

EMPOWERING VOCATIONAL SKILLS DEVELOPMENT A STUDY ON THE INTEGRATION OF DIGITAL TOOLS IN TECHNOLOGY AND LIVELIHOOD EDUCATION

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Abstract

The 21st-century educational landscape demands practical, demonstrable skills in vocational fields, yet a persistent problem exists regarding the misalignment between provided digital tools, students' learning needs, and their overall satisfaction. This study investigated the use of digital tools in Technology and Livelihood Education (TLE) to enhance students' vocational skills and learning experiences. Employing a quantitative predictive correlational research design, the study purposively selected a sample of 137 college students enrolled in TLE courses during the 2024-2025 academic year based on their active enrollment in digitally augmented classes. Data were gathered using a validated questionnaire and analyzed using descriptive statistics, multiple regression analysis, and factor analysis. Findings revealed that the integration of digital tools significantly enhanced students' acquired learning competencies and overall satisfaction. However, perceived digital learning needs did not significantly impact student satisfaction, implying that the mere provision of tools acts as a baseline expectation rather than a direct driver of satisfaction. Additionally, a negative relationship was found between year level and satisfaction, suggesting that students in higher years face increased, complex challenges that diminish their satisfaction with digital learning. The study emphasizes the importance of developing digital competencies and contributes significantly to vocational educational policy by highlighting the critical need for curriculum-aligned digital infrastructure and ongoing support as students progress through their academic programs.

Keywords: Technology, digital tools, livelihood education, vocational skills

Introduction

The pervasive integration of digital tools has profoundly reshaped the 21st-century educational landscape (Tria, 2020). However, a significant problem persists in the educational context regarding the inconsistent use, and occasional misuse, of digital tools within practice-based disciplines like Technology and Livelihood Education (TLE). In vocational fields where the primary objective is to equip students with practical, demonstrable skills, the failure to authentically replicate these competencies digitally can severely hinder workforce readiness

(Rabacal & Buntat, 2023). When digital platforms fail to meet specialized academic demands, it creates a complex situation where students' perceived digital learning needs do not align with the actual learning competencies they acquire, leading to discrepancies and a decline in their overall satisfaction (Alforja & Bautista, 2021).

While the importance of digital tools in TLE is acknowledged, a distinct gap exists in the literature regarding the specific predictive relationship between acquired learning competencies, perceived learning needs, and student satisfaction within a Philippine vocational education context. While recent studies have explored online learning satisfaction (Guihama et al., 2022; Malia, 2024), there is a scarcity of research exploring how these variables and challenges quantitatively evolve as students advance in their academic studies. Understanding this is critical; without addressing these gaps, institutions risk continued investment in digital infrastructure that fails to improve student outcomes.

To address this gap, the present study investigates the integration of digital tools within TLE courses. Specifically, this study aims to:

1. Assess the level of students' acquired learning competencies through the use of digital tools in TLE courses.
2. Identify the digital learning needs of students in the context of TLE.
3. Evaluate the level of student satisfaction with the integration of digital tools in TLE courses.
4. Determine the relationship between students' acquired learning competencies, digital learning needs, and their satisfaction with digital tools in TLE.
5. Investigate the impact of students' year level on their satisfaction with the use of digital tools in TLE.

Literature review

The rapid and forced integration of digital tools has fundamentally altered the landscape of higher education, a shift accelerated by the global health crisis (Tria, 2020). While this digital pivot offered continuity, it also exposed significant challenges, particularly in practice-based disciplines like Technology and Livelihood Education (TLE), which traditionally rely on hands-on, face-to-face instruction. This review synthesizes literature across three key domains central to the present study: (1) the unique context of digital tool integration in TLE, (2) the critical role of digital learning needs in the Philippines, and (3) the relationship between acquired competencies and student satisfaction in digital environments.

Digital Integration in Vocational and TLE Contexts

Unlike purely theoretical subjects, TLE and other vocational programs are evaluated by the student's ability to demonstrate practical skills. Translating this "hands-on" pedagogy to a digital format presents a unique set of challenges. In the Philippine context, studies on TLE during the distance learning period highlighted that the primary barrier to practical skills development was not just student access, but also the digital literacy and pedagogical readiness of teachers

(Rabacal & Buntat, 2023). TLE instructors were often tasked with adapting curricula designed for workshops and kitchens to modular or online formats without adequate training, impacting the quality of skills students could acquire (Alforja & Bautista, 2021). This research highlights a crucial point: in vocational education, the effectiveness of digital tools is less about the technology itself and more about its ability to authentically replicate or simulate the practical competencies required by the field.

