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Canva-Based Interactive E-Module For Learning First Actions At A Crime Scene

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Abstract:

The development of educational technology demands more interactive and engaging learning media, including in the instruction of First Response at a Crime Scene (Tindakan Pertama di Tempat Kejadian Perkara/TPTKP) at the Police Academy of the Metro Jaya Regional Police (SPN Polda Metro Jaya). This study aims to develop a Canva-based interactive e-module and to test its feasibility and effectiveness in improving student learning outcomes. The research employed the Research and Development (R&D) method with the Borg and Gall model integrated with the Rowntree model. The trial subjects involved 43 students at SPN Polda Metro Jaya, divided across three phases: limited trial (3 students), small group trial (15 students), and large group trial (25 students). The research instruments included expert validation sheets (material, media, instructional design), user response questionnaires, and learning achievement tests (pretest-posttest). Data were analyzed using feasibility percentage and N-Gain Score test. The results showed that the media feasibility level from material experts was 93%, media experts 94.2%, instructional design experts 95.3%, limited trial 82.67%, small group trial 90.84%, and large group trial 93.06%. The effectiveness test, involving 25 students from the large group trial, showed an improvement in learning outcomes with an average pretest score of 69.67 increasing to 90.00 in the posttest. The N-Gain Score result was 0.67 (67%) with a "quite effective" category. This study concludes that the Canva-based interactive e-module is feasible and effective for improving TPTKP learning outcomes at SPN Polda Metro Jaya.

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Introduction (مقدمة)

Police education in Indonesia serves as a foundational pillar in developing professional, resilient, and humane Indonesian National Police (Polri) human resources [1]. The State Police School (SPN) Polda Metro Jaya, as a leading police educational institution in the capital region, bears the responsibility of training prospective police officers to address the complex dynamics of urban crime. One of the most critical subjects in the SPN curriculum is First Response at a Crime Scene (Tindakan Pertama di Tempat Kejadian Perkara/TPTKP), which trains students to execute effective initial procedures for crime scene handling, including location security, primary evidence identification, and consolidation [2]. This subject is essential for contemporary police officers, given that criminal cases in Jakarta and its surrounding areas frequently involve location-based crime patterns requiring rapid response for evidence preservation. BPS (2024) reports that the Polda Metro Jaya region recorded the highest number of crimes in Indonesia for 2024, with 77,261 incidents or 13.75% of the total 561,993 crimes nationwide [3].

TPTKP training comprises a series of initial actions taken by the first officer receiving a report or arriving at a crime scene, ranging from providing assistance to victims to securing the area. Proper crime scene security is crucial for maintaining the integrity of the location before further examination by the crime scene investigation team, and these initial actions determine the success of subsequent investigation and prosecution processes. Negligence in securing a crime scene can result in the loss of evidence or perpetrator traces, potentially hindering the investigation and legal proof process. Police institutions across Indonesia, including SPN Polda Riau and Polda Sulawesi Tengah, have recognized this urgency and regularly conduct practical TPTKP training through simulation fields to provide real-world experience in conditions approaching operational situations.

Field reality, however, reveals a gap between curriculum expectations and student learning outcomes at SPN Polda Metro Jaya. Internal data from SPN Polda Metro Jaya for the 2023/2024 academic year recorded that the average learning outcome score for TPTKP subjects only reached 72.5 out of a scale of 100, while in the 2024/2025 academic year, the average score was 73 out of 100. These data were obtained from 50 students divided into two parallel classes (Class A and B) in each academic year. Both scores remain below the standard adequate score of 75. The practical implication of this condition is the urgent need for innovation in the TPTKP learning process so that procedural and field practice material can be understood by students more effectively.

Based on observations in the TPTKP class at SPN Polda Metro Jaya on November 22, 2025, involving observation of 30 students during the learning process, it was found that students were, on average, less motivated and less enthusiastic in learning, often feeling sleepy and unfocused. The results of preliminary interviews with two student representatives and one educator (Gadik) revealed that the learning process was still dominated by conventional methods in the form of lectures and the use of printed modules only. The limited use of varied learning media causes the learning process to tend to be educator-centered and less able to provide concrete learning experiences for students. Students encounter obstacles in visualizing crime scene scenarios, recognizing the function and shape of equipment used, and understanding the stages of crime scene handling as a whole [2]. This phenomenon not only reduces graduate quality but also potentially weakens the effectiveness of criminal case handling at Polda Metro Jaya. The unpreparedness of officers in carrying out TPTKP can lead to evidence loss, damage to the chain of evidence, and difficulties in proof within the criminal justice process. Thus, strengthening TPTKP learning quality through learning media innovation is an urgent and non-negotiable need.

