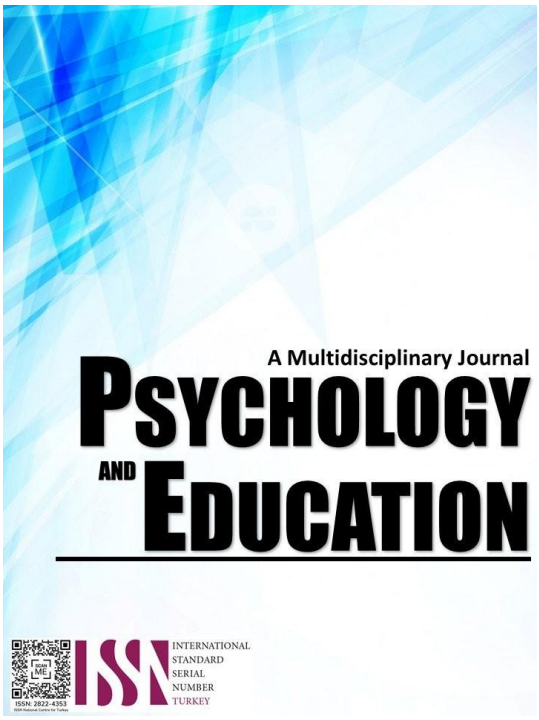
THE RELATIONSHIPS BETWEEN TEACHERS' TECHNOLOGY EDUCATION AND STUDENTS' ENTREPRENEURIAL DISPOSITIONS AND LIVELIHOOD OPPORTUNITIES



PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL

Volume: 59
Issue 8
Pages: 994-1007
Document ID: 2026PEMJ5808
DOI: 10.70838/pemj.590802
Manuscript Accepted: 05-15-2026

Psych Educ, 2026, **59**(8): 994-1007, Document ID:2026PEMJ5808, doi:10.70838/pemj.590802, ISSN 2822-4353

Research Article

The Relationships Between Teachers' Technology Education and Students' Entrepreneurial Dispositions and Livelihood Opportunities

Remedios F. Diego,* Ana Perla B. De Guzman
For affiliations and correspondence, see the last page.

Abstract

This study examines the relationships between teachers' technology education practices and students' entrepreneurial dispositions and livelihood opportunities in the Division of Pangasinan II. Using a descriptive–correlational design, data are gathered from 150 public secondary school teachers through a structured survey questionnaire. The study describes teacher profiles, determines the extent of technology practices, examines perceived implications for students, and tests differences and relationships across profile variables. Results show that teachers often implement technology-integrated instruction and perceive positive implications for learners' entrepreneurial dispositions and livelihood competencies. No significant differences or relationships are found between teachers' technology practices and their profile characteristics. Based on the findings, a Technology-Integrated Entrepreneurial Educator (TIEE) exemplar is proposed to guide instruction. The study highlights the importance of purposeful technology integration and professional development to strengthen entrepreneurial and livelihood-oriented learning outcomes.

Keywords: *technology education, entrepreneurial dispositions, livelihood opportunities, technology integration, descriptive–correlational study*

Introduction

The twenty-first century global economy is increasingly shaped by digitalization, automation, and new forms of enterprise, creating both opportunities and vulnerabilities for workers and young people. The 2030 Agenda for Sustainable Development, particularly Sustainable Development Goal (SDG) 8: Decent Work and Economic Growth, stresses the need to promote sustained, inclusive, and sustainable economic growth, productive employment, and decent work for all. It explicitly highlighted entrepreneurship, innovation, and higher productivity through diversification and technological upgrading as key levers for achieving these aims (United Nations, 2023).

In this context, education systems are expected to cultivate not only basic literacy and numeracy but also digital skills, entrepreneurial mindsets, and adaptability among learners can navigate changing labor markets and create their own livelihood opportunities.

Global labor market analyses underscored the urgency of this agenda. The International Labor Organization's Global Employment Trends for Youth 2022 report showed that youth employment has not yet fully recovered from the COVID-19 crisis and that young people, especially in low- and middle-income countries, remained disproportionately affected by unemployment, informality, and job insecurity (International Labor Organization, 2022).

In the Philippines, the World Bank's 2023 jobs report noted that creating "more and better jobs for the youth" was essential to sustaining post-pandemic recovery and long-term growth, emphasizing the need for stronger links between education, skills development, and the labor market (World Bank, 2023).

A joint Asian Development Bank–Linked, In report found that about 75% of employers in selected Asian countries had observed rising demand for digital skills among new hires, highlighting digital competencies as increasingly essential for employability and productivity (Asian Development Bank & LinkedIn, 2022).

Recognizing this, global initiatives have emphasized digital skills and entrepreneurship as twin pillars of youth employment. The Digital Skills for Youth initiative under the Global Initiative on Decent Jobs for Youth aimed to equip millions of young people with basic and advanced digital skills to harness opportunities in the digital economy and address the youth employment challenge (Decent Jobs for Youth, n.d.).

These global efforts converge on a key insight: schools and teachers are strategic actors in bridging global aspirations under SDG 8 with concrete pathways for learners to attain digital competence, entrepreneurial capability, and sustainable livelihoods.

At the level of global education policy, the UNESCO Global Education Monitoring (GEM) Report 2023: Technology in Education – A Tool on Whose Terms? reviewed evidence around the world and concluded that digital technologies can support access, equity, and quality only when embedded in appropriate governance, teacher preparation, and pedagogical use (UNESCO, 2023a).

At the level of global education policy, the UNESCO Global Education Monitoring (GEM) Report 2023: Technology in Education – A Tool on Whose Terms? reviewed evidence around the world and concluded that digital technologies can support access, equity, and quality only when embedded in appropriate governance, teacher preparation, and pedagogical use (UNESCO, 2023a). The report warned that uncritical adoption of technology can exacerbate inequalities and distract from fundamental teaching and learning, but that well-designed, teacher-led technology integration could help develop higher-order skills such as problem solving, creativity,

collaboration, and critical thinking—all of which were core to entrepreneurial capacity and employability.

A companion GEM 2023 Southeast Asia report, produced jointly by UNESCO and the Southeast Asian Ministers of Education Organization (SEAMEO), emphasized that governments in the region increasingly viewed technology as central to socio-economic development and were investing in connectivity and digital skills. However, the report noted persistent disparities in infrastructure, teacher capacity, and relevant digital content. Stressing the need to align technology use with local contexts, to strengthen teachers' digital pedagogical skills, and to connect learning more directly to economic and livelihood opportunities (UNESCO & SEAMEO, 2023). These global and regional analyzed positioned teachers as key intermediaries between technology and meaningful, context-responsive learning.

The OECD Digital Education Outlook 2021 similarly argues that "smart technologies" – including artificial intelligence, learning analytics, robotics, and blockchain – were transforming educational practices and systems. It highlighted both the potential of these tools for personalization and innovation, and the risks of widening inequalities if teachers and students lacked adequate support (Organization for Economic Co-operation and Development, 2021). Across OECD analyses, teachers were consistently described as central agents of change, whose competencies in using digital tools for pedagogy determined whether technology contributed to better learning and future-ready skills. Complementing this, the State of Broadband 2023 report of the Broadband Commission for Sustainable Development documents uneven progress toward universal and "meaningful connectivity," noting that gaps in access, affordability, and skills remain major barriers to leveraging technology for inclusive growth and employment (Broadband Commission, 2023).

