

EVALUATING TPACK-BASED DIGITAL LEARNING MEDIA TRAINING FOR TEACHERS IN A ONE-ROOF JUNIOR SECONDARY SCHOOL

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Abstract. The ability to integrate technology, pedagogy, and subject matter has become an essential teacher competency in the digital era. This study evaluated the implementation and perceived outcomes of a digital learning media training program based on the Technological Pedagogical Content Knowledge (TPACK) framework for teachers at SMP Satu Atap Negeri 1 Poncomulyo, Pati Regency, Indonesia. A descriptive quantitative approach with a program evaluation design was employed. The participants were 16 teachers who completed 32 instructional hours of training. Data were collected through structured observations of attendance and participation, as well as a four-point program evaluation questionnaire. Frequencies, percentages, and descriptive interpretations were used to analyze the data. All participants attended the entire program and actively engaged in presentations, discussions, and practical activities. Most participants rated the relevance of the materials, program implementation, facilitator competence, time allocation, and supporting facilities as good or very good. Fifteen participants (93.8%) selected the highest rating for perceived improvement in their knowledge of digital learning media development. Participants also reported improvements in skills, experience, motivation, and confidence. However, one participant reported that the materials did not fully address individual needs, and another reported no perceived improvement in technical skills. The findings indicate that the program was well-received and perceived as providing immediate benefits. Nevertheless, pretest-posttest measures, product assessment, and classroom observations are required before conclusions can be drawn about objective improvements in teachers' TPACK competencies.

Keywords: TPACK, teacher digital competence, digital learning media, teacher training, program evaluation

INTRODUCTION

Digital transformation has changed the competencies teachers need to design and facilitate learning. Technology is no longer used solely as a supporting tool for presenting information but has become part of lesson planning, classroom interaction, assessment, and the development of learning experiences. Consequently, teachers are expected to select technologies that correspond to learning objectives, subject matter, pedagogical strategies, and student needs. However, technical proficiency alone does not guarantee meaningful technology integration.

The Technological Pedagogical Content Knowledge framework explains the knowledge teachers require to integrate technology, pedagogy, and content effectively. TPACK extends the concept of pedagogical content knowledge by incorporating technology as a knowledge domain that interacts with pedagogical and content knowledge. It consists of technological knowledge, pedagogical knowledge, content knowledge, technological pedagogical knowledge, technological

content knowledge, pedagogical content knowledge, and technological pedagogical content knowledge (Mishra & Koehler, 2006).

TPACK does not treat technology, pedagogy, and content as independent competencies. Instead, these domains must be integrated according to the instructional context. Teachers with strong TPACK are not merely capable of operating digital applications. They can also explain the pedagogical reasons for using particular technologies, select media that align with the subject matter, and adapt technology use to students' characteristics. TPACK has therefore become one of the most widely used frameworks for explaining teachers' technology integration competencies (Voogt et al., 2013).

Pedagogically meaningful technology integration is increasingly important because technology use in schools is frequently limited to presentation and information delivery. Digital tools are not always used to facilitate active learning, collaboration, problem-solving, differentiation, and formative assessment. Teacher professional development should therefore go beyond application-oriented instruction and connect technology with learning objectives, pedagogical strategies, subject content, and classroom conditions.

Preparing teachers to integrate technology requires authentic learning experiences, direct practice, facilitator modeling, reflection, collaboration, and mentoring. A synthesis of teacher education research found that technology-related professional development is more meaningful when conceptual knowledge is connected to instructional practice, learning design, and the solution of authentic educational problems (Tondeur et al., 2012). Professional development should also consider school context, institutional support, infrastructure, teacher beliefs, and opportunities to apply newly acquired competencies.

Practice-oriented training is one strategy for developing teachers' TPACK. It enables teachers to study principles of technology integration while producing learning media for their classes. Professional development that includes hands-on practice, collaborative learning, mentoring, and sustained support is more likely to influence teachers' attitudes and technology integration practices than lecture-oriented or device-focused training (Amemasor et al., 2025).