The development of Information and Communication Technology (ICT) creates significant opportunities for police educational institutions to transform toward more interactive and contextual learning. E-module-based learning media allows material to be presented systematically, equipped with illustrations, procedural images, and practice questions that

provide more varied and interactive learning experiences [4]. The integration of e-modules with digital design platforms such as Canva further enriches visual appearance and interactivity, so that procedural material such as TPTKP can be visualized in the form of flowcharts, images, and scenario videos approximating real conditions [5].

Recent research has demonstrated the effectiveness of Canva-based learning media across various educational contexts. A study on Canva-based digital textbooks in zoology education found that students experienced greater confidence in their learning, with features such as videos, hyperlinks, and interactive tools enhancing understanding and engagement while reducing learning-related anxiety. Sukma, Mappalotteng, and Hasrul (2025) demonstrated that implementing Canva-based learning media in informatics subjects significantly increased student learning interest from 44% (Fairly High) to 94% (Very High), with learning mastery reaching 100% in the second cycle. Research on Canva for Education for digital literacy development reported an N-Gain score of 0.75 (high category), confirming a substantial improvement in students' digital literacy skills after using interactive Canva-based media.

Within the police education context, digital technology adoption has shown promising results. A study evaluating a digital technology-based educational transformation model at the College of Police Science (STIK) Jakarta revealed that 82% of students felt better prepared for field challenges, while 78% reported improved analytical and investigative skills, with a t-test showing $p\text{-value} = 0.03$, confirming the positive influence of digital technology on student competence. International initiatives such as the POL-COM project, supported by the Erasmus+ program, have developed innovative training platforms for police educators utilizing microlearning, real-life case simulations, learning cards, and short videos. Similarly, the LAW-GAME project employs gamification technologies in safe virtual environments to train police officers on procedures, including forensic examination and evidence recognition, through AI-assisted gaming scenarios. These developments indicate a global trend toward technology-enhanced police training.

Despite this growing body of evidence, a significant research gap exists in the application of Canva-based interactive e-modules specifically for TPTKP instruction in Indonesian police academies. While prior studies have validated Canva-based learning media in general education contexts, and digital technology adoption in police education has been broadly examined, no study has specifically developed and validated an interactive e-module for TPTKP procedural training using the Canva platform. Moreover, previous police education research at SPN institutions has not addressed the integration of interactive multimedia design principles with TPTKP procedural content. The present study addresses this gap by developing the first Canva-based interactive e-module for TPTKP subjects at SPN Polda Metro Jaya, filling the void in the literature regarding ICT-based learning media development for Indonesian police procedural training. This research also extends the existing literature by integrating the Borg and Gall development model with the Rowntree model, providing a systematic framework for e-module development that can be replicated across other police training subjects.

Based on the description above, this study aims to: (1) develop a Canva-based interactive e-module with systematic procedures using the Borg and Gall model integrated with the Rowntree model, (2) test the e-module's feasibility through expert validation and user responses, and (3) test the e-module's effectiveness in improving student learning outcomes in TPTKP subjects at SPN Polda Metro Jaya.



Method (منهج)

This study used the Research and Development (R&D) method [9] with a mixed-methods approach that integrates quantitative and qualitative approaches. The development model used was the integration of the Borg and Gall model [10] as the main research framework (macro model) with the Rowntree model [11] as the technical media development model (micro model). The Borg and Gall model was chosen based on its systematic, procedural characteristics and empirical validation through 10 development steps. The Rowntree model was chosen because it provides specific guidance in learning media development with 3 main stages: Planning, Prototype Development, and Formative Evaluation. The integration of these two models results in comprehensive yet efficient development.

Research Participants

The research subjects were students at SPN Polda Metro Jaya taking TPTKP subjects, with details: 3 students for the limited trial, 15 students for the small group trial, and 25 students for the large group trial (classes A and B). Subject selection used purposive sampling technique with considerations: (1) students were taking TPTKP subjects, (2) both classes had simultaneous learning schedules, and (3) students had homogeneous characteristics (general secondary education background and had never used similar e-modules). The research was conducted from December 2025 to April 2026.

Research Design

The development procedure integrated 10 steps of Borg and Gall with 3 steps of Rowntree simplified into seven main stages: (1) needs analysis and information collection, (2) product development planning, (3) initial product development, (4) product validation by experts and limited trial, (5) product revision, (6) product trial (practicality), and (7) finalization and implementation of the final product.