Parallel to these debates on technology in education, an expanding body of research on entrepreneurship education (EE) demonstrated its role in shaping entrepreneurial mindsets and career pathways. A systematic literature review by Banha, Coelho, and Flores (2022) found that EE programs in schools were associated with higher entrepreneurial intentions, improved opportunity recognition, and more positive attitudes toward starting a business. In vocational settings, Handayati et al. (2020) showed that structured EE significantly enhanced vocational students' entrepreneurial mindset, including traits such as opportunity seeking, persistence, and risk-taking. Similarly, Kusumojanto et al. (2021), using data from vocational students, report that entrepreneurship education and supportive environments positively influence entrepreneurial intention, with entrepreneurial attitude acting as a key mediator. In the secondary school context, Rodriguez and Lieber (2020) find that participation in entrepreneurship education was associated with a stronger entrepreneurial mindset and career readiness, confirming that EE can contribute to 21st-century skills and career-focused competencies among adolescents. Collectively, these studies supported the view that systematic entrepreneurial learning experiences could cultivate dispositions such as initiative, creativity, problem solving, and resilience—traits aligned with SDG 8's emphasis on productive employment and entrepreneurship. Recent scholarship further underscored the intersection of technology and entrepreneurship education. Satar et al. (2024) demonstrated that a strong digital learning orientation and engagement in blended learning environments were significantly associated with higher entrepreneurial competencies among graduates, suggesting that digitally mediated learning could enhance entrepreneurial skills when effectively designed.

A comprehensive review by Sitaridis and Kitsios (2024) on digital entrepreneurship and entrepreneurship education highlighted how continuous advanced in digital technology are reshaping entrepreneurship and, consequently, the aims and methods of entrepreneurship education. Their conceptual framework identified technology-rich pedagogies, digital ecosystems, and new forms of value creation as central themes for future EE curricula (International Journal of Entrepreneurial Behavior & Research).

These global insights converge on a critical point: technology-enabled entrepreneurship education, when thoughtfully implemented by teachers, could simultaneously develop digital skills, entrepreneurial dispositions, and livelihood readiness—key dimensions of SDG.

In the Philippine context, the integration of technology in education has been actively pursued, but with persistent challenges. Tomaro (2018), in a review of ICT integration in the Philippine educational system, notes that while national policies support ICT in education, constraints such as inadequate infrastructure, limited teacher training, and uneven access hindered effective implementation and impact on learning outcomes (Journal of Governance and Public Policy).

Subsequent studies on ICT integration within the Department of Education (DepEd) system similarly point to variability across schools and divisions, emphasizing the need for ongoing professional development and context-responsive support for teachers.

The K to 12 Basic Education Curriculum positioned Edukasyong Pantahanan at Pangkabuhayan (EPP) at the elementary level and Technology and Livelihood Education (TLE) and the Technical-Vocational-Livelihood (TVL) track at the secondary level as core vehicles for equipping learners with technical, vocational, and entrepreneurial skills. DepEd's official description of the TLE and TVL track states that these specializations, offered from Grades 9 to 12, are designed to prepare learners for middle-level skills, employment, entrepreneurship, or higher education (Department of Education, n.d.).

The 2016 EPP/TLE Curriculum Guide explicitly articulates goals related to productivity, resourcefulness, and work-related skills through exploratory and specialization offerings in areas such as agri-fishery, home economics, industrial arts, and ICT (DepEd, 2016).

At the senior high school level, the Applied Track subject "Entrepreneurship" aims to develop competencies in opportunity seeking, business planning, product development, marketing, financial literacy, and venture implementation. The official SHS Applied Entrepreneurship Curriculum Guide clarifies that learners are expected to create a marketable product or service and prepare a business

plan, thus strengthening entrepreneurial mindsets and practical skills (DepEd, n.d.). These curriculum documents align with SDG 8 by promoting enterprise development, self-employment, and improved employability through school-based learning.

Curriculum reforms continue through the MATATAG K to 10 Curriculum, launched in 2023 and set for phased implementation from School Year 2024–2025. The MATATAG EPP/TLE curriculum guide for Grades 4–10 reaffirms that EPP/TLE and the TVL track aim to equip learners with lifelong learning skills, readiness for the world of work, and capacity to contribute to national development (DepEd, 2023). These reforms highlight the importance of integrating technology education and strengthening entrepreneurial and livelihood competencies across grade levels.

To operationalize these curricular goals, DepEd has issued several policy instruments. DepEd Order No. 30, s. 2017 provides Guidelines for Work Immersion, institutionalizing work immersion as a key feature of the Senior High School curriculum. The order mandates that learners undergo immersion in industry or community-based workplaces, enabling them to apply competencies in real work settings and gain exposure to employment and entrepreneurship contexts (DepEd, 2017).

In addition, DepEd Order No. 35, s. 2020 establishes the Joint Delivery Voucher Program for SHS-TVL (JDVP-TVL), which allows public school SHS learners in TVL specializations to access industry partners, specialized facilities, and experts through vouchers. A 2023 update reiterates that JDVP-TVL prioritizes schools with inadequate equipment and aims to strengthen linkages with technical-vocational institutions, thereby improving the quality and relevance of TVL training (DepEd, 2023). At the regional and divisional levels, these national policies are contextualized. In Region I, for instance, a Regional Memorandum (RM 762, s. 2020) details the implementation of the JDVP-TVL in alignment with DepEd Order 35, s. 2020, highlighting coordination between schools, regional offices, and partner institutions to support TVL specializations (DepEd Region I, 2020).

Within this broader context, the Schools Division Office of Pangasinan II implements EPP/TLE, TVL, work immersion, and partnership programs across diverse urban and rural schools, where livelihoods often center on agriculture, fisheries, services, and small enterprises. School-based business simulations, community-based livelihood projects, and work immersion placements provide avenues for learners to experience entrepreneurship and employment realities, potentially reinforcing SDG 8 at the local level.

Empirical studies on Philippine TVL implementation and work immersion further illuminate this link between curriculum and employability. For instance, Jaime (2023) examined the Technical-Vocational-Livelihood Work Immersion Program in selected senior high schools and found that effective immersion implementation is associated with higher levels of students' employability competencies and satisfaction. The study identified gaps in resources and industry partnerships that need to be addressed for optimal outcomes.

Other local studies similarly report that TVL strands and work immersion enhance students' job readiness and entrepreneurial opportunities, but highlight persistent challenges related to teacher preparation, facilities, and contextualization of learning to local labor market needs. Despite these policy and programmatic advances, a notable gap remains in empirical evidence at the division level, particularly within the Division of Pangasinan II, regarding how teachers actually integrate technology education in EPP/TLE, TVL, and Entrepreneurship, and how such practices influence students' entrepreneurial dispositions and perceived livelihood opportunities. Existing studies on ICT integration in Philippine schools often focus on infrastructure and generic ICT use, without systematically examining the relationship between teacher profiles (e.g., age, educational attainment, teaching experience, participation in technology-related training), technology integration practices, and student outcomes in entrepreneurship and livelihoods (Tomaro, 2018; DepEd, 2016).

Likewise, while the international literature documents strong links between technology-enabled entrepreneurship education and entrepreneurial competencies (Banha et al., 2022; Handayati et al., 2020; Kusumojanto et al., 2021; Rodriguez & Lieber, 2020; Satar et al., 2024; Sitaridis & Kitsios, 2024), there is limited localized research that applies these insights to Philippine basic education, and even less that focuses specifically on Pangasinan II. In light of the identified gaps in technology education practices, the present study titled "The Relationships Between Teachers' Technology Education and Students' Entrepreneurial Dispositions and Livelihood Opportunities" in the Division of Pangasinan II is both timely and relevant. Guided by the Statement of the Problem, the study aims to: (1) describe the profile of teacher-respondents in terms of educational attainment, teaching experience, grade level currently taught, and technology-related trainings attended; (2) determine the extent of teachers' practices in technology education; (3) examine the perceived implications of these practices on students' entrepreneurial dispositions—including creativity, initiative, problem solving, opportunity recognition, and resilience—and on their livelihood opportunities, such as readiness for self-employment, enterprise development, and enhanced employability; (4) analyze whether significant differences in technology education practices exist when teachers are grouped according to their profile variables; and (5) determine whether a significant relationship exists between teachers' technology practices and their profile. Ultimately, the study seeks to (6) develop a teacher exemplar or contextualized model aimed at strengthening students' entrepreneurial dispositions and livelihood opportunities. By generating localized, data-driven insights, the study endeavors to contribute to ongoing national education reforms and global development goals, particularly SDG 8: Decent Work and Economic Growth, by reinforcing technology education as a catalyst for entrepreneurship and livelihood readiness in Pangasinan II.