In Indonesia, TPACK is particularly important because teachers must respond to the demands of digital learning while facing unequal access to professional development and technological infrastructure. Indonesian studies suggest that technological proficiency should be accompanied by the ability to connect digital tools with pedagogy and subject content. Mastery of only one TPACK component is insufficient to produce high-quality technology integration (Sartika et al., 2023).

The need for professional development was identified at SMP Satu Atap Negeri 1 Poncomulyo, a one-roof junior secondary school in Pati Regency, Central Java. Preliminary observations indicated that teacher-centered lectures frequently dominated instruction and that digital learning media were not optimally used. The school is located relatively far from the regency center and has limited facilities and access to professional development. Several teachers are non-permanent employees who also teach at other schools. The school is also periodically affected by flooding, which creates a need for flexible learning media that can support instruction beyond conventional classroom meetings.

These conditions informed the development of a 32-hour TPACK-based digital learning media training program. The program addressed 21st-century learning, TPACK concepts, digital learning media, and the development of Canva-based instructional materials. Program evaluation included observations of attendance and participation, and a questionnaire was administered at the end of the training.

Although many TPACK and digital media training programs have been conducted, their reports often focus on activity sequences and participant satisfaction. Evaluations do not always distinguish among program relevance, implementation quality, facilities, and perceived changes in knowledge, skills, motivation, and confidence. Positive self-reported responses should also not be automatically interpreted as evidence of objectively improved competence, because self-reported competencies may differ from those demonstrated through performance tests, product assessments, or classroom observations (Schmidt et al., 2009; von Kotzebue et al., 2022).

Accordingly, this study evaluated the implementation and perceived immediate outcomes of a TPACK-based digital learning media training program. It did not test the intervention's causal effectiveness but provided an empirical description of program quality and the benefits perceived by participating teachers. The study addressed three questions: (a) How was the training program implemented? (b) How did participants evaluate the quality of the program? and (c) How did participants perceive changes in their knowledge, skills, experience, motivation, and confidence following the training?

METHODS

Research Design

This study employed a descriptive quantitative approach with a program evaluation design. A quantitative approach was used because the principal data consisted of structured responses expressed as numerical scores, which were summarized using descriptive statistics. Descriptive research systematically presents the characteristics of a phenomenon without manipulating variables or establishing experimental causality (Creswell & Creswell, 2023).

The program evaluation design was used to assess the implementation and immediate outcomes of the TPACK-based digital learning media training. Program evaluation provides information for improving program planning, implementation, and sustainability. This function is consistent with the CIPP model, which conceptualizes evaluation as a decision-making and program improvement process involving context, input, process, and product evaluation (Stufflebeam, 2000; Stufflebeam & Zhang, 2017).

Based on the available data, the evaluation focused on two components. The process component included attendance, active participation, engagement in discussions, and participation in practical activities. The immediate outcome component included participants' evaluations of program quality and their perceived changes in knowledge, skills, experience, motivation, and confidence. Because the study did not include an objective pretest, posttest, or comparison group, the findings were not interpreted as causal evidence of training effectiveness.

Setting and Participants

The study was conducted at SMP Satu Atap Negeri 1 Poncomulyo, Pati Regency, Central Java, Indonesia. The participants were 16 teachers who attended the entire TPACK-based digital learning media training program. All participating teachers were included as respondents. This approach can be categorized as total population sampling because the entire accessible target population was involved in data collection. Total population sampling is appropriate when the population is small, and all members can be reached (Creswell & Creswell, 2023). The individual teacher was the unit of analysis. Because the participants came from one school and constituted a small group, the findings are context-specific and are not intended for statistical generalization to all junior secondary school teachers.

Training Program

The training consisted of 32 instructional hours and was developed using the ADDIE model: analysis, design, development, implementation, and evaluation. ADDIE provides a systematic framework for developing instructional and training programs from needs analysis to program evaluation (Branch, 2009).

During the analysis stage, the team identified participant needs, school characteristics, existing technology use, and instructional problems. The design stage involved formulating objectives, selecting content, determining instructional methods, allocating time, and designing evaluation activities. During development, the team prepared presentation materials, modules, practical guidelines, and examples of digital learning media. Implementation involved conceptual explanations, demonstrations, discussions, guided practice, and mentoring. Evaluation was conducted during and after the program.