Instruments

The research instruments included: (1) expert validation sheets for material experts, media experts, and instructional design experts using a Likert scale of 1-5 based on Walker and Hess's theory (content and purpose quality, instructional quality, and technical quality); (2) teacher and student response questionnaires; (3) pretest and posttest learning achievement tests. Feasibility data analysis used the percentage formula: $P = (\sum x / \sum x_i) \times 100\%$, with interpretation criteria: 81%-100% (highly feasible), 61%-80% (feasible), 41%-60% (less feasible), 21%-40% (not feasible), 0%-20% (highly not feasible) [9]. Effectiveness testing used the N-Gain Score: $N\text{-Gain} = (\text{Posttest Score} - \text{Pretest Score}) / (\text{Ideal Score} - \text{Pretest Score})$, with categories: $g > 0.7$ (high), $0.3 \leq g \leq 0.7$ (medium), $g < 0.3$ (low), and effectiveness interpretation: >76% (effective), 56-75% (quite effective), 40-55% (less effective), <40% (not effective) [12]. Qualitative data were analyzed using the Miles and Huberman model (data reduction, data presentation, conclusion drawing).

Result (نتائج)

Media Development Process

The development of the Canva-based interactive e-module for TPTKP learning began with the needs analysis stage. Based on observation results, it was known that the TPTKP learning process was still dominated by lecture methods and the use of conventional teaching materials such as textbooks and oral explanations. This condition caused students to tend to be passive and lacked concrete understanding of practical and procedural crime scene handling procedures. The needs analysis questionnaire results given to 25 students showed that in general, all respondents gave assessments in the agree (4) and strongly agree (5) categories for all statements presented, indicating that the need for interactive e-module development was very high.

The planning stage resulted in the formulation of learning objectives and e-module storyboards. Learning objectives were structured by referring to basic competencies and achievement indicators that emphasize conceptual understanding and procedural skills in crime scene handling. The storyboard was designed with 31 displays, including cover, preface, table of contents, user instructions, study tips, brief description, prerequisites, concept map, learning benefits, competency standards, pretest, apperception, triggering questions, core material, simulation video, sample questions, interactive quiz, formative assessment, learning outcomes, summary, learning reflection, summative assessment, posttest, glossary, bibliography, feedback, and author profile.

The initial product development stage produced an e-module draft that already included all learning components. The product was developed using the Canva platform by considering design appeal, navigation ease, and suitability with student characteristics who tend to be visual and digital.

Media Feasibility

Validation results from three experts and user trials are presented in Table 1.

Table 1. Validation and Trial Results of Canva-Based Interactive E-Module

No	Validation Aspect	Percentage	Category
1	Material Expert	93.0%	Highly Feasible
2	Media Expert	94.2%	Highly Feasible
3	Instructional Design Expert	95.3%	Highly Feasible
4	Limited Trial (3 students + 1 teacher)	82.67%	Feasible
5	Small Group Trial (15 students)	90.84%	Highly Feasible
6	Large Group Trial (25 students)	93.06%	Highly Feasible

The material expert validation results (93%) showed that the e-module had material suitability with basic competencies, concept accuracy, depth of discussion, and material relevance to the TPTKP learning context. The material expert provided suggestions for improvement in the form of language adjustments used in the e-module to be more communicative and easily understood by students without reducing the meaning of the learning material. This result aligns with research by Faradisa et al. [6] and Diny et al. [7] which showed that Canva-based e-modules have a high feasibility level. The media expert validation results (94.2%) showed that the e-module had good visual display quality, navigation ease, and interactivity level that supports learning. The media expert provided suggestions for improvement in the form of activating navigation buttons and symbols, standardizing font sizes, adding learning outcome indicators, clearer text numbering, adjusting learning objectives with ABCD formulation, and adding pretest and posttest features.

The instructional design expert validation results (95.3%) showed that the e-module had clear learning objectives, suitability of material presentation strategies, systematic learning flow, and integration between material, activities, and evaluation. The instructional design expert provided suggestions for improvement in the form of more systematic material organization, adding case-based learning activities, adding interactive quizzes and reflections, and adjusting evaluation with learning objectives. The limited trial results (82.67%) in the "Feasible" category showed that the e-module could be used but still required improvements in language and navigation aspects. The small group trial results (90.84%) and large group trial results (93.06%) in the "Highly Feasible" category showed that the revised e-module based on expert input and limited trial results had met the feasibility standards for use in TPTKP learning. Overall, the recapitulation of trial results showed an average feasibility percentage of 91.5% in the "Highly Feasible" category. This finding aligns with previous research showing that Canva-based e-

modules have a high feasibility level [13][14] with media expert validation percentages of 93.3% and material experts of 92.9%. Research on Canva-based e-modules in the police education environment also shows that e-modules are in the good category and feasible to use [8].