Digital Learning Needs and the Philippine Digital Divide

The variable "digital learning needs" in the context of the Philippines extends far beyond a simple desire for more training. The "new normal" in education exposed a stark digital divide, which Baticulon et al. (2021) categorized into a "hierarchy" of barriers faced by Filipino students. These barriers include a lack of reliable internet access, the unavailability of personal computing devices, and the financial strain of data costs. This reality means that a student's perceived "need" for a digital tool is intrinsically linked to these fundamental issues of access and equity. Research by Dizon and O'Brien (2022) further confirmed that socioeconomic factors are a significant predictor of student engagement and success in remote learning. Similarly, capturing broader demographic and social attitudes across the country requires examining structured public sentiment; for instance, Barrios (2023) evaluated Filipino young adults, students, and parents, highlighting widespread collective engagement and support for large-scale institutional frameworks. Therefore, any investigation into the digital learning needs of Filipino students must account for these structural barriers, which can prevent the effective use of digital tools, regardless of their pedagogical quality.

Acquired Competencies and Student Satisfaction

Student satisfaction is a key metric for the success of digital learning initiatives. In Philippine higher education, satisfaction is not driven solely by technology, but is deeply linked to human and personal factors. A recent study by Malia (2024) found that student satisfaction was significantly predicted by their online learning self-efficacy and the perceived school climate. This suggests that students must not only have access to tools but also feel confident in their ability to use them and feel supported by the institution.

This finding is particularly relevant in the Mindanao context. A study by Guihama et al. (2022) on student satisfaction in Mindanao found that the most critical factors were teacher presence, social presence, and robust technical and academic support. When students feel connected to their instructors and peers and believe the institution is responsive to their needs, their satisfaction increases. This directly connects to the acquisition of competencies. Buno et al. (2023) established a clear link between students' perceived learning outcomes and their satisfaction; when students feel they are genuinely mastering the subject and acquiring the intended skills, they report higher satisfaction. This body of literature suggests that "acquired competencies" are not just an outcome but also a key driver of student satisfaction.

The literature confirms that integrating digital tools in Philippine TLE is a complex issue mediated by teacher readiness (Rabacal & Buntat, 2023) and significant, systemic barriers related to the digital divide (Baticulon et al., 2021). Furthermore, student satisfaction is shown to be a multidimensional construct dependent on human support (Guihama et al., 2022), self-efficacy (Malia, 2024), and a sense of genuine learning (Buno et al., 2023).

While these studies establish the interconnectedness of these factors, a clear gap remains. Few studies have quantitatively modeled the predictive relationship between acquired learning competencies, perceived digital needs, and student satisfaction in a single model. It is unclear how these variables interact, for example, whether high acquired competency can offset the dissatisfaction from unmet digital needs. Furthermore, there is a distinct lack of research exploring how these dynamics shift as students progress through their higher education. The present study, therefore, aims to fill this gap by examining these specific relationships within a Philippine vocational college, with a particular focus on the impact of the students' year level.

Methodology

This study employed a quantitative predictive correlational research design to assess the use of digital tools in teaching and learning Technology and Livelihood Education (TLE) and to identify predictors of student satisfaction. This design is highly relevant to the research objectives as it allows for the examination of direct relationships and the predictive power of independent variables: acquired competencies, learning needs, and year level) on a dependent variable: student satisfaction.

Purposive sampling defined as a non-probability technique where the researcher relies on their judgment to select participants who possess specific characteristics highly relevant to the study (Etikan et al., 2016) was used to select 137 college students enrolled in TLE courses during the 2024–2025 academic year. The inclusion criteria required participants to be actively enrolled in TLE courses that formally utilized digital tools as part of their instruction. Students who were not enrolled in digitally augmented classes or who were inactive were excluded from the study.

Ethical considerations were strictly observed throughout the research process. Informed consent was obtained from all participants prior to data collection, and anonymity and confidentiality of the respondents' data were strictly maintained.

Data were collected using a researcher-adapted questionnaire consisting of four sections: (1) demographic profile, (2) acquired learning competencies, (3) digital learning needs, and (4) student satisfaction with digital tools. The instrument underwent content validation by experts in the field and reliability testing, yielding an acceptable Cronbach's alpha coefficient to ensure methodological transparency. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was applied, yielding a KMO value of 0.89, which is considered "great" (Kaiser, 1974), indicating that the data were suitable for factor analysis. Bartlett's Test of Sphericity was also significant, $\chi^2(561) = 2,580.25$, $p < .001$, suggesting that the correlations between items were sufficiently strong for factor analysis (Bartlett, 1950).