Research Questions

This study aimed to examine teachers' technology practices and their perceived implications for students' entrepreneurial dispositions and livelihood opportunities. Specifically, it answered the following questions:

1. What is the profile of the teacher-respondents in terms of:
    1.1. educational attainment;
    1.2. teaching experience;
    1.3. grade-level currently teaching; and
    1.4. technology-related trainings attended?
2. What is the extent of teachers' practice in technology education?
3. What are the perceived implications of teachers' technology practices along:
    3.1 entrepreneurial dispositions; and
    3.2 livelihood opportunities?
4. Is there a significant difference in teachers' technology practices when grouped according to their profiles?
5. Is there a significant relationship between teachers' technology practices and their profiles?
6. What teacher exemplar can be proposed to enhance students' entrepreneurial dispositions and livelihood opportunities?

Methodology

Research Design

This study employed a descriptive-correlational research design supported by a quantitative survey strategy. Descriptive research was appropriate as it systematically described the extent of technology education practices among teachers and their perceived implications for students' entrepreneurial dispositions and livelihood opportunities. At the same time, correlational analysis was employed to determine significant differences when data were grouped according to teacher profiles and to assess relationships between technology practices and student-related outcomes.

According to Creswell and Creswell (2018), descriptive-correlational design allowed researchers to capture existing conditions, perceptions, and associations without manipulating variables, making it suitable for educational settings. Likewise, Fraenkel et al. (2021) emphasized that surveys enabled researchers to collect standardized information from a large population, ensuring comparability and reliability. This design aligned with the objectives of exploring both the extent (quantitative measurement of practices) and the perceived implications (interpretive meaning of practices) in the research questions.

Respondents

The respondents of this study were composed of 150 public secondary school teachers from the Department of Education (DepEd), Pangasinan II Division, particularly from the 4th, 5th, and 6th Districts. To ensure equitable representation, 50 teachers from each district were included in the sample.

The study adopted stratified random sampling as the sampling method. Stratification was based on the district of assignment (4th, 5th, and 6th), ensuring that each group of teachers was adequately represented. Within each stratum, teachers were randomly selected. This method enhanced representativeness and generalizability, while also reducing sampling bias (Etikan & Bala, 2017).

Instrument

The primary data-gathering instrument was a researcher-developed survey questionnaire organized into four sections that mirrored the Statement of the Problem: (a) teacher profile variables, (b) the extent of teachers' technology education practices, (c) the perceived implications of these practices for students' entrepreneurial dispositions, and (d) the perceived implications for students' livelihood opportunities.

Content validity was established through expert review by specialists in educational research and technology integration, who evaluated item relevance, clarity, and alignment with the study constructs and provided recommendations for refinement. To ensure reliability, the instrument underwent pilot testing with a separate group of 10 teachers outside the study locale. Feedback from the pilot informed revisions to item wording and structure. Internal consistency was then assessed using Cronbach's alpha, with a coefficient of $\alpha \geq 0.70$ considered acceptable for reliability in educational research (Taber, 2018). This systematic process ensured that the measurement suited to the study's objectives and analytic requirements was both valid and reliable for the study.

Procedure

Data collection proceeded in sequential stages aligned with established guidance in educational research articulated by Creswell and Creswell in 2018 and by Fraenkel, Wallen, and Hyun in 2019. First, a formal request letter was submitted to the Schools Division Superintendent of Pangasinan II to obtain authorization for fieldwork.

Upon approval, the researcher coordinated with school heads in the identified districts by providing endorsement letters to facilitate

access to teacher-respondents. Prior to data collection, each prospective participant received an informed-consent brief embedded on the first page of the online instrument that explained the study's purpose, procedures, potential risks and benefits, confidentiality safeguards, and the voluntary nature of participation. Only those who provided digital consent were allowed to proceed.

The survey was administered exclusively online through a Google Form link disseminated via Messenger to the identified teacher-respondents. Standardized instructions, an adequate response window, and a single non-coercive reminder were provided to ensure consistency in administration as recommended by the Standards for Educational and Psychological Testing issued by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education in 2014 and by Cohen, Manion, and Morrison in 2018. Form settings, such as required fields, were used to minimize missing data. Respondent verification through school-issued email or unique access codes and single-response controls helped prevent duplicate submissions. After the response window closed, submissions were exported, screened for completeness and duplicates, and prepared for statistical analysis.

All procedures adhered to the principles of respect for persons, beneficence, and justice as presented by the U.S. Department of Health and Human Services Office for Human Research Protections on 26 August 2024 in The Belmont Report, originally published in 1979, and complied with the Philippines Data Privacy Act of 2012 through data minimization, secure storage, and restricted access to authorized research personnel.

Data Analysis

All data were encoded, cleaned, and statistically analyzed using SPSS, Statistical Package for the Social Sciences, or equivalent software. To address the extent to which teachers practiced technology education, weighted means were computed to describe the level of technology education practices at the item and subscale levels, an approach appropriate for summarizing practice indicators as discussed by Bandalaria and Alfonso (2020).

Perceptions of the implications of teachers' technology practices on learners' entrepreneurial dispositions and livelihood opportunities were examined through weighted means and descriptive analysis to determine the prevailing response patterns across the identified indicators.

Group differences in technology practices by teacher profile were tested using independent-samples t-tests for dichotomous variables and one-way ANOVA for multi-category variables such as years of service or number of trainings. Assumptions of normality and homogeneity of variance were checked, appropriate post hoc procedures were employed when omnibus tests were significant, and effect sizes were reported to complement p-values, consistent with guidance provided by Pallant (2020).

Finally, findings from the descriptive and inferential phases were integrated to develop a teacher exemplar that could be proposed to enhance students' entrepreneurial dispositions and livelihood opportunities. The exemplar translated empirical findings into practical instructional guidance, sample learning activities, assessment strategies, and technology-supported tasks that teachers could use to strengthen entrepreneurship-oriented and livelihood-focused learning outcomes.

Ethical Considerations

The study adhered to the ethical principles of respect for persons, beneficence, and justice as articulated by the American Psychological Association in 2017. Voluntary participation was ensured through a clear informed-consent process that explained the study's purpose, procedures, risks, benefits, and the right to withdraw at any time without penalty.

Confidentiality and anonymity were strictly maintained by assigning codes to responses, omitting personal identifiers, and limiting data access to authorized research personnel only. Non-maleficence guided all procedures by minimizing foreseeable risks and providing appropriate channels for queries or concerns to prevent physical, psychological, or professional harm.

Transparency was upheld through advance communication of the study objectives, the intended uses of the data, the measures for secure storage, and the plan for dissemination of findings.

Results and Discussion

This section presents and analyzes the findings of the study based on the research questions. The results are organized systematically, using appropriate statistical tools and tables, followed by discussions that explain their meaning in relation to the study's objectives and related literature.

Table 1. *Demographic Profile of the Respondents in Terms of Educational Attainment*

Highest Educational Attainment	*Counts*	*Percentage*
Bachelor's degree	37	24.7%
Bachelor's degree with a master's unit	41	27.3%
Master's degree	44	29.3%
Master's degree with doctoral units	21	14.0%
Doctorate	7	4.7%

The data show that most of the teacher-respondents are academically prepared and committed to professional growth. The largest group, 29.3%, already holds a master's degree, followed by 27.3% who have a bachelor's degree with master's units, showing that many are actively pursuing graduate studies. Meanwhile, 24.7% still hold a bachelor's degree as their highest qualification.

In addition, 14.0% have master's degrees with doctoral units, and 4.7% have already completed a doctorate. Overall, the results suggest that most teachers are either graduates of or currently enrolled in advanced studies, reflecting their dedication to improving their knowledge and teaching practices.

