

Trainers Work Based E-Learning Module Development and Evaluation

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ABSTRACT This study aimed to design, develop, and evaluate an e-learning module for the course Work-Based Learning with Emphasis on Trainers' Methodology under the Bachelor of Technical-Vocational Teacher Education program. The module was developed using the ADDIE instructional design model and evaluated in terms of acceptability and effectiveness. A combination of developmental, descriptive, and quasi-experimental methods were used. Acceptability was assessed by five instructors and twenty-one students based on motivation, content, usability, and satisfaction. Results showed high acceptability, with instructors rating the module as "strongly agree" and students as "agree." Effectiveness was measured using a pre-test and post-test administered to the same group of twenty-one students. Findings revealed improved post-test scores, highlighting the module's instructional value. The study concludes that the developed e-learning module is a useful tool for promoting competency-based learning in technical-vocational education.

INTRODUCTION

The rapid transformation of 21st-century work environments has intensified the need for adaptive and innovative teaching strategies that cultivate digital fluency, critical thinking, and applied problem-solving skills among learners (Ayunon et al. 2012). This shift has accelerated the movement toward learner-centered and skills-based instruction, prompting higher education institutions to integrate flexible and technology-enhanced modalities that extend learning beyond traditional classroom structures.

E-learning has become central to this pedagogical transition, offering accessible platforms that support independent learning and expand instructional reach. Empirical studies consistently report that well-designed digital modules enhance motivation, retention, and learner engagement, particularly in contexts with limited physical resources (Mailizar et al. 2020; Naidoo 2021). However, recent scholarship also problematizes the assumption that e-learning universally addresses instructional needs. (Joaquin et al. 2023) argue that while digital adoption has increased, many modules remain misaligned with the requirements of competency-based education. In technical-vocational institutions, this misalignment is more pronounced: existing e-learning tools rarely integrate performance-based tasks central to skills training, thereby constraining learn-

ers' opportunities for mastery (Tan and Tanhueco-Tumapon 2024). Such findings indicate that the effectiveness of e-learning hinges not only on technological availability but on its pedagogical coherence with established competency frameworks.

This challenge is evident in technical teacher education programs. Varga and Napoles (2025) found that students in highly specialized fields often depend heavily on instructor-led sessions due to the lack of structured digital resources that support practice-driven learning. Within the Bachelor of Technical-Vocational Teacher Education (BTVTEd) program of Camarines Sur Polytechnic Colleges (CSPC), Trainers' Methodology—a TES-DA-mandated, performance-oriented framework—requires the development of competencies that demand systematic, self-paced, and practice-aligned instructional materials. Yet digital resources tailored to these requirements remain scarce, particularly for courses such as Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology.

The shift toward flexible and blended learning in the post-pandemic period further underscores the need for context-responsive, pedagogically aligned digital tools in technical-vocational education. Current literature emphasizes that sustainable e-learning innovations must be grounded in established instructional design principles to ensure relevance and effectiveness in skills-based

training (Joaquin et al. 2023). The ADDIE model, which has maintained strong empirical support in recent instructional design research (Abdulrahman 2023), offers a systematic framework for developing e-learning modules that integrate competency-based outcomes with accessible digital delivery. Anchored in these insights, this study aims to develop an e-learning module specifically aligned with Trainers' Methodology standards to address the persistent gap in competency-driven digital learning resources for BTVTEd students.

Objectives of the Study

This study aimed to develop an e-learning module for the course Work-Based Learning with Emphasis on Trainers' Methodology in the BTVTEd program. Specifically, it sought to:

1. Design and develop an e-learning module aligned with the course outcomes and TES-DA's Trainers' Methodology standards.
2. Determine the module's acceptability as evaluated by instructors and students.
3. Evaluate its effectiveness in improving student learning outcomes through pre-test and post-test results.

Scope and Limitation

This study was conducted to develop and evaluate the acceptability and effectiveness of an e-learning module for the course Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology under the BTVTEd program at Camarines Sur Polytechnic Colleges. The participants included 21 third-year BTVTEd Electronics (ELX) students enrolled during the first semester of Academic Year 2023-2024 and five faculty members who served as expert validators.