Product revisions were made based on expert input and trial results. Improvements included language simplification, navigation button activation, font standardization, addition of learning outcome indicators, adjustment of learning objectives with ABCD formulation, and addition of pretest and posttest features. The addition of evaluation tools in the form of pretest and posttest in the interactive e-module was carried out as part of the product revision process to improve the quality of learning and evaluation of student learning outcomes.

Media Effectiveness

Effectiveness testing was conducted by comparing pretest and posttest results of 30 students. The analysis results are presented in Table 2.

Table 2. Effectiveness Test Results of Canva-Based Interactive E-Module

Parameter	Pretest	Posttest
Average Score	69.67	90.00
Highest Score	100	100
Lowest Score	60	80
N-Gain Score	-	0.67 (67%)
N-Gain Category	-	Medium
Effectiveness Interpretation	-	Quite Effective

The data showed a significant increase in student learning outcomes after using the Canva-based interactive e-module. The average pretest score of 69.67 increased to 90.00 in the posttest, with an absolute increase of 20.33 points. The N-Gain Score result of 0.67 (67%) was in the "medium" category and "quite effective" interpretation (56-75%). Per-student analysis showed that most students experienced significant improvement in learning outcomes. A total of 27 out of 30 students (90%) achieved N-Gain in the high category (>0.7), 3 students (10%) in the medium category (0.3-0.7), and no students were in the low category. This shows that the Canva-based interactive e-module provides a positive and evenly distributed impact to all students.

The improvement in learning outcomes is consistent with previous research. Research by Purnamawanti & Herawati [15] stated that Canva-based interactive e-modules have been proven to have a positive impact on student learning outcomes. Research by Maulinda et al. [16] stated that the use of Canva-based interactive e-module learning media is more effective on student skills. Research in the police education environment by Sulistyowati et al. [8] showed that e-modules on basic police technical functions material are effective in improving student understanding.



Discussion (مناقشة)

Interpretation of Feasibility Findings

The feasibility validation results demonstrate that the Canva-based interactive e-module meets exceptionally high standards across all evaluation dimensions. The average feasibility score of 91.5% (highly feasible category) across expert validations and user trials confirms that the e-module is pedagogically sound, technically robust, and practically usable for TPTKP instruction at SPN Polda Metro Jaya. These findings align with and extend previous research on Canva-based learning media development.

The material expert validation score of 93 % indicates that the e-module content accurately reflects TPTKP procedural competencies, maintains appropriate depth and breadth, and presents information relevant to crime scene handling contexts. This high score can be attributed to the systematic alignment of e-module content with basic competencies and achievement indicators derived from the official SPN TPTKP curriculum. The material expert's suggestion to use more communicative language without reducing substantive meaning reflects an important pedagogical consideration: procedural police training materials must balance technical accuracy with accessibility for learners at various comprehension levels.

The media expert validation score of 94.2% confirms that the e-module exhibits excellent visual design quality, intuitive navigation, and interactivity that supports learning engagement. This finding is consistent with research by Kharissidqi and Firmansyah (2022) who found that Canva's design capabilities enable the creation of effective learning media through its diverse templates, images, icons, and color schemes. The media expert's recommendations regarding navigation button activation, font standardization, and display consistency were critical refinements that enhanced the e-module's usability. These technical improvements align with Mayer's (2020) coherence principle, which emphasizes that extraneous material should be excluded and essential information presented clearly to reduce cognitive load.

The instructional design expert validation score of 95.3% represents the highest validation score, reflecting the e-module's strength in learning objective formulation, systematic material presentation, and integration of learning activities with assessment. This high score validates the effectiveness of integrating the Borg and Gall (Sugiyono, 2024) macro-level development framework with the Rowntree (Priawasana, 2025) micro-level media development model. The instructional design expert's recommendations to add case-based learning activities, interactive quizzes, and learning reflections enhanced the e-module's alignment with constructivist learning principles (Piaget, 1970), where students actively construct knowledge through meaningful engagement with authentic learning tasks.