Table 2. *Demographic Profile of the Respondents in Terms of Teaching Experience*

Teaching Experience	*Counts*	*Percentage*
1-3	13	8.7%
4-6	30	20.0%
7-10	50	33.3%
>10	57	38.0%

In terms of years of teaching experience, the data show that most of the teacher-respondents are already experienced in the profession. The largest group, 38.0%, has been teaching for more than 10 years, indicating a strong presence of seasoned educators. This is followed by 33.3% who have 7–10 years of teaching experience, also reflecting a substantial number of mid-career teachers.

Meanwhile, 20.0% of the respondents have 4–6 years of experience, and a smaller portion, 8.7%, have been teaching for only 1–3 years. Overall, the findings suggest that most of the teachers have considerable teaching experience, which may contribute to their confidence, classroom management skills, and ability to implement effective instructional practices.

Table 3. *Demographic Profile of the Respondents in Terms of Grade-Level Currently Teaching*

Grade-Level Currently Teaching	*Counts*	*Percentage*
JHS (Grades 7–10)	90	60.0%
SHS (Grades 11–12)	51	34.0%
Both	9	6.0%

In terms of grade level currently being taught, the data show that most of the teacher-respondents are assigned to the Junior High School (Grades 7–10) level. This group makes up 60.0% of the respondents, indicating that the majority are handling foundational secondary education. Meanwhile, 34.0% of the teachers are assigned to the Senior High School (Grades 11–12) level. A smaller portion, 6.0%, reported that they are teaching both junior and senior high school levels. Overall, the findings suggest that most of the respondents are focused on junior high school instruction, with a significant number also engaged in senior high school teaching, reflecting a diverse range of teaching assignments across grade levels.

Table 4. *Demographic Profile of the Respondents in Terms of Technology-Related Trainings Attended*

Technology-Related Trainings Attended	*Counts*	*Percentage*
1-5	98	65.3%
6-10	19	12.7%
11-15	5	3.3%
above 15	28	18.7%

In terms of the number of technology-related trainings, the data show that most of the teacher-respondents have attended a moderate number of trainings. The majority, 65.3%, reported attending 1–5 trainings, indicating basic exposure to technology-related professional development. Meanwhile, 18.7% of the teachers have attended more than 15 trainings, suggesting a group of highly trained and experienced users of educational technology. A smaller portion, 12.7%, reported attending 6–10 trainings, while only 3.3% have participated in 11–15 trainings.

Overall, the findings suggest that while most teachers have some level of technology training, only a smaller group has received extensive professional development in this area. This indicates the need for more consistent and sustained technology-related training opportunities for teachers.

The findings indicate that teachers often practice technology education in ways that are instructionally purposeful and entrepreneurship-oriented (Overall M = 4.35, "Often"). High item means—especially on aligning resource use with lesson objectives (M = 4.58, "Always"), teaching safety protocols (M = 4.51, "Always"), and discussing data privacy and intellectual property (M = 4.55, "Always")—suggest that technology use is not merely for convenience but is intentionally connected to learning goals and responsible practice.

This pattern reflects what contemporary synthesis studies describe as effective technology integration: teachers are more successful when they connect digital tools to pedagogy and content aims, rather than using technology as an add-on (Kholid et al., 2023; Jiménez-Sierra et al., 2023).

Table 5. *Extent of Teachers' Technology Practices in Technology Education*

Statement	*Mean*	*Descriptive Equivalent*
I utilize available ICT/TLE tools (e.g., computers, tablets, machines, kits) to help learners explore opportunities and innovative solutions.	4.33	Often
I manage device sharing or rotations to maximize student hands-on activities.	4.25	Often
I align resource use with lesson objectives that promote opportunity identification and creative problem-solving.	4.58	Always
I design lessons where technology is essential for achieving learning outcomes.	4.40	Often
I assist inquiry- or problem-based activities that require technology use.	4.40	Often
I use technology-based instruction to help learners set goals suited to their learning needs and entrepreneurial growth.	4.45	Often
I use digital tools to evaluate learner performance (quizzes, e-portfolios, rubrics) to monitor progress and help learners track their own development.	4.25	Often
I provide timely, individualized feedback via digital platforms to support learners' goal setting and improvement.	4.14	Often
I assign projects where learners design or prototype solutions using technology, encouraging them to take calculated risks.	4.18	Often
I guide learners through an interactive design cycle to develop persistence and adaptability.	4.23	Often
I showcase learners' outputs to cultivate quality standards and client-oriented thinking.	4.27	Often
I explicitly teach safety protocols for equipment and online platforms to promote responsibility and high- quality work practices.	4.51	Always
I discuss data privacy, intellectual property to support ethical decision-making in entrepreneurial activities.	4.55	Always
I align tasks with local livelihood opportunities (agro-tech, crafts, services) to help learners seek information and understand community-based opportunities.	4.25	Often
I recognized learners' credentials to boost their self-confidence and professional readiness.	4.52	Always
Overall	4.35	Often

Legend: 4.50–5.00 = Always; 3.50–4.49 = Often; 2.50–3.49 = Sometimes; 1.50–2.49 = Rarely; 1.00–1.49 = Never.

The findings in Table 5 revealed an overall mean of 4.35, interpreted as "Often," indicating that teachers frequently integrate technology practices in Technology and Livelihood Education (TLE). This suggests that technology integration has become a regular and purposeful component of instructional delivery rather than a supplementary classroom tool. In the context of Philippine DepEd implementation, this finding reflects the increasing alignment of TLE instruction with 21st-century learning competencies emphasized in the MATATAG curriculum, particularly in promoting innovation, problem-solving, digital literacy, productivity, and entrepreneurial readiness among learners. The results imply that teachers are not merely exposing learners to technology but are intentionally using technological resources to strengthen practical, livelihood-oriented, and competency-based learning experiences.

From a TPACK perspective, the consistently high ratings on designing lessons where technology is essential for inquiry-based activities, assessment, and goal setting indicate that teachers demonstrate integrated technological, pedagogical, and content knowledge. The highest-rated indicators, particularly aligning technology use with lesson objectives that promote opportunity identification and creative problem-solving, suggest that teachers understand that technology becomes meaningful only when it directly supports instructional goals and authentic learner tasks. This supports the findings of Kholid et al. (2023) and Jiménez-Sierra et al. (2023), who emphasized that effective technology integration occurs when teachers intentionally connect technological tools with inquiry, problem-solving, and authentic learning activities. In the local TLE context, this is highly important because TLE learning competencies require learners not only to acquire technical skills but also to apply creativity, innovation, and practical reasoning to real-life livelihood situations. Thus, the findings imply that teachers are moving toward more learner-centered and application-driven instruction consistent with DepEd's competency-based educational framework.

The findings further indicate that teachers frequently use technology to support entrepreneurial and employability skills development. Indicators involving project prototyping, design cycles, showcasing outputs, and clientele-oriented thinking demonstrate that technology is being used to simulate real-world entrepreneurial practices rather than simply digitizing traditional classroom instruction. This reflects a more transformative use of technology consistent with the SAMR model, where technology supports task redesign and authentic performance-based learning (Blundell et al., 2022). In TLE classrooms, such practices are particularly significant because learners are expected to develop practical competencies relevant to local industries, small enterprises, and community livelihood opportunities. By engaging learners in digital prototyping, collaborative design activities, and output presentation, teachers may be strengthening learners' creativity, adaptability, persistence, and confidence—qualities necessary for entrepreneurship and future work readiness.

The frequent alignment of classroom activities with local livelihood opportunities such as agro-technology, crafts, and services further highlights the relevance of the findings to the Philippine setting. This suggests that teachers recognize the importance of contextualizing technology education according to community needs and available economic opportunities. In many public schools, especially in rural or semi-urban communities, TLE serves as a practical avenue for preparing learners for employment, entrepreneurship, or family livelihood support. Therefore, integrating technology into community-based tasks may help learners better appreciate how digital tools

can improve productivity, innovation, and sustainability within local industries. The findings imply that technology integration in TLE can contribute not only to academic development but also to local economic responsiveness and livelihood empowerment.