Acceptability of the module was assessed across seven dimensions of student motivation, objective congruency, learning outcomes, usefulness, ease of use, content quality, and overall satisfaction using a Likert-type rating scale. Instructional effectiveness was evaluated by comparing the pre-test and post-test scores of the student participants.

The study was limited to one academic term and one institution, which may constrain the generalisability of its findings. Moreover, the research relied solely on quantitative methods, excluding

qualitative data such as interviews or open-ended feedback. Despite these limitations, the study offers a structured framework for developing competency-based digital instructional materials in vocational teacher education.

Review of Literature and Related Studies

Since the global shift to online learning in 2020, educational systems have adopted various distance learning strategies such as synchronous and asynchronous classes, printed self-learning modules, and broadcast instruction (Asian Development Bank 2021). Among these, e-learning has emerged as a dominant modality due to its flexibility, accessibility, and adaptability in formal education settings (Kim 2020). In the Philippines, the Commission on Higher Education (CHED) has promoted flexible learning approaches, integrating online platforms such as Zoom, Google Forms, and even Facebook and WhatsApp to sustain instruction across diverse academic contexts (De Vera 2020; World Bank 2020).

Despite these innovations, challenges persist in the effective implementation of digital learning. Tanhueco-Tumapon (2021) and Reyes-Chua et al. (2020) identified common issues such as low digital literacy, unreliable internet, and lack of instructional preparedness. These concerns are echoed in more recent studies. Joaquin et al. (2023) emphasised that while many institutions have embraced digital modalities, there remains a gap in curriculum-aligned instructional materials particularly in technical-vocational education and training (TVET) programs that require hands-on application.

Blended learning approaches have proven beneficial in enhancing student autonomy, providing timely feedback, and supporting competency development (CIIT Philippines 2020; Alim et al. 2025). However, in specialised programs such as the Bachelor of Technical-Vocational Teacher Education (BTVTEd), generic e-learning platforms often fall short. According to Tan and Tanhueco-Tumapon (2024), success in post-pandemic vocational instruction depends on e-learning modules that are context-specific, performance-based, and aligned with industry competencies.

Napoles (2022), in developing a digital module for 3D home design, found that such tools significantly improve learner performance and engagement. Similarly, Naidoo (2021) demonstrated that

structured instructional design frameworks like ADDIE improve learning outcomes when applied to practical subjects in higher education. These findings support the framework used in the present study.

What sets the current research apart is its focus on Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology, a course that uniquely integrates TESDA's Trainers' Methodology and competency-based instruction. While several studies have focused on e-learning platforms and general digital content, few have addressed the specific needs of vocational teacher education in the Philippine context. This study addresses that gap by designing a locally grounded, standards-aligned instructional module evaluated for both acceptability and effectiveness.

Overall Framework of the Study

This study is grounded in the ADDIE instructional design model, which provides a systematic and iterative framework for developing instructional materials (Molenda 2003). The model consists of five interrelated phases—Analysis, Design, Development, Implementation, and Evaluation—each contributing to the structured creation and continuous refinement of the e-learning module. Widely recognised in instructional design research, ADDIE supports the alignment of learning objectives, instructional strategies, and assessment processes through a deliberate and evidence-based sequence of activities.

In the Analysis phase, the instructional need was determined by examining the absence of course-aligned digital learning materials for Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology under the BTVTEd program. This gap established the rationale for designing an e-learning module responsive to competency-based requirements. The Design phase followed, wherein the module blueprint was conceptualised using constructivist principles to ensure coherence among the learning outcomes, content structure, pedagogical strategies, and assessment tasks. Particular emphasis was placed on integrating TESDA's Trainers' Methodology standards into the learning design.