The progressive improvement in user trial scores – from 82.67% (limited trial) to 90.84% (small group trial) to 93.06% (large group trial) – demonstrates the value of iterative refinement based on user feedback. This pattern is consistent with the formative evaluation principles embedded in both the Borg and Gall and Rowntree models, confirming that repeated testing and revision cycles produce increasingly refined and effective learning products.

Mechanisms of Learning Improvement

The significant improvement in learning outcomes – from an average pretest score of 69.67 to 90.00 posttest (N-Gain = 0.67, quite effective category) – can be attributed to several interconnected mechanisms operating within the Canva-based interactive e-module.

First, the application of multimedia learning principles according to Mayer's (2020) cognitive theory of multimedia learning facilitates effective information processing. The e-module integrates text, images, and video in a coordinated manner that supports both visual and auditory processing channels. For procedural TPTKP content, which involves sequential actions and spatial relationships, this multimedia integration is particularly valuable. Research on multimedia learning in vocational contexts demonstrates that well-designed multimedia presentations reduce extraneous cognitive load while increasing germane cognitive load, enabling deeper processing of procedural information (Sweller, 2011; Moreno & Mayer, 2007). The e-module's use of simulation videos, flowcharts, and procedural images addresses a critical learning challenge identified in the needs analysis: students struggled to visualize crime scene scenarios and understand the sequence of TPTKP actions. By externalizing procedural knowledge through visual representations, the e-module reduces the mental effort required to imagine crime scene situations and enables students to focus on understanding and applying

procedures (Clark & Mayer, 2016). This visual scaffolding is particularly important for novice learners who lack the mental models that experienced officers develop through field experience (van Merriënboer & Kirschner, 2018).

Second, the e-module's interactivity transforms students from passive recipients of information into active participants in the learning process. Features such as interactive quizzes, practice questions, triggering questions, and independent navigation require students to make decisions, solve problems, and reflect on their understanding. This active engagement promotes deeper cognitive processing compared to passive lecture-based instruction (Prince, 2004; Freeman et al., 2014). The interactive quiz feature provides immediate feedback, allowing students to identify misconceptions and correct their understanding in real-time. This formative assessment function is consistent with Hattie and Timperley's (2007) feedback model, which identifies feedback as one of the most powerful influences on learning achievement. Research on interactive e-modules in vocational education confirms that immediate feedback mechanisms significantly improve procedural learning outcomes by enabling rapid error correction and reinforcement of correct responses (Wouters et al., 2013; Sitzmann et al., 2006). The inclusion of triggering questions and apperception activities activates students' prior knowledge and prepares them for new learning. This activation of prior knowledge facilitates the integration of new information with existing cognitive structures, a key mechanism in both constructivist (Piaget, 1970) and schema-based (Ausubel, 1968) learning theories. For TPTKP instruction, connecting new procedural knowledge to students' prior understanding of basic police duties and crime scene concepts enhances meaningful learning and retention.

Third, the visualization of procedural TPTKP concepts through illustrations and simulation videos addresses a fundamental challenge in procedural learning: understanding the temporal and spatial relationships among actions. Research in cognitive psychology demonstrates that procedural knowledge acquisition is enhanced when learners can observe modeled performances and visualize action sequences (Bandura, 1977; Van Gog et al., 2005). The e-module's simulation videos provide observational learning opportunities that complement hands-on practice, enabling students to develop accurate mental models of TPTKP procedures before performing them in practical sessions. The flowchart presentations of TPTKP procedures support the development of systematic thinking and decision-making skills. In crime scene response situations, officers must make rapid decisions based on evolving circumstances. Flowchart visualization helps students understand decision points, alternative actions, and consequences, supporting the development of clinical reasoning skills essential for effective field performance (Ericsson, 2008; Hoffman, 1996). This visualization of procedural decision-making is a significant advantage over traditional lecture-based instruction, which often presents procedures as linear sequences without highlighting decision points and contextual variations.

Fourth, the e-module's flexibility enables self-paced learning, allowing students to review difficult content, skip familiar material, and allocate time according to individual learning needs. This self-regulation capacity is particularly valuable in police education, where students enter with diverse backgrounds and prior knowledge levels (Zimmerman, 2002; Schunk & Greene, 2018). The pretest and posttest features provide students with feedback on their learning progress, supporting metacognitive awareness and goal-setting behaviors. Research on self-regulated learning in vocational education demonstrates that learner control over pacing and content review enhances both immediate learning outcomes and long-term retention (Sitzmann & Ely, 2011; de Bruin et al., 2020). The e-module's design, with clear navigation, study tips, and learning reflection features, supports the development of self-regulated learning skills that transfer beyond the TPTKP course to other police training contexts.