The training covered the characteristics of 21st-century learning; the concepts and components of TPACK; the functions of digital learning media; principles for selecting media based on objectives and learner characteristics; and the practical development of Canva-based digital learning media. The program adopted an experiential approach through demonstrations, direct practice, discussions, and reflection. Professional competence is more likely to develop when participants engage in concrete experiences, practice relevant skills, receive feedback, and reflect on their performance (Yardley et al., 2012).

Data Collection Observation

Structured observation was used to document attendance, attention during presentations, active questioning, participation in discussions, engagement in practical activities, and completion of training assignments. Members of the training team recorded the observations using predetermined indicators to ensure that the information was systematic and aligned with the evaluation objectives (Creswell & Creswell, 2023).

Program Evaluation Questionnaire

The questionnaire was administered after participants completed the program. It consisted of closed-ended statements with four response options. A four-point scale was selected to encourage participants to indicate the direction of their evaluations without selecting a neutral midpoint. A score of 1 represented the lowest evaluation, whereas a score of 4 represented the highest. The dimensions and indicators are presented in Table 1.

Table 1. *Questionnaire Dimensions and Indicators*

Dimension	Indicators
Program relevance	Alignment of materials with program objectives and participant needs
Implementation quality	Procedural appropriateness, adequacy of materials, and time allocation
Facilitator and program support	Facilitator competence, training room, media, and handouts
Perceived immediate outcomes	Knowledge, skills, experience, ideas, motivation, confidence, and optimism

The questionnaire was developed for program evaluation, based on the training's objectives and indicators. Ideally, educational questionnaires should undergo theoretical review, construct mapping, expert assessment, readability testing, and psychometric analysis (Artino et al., 2014; Boateng et al., 2018). However, the available program documentation did not include evidence of expert validation, pilot testing, or reliability analysis. The questionnaire was therefore treated as a program evaluation instrument rather than a standardized psychometric measure of the complete

TPACK construct. The term "improvement" refers to the improvement as perceived and reported by participants, not to objectively measured changes in competency.

Data Analysis

Data were analyzed using frequencies and percentages. The percentage for each response category was calculated as $P = (f/N) \times 100\%$, where P is the percentage of responses, f is the number of participants selecting that category, and N is the total number of participants. The complete percentage distribution across all response categories was reported to prevent less favorable responses from being obscured by aggregate positive ratings.

Ethical Considerations

Participant data were reported in aggregate form without disclosing individual identities. Questionnaire responses were used for program evaluation and academic reporting. The results should be interpreted with consideration of the original training context and the absence of documented formal ethical review procedures.

RESULTS AND DISCUSSION

Results

Training Implementation

The 32-hour training program included 21st-century learning, the concept and benefits of TPACK, digital learning media, and Canva-based media development. All 16 participants attended the program from beginning to end, resulting in a 100% attendance rate. Observations indicated that the participants engaged in presentations, discussions, question-and-answer sessions, and practical media development. Their participation was reflected in questions directed to the facilitators and their involvement in hands-on activities.

Participant Evaluation of Training Quality

Participants evaluated the alignment of materials with training objectives and needs, program procedures, material adequacy, time allocation, and facilitator competence. Table 2 presents the complete response distribution.

Table 2. Distribution of Participant Evaluations of Training Quality

Indicator	Score 1 n (%)	Score 2 n (%)	Score 3 n (%)	Score 4 n (%)
Materials aligned with training objectives	0 (0.0%)	0 (0.0%)	3 (18.8%)	13 (81.3%)
Materials aligned with participant needs	0 (0.0%)	1 (6.3%)	4 (25.0%)	11 (68.8%)
Program implemented according to procedures	0 (0.0%)	0 (0.0%)	5 (31.3%)	11 (68.8%)
Training materials were adequate	0 (0.0%)	0 (0.0%)	4 (25.0%)	12 (75.0%)
Time allocation was appropriate	0 (0.0%)	0 (0.0%)	6 (37.5%)	10 (62.5%)
Facilitators demonstrated content mastery	0 (0.0%)	0 (0.0%)	4 (25.0%)	12 (75.0%)

Scores of 3 and 4 dominated ratings. Thirteen participants rated the alignment between the materials and training objectives as very good, while three rated it as good. To align with participant needs, 11 participants selected a score of 4, 4 selected a score of 3, and 1 selected a score of 2. This lower rating indicates that the program did not fully accommodate the needs of

every participant. Program procedures, material adequacy, time allocation, and facilitator competence received no scores of 1 or 2.