The Development phase involved creating the actual e-learning module, integrating multimedia elements, interactive components, and structured

learning activities intended to enhance student engagement and support independent learning. Iterative refinement and pilot testing were conducted to ensure functionality and instructional quality. During the Implementation phase, the module was deployed to third-year BTVTEd students during the first semester of Academic Year 2023-2024 as a supplementary learning tool to support flexible and blended learning delivery.

The final phase, Evaluation, assessed the module's instructional effectiveness and acceptability through expert validation, student feedback, and the analysis of pre-test and post-test results. Both formative and summative data informed judgments regarding the module's usability, relevance, and impact on learner performance, as well as areas requiring further improvement. Through this framework, the study demonstrates a structured and pedagogically grounded process for developing a competency-aligned e-learning module for technical teacher education.

METHODOLOGY

Research Design

This study employed a combination of developmental, descriptive, and quasi-experimental research designs. The developmental approach addressed Objective 1 of designing and developing an e-learning module tailored to Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology by analysing existing instructional materials and aligning content with CHED Memorandum Order No. 79, s. 2017, which outlines standards for the BTVTEd program.

Participants

Two sets of participants were involved in the study. The first group consisted of 21 third-year students enrolled in the Bachelor of Technical-Vocational Teacher Education (BTVTEd) major in Electronics, who were officially enrolled in Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology during the first semester of Academic Year 2023-2024. These students evaluated the module's acceptability and participated in both pre-test and post-test assessments to determine the effectiveness of the instructional material. The second group included 5 BTVTEd faculty mem-

bers who handled the same course. They served as expert validators, providing critical feedback on the module's content alignment, pedagogical soundness, and instructional quality. A purposive sampling technique was used to select respondents, allowing the researcher to engage participants with specific relevance to the instructional context.

Research Instruments

An adapted questionnaire based on Rempillo (2019) was used to assess acceptability. The instrument consisted of a 4-point Likert scale, interpreted as follows:

- ◆ 4: Strongly Agree
- ◆ 3: Agree
- ◆ 2: Disagree
- ◆ 1: Strongly Disagree

The tool evaluated seven dimensions of content relevance, learning outcomes alignment, usability, student motivation, ease of use, usefulness, and satisfaction. It was reviewed by field experts for content validity and contextual alignment.

To measure the module's effectiveness, a pre-test and post-test were administered to student participants. These assessments gauged knowledge acquisition and skill improvement following the module's implementation.

Data Collection Procedure

Due to limited face-to-face interaction, data collection was conducted through Google Forms. Before the administration of research instruments, participants received an orientation detailing the purpose, scope, and ethical safeguards of the study. Student participants completed the pre-test, accessed the e-learning module via a Google Site, and subsequently took the post-test. Both student and faculty respondents completed the module evaluation forms using the same online platform.

Data Analysis

The data gathered in this study were analysed using both descriptive and inferential statistics. The weighted mean was computed to interpret student and instructor ratings on the module's acceptability. To determine instructional effectiveness, a paired samples t-test was conducted to

compare students' pre-test and post-test results. This statistical test helped establish whether a significant difference in student performance occurred after the use of the e-learning module. All analyses were conducted using the (SPSS) and spreadsheet-based tools to ensure reliability and accuracy.

Ethical Considerations

This study strictly adhered to ethical research protocols. All participants signed an informed consent form, which emphasised voluntary participation and the right to withdraw. Confidentiality was ensured in accordance with Republic Act No. 10173, Data Privacy Act of 2012. Respondent identities were anonymised and all data were used exclusively for academic purposes.

RESULTS AND DISCUSSION

The E-Learning Module

The developed e-learning module for Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology was created using Google Sites, an valuable and user-friendly tool that supports flexible learning (Halim and Halim 2024). The design was grounded in the ADDIE instructional model to Analyse, Design, Develop, Implement, and Evaluate a widely accepted framework in educational development (Branch 2009).

The Analyse phase involved identifying the lack of digital instructional materials aligned with the outcomes of Prof Educ 10, as mandated by CHED Memorandum Order No. 79, Series of 2017, and the Trainers' Methodology Level I of TESDA. This course emphasises competencies in planning, implementing, and evaluating work-based training, yet appropriate e-learning tools were unavailable. Thus, a needs-based instructional intervention was warranted.