Using the Technology Acceptance Model (TAM), the "Often" to "Always" ratings may also indicate strong teacher acceptance of educational technology. Teachers appear to perceive technology as useful for instruction, learner monitoring, feedback provision, and classroom management. According to Granić and Marangunić (2022) and Santini et al. (2025), perceived usefulness remains one of the strongest predictors of sustained technology adoption in educational settings. Similarly, Galimova et al. (2024) and Feng et al. (2025) emphasized that ease of use, facilitating conditions, and instructional value significantly influence teachers' continued technology integration. In the present findings, teachers' frequent use of digital assessments, e-portfolios, and individualized feedback suggests that technology is viewed as an efficient mechanism for tracking learner progress and supporting differentiated instruction. This is especially important in large public-school classrooms where monitoring individual learner performance may otherwise become difficult.

Another significant implication of the findings is the strong emphasis on digital responsibility, safety, and ethical practices. The indicators on safety protocols, data privacy, and intellectual property received "Always" ratings, implying that teachers consistently incorporate responsible technology use into TLE instruction. This reflects growing awareness of the ethical dimensions of digital learning and production. In the Philippine educational context, where learners increasingly engage in online platforms, digital outputs, and multimedia production, embedding digital ethics becomes essential in preparing learners for responsible participation in both academic and entrepreneurial environments. The findings suggest that teachers recognize that entrepreneurship and technology education should not only focus on productivity and innovation but also on accountability, safety, and ethical decision-making.

Overall, the findings imply that teachers' technology practices in TLE are generally purposeful, contextualized, and aligned with authentic learning outcomes. The frequent integration of technology into inquiry, assessment, prototyping, collaboration, and livelihood-oriented tasks suggests that teachers are helping learners develop competencies beyond technical skills alone. In the DepEd and Philippine TLE context, this may contribute to producing learners who are more innovative, adaptable, digitally responsible, and responsive to local entrepreneurial opportunities. The findings, therefore, highlight the important role of technology integration in strengthening the practical and transformative goals of TLE education.

Table 6. *Perceived Implications of Teachers' Technology Practices on Learners' Entrepreneurial Dispositions*

Statement	*Mean*	*Descriptive Equivalent*
Tech-integrated activities help learners identify community problems worth solving.	4.27	Often
Learners can spot market needs or niches through project work.	4.22	Often
Learners learn to validate ideas using feedback or simple market tests.	4.20	Often
Learners combine ideas, tools, or materials in novel ways.	4.21	Often
Learners learn to prototype and improve their work even after failures.	4.19	Often
Learners can handle setbacks or technical challenges.	4.04	Often
Learners feel confident initiating tech-based projects.	4.11	Often
Learners believe they can pitch or present their ideas effectively.	4.17	Often
Learners feel confident starting tech- based projects.	3.93	Often
Learners analyze root causes using data or observations.	4.01	Often
Learners test assumptions and adapt based on results.	4.02	Often
Learners estimate costs and think about pricing for their outputs.	4.12	Often
Learners understand basic profit, margin, or break-even ideas.	4.03	Often
Learners work well together using digital platforms or shared tools.	4.07	Often
Learners build connections with peers or resource people to enhance their projects.	4.22	Often
Overall	4.12	Often

Legend: 4.50–5.00 = Always; 3.50–4.49 = Often; 2.50–3.49 = Sometimes; 1.50–2.49 = Rarely; 1.00–1.49 = Never.

The findings in Table 6 revealed an overall mean of 4.12, interpreted as "Often," indicating that teachers' technology practices are frequently perceived to contribute to the development of learners' entrepreneurial dispositions. This suggests that technology-integrated TLE instruction supports more than technical skill acquisition; it also helps learners develop opportunity recognition, creativity, resilience, initiative, collaboration, financial awareness, and communication skills. In the Philippine DepEd context, this is significant because TLE is designed not only to prepare learners for school-based performance tasks but also to equip them with practical competencies for livelihood, employment, and entrepreneurship.

The highest-rated indicators show that technology-integrated activities often help learners identify community problems worth solving, spot market needs or niches, and build connections with peers or resource persons. These results imply that technology use enables learners to observe real-life needs, gather information, collaborate with others, and develop solutions that are relevant to their local communities. In many Philippine public schools, especially in rural and semi-urban settings, TLE becomes more meaningful when learners connect classroom outputs to livelihood opportunities such as food processing, agriculture, crafts, services, ICT-related work, and small enterprise activities. Thus, technology-supported learning may strengthen learners' awareness of how local problems can become opportunities for innovation and income-generating projects.

The consistent "Often" ratings for prototyping, improving work after failure, handling setbacks, analyzing root causes, testing

assumptions, and estimating costs indicate that learners are being exposed to important entrepreneurial processes. These practices reflect experiential and project-based entrepreneurship education, where learners do not merely study business concepts but actively test ideas, improve products, and make decisions based on feedback. This supports Martínez-Gregorio et al. (2021), who emphasized that entrepreneurship education becomes more effective when learners engage in active and practice-oriented tasks rather than passive instruction. In TLE, this means that technology can help learners experience the actual cycle of entrepreneurship: identifying a need, designing a product or service, testing it, revising it, costing it, and presenting it to a possible market.

From the perspective of Entrepreneurial Self-Efficacy, the findings suggest that learners' confidence in entrepreneurial tasks is strengthened when they repeatedly engage in authentic technology-supported activities. Learners who prototype, pitch ideas, collaborate digitally, and revise outputs after feedback are given mastery experiences that may build confidence and persistence. This aligns with Newman et al. (2019), who explained that entrepreneurial confidence develops through meaningful engagement in tasks that require opportunity identification, problem-solving, and action. In the DepEd TLE context, this is important because learners often need practical confidence before they can apply their skills in real-life or enterprise situations.

From the TPACK perspective, the findings further suggest that teachers are using technology in ways that support both pedagogy and content learning. When digital tools are used for inquiry, collaboration, design, presentation, and feedback, learners are able to practice higher-order thinking and entrepreneurial behavior. This supports Kholid et al. (2023), who emphasized that purposeful technology integration is associated with improved problem-solving, creativity, and real-world skill development. In this sense, the value of technology in TLE does not come from the tool itself, but from how teachers use it to deepen learning, support decision-making, and connect classroom tasks with authentic livelihood contexts.

Overall, the findings imply that teachers' technology practices often create learning conditions that nurture entrepreneurial dispositions among learners. However, the results also suggest the need to strengthen further areas such as learners' confidence in starting tech-based projects, financial analysis, and evidence-based decision-making, since these indicators received comparatively lower means despite still being interpreted as "Often." For DepEd schools, these points highlight the importance of designing TLE activities that include costing, pricing, break-even analysis, simple market testing, digital promotion, and community-based product presentation. Strengthening these areas can help ensure that learners are not only creative and collaborative but also financially literate, market-aware, and prepared to apply their TLE competencies in real entrepreneurial and livelihood situations.

