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Innovative Technology Skills of Technology and Livelihood Education Teacher on the Student Engagement and Performance

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Abstract— *The research study focuses on the relationship between Technology and Livelihood Education (TLE) teachers' innovative technology skills and their students' engagement and performance. The study aims to determine level of TLE teachers' innovative technology skills, students' engagement and students' academic performance. It also identifies the significant relationship between TLE teachers' innovative technology skills on students' engagement and performance. The study utilized quantitative research. This involved the Senior High school students of Union College of Laguna. The total population of at least 213 students served as the respondents in this study. The main instruments of the study was a set of survey questionnaires which was created by the researcher and validated by the experts. Based on the findings, TLE teachers' innovative technology skills and their students' engagement are very high. This shows that high skilled TLE teachers effectively integrate digital tools, modern instructional strategies, and educational technology platforms into their teaching practices which students actively participate. In terms of students' performance of third grading grade is found to be satisfactory. This indicates an excellent level of performance and achievement among the assessed individuals during this period. There is a significant relationship between a Technology and Livelihood Education (TLE) teacher's innovative technology skills and student engagement only in terms of task behavior while there is no significant effect on performance. Moreover, the TLE teachers' innovative technology skills show significant relationship on Student Engagement that only in terms of task behavior supporting the acceptance of the hypothesis. This implies that TLE teachers' innovative technology skills play a vital role in enhancing student class involvement. However, no significant relationship is found between TLE teachers' innovative technology skills and student performance, leading to the acceptance of the hypothesis in this case as well. This implies that, aside from the importance of fostering active participation, adaptive learning approaches should be implemented to align technology use with improved student performance. This research highlights the necessity of teachers developing technology skills to design dynamic, student-centered classrooms. Schools must invest in teacher training and set-up to ensure equitable access to technology, thereby elevating academic achievement and preparing learners for future success.*

Keywords— *Innovative technology skills; technology and livelihood education (TLE); student engagement; academic performance; educational technology.*

I. INTRODUCTION

In the 21st-century educational scenario, it is essential to know and apply innovative technology skills and a strong pedagogical competency of the teachers for better engagement and performance of students. The rapid development of educational technologies means that teachers need not only possess pedagogical qualifications, but also proficiency in the use of technology, (Setiawati et al., 2021; Kporyi & Arko, 2021).

As such, innovative technology skills, from the use of interactive multimedia tools, online platforms, and virtual simulations to incorporating modern digital tools in technical skills training have the potential to transform traditional teaching methods.

When Technology and Livelihood Education (TLE) teachers judiciously utilize these technologies, students are provided with more interactive, engaging, and personalized learning experiences. This not only makes learning more enjoyable but also supports diverse learning styles, ensuring that all students have the opportunity to succeed. However, despite the emphasis given to classroom training in performing learning tasks, there seem to be students who are passive in terms of the learning engagement. Other students are excited and eager to learn something new every day, but others seem less determined and inspired. Other students somehow failed to see the essential value of the subject and it would add worth to their lives. The degree of engagement and participation the student has demonstrated in their class is reflected in their academic evaluations and performance. (Dimaunahan et al., 2021).

Moreover, integrating technology into TLE instruction has been shown to enhance student performance. By incorporating digital tools and resources, teachers can offer more targeted, real-time feedback, foster collaboration, and provide students with opportunities for hands-on practice, all of which contribute to improved learning outcomes. The increased engagement that comes from using technology in the classroom also leads to higher motivation and a greater interest in the subject matter, which in turn positively impacts student performance.

This research sought to find the influence of TLE teachers' innovative pedagogical skills on students' engagement and performance.

1.1 Statement of the Problem

Problem/s which were addressed by the research

The study aims to determined level of TLE teachers' innovative technology skills, students' engagement and students' academic performance.

1. What is the level of Technology and Livelihood Education

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Innovative Technology Skills in terms of:
1.1 Digital literacy and pedagogy;
1.2 online platforms;
1.3 educational technology;
1.4 reflective practices and
1.5 instructional skill?
2. What is the level of Student engagement in terms of:
2.1 participation;
2.2 task behavior;
2.3 goal setting and
2.4 effort and persistence?
3. What is the level of the student academic performance in terms of third grading grade?
4. Is there a significant relationship between TLE teacher innovative technology skill and student engagement?
5. Is there a significant effect in TLE teacher innovative technology skill and student academic performance?