A 5-point Likert scale was used to measure responses. To streamline the reporting of results and avoid redundancy in the data tables, the following scale and descriptions were uniformly applied: 4.50–5.00 (Very High/Strongly Agree), 4.00–4.49 (High/Agree), 3.00–3.99 (Moderately High/Neutral to Agree), 1.50–2.49 (Low/Disagree), and 1.00–1.49 (Very Low/Strongly Disagree).

Prior to conducting inferential statistics, standard statistical assumptions namely normality, linearity, and homoscedasticity were formally checked and verified. Data were analyzed using descriptive statistics like mean and standard deviation to assess the levels of competency acquisition, digital learning needs, and student satisfaction. Furthermore, multiple regression analysis was employed to examine the predictive relationships between the variables, a method appropriate for identifying how multiple independent variables influence a single continuous dependent variable (Hair et al., 2019).

Results

Learning Competencies in Technology and Livelihood Education (TLE)

The descriptive statistics in Table 1 present the students' levels of acquired competencies through the use of digital tools. To address the multidimensional nature of competencies, the indicators were categorized into Knowledge, Skills, Abilities, and Attitudes (KSAA). Overall, the data indicate a high level of acquired competencies among respondents (Overall Mean = 4.15, SD = 0.65). Students rated their acquired skills (communication and collaboration) and knowledge (transferable skills) highest, both yielding a mean of 4.20.

These findings demonstrate that digital tools are highly effective in building essential vocational and interpersonal competencies. Consistent with Kiselev et al. (2023), these results show that digital tools and interactive services significantly improve student motivation (Attitudes) and cognitive engagement (Knowledge) by making learning more accessible. By fostering these specific KSA as digital tools successfully bridge the gap between theoretical knowledge and practical application required in TLE.

Table 1

Mean and Standard Deviations in the Acquired Learning Competencies

Competencies	Indicator Statements	Mean	SD	Description
Abilities	Improved time management skills.	4.10	0.65	High
Knowledge	Development of transferable skills.	4.20	0.64	High
Skills	Increased engagement with TLE	4.09	0.73	High
	Improved ability to communicate/collaborate	4.20	0.60	High
Overall Mean		4.15	0.65	High

Range	Description
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4.50 - 5.00	Very High
4.00 – 4.49	High
3.00 – 3.49	Moderately High
1.50 – 2.49	Low
1.00 – 1.49	Very Low

Digital Learning Needs in TLE

Table 2 illustrates the students' perceived digital learning needs. The indicators reflect a strong consensus (Overall Mean = 4.44, SD = 0.64) regarding the necessity for institutional support and pedagogical improvements. The exceptionally high mean for hands-on practice (4.47) and educator training (4.45) highlights a critical need for enhanced professional development. These findings align with Dudar et al. (2021), who emphasized that the successful integration of digital tools relies heavily on the professional readiness of educators. Furthermore, the strong desire for practice and personalized learning reflects the broader systemic challenges identified by Baticulon et al. (2021), suggesting that digital learning needs in the Philippines are not merely about acquiring software, but overcoming foundational barriers to ensure equitable, hands-on access.

Table 2

Mean Scores and Standard Deviations in Digital Learning Needs in TLE

Indicator Statements	Mean	SD
Additional training for TLE educators	4.45	0.66
Opportunities for hands-on practice	4.47	0.64
Personalized learning experiences	4.39	0.63
Overall Mean	4.44	

Range	Description
4.50 - 5.00	Very High
4.00 – 4.49	High
3.00 – 3.49	Moderately High
1.50 – 2.49	Low
1.00 – 1.49	Very Low

Students Satisfaction Level

Table 3 presents the students' satisfaction levels, categorized into perceived "Usefulness" and perceived "Effectiveness/Support" to provide a nuanced evaluation of their

digital learning experience. The results indicate a highly positive perception (Overall Mean = 4.24), demonstrating that when digital tools are integrated effectively, they strongly enhance the learning experience. This supports the findings of Guihama et al. (2022) , which identified technical support and institutional responsiveness as primary drivers of student satisfaction in the Mindanao context. Additionally, the students' high likelihood of continuing to use these tools (4.28) reflects Malia's (2024) assertion that student satisfaction is deeply tied to digital self-efficacy.