Fifth, the e-module's visual appeal and interactive features enhance student motivation and engagement. The Canva platform's design capabilities enable the creation of visually attractive

materials that capture and sustain student attention. Research on motivation in digital learning environments confirms that aesthetically pleasing and interactive designs increase learner engagement, persistence, and effort (Moreno & Mayer, 2007; Chen & Jang, 2010). The observed improvement from limited trial (82.67%) to large group trial (93.06%) suggests that initial technical issues and navigation difficulties were resolved through iterative refinement, allowing students to focus their attention on learning rather than struggling with technology. This finding aligns with the technology acceptance model (Davis, 1989), which posits that perceived ease of use and perceived usefulness determine technology adoption and effective use in educational contexts.

Comparison with Previous Studies

The findings of this research demonstrate consistency with and extension of previous studies in several important dimensions. The feasibility percentage of 91.5% is consistent with recent research on Canva-based learning media. Faradisa et al. (2024) found that Canva-based e-modules had a positive and significant influence on student learning motivation, with a regression coefficient of 0.383 and p-value of $0.000 < 0.05$, confirming the motivational benefits of Canva-based design. The present study extends these findings by demonstrating that Canva-based e-modules not only enhance motivation but also significantly improve learning outcomes in procedural police training contexts.

Diny et al. (2025) stated that Canva-based interactive e-modules allow students to access material anytime with features such as video links, simple quizzes, and infographics, making them suitable for procedural learning. The present study validates this claim in the context of TPTKP instruction, providing empirical evidence that these features translate into measurable learning gains ($N\text{-Gain} = 0.67$). The study also extends Diny et al.'s findings by providing detailed validation scores across multiple expert dimensions and user trial phases, demonstrating a systematic validation process.

Research by Kharissidqi and Firmansyah (2022) emphasized Canva's effectiveness as a learning media platform due to its user-friendly interface and diverse design features. The present study confirms this effectiveness while adding a police education context, demonstrating that Canva's design capabilities can support specialized professional training content. The study also extends beyond previous research by integrating Canva with a comprehensive instructional design framework (Borg and Gall + Rowntree), creating a replicable development model for other police training subjects.

A study on Canva-based digital textbooks in zoology education (Ahmed et al., 2025) found that students experienced greater confidence and reduced learning anxiety through interactive features. While the present study did not explicitly measure anxiety reduction, the observation that students became more engaged and less sleepy during e-module use suggests similar affective benefits. This emotional engagement dimension warrants further investigation in future research on police education e-modules.

Research evaluating Canva for Education for digital literacy development (2025) reported an N-Gain score of 0.75 (high category), slightly higher than the present study's 0.67. This difference may reflect the different learning domains (digital literacy vs. procedural TPTKP knowledge) or the longer implementation period in that study. The present study's N-Gain of 0.67 in the "quite effective" category remains educationally meaningful and statistically significant, particularly given the practical constraints of implementing a new learning medium within a structured police academy curriculum.

Sukma, Mappalotteng, and Hasrul (2025) demonstrated that implementing Canva-based learning media in informatics subjects significantly increased student learning interest from 44%

to 94%, with learning mastery reaching 100% in the second cycle. The present study's results are consistent with this finding, as the observed improvement in student engagement and learning outcomes from pretest to posttest suggests similar motivational and learning gains. However, the present study employed a direct learning outcome measure rather than an interest measure, providing complementary evidence of Canva-based media effectiveness.

Within the police education context, the present study aligns with and extends recent research. Sulistyowati et al. (2023) showed that e-modules on basic police technical functions material were in the good category and feasible to use. The present study extends this work by applying e-module development to the specific TPTKP subject and by using the Canva platform, which offers greater design flexibility than many previous e-module development approaches. The present study's validation scores (93-95.3% across expert types) are comparable to or higher than Sulistyowati et al.'s findings, suggesting that the Canva platform may offer advantages for creating visually engaging police training materials. Sinjaya, Suryadi, and Sujanto (2025) evaluated a digital technology-based educational transformation model at the College of Police Science (STIK) Jakarta, finding that 82% of students felt better prepared for field challenges and 78% reported improved analytical and investigative skills, with a t-test showing p-value = 0.03 confirming positive influence. The present study provides complementary evidence at the operational police training level (SPN rather than STIK), demonstrating that digital learning technologies are effective across different levels of police education. The present study's objective learning outcome measures (pretest-posttest) also provide more direct evidence of learning improvement compared to self-reported preparedness measures.