II. Methodology

The study utilized quantitative research. This involved the Senior High school students of Union College of Laguna. The total population of at least 213 students served as the respondents in this study. The main instruments of the study was a set of survey questionnaires which was created by the researcher and validated by the experts.

III. Results and Discussion

This chapter deals with the presentation of the gathered data based on the research questions, the analysis and interpretation relative to the sub problem and hypothesis stated on the first chapter.

Level of TLE Teachers' Innovative Technology Skills

In this study, TLE Teachers' Innovative Technology Skills was described in terms of digital literacy and pedagogy, online platforms, educational technology tools, reflective practice and instructional skills and was determined by the mean and standard deviation.

The results show that TLE teachers have very high innovative technology skills in digital literacy and pedagogy (M = 4.58, SD = 0.56) indicate that they are highly effective in integrating digital tools into their teaching. This goes beyond basic technology use, as these teachers thoughtfully apply digital platforms and educational technology to create engaging, student-centered learning experiences. Their expertise helps students develop digital literacy while accommodating various learning needs.

Additionally, this high level of digital literacy reflects the teachers' commitment to continuous professional growth and reflective practice. They regularly update their methods to keep up with technological changes and ensure lessons have real-world relevance. Even when faced with challenges like limited resources, TLE teachers show adaptability and resourcefulness. In general, these results highlight the critical role that TLE instructors have in preparing students with the digital skills they need to succeed and continue learning throughout their lives in today's technologically advanced society.

TABLE 1. Level of TLE Teachers' Innovative Technology Skills in terms of Digital literacy and pedagogy

STATEMENT	Mean	SD	Remarks
My TLE Teacher…			
…knows how to use and apply technology appropriately and efficiently.	4.79	0.44	Always
…encourages us to develop our digital literacy skills.	4.77	0.42	Always
…demonstrates different aspects of solving technical problems we can experience while socializing online.	4.45	0.59	Always
…shows us how to troubleshoot common technical issues we might encounter during online activities.	4.34	0.59	Always
…provides me information about how to find information online and assess sources found on the internet.	4.54	0.61	Always
Grand Mean	4.58		
SD	0.56		
Verbal Interpretation	Very High		

As illustrated in Table 1, the TLE teachers' innovative technology skills in terms of digital literacy and pedagogy are at a very high level, with a grand mean of M = 4.58, SD = 0.56. This indicates that TLE teachers effectively integrate technology into their teaching, fostering students' digital literacy and technical proficiency.

There is a strong consensus that teachers are highly adept at applying technology appropriately and efficiently, as well as encouraging students to enhance their digital literacy skills. Their ability to troubleshoot technical issues and provide guidance on assessing online information further demonstrates their competence in supporting students' learning in a digital environment.

Strengthening digital literacy through innovative teaching strategies is crucial for enhancing students' abilities to navigate technology, develop problem-solving skills, and critically evaluate digital content. By fostering a tech-integrated and student-centered learning environment, TLE teachers play a vital role in equipping students with essential 21st-century skills necessary for both academic and professional success. Through this integration, students not only become proficient in using digital tools and resources but also develop the ability to locate information effectively, manage digital resources, and troubleshoot technical issues.

Furthermore, they learn to critically assess online information, discern credible sources, and understand the ethical implications of digital content, thereby fostering responsible online behavior. By focusing on individual student needs and learning styles, TLE teachers promote personalized educational experiences that encourage self-direction, motivation, and a lifelong love of learning. Ultimately, this approach cultivates essential skills such as communication, collaboration, creativity, and critical thinking, preparing students for higher education, future careers, and active participation in a technology-driven world.

Digital Pedagogy (DP) is formalized as a pedagogical activity through Virtual learning Environment (VLE) with seven pedagogical principles (Dhakal, 2023). 1) Learning Contents and curriculum mapping 2) Learning Objectives 3) Learning Resources. 4) Learning Activities/Assignments 5) Learning Communication and Discussion 6) Learning Feedback and support 7) Learning Assessment/Evaluation.