Table 7. *Perceived Implications of Teachers' Technology Practices on Learners' Livelihood Opportunities*

Statement	*Mean*	*Descriptive Equivalent*
Learners gain hands-on proficiency with relevant tools/equipment, showing initiative in completing tasks independently.	4.27	Often
Learners improve time management and task ownership. demonstrating the Personal Entrepreneurial Competencies of self- discipline.	4.08	Often
Learners demonstrate professionalism (e.g., punctuality, safety compliance, etiquette) aligned with strong work commitment.	4.11	Often
Learners communicate effectively with peers and mentors, exhibiting persuasive communication skills.	4.15	Often
Learners can plan small-scale ventures or services, applying opportunity- seeking and goal- setting competencies.	4.09	Often
Learners can package and present outputs to potential customers, demonstrating creativity and marketing orientation.	4.11	Often
Learners understand simple inventory and cost tracking, showing systematic planning and monitoring skills.	4.07	Often
Learners become aware of local industry demands and job roles relevant to their skills.	4.11	Often
Learners are guided toward relevant TESDA/industry certificates that can enhance employability.	4.17	Often
Learners are exposed to online platforms where they can offer outputs, gigs, or services, showing adaptability and persistence.	4.08	Often
Learners understand basic client communication, expectations, deliverables essential for service-based livelihood.	4.11	Often
Learners learn about data privacy, intellectual property, and safe online transactions, demonstrating responsible ethical business practice.	4.14	Often
Learners apply their skills to support family/community livelihood activities, showing a sense of responsibility.	4.15	Often
Learners explore Agro-based or locality-specific opportunities, applying creativity and opportunity- seeking competencies.	3.96	Often
Learners collaborate with LGUs/NGOs/industry in community projects, demonstrating networking and relationship-building skills.	3.97	Often
Overall	4.10	Often

Legend: 4.50–5.00 = Always; 3.50–4.49 = Often; 2.50–3.49 = Sometimes; 1.50–2.49 = Rarely; 1.00–1.49 = Never.

The findings in Table 7 revealed an overall mean of 4.10, interpreted as "Often," indicating that teachers' technology practices are frequently perceived to contribute to learners' livelihood opportunities. This suggests that technology-integrated TLE instruction supports the development of practical, technical, entrepreneurial, and work-readiness competencies. In the Philippine DepEd context, this is highly relevant because TLE is expected to prepare learners not only for academic completion but also for employment,

entrepreneurship, and community-based livelihood participation.

The highest-rated indicator shows that learners often gain hands-on proficiency with relevant tools and equipment. This implies that technology-supported instruction strengthens learners' ability to perform practical tasks independently and with initiative. In TLE, this is important because livelihood readiness depends not only on theoretical knowledge but also on actual skill performance. When learners operate ICT tools, machines, kits, or digital platforms, they develop work habits and technical confidence that are useful in real employment and enterprise settings. This supports Human Capital Theory, which explains that education and skills development increase productivity, employability, and economic opportunities (Becker, 1993).

The findings also show that learners are often guided toward TESDA or industry-related certifications. This has strong implications for DepEd schools because TLE competencies may serve as a pathway toward technical-vocational readiness. Exposure to TESDA-aligned skills, certificates, and industry standards can help learners understand the value of formal qualifications in improving employability. This is especially important for learners who may pursue work, entrepreneurship, or further technical training after junior or senior high school. As Okolie et al. (2020) and Udekwe et al. (2024) emphasized, technology-integrated, skills-based education strengthens employability by developing technical competence, adaptability, and workplace behaviors required in modern economies.

The consistent "Often" ratings for small-scale venture planning, cost tracking, inventory monitoring, client communication, packaging, and online platforms indicate that technology practices help learners understand livelihood as a real process. These skills are essential in TLE because learners must learn how to transform products and services into possible income-generating activities. Digital tools allow learners to compute costs, organize materials, present outputs, communicate with clients, and explore online markets. This supports Hammoda (2024) and Duong et al. (2024), who explained that digital and technology-supported entrepreneurship education improves learners' readiness for employment and participation in local and digital economies.

The results further imply that technology practices contribute to the development of professionalism, communication, collaboration, and responsibility. These are important livelihood competencies because successful work and enterprise require punctuality, safety compliance, etiquette, teamwork, and clear communication with clients or mentors. From the perspective of Bandura's Social Learning Theory, these behaviors are developed through observation, guided practice, feedback, and interaction in authentic learning environments. This is consistent with Schunk and DiBenedetto (2020), who emphasized that learning is strengthened when learners observe models, practice behaviors, and receive support in social contexts.

However, the comparatively lower indicators on agro-based or locality-specific opportunities and collaboration with LGUs, NGOs, or industry suggest areas for further strengthening. Although still interpreted as "Often," these results imply that community linkage and local industry immersion may need deeper integration in TLE instruction. In the Philippine setting, this is especially important because livelihood opportunities are often tied to local agriculture, food processing, crafts, tourism, repair services, and microenterprise activities. DepEd schools may therefore strengthen partnerships with TESDA, LGUs, NGOs, cooperatives, local entrepreneurs, and industry partners to make TLE learning more contextualized, practical, and community-responsive.

Overall, the findings suggest that teachers' technology practices often support learners' livelihood readiness by developing technical skills, employability behaviors, entrepreneurial planning, digital responsibility, and community-oriented competence. The implication is that technology integration in TLE should continue to move beyond classroom-based activities toward authentic production, service delivery, certification pathways, online livelihood exposure, and local enterprise collaboration. This would help learners become more prepared for employment, entrepreneurship, and meaningful participation in both local and digital economies.

Table 8. *Significant Differences in Teachers' Technology Practices Based on Their Profile*

	Educational Attainment		*Teaching Experience*		*Grade-Level Currently Teaching*		*Technology-Related Trainings Attended*	
	F	*p*	*F*	*P*	*F*	*p*	*F*	*p*
Teachers' Technology Practices	0.58	0.682	2.25	0.095	1.26	0.301	2.10	0.139

The results in Table 8 show no significant differences in teachers' technology practices when grouped according to educational attainment, teaching experience, grade level currently teaching, and technology-related trainings attended. Since all p-values are greater than .05, the findings indicate that teachers demonstrate generally comparable levels of technology practice across profile categories. This means that differences in degree earned, years of service, assigned grade level, or number of attended trainings did not produce statistically distinct differences in how teachers integrate technology in Technology and Livelihood Education.

Analytically, this finding may suggest that technology practices among TLE teachers have become relatively standardized across groups. In the Philippine DepEd context, this may be influenced by system-wide curriculum expectations, school-based ICT initiatives, learning resource portals, digital reporting requirements, and post-pandemic exposure to technology-supported instruction. Since many teachers were required to use digital tools during and after blended learning implementation, technology use may no longer be limited to younger teachers, higher degree holders, or those with more training. Instead, ICT practices may have become a common professional expectation across DepEd classrooms.

However, the absence of significant differences should not automatically mean that all teachers are equally skilled in deep technology integration. It may also raise a methodological question: Was the instrument sensitive enough to capture qualitative differences in technology use? Teachers may report similar frequency levels, but their actual practices may differ in depth. For example, one teacher may use technology mainly for presentation and assessment, while another may use it for prototyping, online marketing simulations, e-portfolios, or client-based TLE projects. These differences may not be fully captured if the instrument measures general technology practices rather than levels of sophistication, innovation, or transformation.

The findings may also imply that teachers are uniformly exposed to ICT-related policies and expectations. In DepEd schools, teachers are commonly guided by curriculum standards, school improvement priorities, digital learning initiatives, and professional development programs that encourage ICT integration. This shared exposure may explain why profile variables did not significantly differentiate technology practices. In this sense, technology integration may be shaped less by personal background and more by institutional culture, available resources, leadership support, peer mentoring, and access to devices and connectivity.

This interpretation aligns with technology adoption literature, which emphasizes that teachers' technology use is often explained more strongly by acceptance-related and contextual factors than by demographic characteristics alone. Granić and Marangunić (2022) and Galimova et al. (2024) noted that perceived usefulness, perceived ease of use, attitudes, self-efficacy, and institutional support are key drivers of technology adoption. Similarly, Kholid et al. (2023) emphasized that effective technology integration depends on the purposeful alignment of technology, pedagogy, and content rather than on the teacher profile alone.

In relation to TLE, the findings suggest that improving technology practices should not focus only on selected groups of teachers, such as beginning teachers, senior teachers, or those with less training. Instead, DepEd schools may need to provide school-wide and competency-based professional development that helps all TLE teachers move from basic technology use to deeper, livelihood-oriented integration. Training should focus on digital prototyping, online enterprise simulation, costing and inventory tools, e-portfolios, digital marketing, TESDA-aligned skills documentation, data privacy, and safe online transactions.