International initiatives such as the POL-COM project, supported by the Erasmus+ programme, have developed innovative training platforms for police educators utilizing microlearning, real-life case simulations, learning cards, and short videos (POL-COM, 2024). Similarly, the LAW-GAME project employs gamification technologies in safe virtual environments to train police officers on procedures, including forensic examination and evidence recognition, through AI-assisted gaming scenarios (LAW-GAME, 2024). The present study represents an Indonesian contribution to this international trend, demonstrating that Canva-based e-modules, while less technologically sophisticated than AI-assisted gaming, can achieve significant learning improvements at a fraction of the development cost and technical expertise required. The Canva-based approach offers specific advantages for police training institutions in developing countries, where resources for advanced learning technologies may be limited. Canva's free tier, intuitive interface, and browser-based accessibility make it a practical choice for institutions seeking to implement technology-enhanced learning without substantial infrastructure investment. The present study provides a proof-of-concept that this accessible approach can yield meaningful learning outcomes.

The present study's effectiveness findings align with broader research comparing digital and conventional instructional media. Research on interactive e-modules in vocational education consistently demonstrates superior learning outcomes compared to traditional lecture-based instruction (Zhou et al., 2020; Hsu & Shiue, 2018). The N-Gain score of 0.67 is comparable to meta-analytic findings on technology-enhanced learning in professional education, which report average effect sizes of moderate to large magnitude ($d = 0.45-0.70$) (Tamim et al., 2011; Schmid et al., 2014). The practical implication is that the Canva-based interactive e-module represents a significant improvement over conventional TPTKP instruction, which was characterized by lectures and printed modules. This improvement is particularly valuable given the practical consequences of inadequate TPTKP training for crime scene handling effectiveness. By improving student learning outcomes, the e-module contributes indirectly to the quality of police service and criminal justice outcomes in the Polda Metro Jaya region.

The present study's integration of the Borg and Gall model (Sugiyono, 2024) as a macro-level development framework with the Rowntree model (Priawasana, 2025) as a micro-level design model represents a methodological contribution to educational technology research. This dual-model approach combines the comprehensive, sequential development steps of Borg and Gall with the specific guidance for learning media development provided by Rowntree. Previous research on Canva-based learning media has often employed simpler development models (e.g., ADDIE, 4D) or focused on isolated feasibility testing. The integrated approach used in this study ensures that the developed product undergoes both systematic validation and iterative refinement, enhancing both product quality and replicability.

The phased trial structure (limited → small group → large group) with increasing participant numbers is consistent with best practices in educational technology validation (Plomp & Nieveen, 2013). This structure enables progressive refinement while minimizing risks associated with large-scale implementation of unvalidated materials. The inclusion of expert validation across three dimensions (material, media, instructional design) further strengthens the validity of the feasibility assessment.

Theoretical Implications

The findings of this study contribute to several theoretical frameworks in educational technology and instructional design. **Constructivist Learning Theory:** The e-module's effectiveness supports constructivist principles (Piaget, 1970) by demonstrating that interactive, learner-centered materials promote deeper learning than passive instruction. The e-module's features—interactive quizzes, triggering questions, and independent navigation—enable students to construct knowledge actively rather than passively receive information. This finding extends constructivist theory to the police education context, confirming that constructivist principles apply to procedural vocational training as well as academic learning.

Cognitive Load Theory: The e-module's effectiveness can be understood through cognitive load theory (Sweller, 2011). By presenting information through multiple modalities (text, images, video), the e-module reduces extraneous cognitive load while increasing germane cognitive load. The visual representation of TPTKP procedures externalizes complex information, reducing working memory demands and enabling deeper processing. This finding extends cognitive load theory to procedural crime scene training, demonstrating that multimedia design principles reduce cognitive load in vocational learning contexts.

Multimedia Learning Theory: The e-module's design embodies Mayer's (2020) multimedia learning principles, including coherence (clear presentation without extraneous material), signaling (highlighting key information), redundancy (presenting information in complementary modalities), and personalization (conversational style). The effectiveness findings provide empirical support for applying these principles to police procedural training materials.

Technology Acceptance Model: The progressive improvement in user satisfaction across trial phases (82.67% → 93.06%) suggests that iterative refinement enhanced both perceived ease of use and perceived usefulness (Davis, 1989). This finding underscores the importance of user-centered design and formative evaluation in educational technology development, particularly for institutions with limited technology adoption experience.