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Teachers' roles are continuously evolving in a rapidly changing environment in order to meet current educational concerns. They are expected to learn new skills and stay current with the newest digital technologies. In the area of educational technology, the need for digital pedagogy and the integration of digital technologies into teaching and learning continue to be contentious topics (Tan, Voogt and Tan, 2024).

TABLE 2. Level of TLE Teachers' Innovative Technology Skills in terms of Online Platforms

STATEMENT	Mean	SD	Remarks
My TLE Teacher…			
…uses various online platforms effectively for communication and learning.	4.11	0.88	Very Often
…makes me feel comfortable navigating the online platforms used in my TLE classes.	4.28	0.93	Always
…integrates several educational technologies in the teaching process (for example, videos, simulations and interactive programs).	3.98	0.98	Very Often
…introduces educational technology tools that are easy for me to navigate and use.	4.19	0.85	Very Often
…utilizes online platforms in our class which can provide access to additional resources that enhance my understanding of the subject.	3.88	1.07	Very Often
Grand Mean	4.09		
SD	0.95		
Verbal Interpretation	High		

As presented in Table 2, the TLE teachers' innovative technology skills in terms of online platforms are at a high level, with a grand mean of M = 4.09, SD = 0.95. This signifies that teachers frequently utilize various online platforms to facilitate communication, enhance learning experiences, and provide access to additional resources that support students' understanding of TLE subjects.

There is a strong agreement that teachers help students feel comfortable navigating online platforms by ensuring that digital tools are user-friendly and accessible. Additionally, the effective integration of educational technologies such as videos, simulations, and interactive programs enhances student engagement and comprehension. The frequent use of online platforms for communication and resource-sharing further reinforces students' digital literacy and adaptability in technology-enhanced learning environments.

This highlights the importance of leveraging online platforms to create an interactive and student-centered learning experience that allows students to explore diverse educational resources, develop technological skills, and actively engage in digital learning activities. Through these platforms, students benefit from real-time interaction and collaboration, which enhances engagement and supports personalized learning tailored to their individual needs. Access to a wide variety of digital content, such as virtual labs and multimedia resources, broadens their understanding and enriches their learning experience. Regular use of these tools also strengthens students' digital literacy and technical proficiency, enabling them to confidently navigate software and troubleshoot issues. Overall, such digital learning activities complement classroom instruction, promote hands-on practice, and provide timely feedback, all of which contribute significantly to students' academic and technical growth.

The integration of technology into contemporary education has fundamentally changed traditional learning environments and provided unparalleled possibilities. Technological advancements, such as online learning platforms and digital resources, have democratized education, making it accessible to a broader audience. However, challenges such as the digital divide, data privacy concerns, and potential exacerbation of educational inequalities persist (Hussain, Qureshi and Malik, 2024).

TABLE 3. Level of TLE Teachers' Innovative Technology Skills in terms of Educational Technology Tools

STATEMENT	Mean	SD	Remarks
My TLE Teacher…			
…uses educational technology tools to enhance my learning experience.	4.18	0.86	Very Often
…makes us believe that the use of technology in our class helps me understand the subject better.	4.56	0.77	Always
…asks about our concerns regarding the use of technology in our class.	4.32	0.88	Always
…guides us clearly and to easily follow troubleshooting technical problems.	4.40	0.74	Always
…actively encourages me to try finding help whenever I struggle with understanding or using educational technology tools in our lessons.	4.20	0.97	Very Often
Grand Mean	4.33		
SD	0.86		
Verbal Interpretation	Very High		

As presented in Table 3, the TLE teachers' innovative technology skills in terms of educational technology tools are at a very high level, with a grand mean of M = 4.33, SD = 0.86. This implies that teachers effectively integrate educational technology tools into their teaching, enhancing students' learning experiences and engagement in TLE subjects.

Teachers agree that reinforcing the value of technology improves students' understanding by highlighting its benefits in learning. They also consistently guide students in troubleshooting technical issues, helping them navigate challenges easily. Addressing student concerns about technology use creates a more supportive and adaptive learning environment.

