constructive feedback in evaluating practical competencies.

Table 9 Level of Skill-based Instructional Practices of TLE Teachers along Assessment of Students' Skills Performance

Indicators	Weighted Mean	Interpretation
1. I evaluate students based on their performance of skills tasks.	3.69	VGE
2. I use rubrics to assess students' technical skills.	3.67	VGE
3. I provide feedback to help students improve their performance.	3.73	VGE
4. I assess students based on accuracy and quality of their work.	3.70	VGE
5. I observe students carefully while performing tasks.	3.73	VGE
6. I assess students' ability to follow procedures correctly.	3.72	VGE
7. I evaluate students' ability to apply learned skills.	3.78	VGE
8. I provide suggestions to improve student outputs.	3.73	VGE
9. I ensure fairness and objectivity in evaluating skills.	3.77	VGE
10. I encourage students to improve their skills based on assessment feedback.	3.85	VGE
Over-all Weighted Mean	3.74	VGE

Rating Scale: Descriptive Interpretation:

3.20 – 4.00 - Very Great Extent (VGE)

2.40 – 3.19 - Great Extent (GE)

1.80 – 2.39 - Moderate Extent (ME)

1.00 – 1.79 - Low Extent (LE)

Relationship between the Extent of Utilization of Artificial (AI) Intelligence Tools and the Skills-based Instructional Practices of TLE Teachers. AI tools utilization was significantly and positively related to three dimensions of skills-based instructional practices of TLE teachers. Lesson preparation and organization showed the strongest relationship ($\rho = .414$, $p < .001$), indicating that greater AI utilization is associated with stronger preparation and organization of skills-based lessons. Effectiveness of skills demonstration was also significantly related to AI utilization ($\rho = .313$, $p < .001$), suggesting that AI-generated visuals, procedural guides, and instructional resources can support teachers in presenting technical procedures. Likewise, facilitation of student practice and engagement showed a significant positive relationship with AI utilization ($\rho = .274$, $p < .001$), indicating that AI can help teachers develop practice activities and learning tasks that encourage learner participation. In contrast, assessment of students' skills performance was not significantly related to AI utilization ($\rho = .148$, $p = .052$). This suggests that practical assessment continues to depend largely on direct

observation, procedural accuracy, quality of outputs, safety practices, and teachers' professional judgment. Overall, AI is more strongly associated with planning, demonstration, and facilitation than with direct skills assessment. Becker et al. (2025) supports this pattern, showing that greater use of adaptive and AI-related technologies is associated with more responsive and student-centered instructional practices.

Table 10Test for Significant Relationship Between the Extent of AI Tools Utilization and Skills-Based Instructional Practices of TLE Teachers

Skills-Based Instructional Practices	AI Tools Utilization		Remarks
	ρ	p-value	
Lesson Preparation and Organization	.414**	.000	Significant
Effectiveness of Skills Demonstration	.313**	.000	Significant
Facilitation of Student Practice and Engagement	.274**	.000	Significant
Assessment of Students' Skills Performance	.148	.052	Not Significant

*Correlation is significant @ 0.05 level
**Correlation is significant @ 0.01 level

Relationship between the Extent of Artificial Intelligence (AI) Integration and the Skills-based Instructional Practices of TLE Teachers. AI integration was significantly and positively associated with most dimensions of skills-based instructional practices, although the strength of the relationships varied. AI integration in lesson planning showed no significant relationship with lesson preparation and organization, effectiveness of skills demonstration, facilitation of student practice and engagement, or assessment of students' skills performance. This suggests that greater AI use in planning does not necessarily correspond with stronger instructional practices because actual teaching still depends on teachers' technical expertise, learner needs, available resources, and classroom conditions. In contrast, AI integration in skills demonstration showed significant positive relationships with all four instructional dimensions, with the strongest relationship found in lesson preparation and organization ($\rho = .446$, $p < .001$). AI integration in student practice and engagement also showed significant positive relationships across all four areas. AI integration in assessment of skills was significantly related to lesson preparation, skills demonstration, and student practice and engagement, but not to assessment of students' skills performance. Overall, AI is more relevant when it directly supports demonstrations, practice, engagement, and assessment preparation, while teacher judgment remains essential in evaluating authentic performance. Annuš (2024) likewise emphasized AI's role in improving instructional efficiency, engagement, and individualized learning support.