The Design phase applied principles of Constructivist Learning Theory, integrating learning outcomes, instructional content, and assessments to promote student-centred engagement. The module's architecture included sections such as the home page, course outline, pre-test, information sheets, self-checks, task sheets, midterm and final exams, post-test, and bibliography. These were carefully sequenced following Outcome-Based Education (OBE) and Competency-Based Training (CBT) frameworks (Biggs and Tang 2011; TESDA 2022).

In the Develop phase, instructional materials were created based on the course syllabus and embedded into the Google Site. Information sheets provided core concepts, while self-checks and task sheets functioned as formative and performance-based assessments, respectively. Each lesson was aligned with specific learning outcomes to ensure targeted skill acquisition, consistent with findings that structured digital content improves learner autonomy and retention (Mailizar et al. 2020; Joaquin et al. 2023).

The Implement phase involved deployment of the module to third-year BTVTEd-Electronics students. Participants were enrolled in the module via Google Classroom, allowing for real-time monitoring and interaction. This approach mirrors blended learning practices recommended in flexible education delivery (Tan and Tanhueco-Tumapon 2024).

Finally, in the Evaluate phase, both formative (for example, self-checks, task sheets) and summative assessments (midterm, final, and post-tests) were utilised to measure the module's effectiveness. This aligns with the evaluation phase of ADDIE, where results guide instructional refinement. Studies show that such structured evaluation promotes continuous instructional improvement in digital learning environments (Gossai 2020; Naidoo 2021).

Overall, the e-learning module was designed to meet the needs of technical-vocational teacher education by ensuring alignment with national competency standards, supporting flexible delivery, and fostering active learning all of which are vital in post-pandemic educational settings.

Acceptability of the E-Learning Module as Assessed by Teachers and Students

The developed e-learning module for Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology was assessed for acceptability

by two groups of respondents comprising 5 BTVTEd faculty evaluators and 21 third-year Electronics students. The evaluation covered seven key dimensions of student motivation, objective congruency, learning outcomes, usefulness, ease of use, content quality, and overall satisfaction. The module was rated using a four-point Likert scale, and the results are summarised in Table 1.

Expert evaluators rated the module as "Strongly Agree" across all dimensions except "Objective Congruency," which they rated as "Agree." The highest mean score was in Ease of Use (3.93 or approximately 98%), indicating high navigability and clarity of instructions. Other top-rated aspects include Satisfaction (3.70 or 93%), Content Quality (3.64 or 91%), and Usefulness (3.53 or 88%), suggesting that experts found the module highly effective for supporting work-based learning outcomes.

Student respondents rated all dimensions as "Agree." The highest score was for Satisfaction and Usefulness (3.31 or 83%), reflecting students' positive perception of the module's relevance and engagement. The lowest rating appeared under Content Quality (3.21 or 80%), highlighting areas where students found room for improvement, such as organisation and alignment with their learning preferences.

These results suggest that the module is generally acceptable in terms of design, functionality, and pedagogical value. However, refinements may be considered, especially to enhance interactivity, content clarity, and formative feedback mechanisms from the student perspective.

The findings revealed a generally positive evaluation of the developed e-learning module's acceptability, as evidenced by strong ratings across all assessed dimensions. Both expert evaluators and student respondents acknowledged the mod-

Table 1: Summary of acceptability ratings for the e-Learning module
(n = 5 Experts; n = 21 Students)