Table 3

Mean Scores and Standard Deviations in the Satisfaction of Students

Categories	Indicator Statements	Mean	SD	Description
Effectiveness/Support	Satisfaction with integration of digital tools	4.08	0.66	High
Effectiveness/Support	Satisfaction with support/resources provided	4.14	0.64	High
Usefulness	Likelihood of continuing to use digital tools	4.28	0.63	High
Usefulness	Likelihood of recommending TLE course	4.29	0.66	High
Usefulness	Likelihood of recommending TLE programs with digital tools	4.41	0.64	High
Overall Mean		4.24	0.78	High
Range	Description			
4.50 - 5.00	Very High			
4.00 – 4.49	High			
3.00 – 3.49	Moderately High			
1.50 – 2.49	Low			
1.00 – 1.49	Very Low			

Predictors of Student Satisfaction: Regression Analysis

Table 4 presents the multiple regression analysis utilized to determine the relationship between acquired learning competencies, digital learning needs, year level, and students' overall satisfaction. The results show that acquired learning competencies are a significant positive predictor of students' satisfaction ($B = 0.29$, $\beta = 0.23$, $p < .01$). This suggests that for every unit increase in acquired learning competencies, students' satisfaction increases by 0.29 units. This confirms that satisfaction in vocational training is directly tied to the tangible mastery of skills.

Interestingly, when digital learning needs are added to the model, they do not significantly predict student satisfaction ($B = 0.14$, $\beta = 0.11$, $p > 0.05$). While descriptive data

show students have high learning needs, the regression reveals that simply possessing these needs (or institutions merely identifying them) does not drive satisfaction. Satisfaction only occurs when those needs are transformed into actual competencies.

Finally, when year level is introduced, it reveals a significant negative relationship with satisfaction ($B = -0.18$, $\beta = -0.27$, $p < .01$). This indicates that as students progress in their year levels, their satisfaction decreases. This is a crucial, potentially unexpected finding that carries significant practical implications. As Forde and O'Brien (2022) suggest, students in advanced levels encounter increasingly complex, specialized vocational demands. The negative correlation implies that the current digital infrastructure and institutional support systems may be adequate for foundational first-year courses but become insufficient for the advanced technical requirements of upper-year curricula. This highlights a pressing need for TLE curriculum designers to upgrade digital tools and simulation software progressively as students advance.

Table 4

Regression Coefficient of Digital Learning on Students' Satisfaction

Variable	Model 1			Model 2			Model 3		
	B	β	SE	B	β	SE	B	β	SE
Constant	3.04**		.38	3.61		.41	4.58**		.10
Acquired learning competencies	.29**	.23	.09						
Digital learning needs				.14	.11	.09			
Year Level							-.18**	-.27	.04
R ²	.05			.01			.07		
ΔR^2	.04			.00			.06		

Note. N=137. In Model 1, the author entered the acquired learning competencies to predict students' satisfaction. In Model 2, I entered the digital learning needs as a predictor, while in Model 3, I entered the students' year level as another predictor. * $p < .05$. ** $p < .01$.

Conclusion

The analysis concludes that "acquired learning competencies" are the primary significant positive predictor of student satisfaction. This demonstrates that student satisfaction in vocational education is rooted in tangible outcomes; when digital tools effectively build transferable skills and enhance collaboration, satisfaction rises.

Furthermore, the lack of a significant relationship between "digital learning needs" and satisfaction reveals that these needs function as baseline expectations. Simply providing tools or acknowledging a need for training does not guarantee satisfaction those needs must be successfully translated into valued competencies.

Finally, a critical "satisfaction gap" exists among advancing students. The significant negative relationship between year level and satisfaction indicates that while current digital infrastructure may adequately support foundational courses, it fails to meet the increasingly complex and specialized vocational demands of upper-year curricula.

Recommendations

To address these findings and improve the digital learning environment, the following targeted interventions are recommended:

1. Invest in technical support systems and address structural digital divide barriers specifically tailored to the advanced needs of higher-year students to mitigate the satisfaction gap.
2. Redesign upper-level TLE curricula to seamlessly integrate highly capable, specialized digital simulation tools, ensuring technology scales appropriately with academic difficulty.
3. Engage in ongoing professional development and targeted training to effectively merge digital tools with hands-on pedagogical practices.
4. Future studies should consider qualitative research designs to explore the specific technical and academic barriers upper-year students face to provide deeper context to the quantitative "satisfaction gap" identified here.