Overall, the absence of significant differences implies that teachers' technology practices are broadly comparable across profile groups, but this should be interpreted with caution. The result may reflect equal exposure to ICT expectations, shared DepEd implementation practices, or limited instrument sensitivity in detecting bigger differences. Therefore, future improvement efforts should examine not only whether teachers use technology, but also how deeply, creatively, and contextually they use it to strengthen learners' entrepreneurial dispositions and livelihood opportunities in TLE.

Table 9. *Significant Relationship Between Teachers' Technology Practices and Their Profiles*

	Educational Attainment		*Teaching Experience*		*Grade-Level Currently Teaching*		*Technology-Related Trainings Attended*	
	Spearman rho	*p*	*Spearman rho*	*p*	*Spearman rho*	*p*	*Spearman rho*	*p*
Teachers' Technology Practices	-0.152	0.0630	0.000	0.997	-0.053	0.516	-0.083	0.313

*Note. *p < .05, **p < .01, ***p < .001*

Table 9 shows that teachers' technology practices have no statistically significant relationship with educational attainment, teaching experience, grade level currently teaching, and technology-related trainings attended. Since all p-values are greater than .05, the findings suggest that these profile variables do not significantly influence or predict teachers' extent of technology practices. This means that teachers' use of technology in TLE appears to be generally consistent regardless of academic qualification, years of service, teaching assignment, or number of technology-related trainings attended. The weak negative association between educational attainment and technology practices, although not significant, may imply that higher academic credentials do not automatically translate into stronger classroom technology integration. In the DepEd and TLE context, this is important because technology practice is highly performance-based and context-driven. A teacher may hold an advanced degree but still need hands-on exposure to digital tools, livelihood-based applications, and technology-supported performance tasks. Conversely, teachers with lower formal educational attainment may still demonstrate strong technology use if they are regularly exposed to school ICT practices, peer mentoring, or actual classroom demands.

The result for teaching experience, which shows virtually no relationship with technology practices, suggests that years in service alone do not determine technology integration. This may reflect the post-pandemic reality of Philippine schools, where both beginning and experienced teachers were required to adapt to digital platforms, online resources, blended learning practices, and technology-supported instruction. Thus, technology use may have become a shared professional expectation rather than a practice limited to newer or more experienced teachers.

The lack of a significant relationship with technology-related training also deserves deeper interpretation. It may suggest that the number of trainings attended is not enough to explain the quality or frequency of technology practices. Some trainings may be too general, compliance-oriented, or not directly connected to TLE tasks such as prototyping, costing, inventory monitoring, digital marketing, e-portfolios, TESDA-aligned documentation, or online livelihood platforms. This raises an important question: was the instrument sensitive enough to distinguish between basic ICT exposure and deeper, transformative technology integration? Teachers may report similar practices, but the depth of use may differ greatly across classrooms.

Another possible explanation is that teachers may be uniformly exposed to ICT policies, curriculum expectations, and school-level technology initiatives. In DepEd schools, teachers commonly encounter system-wide requirements related to digital reporting, learning resource use, online communication, assessment tools, and ICT-supported instruction. This shared exposure may reduce profile-based differences because technology use becomes part of routine teaching practice across all groups. However, uniform exposure does not necessarily mean uniform mastery. Some teachers may comply with ICT expectations at a basic level, while others may use technology more creatively for authentic TLE learning.

This finding aligns with technology adoption literature, which emphasizes that teacher demographics are often weaker predictors of technology integration than psychological and contextual factors. Granić and Marangunić (2022) and Galimova et al. (2024) stressed that perceived usefulness, perceived ease of use, attitude, and enabling conditions are stronger drivers of technology acceptance. Similarly, Kholid et al. (2023) and Fontyn et al. (2025) emphasized that effective integration depends more on teachers' ability to align technology with pedagogy and content than on credentials or length of service.

Overall, Table 9 implies that improving technology practices in TLE should not be based only on teacher profile categories. Instead, DepEd schools should strengthen needs-based, hands-on, and TLE-specific professional development for all teachers. Training should focus not only on using digital tools but also on designing technology-supported livelihood tasks, community-based projects, entrepreneurial simulations, digital portfolios, costing activities, online marketing, safe transactions, and ethical digital production. The findings therefore suggest that what matters most is not who the teacher is by profile, but how meaningfully technology is used to support authentic TLE learning, entrepreneurial dispositions, and livelihood readiness.

Conclusions

Based on the findings of the study, the following conclusions were drawn:

The results suggest that the teacher-respondents have sufficient qualifications and experience to implement technology-based instruction. The presence of graduate-level education and years of teaching experience indicates a stable and professionally developed teaching workforce capable of integrating technology into instruction. The findings indicate that teachers are capable of integrating technology into their instruction in purposeful and meaningful ways. Technology is not merely used for presentation, but also for assessment, collaboration, problem-solving, and entrepreneurial learning tasks. The results suggest that technology-integrated instruction contributes to the development of learners' entrepreneurial mindset and livelihood readiness. The frequent use of authentic, project-based, and technology-supported tasks promotes opportunity recognition, innovation, collaboration, technical competence, and employability skills, indicating positive implications for students' entrepreneurial and work-related outcomes. The results indicate that teachers demonstrate relatively consistent technology practices regardless of their profile characteristics. Technology integration appears to depend more on instructional approach and school context than on demographic or professional profile factors. The findings suggest that teachers' technology practices are not determined by profile characteristics alone. Other factors, such as instructional beliefs, school support, and access to resources, may play a more important role in shaping technology integration. The findings support the need for a teacher exemplar that integrates technology, pedagogy, and real-world applications to promote entrepreneurial thinking and livelihood readiness. Effective technology integration depends on purposeful instructional design, authentic learning tasks, and community connections.

It is recommended that schools institutionalize a stronger professional development program for teachers by providing advanced technology-related trainings, opportunities for graduate studies, specialized certifications, and hands-on capacity-building activities that directly enhance their instructional competence, digital literacy, and readiness to deliver entrepreneurship- and livelihood-oriented instruction. Schools should strengthen classroom implementation support by sustaining mentoring systems, peer coaching, access to updated digital tools, and curated instructional resources that enable teachers to design authentic, project-based, and technology-integrated learning tasks aligned with students' entrepreneurial dispositions and livelihood opportunities. Teachers and schools should continue implementing technology-supported entrepreneurial projects, inquiry-based tasks, and design-cycle activities, while strengthening industry partnerships, certification programs, and community-based initiatives to enhance further learners' creativity, initiative, and livelihood opportunities.

Professional development programs should be provided to all teachers equally, focusing on improving instructional design, authentic task development, and effective technology integration rather than grouping teachers based on profile variables. Schools should focus on strengthening teachers' instructional strategies, attitudes toward technology, and support systems rather than relying solely on profile-based factors when designing technology integration programs. Schools should adopt the Technology-Integrated Entrepreneurial Educator (TIEE) as a teacher exemplar and implement a structured professional development program that focuses on technology-integrated projects, entrepreneurial learning tasks, and partnerships with industry and community stakeholders to enhance students' entrepreneurial and livelihood outcomes.

References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). Standards for educational and psychological testing.

American Psychological Association. (2017). Ethical principles of psychologists and code of conduct. https://www.apa.org/ethics/code

Bandalaria, M. d. P., & Alfonso, G. J. (2020). Data analysis techniques for social sciences research. Journal of Social Science Research, 16(2), 112–120. https://doi.org/10.24297/jssr.v16i2.8690

Banha, F., Lemos, S., & Gamelas, A. M. (2022). Entrepreneurship education: A systematic literature review and identification of an existing gap in the field. Education Sciences, 12(5), 336. https://doi.org/10.3390/educsci12050336

Blundell, C. N., Lee, K.-T., & Nykvist, S. (2022). A scoping review of the application of the SAMR model to classify educational practices with digital technologies. Contemporary Educational Technology, 14(3), ep374. https://doi.org/10.30935/cedtech/11762

Brianza, E., Schmid, M., Tondeur, J., & Petko, D. (2022). Situating TPACK: A systematic literature review of context as a domain of knowledge. Contemporary Issues in Technology and Teacher Education, 22(4), 1–30.