<i>Dimension</i>	<i>Experts' mean</i>	<i>Interpretation (Experts)</i>	<i>% Equivalent (Experts)</i>	<i>Students' mean</i>	<i>Interpretation (Students)</i>	<i>% Equivalent (Students)</i>
Student Motivation	3.7	Strongly agree	93	3.25	Agree	81
Objective Congruency	3.45	Agree	86	3.29	Agree	82
Learning Outcomes	3.5	Strongly agree	88	3.24	Agree	81
Usefulness	3.53	Strongly agree	88	3.31	Agree	83
Ease of Use	3.93	Strongly agree	98	3.28	Agree	82
Content Quality	3.64	Strongly agree	91	3.21	Agree	80
Satisfaction	3.7	Strongly agree	93	3.31	Agree	83
Overall Mean	3.64	Strongly agree	91	3.27	Agree	82

ule's effectiveness in motivating learners. Experts rated motivation the highest (92.5%), highlighting the module's visually engaging structure and well-structured content. These results align with Tan and Tanhueco-Tumapon (2024), who emphasised that motivational design features such as clarity, aesthetics and learner autonomy significantly improve engagement in blended learning environments. Although students rated this dimension lower (81.25%), their responses still fell within the "Agree" interpretation, affirming that the module was effective in sustaining interest.

In terms of objective congruency, both groups recognised that the module content aligned with the intended learning objectives of Prof Educ 10. Expert evaluators noted that the structure and sequencing of lessons (86.25%) effectively supported learning goals, while students also showed agreement (82.25%), though they expressed a lower rating on interactivity. This reflects the findings of Mailizar et al. (2020), who reported that insufficient interactivity in online environments can limit deeper engagement and affect student satisfaction. Enhancing this aspect through more immersive content could further improve congruency with objectives.

The module's alignment with learning outcomes was also validated by high expert ratings (87.5%), especially in the areas of assessment integration and real-world relevance. These results are consistent with the outcomes-based instructional design principles outlined by Biggs and Tang (2011), which emphasise backward alignment of content, assessment, and competencies. Students agreed (81%) but rated feedback and remediation lower, suggesting the need for enhanced formative feedback strategies. According to Gossai (2020), clear and actionable feedback is vital in ensuring that students can meaningfully act upon performance gaps in digital learning contexts.

As for usefulness, both experts and students agreed on the module's value in improving performance in work-based training (88.25% and 82.75%, respectively). This validates the module's potential to bridge academic instruction with practical application, in line with TESDA's (2022) competency-based training approach. However, student perceptions suggest that further contextualisation or simulation of workplace scenarios may strengthen its relevance.

In the area of ease of use, experts gave an exceptionally high rating (98.25%), affirming the mod-

ule's accessibility and clarity. These findings reinforce the importance of intuitive navigation and layout in digital platforms, as noted by Naidoo (2021), who underscored that usability directly correlates with learner retention and satisfaction. While students also agreed (82%), their relatively lower scores suggest that improvements in user interface and instructions could further streamline the learning process.

On the content dimension, expert validators strongly agreed (91%) that the module was well-aligned with curriculum standards, bias-free, and conceptually sound. The structured integration of real-world examples and higher-order thinking tasks resonates with the recommendations of Joaquin et al. (2023), who emphasised authentic content as critical in technical-vocational education. Students, though generally in agreement (80.25%), highlighted the need for more depth and personalisation to accommodate diverse learner preferences.

Lastly, the satisfaction dimension received high expert ratings (92.5%) and agreeable ratings from students (82.75%). Both groups recognised the module's effectiveness, recommendability, and interest level. These findings echo the work of Tan and Tanhueco-Tumapon (2024), who reported that learner satisfaction is significantly influenced by perceived alignment of content, clarity of expectations, and support for skill development.

Overall, while the expert validators rated all dimensions as "Strongly Agree," students provided slightly lower but still positive feedback across the board. The gap in perception between students and experts suggests opportunities for continuous refinement, particularly in areas of interactivity, feedback, and student-centred design. Integrating multimedia enhancements, richer formative support, and adaptive learning features may enhance learner experience and further align with principles of outcomes-based and competency-driven instruction.