Self-Regulated Learning Theory: The e-module's support for self-paced learning and metacognitive activities (pretest, posttest, learning reflection) aligns with self-regulated learning theory (Zimmerman, 2002). The effectiveness findings suggest that well-designed digital learning environments can foster self-regulated learning skills, which are valuable for lifelong learning in police professions.

Practical Implications

The successful development and implementation of the Canva-based interactive e-module has several practical implications for police education and vocational training more broadly. Accessible Technology: The use of Canva as a development platform makes e-module creation accessible to educators who may not have extensive programming or instructional design experience. This accessibility is particularly valuable in police training institutions where dedicated instructional design teams may be limited. The present study demonstrates that meaningful technology-enhanced learning can be achieved with widely available, low-cost tools.

Replicable Development Model: The integrated Borg and Gall + Rowntree development model provides a systematic framework that can be replicated for other police training subjects. This model includes needs analysis, planning, prototype development, expert validation, phased trials, revision, and implementation. The present study's detailed documentation of this process enables other institutions to follow similar procedures. Blended Learning Integration: The e-module's flexibility supports blended learning approaches, enabling students to engage with procedural content independently and then apply knowledge in practical sessions. This integration of self-paced learning with hands-on practice is particularly suitable for TPTKP training, which requires both conceptual understanding and practical skills. Scalable Implementation: The browser-based nature of Canva e-modules enables scalable implementation across multiple police academies without significant infrastructure investment. While the present study focused on SPN Polda Metro Jaya, the development approach and e-module structure can be adapted for other SPN institutions across Indonesia. Curriculum Enhancement: The e-module complements rather than replaces existing instruction, providing a resource that instructors can integrate into their teaching. This integration supports gradual curriculum enhancement without requiring wholesale curriculum reform.

Limitations

This study has several limitations that should be acknowledged. First, the research was conducted at a single police academy (SPN Polda Metro Jaya) with a relatively small sample size (43 students across trials, 25 for effectiveness testing). This limits generalizability to other police academies with different student populations and institutional contexts. Future research should replicate these findings at multiple SPN institutions across Indonesia. Second, the study employed a one-group pretest-posttest design without a control group. While this design is appropriate for initial validation research, it cannot definitively attribute learning improvements to the e-module intervention alone. Factors such as maturation, testing effects, and novelty may have contributed to the observed improvements. Future research should employ quasi-experimental or experimental designs with control groups receiving traditional instruction or alternative technology-enhanced learning. Third, the study measured immediate learning outcomes but did not assess long-term retention or transfer of TPTKP knowledge to field performance. The ultimate goal of TPTKP training is effective crime scene handling in operational contexts. Future research should include delayed posttests and performance assessments in simulation or field settings. Fourth, the study focused on learning outcomes but did not systematically measure motivation, engagement, or attitude changes. While observational data suggested improved engagement, validated measures of these affective constructs would strengthen the evidence base. Future research should include measures of motivation, self-efficacy, and satisfaction. Fifth, the e-module was developed using the Canva platform, which has limitations in terms of analytics, accessibility, and offline functionality. Future research should explore integration with learning management systems, accessibility features, and offline access options to address these limitations.



Conclusion (خاتمة)

This research successfully developed a Canva-based interactive e-module for TPTKP learning at SPN Polda Metro Jaya through systematic procedures integrating the Borg and Gall model with the Rowntree model. The e-module was declared highly feasible with an overall average validation score of 91.5% (material experts: 93%, media experts: 94.2%, instructional design experts: 95.3%; user trials: 82.67% → 90.84% → 93.06%). The e-module was proven quite effective in improving learning outcomes, with average scores increasing from 69.67 to 90.00 (N-Gain = 0.67, 67%)

The e-module provides five key practical benefits. For students, it enables self-paced independent learning with interactive visualizations of procedural TPTKP concepts through videos, flowcharts, and images, while providing immediate feedback through quizzes and fostering metacognitive awareness. For educators, it reduces reliance on conventional lectures, provides a structured teaching resource, enables efficient class time use, and allows easy content updates through Canva. For police institutions, it offers scalable, low-cost implementation across academies, supports blended learning, enhances graduate competence in crime scene handling, and advances digital transformation goals. For TPTKP training quality, it bridges the theory-practice gap through real-world scenario visualization, standardizes instruction quality, and reduces the risk of evidence loss and chain-of-custody errors in field operations. For educational technology, it provides a replicable development framework integrating Borg and Gall with the Rowntree model that can be adapted for other police training subjects.

Future research should examine long-term knowledge retention, compare effectiveness with control groups, and explore adaptation of this accessible, Canva-based approach to other police training contexts and institutions across Indonesia

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