When used effectively, educational technology improves students' digital literacy, problem-solving abilities, and level of engagement in learning. By encouraging students to explore technology and seek help when needed, educators foster independent learning and critical thinking. Students are better prepared for academic and professional settings that are heavily influenced by technology.

Today's classrooms are filled with Generation Z, or digital citizens (Gusho et al., 2023), making it crucial for teachers, students, and parents to recognize the benefits of educational technology. Over the past decade, the integration of technology in education has grown significantly due to technological advancements and increased networking. Researchers highlight that using technology in learning offers multiple ways to learn, improves student achievement,

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supports efficient independent study, fosters creative thinking, and promotes independence in the learning process.

TABLE 4. Level of TLE Teachers' Innovative Technology Skills in terms of Reflective Practice

STATEMENT	Mean	SD	Remarks
My TLE Teacher…			
…encourages us to reflect on our learning experiences.	4.23	0.83	Always
…often think about what I've learned in class and how I can apply it.	4.51	0.81	Always
…provides opportunities for us to reflect on our learning through discussions or journals.	4.24	0.88	Always
…motivates us to share our reflections with classmates, which enhances my understanding.	4.29	0.78	Always
…teaches us to reflect on our learning experiences, which helps me identify areas where I have grown and areas where I need improvement.	4.14	1.02	Very Often
Grand Mean	4.28		
SD	0.88		
Verbal Interpretation	Very High		

As shown in Table 4, the TLE teachers' innovative technology skills in terms of reflective practice are at a very high level, with a grand mean of M = 4.28, SD = 0.88. This implies that teachers actively integrate reflection into their teaching strategies, helping students assess their learning progress and enhance their understanding of TLE subjects.

There is strong agreement that teachers encourage students to reflect on their learning experiences and provide structured opportunities for reflection through discussions or journals, fostering a more introspective and self-directed learning process. Additionally, promoting peer-sharing of reflections further strengthens students' comprehension by allowing them to exchange perspectives and insights.

Incorporating reflective practice in TLE education enables students to actively assess their own learning experiences, helping them recognize their strengths and identify areas for growth. This process encourages students to think critically about their performance, understand the reasons behind their successes and challenges, and make informed decisions to improve their skills. Students are encouraged to take ownership of their learning path by continuous reflection, which fosters self-awareness and responsibility.

Moreover, it fosters essential skills such as problem-solving, adaptability, and goal setting, which are crucial not only for academic success but also for personal and professional development. By embedding reflective practice into TLE education, teachers help students develop lifelong habits of self-improvement and critical thinking that prepare them to navigate complex real-world situations confidently and effectively.

Reflection is a fundamental component of instruction and learning. By 'challenging assumptions of everyday practice and critically evaluating practitioners' own responses to practice situations' (Finlay, 2014), it seeks to increase your awareness of your own professional knowledge and behavior.

As reflected in Table 5, the TLE teachers' innovative technology skills in terms of instructional skills are at a very high level, with a grand mean of M = 4.32, SD = 0.88. This implies that teachers effectively implement engaging and technology-integrated instructional strategies that enhance students' learning experiences in TLE.

TABLE 5. Level of TLE Teachers' Innovative Technology Skills in terms of Instructional Skills

STATEMENT	Mean	SD	Remarks
My TLE Teacher…			
…carries out instructional methods that are helpful in my learning process.	4.23	0.90	Always
…knows how to handle the class, bearing in mind that she must teach us something that catches my attention most of the time.	4.51	0.84	Always
…uses engaging techniques that keep my attention during lessons.	4.27	0.85	Always
…utilizes instructional methods by effectively incorporating technology to enhance learning.	4.46	0.71	Always
…connects lessons to real-world applications, making the content more relevant and interesting.	4.13	1.03	Very Often
Grand Mean	4.32		
SD	0.88		
Verbal Interpretation	Very High		

There is strong agreement that teachers carry out instructional methods that facilitate learning and utilize engaging techniques to maintain students' attention during lessons. Additionally, the effective incorporation of technology into instruction further enriches the learning process, making lessons more interactive and meaningful. The ability to connect lessons to real-world applications also helps students see the relevance of their learning in practical settings.