References

- Alforja, M. F. A., & Bautista, R. C. (2021). Lived experiences of technology and livelihood education (TLE) students in the new normal of TUP-Taguig. *International Journal of Research*, 8(6), 11-25.
- Bartlett, M. S. (1950). Tests of significance in factor analysis. *British Journal of Statistical Psychology*, 3(2), 77–85. <https://doi.org/10.1111/j.2044-8317.1950.tb00285.x>
- Barrios, M. M. (2023). The attitude of Filipinos in the proposed integration of mandatory Reserve Officers Training Corps (ROTC) in the Philippine basic curriculum. *Journal of Namibian Studies*, 33, 5068. <https://namibian-studies.com/index.php/JNS/article/view/4198>
- Baticulon, R. E., Alberto, N. R. I., Baron, M. B. C., Mabulay, R. E. C., Rizada, L. G. T., Sy, J. J., Tiu, C. J. S., Tsuchiya, K., & Reyes, J. C. B. (2021). Barriers to online learning in the time of COVID-19: A national survey of medical students in the Philippines. *Medical Science Educator*, 31(2), 615–626. <https://doi.org/10.1007/s40670-021-01231-9>
- Buno, M. V. R., CEREZO, C. A., & Jamis, M. V. M. (2023). Perceived learning outcomes and student satisfaction in online learning during the COVID-19 pandemic. *International Journal of Educational Management and Development Studies*, 4(1), 1-18. <https://doi.org/10.53378/ijemds.v4i1.132>

- Co, A. G. E., Magno, K. G. C., & De Jesus, F. S. (2021). Barriers to the Effective Integration of Interactive Technology Learning Tools in Science Instruction. *Open Access Library Journal*, 8(8), 1–19. <https://doi.org/10.4236/oalib.1107724>
- Dizon, A. C., & O'Brien, A. (2022). The Digital Divide: Socioeconomic Factors Affecting Remote Learning. *Philippine Journal of Educational Technology*, 11(1), 22–39.
- Dudar, Z. V., & Dmytrenko, H. A. (2021). Professional readiness of future educators for the use of digital tools in the conditions of blended learning. *Information Technologies and Learning Tools*, 82(2), 160–173. <https://doi.org/10.33407/itlt.v82i2.4124>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4.
- Forde, C., & O'Brien, A. (2022). A literature review of barriers and opportunities presented by digitally enhanced practical skill teaching and learning in health science education. *Medical Education Online*, 27(1), Article 2068210. <https://doi.org/10.1080/10872981.2022.2068210>
- Guihama, C. M., Jamil, E. D., & Elang, N. O. (2022). Teacher presence and technical support as drivers of student satisfaction in online learning in Mindanao. *Mindanao Journal of Education and Social Sciences*, 3(1), 45–58.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate Data Analysis* (8th ed.). Cengage Learning.
- Kaiser, H. F., & Rice, J. (1974). Little Jiffy, Mark IV. *Educational and Psychological Measurement*, 34(1), 111–117. <https://doi.org/10.1177/001316447403400115>
- Kiselev, O. M., Galyamova, E. M., & Sadovaya, V. V. (2023). Digital tools are a means of increasing the motivation and cognitive interest of students. In *Proceedings of the International Scientific and Practical Conference "Information Technologies in Education" (ITO-2023)* (pp. 120-125). Naberezhnye Chelny State Pedagogical University.
- Malia, A. B. (2024). Online learning self-efficacy and school climate as predictors of student satisfaction in Philippine higher education. *Journal of Education and E-Learning Research*, 11(1), 101–109. <https://doi.org/10.20448/jeelr.v11i1.5208>
- Rabacal, J. S., & Buntat, Y. (2023). Digital Literacy of Technology and Livelihood Education (TLE) Teachers and Its Impact on Instructional Practices. *Philippine Journal of Vocational and Technical Education*, 5(2), 78-9.
- Rodríguez-Ardura, I., & Meseguer-Artola, A. (2022). The moderating role of digital-learning-related stress in the relationship between students' acceptance of a learning management system and their satisfaction. *Computers in Human Behavior*, 129, Article 107149. <https://doi.org/10.1016/j.chb.2021.107149>
- Tria, J. Z. (2020). The COVID-19 pandemic: The new normal in education. *International Journal of Advanced Research*, 8(5), 1121–1130. <https://doi.org/10.21474/IJAR01/10969>