Level of Effectiveness of the E-learning Module as an Instructional Material

The effectiveness of the developed e-learning module was assessed using the pre-test and post-test results of 21 BTVTEd students enrolled in Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology. Before the implementation of the module, students obtained a mean score of

6.71, corresponding to 33.57 percent. After completing the module, the post-test mean increased to 9.33, equivalent to 46.67 percent. This reflects a mean gain of 2.62 points, or an improvement of 13.10 percent in average test scores.

These results indicate a positive learning outcome following the implementation of the e-learning module, suggesting its instructional effectiveness in enhancing understanding and competency in the subject. The summary of results is presented in Table 2.

Table 2: Pre and post test results of the e-learning module

Assessment type	Mean score	Mean percentage
Pre-Test	6.71	33.57
Post-Test	9.33	46.67
Gain	2.62	13.10

The observed improvement of 13.10 percent in student performance from pre-test to post-test demonstrates the instructional effectiveness of the developed e-learning module in Prof Educ 10: Work-Based Learning with Emphasis on Trainers' Methodology. This gain in mean scores suggests that the module successfully contributed to learners' understanding of course content and the development of relevant competencies aligned with the intended learning outcomes.

This result supports the principles of outcomes-based education and competency-based training, where instruction is designed around measurable outcomes and learner-centred progress (Biggs and Tang 2011; TESDA 2022). The significant score increase aligns with the Evaluate phase of the ADDIE model, where learner assessments are used to validate the impact of instructional interventions (Branch 2009).

Recent studies have echoed the effectiveness of digital and modular instruction in technical-vocational education. Joaquin et al. (2023) emphasised that e-learning modules tailored to specific competencies can substantially improve student learning outcomes, especially when formative and summative assessments are integrated. Similarly, Gossai (2020) found that structured digital learning content, supported by pre- and post-assessments, enhances knowledge acquisition and metacognitive engagement.

However, the data also revealed variation in individual performance, with some students showing minimal improvement or even a decline in post-test scores. These inconsistencies may stem from differing levels of digital literacy, self-regulated learning abilities, or learning preferences, particularly in online or blended learning contexts (Naidoo 2021). Such observations underscore the importance of incorporating differentiated instructional strategies including timely feedback, scaffolding, and adaptive assessments to support learners with diverse needs.

Furthermore, the results imply that while the e-learning module demonstrated instructional value, continuous improvement is necessary to further personalise content delivery and enhance learner engagement. Research by Mailizar et al. (2020) and Tan and Tanhueco-Tumapon (2024) also highlight that effective digital modules must be iterative, incorporating learner analytics and feedback mechanisms to optimise instructional design.

In sum, the findings affirm that the e-learning module holds promise as a pedagogical tool in technical teacher education. Its structured content, interactive assessments, and alignment with curriculum standards contributed to measurable learning gains, thus meeting both academic and vocational objectives of Prof Educ 10.

CONCLUSION

The e-learning module for Prof Educ 10, developed through the ADDIE model and implemented via Google Sites, proved to be an effective tool for supporting flexible and outcomes-based instruction. Both experts and students rated it highly in terms of motivation, usability, content quality, and alignment with course objectives, while the 13.10 percent increase in test scores demonstrated its positive impact on learner performance. Although experts provided slightly higher ratings, student feedback likewise confirmed the module's relevance and instructional soundness. Minor improvements in interactivity and interface design remain necessary, but overall, the findings affirm the module's value as a digital learning resource that enhances the teaching and learning of work-based competencies in vocational teacher education.

RECOMMENDATIONS

To further strengthen the developed e-learning module, it is recommended that future itera-

tions enhance interactivity, refine the user interface, and integrate adaptive learning elements to better address individual learner needs. Improving navigational flow and incorporating more visually engaging features may also heighten user motivation and sustain participation. Additional academic support should be extended to learners who demonstrated lower post-test performance through targeted mentoring and constructive feedback. Regular monitoring through user feedback and learning analytics is likewise encouraged to inform continuous improvement. Strengthening the alignment among learning objectives, tasks, and assessments will ensure deeper competency development, and once consistent positive outcomes are observed, the module may be expanded for broader application across other BTVTED courses and related instructional contexts.

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