This implies further that well-structured instructional approaches contribute to a more dynamic and student-centered learning environment, allowing students to stay engaged, understand concepts more effectively, and apply their knowledge beyond the classroom. Integrating innovative teaching methods fosters critical thinking, problem-solving skills, and a deeper appreciation of TLE subjects.

Marti (2024) argues that Critical Thinking, Creative Thinking, Communicating, and Collaborating are the four main teaching abilities. These abilities are crucial for fostering a vibrant and interesting learning atmosphere, and they equip students with the tools they need to succeed in the classroom and in the real world. These skills are frequently known as the 4 C's of learning. They are essential for helping pupils acquire 21st-century skills. The four C's are linked and need to be incorporated into every facet of instruction and learning. Teachers can hone these abilities through continuous practice and professional training. The acquisition of these abilities can be improved by integrating technology into teaching.

Level of Students' Engagement

In this study, level of Learners' Engagement was described in terms of Active Participation, task completion, and questioning and inquiry and was determined by the mean and standard deviation.

As shown in Table 6, the students' engagement in terms of participation is at a very high level, with a grand mean of M = 4.22, SD = 0.90. This implies that students consistently demonstrate active involvement in their TLE classes,

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recognizing the importance of regular attendance, participation, and task completion in their learning process.

TABLE 6. Level of Students' Engagement in terms of Participation

STATEMENT	Mean	SD	Remarks
1. I attend my TLE classes regularly, recognizing the importance of consistent presence for optimal learning.	4.20	0.89	Very Often
2. I actively engage in our class activities and discussions.	4.45	0.83	Always
3. I seek help from my teacher when I do not understand something about our lesson.	4.19	0.89	Very Often
4. I complete my assignments on time for TLE.	4.23	0.75	Always
5. I am interested in the topics covered in TLE.	4.00	1.08	Very Often
Grand Mean	4.22		
SD	0.90		
Verbal Interpretation	Very High		

There is strong agreement that students actively engage in class activities and discussions, contributing to a more interactive learning environment. Additionally, they seek assistance from their teacher when needed and complete assignments on time, reflecting their commitment to academic responsibilities. Their interest in TLE topics further supports their engagement, helping them stay motivated and involved in the learning process.

This implies further that high levels of participation contribute to better learning experiences, skill development, and overall academic success. Encouraging continuous involvement in discussions, activities, and coursework fosters a deeper understanding of TLE concepts and enhances students' ability to apply their learning effectively.

TABLE 7. Level of Students' Engagement in terms of Task Behavior

STATEMENT	Mean	SD	Remarks
1. I stay focused on tasks during class activities.	4.06	0.90	Very Often
2. I can manage my time effectively during tests and quizzes.	4.14	1.02	Very Often
3. I work well with my classmates during group projects.	3.92	0.97	Very Often
4. I am open to feedback from my peers during collaborative tasks.	4.09	0.87	Very Often
5. I can concentrate on my tasks without getting easily distracted.	3.86	1.07	Very Often
Grand Mean	4.02		
SD	0.97		
Verbal Interpretation	High		

As reflected in Table 7, the students' engagement in terms of task behavior is at a high level, with a grand mean of M = 4.02, SD = 0.97. This implies that students generally exhibit focus, cooperation, and time management skills when completing tasks in their TLE classes.

There is strong agreement that students stay focused during class activities and effectively manage their time during tests and quizzes, demonstrating their ability to handle academic tasks efficiently. Additionally, they work well with classmates on group projects and remain open to feedback during collaborative tasks, which fosters a positive and cooperative learning environment. While students can concentrate on their tasks, there is still room for improvement in minimizing distractions to further enhance their engagement.

This implies further that developing stronger task-related skills like time management, teamwork, and focus can boost students' academic performance and productivity in TLE, helping them overcome challenges and improve learning.

Godwin et al. (2016), conducted a large observational study of elementary students' attention during instruction, finding that attention fluctuated over the school year. Girls were more focused than boys, and as class time grew, on-task behavior decreased. Whole-group instruction saw the lowest on-task rates. Parochial schools had higher on-task behavior, while grade-level effects were unclear. The knowledge gained from these findings is used to improve lesson planning so that students are more involved.