Table 10Test for Significant Relationship Between the Extent of AI Tools Utilization andSkills-Based Instructional Practices of TLE Teachers

Skills-Based Instructional Practices	AI Integration							
	Lesson Planning		Skills Demonstration		Student Practice and Engagement		Assessment of Skills	
	ρ	*p-value*	*ρ*	*p-value*	*ρ*	*p-value*	*ρ*	*p-value*
Lesson Preparation and Organization	-.117	.217	.446**	.000	.372**	.000	.430**	.000
Effectiveness of Skills Demonstration	-.010	.918	.347**	.000	.281**	.000	.316**	.000
Facilitation of Student Practice and Engagement	-.026	.781	.281**	.000	.249**	.001	.250**	.000
Assessment of Students' Skills Performance	.023	.807	.185*	.015	.180*	.018	.116	.131

**Correlation is significant @ .01 level (2-tailed)
*Correlation is significant @ 0.05 level (2-tailed)

Proposed Intervention Program to Guide and Strengthen the Effective Use of Artificial Intelligence in TLE Instruction. The AI-TLE SKILLS Guidebook is proposed as a research-based instructional support intervention designed to strengthen purposeful, appropriate, and competency-aligned AI integration in Junior High School TLE instruction. It builds on teachers' already strong skills-based instructional practices while addressing areas where AI use requires greater support, particularly feedback, learner progress monitoring, and authentic skills assessment. The intervention was developed from findings showing that AI tools were utilized to a Great Extent, AI integration was Practiced, and skills-based instructional practices were demonstrated to a Very Great Extent. However, comparatively lower AI use was observed in providing feedback, monitoring learner progress, developing simulations and problem-based activities, and supporting authentic assessment. The relationship findings further showed that AI was more strongly associated with preparation, skills demonstration, and student practice than with the direct assessment of learners' actual skills performance.

The guidebook therefore includes an AI-Assisted Feedback Guide, Learner Progress Monitoring Tool, Skills Assessment Integrity Check, AI-TLE Output Validation Rubric, and competency-based rubric and checklist templates. These tools support teachers in organizing feedback, documenting learner progress, validating AI-generated resources, and preparing assessment materials while preserving direct observation and teacher judgment as the basis for evaluating competence. Overall, the intervention positions AI as a supplementary instructional support rather than a substitute for teacher expertise. Woldemariam et al. (2025) similarly emphasized that meaningful AI integration requires teacher capacity, pedagogical alignment, and appropriate support structures.

CONCLUSIONS

Based on the obtained results, the researcher formulated the following conclusions.

1. Junior High School TLE teachers use AI to a considerable extent, particularly for instructional materials, lesson ideas, and simplifying technical concepts, while its use for feedback and progress monitoring remains comparatively lower.
2. AI is integrated across lesson planning, skills demonstration, student practice and engagement, and assessment, with greater use in lesson preparation and instructional support.
3. TLE teachers demonstrate a very high level of skills-based instructional practices, particularly in competency development, hands-on learning, guided practice, and authentic assessment.
4. AI tool utilization is significantly related to lesson preparation, skills demonstration, and student practice and engagement, but not to assessment of students' actual skills performance.
5. AI integration is more strongly related to skills demonstration and student practice and engagement, while limited or no significant relationships were found in lesson planning and actual skills assessment.
6. The findings support the development of the AI-TLE SKILLS Guidebook to promote purposeful, responsible, contextualized, and competency-aligned AI integration while preserving the hands-on and performance-oriented nature of TLE.

RECOMMENDATIONS

The conclusions lead to the following proposed recommendations:

1. TLE teachers may continue using AI for instructional materials, lesson development, feedback, and progress monitoring while verifying outputs for accuracy, competency alignment, safety, relevance, and learner suitability.
2. AI-supported lesson-planning resources may be contextualized according to TLE competencies, available tools and materials, learner readiness, school conditions, and opportunities for authentic hands-on performance.
3. Teachers may sustain strong skills-based instructional practices by using AI as a complementary support rather than as a replacement for demonstrations, hands-on practice, safety procedures, authentic problem-solving, and direct skills assessment.

4. AI-supported strategies may be strengthened in lesson preparation, skills demonstration, and student practice and engagement, while recognizing that correlational findings do not establish causation.
5. AI may assist in developing rubrics, assessment tasks, feedback, and progress-monitoring tools, but final judgments of practical competence should remain based on direct observation, actual performance, learner outputs, and professional judgment.
6. The AI-TLE SKILLS Guidebook may undergo expert validation and be adapted to different TLE specializations, school resources, learner needs, and local contexts.
7. Future researchers may replicate the study in other settings, examine additional variables, use qualitative or mixed-method approaches, and evaluate the usability and effectiveness of the proposed guidebook and.

ACKNOWLEDGMENT

this academic journey. Heartfelt appreciation is extended to the Graduate School administration, research adviser, and members of the Thesis Advisory Committee for their valuable guidance, constructive recommendations, and scholarly support. Gratitude is likewise extended to the Schools Division officials, Public Schools District Supervisors, School Heads, and Junior High School TLE teachers for their assistance, cooperation, and participation in the study. Special appreciation is given to the researcher's beloved wife for her unwavering love, patience, prayers, and encouragement. Finally, sincere thanks are offered to everyone who contributed to the successful completion of this research.

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