Broadband Commission for Sustainable Development, & UNESCO. (2023). The transformative potential of data for learning. https://www.broadbandcommission.org/wp-content/uploads/2023/09/UNESCO-Data-for-Learning-Executive-Summary.pdf

Cohen, L., Manion, L., & Morrison, K. (2018). Research methods in education (8th ed.). Routledge.

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approach (5th ed.). SAGE.

Department of Education (DepEd). (2016). K to 12 Edukasyong Pantahanan at Pangkabuhayan (EPP) and Technology and Livelihood Education (TLE) curriculum guide. https://www.deped.gov.ph/wp-content/uploads/2019/01/EPP-CG.pdf

Department of Education (DepEd). (2017). DepEd Order No. 30, s. 2017: Guidelines for work immersion. https://www.deped.gov.ph/wp-content/uploads/2017/06/DO_s2017_030.pdf

Department of Education (DepEd). (2019). Senior High School Applied Track Subject: Entrepreneurship—Curriculum Guide.https://www.deped.gov.ph/wp-content/uploads/2019/01/SHS-Applied_Entrepreneurship-CG.pdf

Department of Education (DepEd). (2020). DepEd Order No. 35, s. 2020: Guidelines on the implementation of the Joint Delivery Voucher Program for SHS-TVL (JDVP-TVL). https://www.deped.gov.ph/wp-content/uploads/2020/11/DO_s2020_035.pdf

Department of Education (DepEd). (2023). MATATAG EPP_TLE curriculum guide (Grades 4–10). https://www.deped.gov.ph/wp-content/uploads/MATATAG-EPP_TLE-CG-2023-Grades-4-10-1.pdf

Department of Education (DepEd). (n.d.-a). Regional & division offices directory (Pangasinan II). https://www.deped.gov.ph/contact-us/regional-division-offices-directory/

Department of Education (DepEd). (n.d.-b). Technology and Livelihood Education (TLE) and Technical-Vocational-Livelihood (TVL) track. https://www.deped.gov.ph/k-to-12/about/k-to-12-basic-education-curriculum/technology-and-livelihood-education-tle-and-technical-vocational-livelihood-tvl-track/

DepEd Region I. (2020). Regional Memorandum 276, s. 2020.https://depedro1.com/wp-content/uploads/2020/06/rm276s2020.pdf

DepEd SDO Pangasinan II. (n.d.). Official website. https://www.depedpang2.ph/

Duong, C. D., et al. (2024). Digital entrepreneurial education and the role of self-efficacy in digital entrepreneurship. Heliyon.

Etikan, I., and Bala, K. (2017). Sampling and sampling methods. Biometrics & Biostatistics International Journal, 5(6), 215–217. https://doi.org/10.15406/bbij.2017.05.00149

Feng, J., et al. (2025). Key factors influencing educational technology adoption in education: A systematic review (2015–2024). Frontiers in Education.

Fontyn, F., Van den Beemt, A., & Drijvers, P. (2025). A review of reviews on TPACK research: Is there any focus? Computers & Education Open.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). How to design and evaluate research in education (10th ed.). McGraw-Hill Education.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2021). How to design and evaluate research in education (11th ed.). McGraw-Hill.

Frei-Landau, R., Avidov-Ungar, O., & Chen, D. (2022). Using Rogers' diffusion of innovation theory to understand mobile learning adoption. Education and Information Technologies, 27(6), 8103–8120. https://doi.org/10.1007/s10639-022-10934-0

Galimova, E. G., Oborsky, A. Y., Khvatova, M. A., Astakhov, D. V., Orlova, E. V., & Andryushchenko, I. S. (2024). Mapping the interconnections: A systematic review and network analysis of factors influencing teachers' technology acceptance—Frontiers in Education, 9, 1436724.

Granić, A., & Marangunić, N. (2022). Educational technology adoption: A systematic review. Education and Information Technologies, 27, 9725–9744.

Hammoda, B. O. S. A. (2024). The impact of educational technologies on entrepreneurial competencies: A systematic review of empirical evidence. Knowledge Management & E-Learning, 16(2), 309–333.

Ho, C. S. M. (2024). Fostering secondary students' entrepreneurial attributes via an LMS informed by cognitive load theory. Education Research International. https://doi.org/10.1016/j.edurev.2024.100216

Jiménez-Sierra, Á. A., et al. (2023). Development of teachers' technological pedagogical content knowledge (TPACK): A systematic review. Frontiers in Education.

Kholid, M. N., Hendriyanto, A., Sahara, S., Muhaimin, L. H., Juandi, D., Sujadi, I., Kuncoro, K. S., & Adnan, M. (2023). A systematic literature review of technological, pedagogical, and content knowledge (TPACK) in mathematics education. Cogent Education, 10(1).

Lesinskis, K., et al. (2023). The use of a digital tool (KABADA) and entrepreneurial intentions in Generation Z. Sustainability, 15(13).

Li, Y. (2023). Effect of entrepreneurial education and creativity on entrepreneurial intention: The mediating role of entrepreneurial self-efficacy. Frontiers in Psychology, 14, 1240910.

Martínez-Gregorio, S., Badenes-Ribera, L., & Oliver, A. (2021). Effect of entrepreneurship education on entrepreneurship intention and related outcomes—International Journal of Educational Research, 109, 101861.

Newman, A., Obschonka, M., Schwarz, S., Cohen, M., & Nielsen, I. (2019). Entrepreneurial self-efficacy: A systematic review. Journal of Vocational Behavior, 110, 403–419. https://doi.org/10.1016/j.jvb.2018.05.012

OECD. (2021). OECD digital education outlook 2021: Smart technologies.https://www.oecd.org/en/publications/2021/06/oecd-digital-education-outlook-2021_0f1487d9.html

OECD. (2023). OECD Digital Education Outlook 2023.https://www.oecd.org/en/publications/2023/12/oecd-digital-education-outlook-2023_c827b81a.html

Okolie, U. C., Igwe, P. A., Nwosu, H. E., Eneje, B. C., & Mlanga, S. (2020). Enhancing graduate employability. Policy Futures in Education, 18(2), 294–313.

Pallant, J. (2020). SPSS survival manual (7th ed.). Routledge.

Santini, F. de O., et al. (2025). Understanding students' technology acceptance behavior. Technological Forecasting and Social Change.

Schunk, D. H., & DiBenedetto, M. K. (2020). Motivation and social cognitive theory. Contemporary Educational Psychology, 60, 101832.

Sun, J., et al. (2023). From entrepreneurship education to entrepreneurial intention. Frontiers in Psychology, 14, 1100703.

Taber, K. S. (2018). The use of Cronbach's alpha. Research in Science Education, 48(6), 1273–1296.

U.S. Department of Health & Human Services. (2024). The Belmont Report.https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/index.html

Udekwe, E., et al. (2024). The nexus between digital technology, innovation, and entrepreneurship education. Education Sciences, 14(11).

UNESCO. (2023). Global Education Monitoring Report 2023: Technology in education.https://unesdoc.unesco.org/ark:/48223/pf0000385723

Wang, T., & Cheng, Z. (2021). Using the SAMR model as a reflection tool. Education Sciences, 11(6), 313.

Zhang, W., Wang, H., Gao, Y., & Halder, P. (2022). The relationship between entrepreneurship education and entrepreneurial intention. International Journal of Environmental Research and Public Health, 19(19), 12158.

Affiliations and Corresponding Information

Remedios F. Diego
Urdaneta City University – Philippines
diegoremedios1215@gmail.com

Ana Perla B. De Guzman, PhD
Urdaneta City University – Philippines