TABLE 8. Level of Students' Engagement in terms of Goal Setting

STATEMENT	Mean	SD	Remarks
1. I set specific academic goals for myself.	4.16	0.33	Very Often
2. I remain committed to my goals even when faced with challenges.	4.44	0.33	Always
3. I used a calendar or planner to keep track of deadlines related to my goals.	4.06	0.30	Very Often
4. I adjust my strategies if they are not making progress.	4.30	0.15	Always
5. I reflect on my progress towards achieving my goals.	4.02	0.25	Very Often
Grand Mean	4.20		
SD	0.90		
Verbal Interpretation	High		

As presented in Table 8, the students' engagement in terms of goal setting is at a high level, with a grand mean of M = 4.20, SD = 0.90. This indicates that students actively establish academic objectives and demonstrate commitment to achieving them, even when encountering challenges.

There is strong agreement that students remain dedicated to their goals and adjust their strategies when progress is not evident, showing adaptability in their learning process. Additionally, they utilize calendars or planners to track deadlines and reflect on their progress, which helps maintain focus and motivation. While students frequently set specific academic goals, continuous reinforcement of goal-setting strategies can further strengthen their long-term academic success.

This suggests that effective goal-setting not only boosts students' persistence, self-discipline, and academic growth but also equips them with essential skills for lifelong learning. By setting clear, achievable goals, students become more motivated to overcome obstacles and remain focused on their tasks, even when facing difficulties. Encouraging planning helps students break down larger assignments or projects into manageable steps, making it easier for them to organize their time and resources efficiently. By nurturing these habits through goal-setting, educators can help students stay on track, develop essential life skills, and ultimately achieve greater success in TLE and beyond.

The study by Rowe et al. (2016) investigated the impact of goal-setting instruction on academic engagement among

middle school students at risk of academic failure, revealing a positive relationship between goal-setting lessons and students' active participation in academic activities. This suggests that teaching students how to set goals can effectively boost their engagement in the classroom. Students can concentrate on desired academic results and have guidance in reaching their goals by setting goals. Students may increase their drive, self-assurance, and self-control by establishing goals.

TABLE 9. Level of Students' Engagement in terms of Effort and Persistence

STATEMENT	Mean	SD	Remarks
1. I put forth my best effort in completing the performance task.	4.37	0.76	Always
2. I continue to work on a task even when it becomes challenging.	4.57	0.78	Always
3. I show determination to improve my skills or knowledge over time.	4.29	0.85	Always
4. I set high standards for my performance task.	4.37	0.71	Always
5. I reflect on my performance and identify areas for improvement.	4.16	1.01	Very Often
Grand Mean	4.35		
SD	0.84		
Verbal Interpretation	Very High		

As shown in Table 9, the students' engagement in terms of effort and persistence is at a very high level, with a grand mean of M = 4.35, SD = 0.84. This implies that students consistently demonstrate dedication and perseverance in accomplishing their tasks, particularly in performance-based activities in TLE.

There is strong agreement that students exert their best effort in completing tasks and continue working even when faced with challenges, reflecting their resilience and determination. Additionally, they set high standards for their work and strive to improve their skills over time, showing a commitment to academic growth. While they frequently reflect on their performance to identify areas for improvement, further encouragement in self-assessment may enhance their learning process.

This implies further that maintaining strong effort and persistence fosters deeper learning, skill development, and a growth mindset. Helping students improve their perseverance, self-discipline, and reflective practices can help them overcome challenges, reach their objectives, and realize their full potential in TLE.

Based on the study of McKoy (2016), found that community college students aiming to earn a credential put in significantly more effort than those seeking to update job skills, change careers, or pursue self-improvement.

Level of Students' Academic Performance in terms of Third Grading Grade

In this study, level of students' academic performance in terms of Third Grading grade and was determined by frequency, percentage, mean and standard deviation.

As reflected in Table 10, the students' academic performance in terms of their third grading grade is at a satisfactory level, with a mean grade of 80.70 and SD = 5.38. This indicates that, on average, students are meeting the required learning competencies in TLE but still have areas for improvement.

TABLE 10. Level of Students' Academic Performance in terms of Third Grading Grade

Grade	Frequency	Percentage	Descriptive Value
90 – 100	18	8.5%	Outstanding
85 – 89	35	16.4%	Very Satisfactory
80 – 84	55	25.8%	Satisfactory
75 – 79	88	41.3%	Fairly Satisfactory
Below 75	17	8.0%	Did not Meet Expectations
Mean Grade	80.70		
SD	5.38		
Descriptive Value	Satisfactory		

The majority of students (41.3%) fall within the fairly satisfactory range (75–79), while 25.8% achieved a satisfactory rating (80–84). A smaller percentage (16.4%) reached the very satisfactory level (85–89), and only 8.5% attained an outstanding grade (90–100). Meanwhile, 8.0% of students did not meet expectations with grades below 75, indicating the need for additional academic support and intervention.

While a significant number of students perform at an acceptable level, there is room for enhancement in academic achievement. Strengthening instructional strategies, reinforcing student engagement, and providing targeted interventions for struggling learners can help improve overall performance and ensure a higher level of competency in TLE.

As revealed in the study of Gray and Bunte (2021), found that low midterm grades motivate students to improve their overall course performance, not by focusing on final exams, but by increasing their efforts on low-stakes assessments like participation, reading quizzes, and in-class exercises. The researchers found that these low midterm grades served as a critical feedback mechanism, encouraging students to adjust their study strategies and engage more consistently throughout the course. Instead of relying on a single high-pressure exam, students responded by dedicating more time and attention to smaller, ongoing assessments, which offered multiple opportunities to demonstrate understanding and improve their grades. This approach helped students build steady academic momentum and fostered a more sustained and proactive learning process.

Significant Relationship Between TLE Teachers' Innovative Technology Skills and Students' Engagement

To test the significant relationship between TLE Teachers' Innovative Technology Skills and Students' Engagement data were treated statistically using Minitab 14 using Pearsons R. The major findings were presented in the following table.

Table 11 presents the significant relationship between TLE teachers' innovative technology skills and students' engagement. The results include correlation values, probability values, and a sample size of 213 for each relationship.

A significant positive relationship is found between educational technology skills and task behavior, highlighting the role of technology in helping students stay focused and

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engaged in class activities. This suggests that integrating educational technology tools enhances students' ability to manage their tasks efficiently and maintain concentration during lessons.

TABLE 11. Significant Relationship Between TLE Teachers' Innovative Technology Skills and Students' Engagement

TLE Teachers' Innovative Technology Skills (IV)	Students' Engagement (DV)			
	Participation	Task Behavior	Goal Setting	Effort and Persistence
Digital Literacy and Pedagogy:				
Pearson Correlation	0.103	0.049	0.082	0.096
p-value	0.132	0.475	0.234	0.162
N	213	213	213	213
Online Platforms:				
Pearson Correlation	0.048	0.083	0.017	0.110
p-value	0.483	0.229	0.803	0.109
N	213	213	213	213
Educational Technology:				
Pearson Correlation	0.032	0.137	0.083	0.106
p-value	0.643	0.045*	0.226	0.121
N	213	213	213	213
Reflective Practices:				
Pearson Correlation	0.115	0.097	0.032	0.103
p-value	0.095	0.158	0.644	0.134
N	213	213	213	213
Instructional Skill:				
Pearson Correlation	0.073	0.020	0.022	0.019
p-value	0.292	0.777	0.751	0.784
N	213	213	213	213

Note: * p < .05

However, digital literacy and pedagogy, online platforms, reflective practices, and instructional skills did not exhibit a significant relationship with students' engagement in participation, goal setting, effort, and persistence. This indicates that while technology supports engagement, it may not directly influence students' motivation, goal-setting behavior, or sustained effort in learning tasks.

To conclude, students' engagement can be strengthened by integrating educational technology tools that promote active learning. However, other instructional strategies, such as interactive teaching methods and student-centered approaches, should also be considered to enhance engagement across different learning aspects.

In the study of Pardinan and Loremia (2020), about the implications of the technology-supported pedagogies, using a hybrid instructional platform adapting technology trends relevant to Education 4.0 called Systematic Computer Assisted Learning Environment (SCALE). The results demonstrated that, in comparison to the group that employed traditional approaches, the group that used the computer-assisted learning environment benefited from the SCALE in terms of their academic performance. Somehow, the authors convey that a list of key recommendations for when and how to employ technologies in a computer-assisted learning environment might be taken into consideration to improve the probability of fostering student engagement, notwithstanding the current inconsistencies and conflicting conclusions.

Significant Relationship Between TLE Teachers' Innovative Technology Skills and Students' Performance

To test the significant relationship between TLE Teachers' Innovative Technology Skills and Students' performance data were treated statistically using Minitab 14 using Pearsons R. The major findings were presented in the following table.

TABLE 12. Significant Relationship Between TLE Teachers' Innovative Technology Skills and Students' Performance

TLE Teachers' Innovative Technology Skills (IV)	Students' Performance (DV)
	Third Grading Grade
Digital Literacy and Pedagogy:	
Pearson Correlation	0.222
p-value	0.001*
N	213
Online Platforms:	
Pearson Correlation	0.439
p-value	0.000*
N	213
Educational Technology:	
Pearson Correlation	0.289
p-value	0.000*
N	213
Reflective Practices:	
Pearson Correlation	0.010
p-value	0.887
N	213
Instructional Skill:	
Pearson Correlation	0.058
p-value	0.401
N	213

Note: * p < .05

The strong correlation between pupils' performance and TLE teachers' creative use of technology is shown in Table 12. The findings include probability values, correlation values, and a sample size of 213.

The findings indicate a significant relationship between digital literacy and pedagogy, online platforms, educational technology and students' performance. Higher levels of competence in these are associated in third grading grades among students.

On the other hand, the findings show no significant relationship between reflective practices and instructional skill, and students' performance. These innovative technology

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skills do not show a direct influence on the students' third grading grades based on the data gathered.

In conclusion, technology-driven teaching skills—such as using online platforms and educational technology—show a strong positive impact on students' third grading grades, while reflective practices and instructional skills do not have a direct effect. This suggests that not all innovative strategies equally influence academic outcomes. A balanced approach that enhances effective technology use alongside other instructional methods may be needed to further boost students' academic achievement.

The study by Felszeghy et al. (2019) found that using online game-based platforms like Kahoot® in histology teaching improved student performance and engagement. The majority of students said they had more drive, worked better with others, and were more interested in studying. The majority also appreciated the immediate feedback from senior professionals. Students generally liked gamification and collaborative team-based learning.

IV. Conclusion and Recommendations

On the basis of the foregoing findings, the following conclusion was drawn.

Only the use of educational technology, among the innovative technology skills of the teacher, shows a significant relationship with student engagement in terms of task behavior. Thus, the null hypothesis is partially accepted. This concludes that while educational technology positively influences students' task-related engagement, other innovative technology skills may not have a significant impact in this area.

Most indicators of TLE teachers' innovative technology skills have a significant relationship with student academic performance, resulting in the rejection of the null hypotheses. This concludes that the innovative use of technology by TLE teachers positively influences and enhances students' academic achievement.

Based on the drawn conclusions, the following recommendations are proposed:

Administrators should train teachers in student-centered, technology-integrated strategies using tools like adaptive learning systems, gamified lessons, and collaborative platforms. This equips teachers to deliver personalized, engaging, and dynamic learning experiences that boost student participation and motivation.

Administrators may provide academic coaching, mentoring, and personalized support to help students develop study habits, time management, and motivation, promoting independent, self-regulated learning.

TLE instruction may use differentiated strategies-project-based learning, real-world tasks, peer collaboration, develop critical thinking and problem-solving skills.

TLE instruction may use structured and interactive digital tools like learning management systems, virtual simulations, and hands-on digital activities to improve student focus, productivity, and engagement.

Students may set clear goals, organize their study time, use active learning strategies, track their progress, study in distraction-free environments, take breaks, seek help when needed, and stay motivated to become effective, independent learners.

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