Perceived Immediate Training Outcomes

Participants evaluated perceived changes in knowledge, skills, experience, ideas, motivation, confidence, and optimism. The response distribution is shown in Table 3.

Table 3. Distribution of Perceived Immediate Training Outcomes

Indicator	Score 1 n (%)	Score 2 n (%)	Score 3 n (%)	Score 4 n (%)
Knowledge of digital media development improved	0 (0.0%)	0 (0.0%)	1 (6.3%)	15 (93.8%)
Skills in developing digital media have improved	1 (6.3%)	0 (0.0%)	4 (25.0%)	11 (68.8%)
Experience in developing digital media has improved	0 (0.0%)	0 (0.0%)	5 (31.3%)	11 (68.8%)
Ideas, motivation, and confidence to improve teaching increased	0 (0.0%)	0 (0.0%)	6 (37.5%)	10 (62.5%)
Confidence in using digital learning media increased	0 (0.0%)	0 (0.0%)	7 (43.8%)	9 (56.3%)
Ideas, motivation, and confidence increased after facilitator presentations	0 (0.0%)	0 (0.0%)	5 (31.3%)	11 (68.8%)
Optimism about creating a different classroom atmosphere increased	0 (0.0%)	0 (0.0%)	6 (37.5%)	10 (62.5%)

Perceived knowledge improvement received the strongest response: 15 participants selected the highest rating, and one selected a score of 3. The pattern for skills was more varied: 11 participants selected a score of 4, four selected a score of 3, and one selected a score of 1. The lowest response suggests that the program did not yield the same perceived improvement in technical skill for all participants. Only 9 participants selected the highest rating for confidence in using digital media, compared with 15 who selected the highest rating for knowledge improvement. This contrast suggests that conceptual understanding developed more strongly than confidence in independent technology use.

Participant Evaluation of Training Facilities

Table 4. Distribution of Participant Evaluations of Training Facilities

Indicator	Score 1 n (%)	Score 2 n (%)	Score 3 n (%)	Score 4 n (%)
The training room was adequate	0 (0.0%)	0 (0.0%)	8 (50.0%)	8 (50.0%)
Training media were adequate	0 (0.0%)	0 (0.0%)	5 (31.3%)	11 (68.8%)
Training handouts were adequate	0 (0.0%)	0 (0.0%)	4 (25.0%)	12 (75.0%)

The training room received equal ratings of 3 and 4. Training media and handouts received higher proportions of responses scoring 4. Although no participant rated the facilities negatively, the lower proportion of very good ratings for the training room suggests that room arrangement, internet access, electrical outlets, or comfort could be improved.

Summary of Findings

Fourteen of the 16 evaluated indicators received only scores of 3 and 4. One participant selected a score of 2 for alignment between the training materials and individual needs, and one selected a score of 1 for perceived improvement in digital media development skills. The program was therefore generally well received, but participant responses were not completely uniform. Variation was most evident in the accommodation of individual needs and in perceived improvement in technical skill.

Discussion

Training Implementation and Participant Engagement

All participants attended the entire training program and engaged in discussions and practical activities. Active engagement is an important feature of effective teacher professional development because teachers should not be positioned merely as passive recipients of information (Desimone, 2009). The Canva-based practical activities enabled participants to apply the technology introduced during the training directly. Nevertheless, attendance and participation should not be interpreted as evidence of improved competency. They indicate successful program implementation at the process level. More robust evidence would require pretest-posttest comparisons, product evaluation, and classroom observation (Lawless & Pellegrino, 2007).

Relevance of the Training Materials

The strong alignment between the materials and program objectives indicates that the training addressed its intended focus. TPACK emphasizes that technology should be selected and used in relation to pedagogical objectives and subject content rather than being taught as an isolated technical skill (Mishra & Koehler, 2006). However, one participant rated the alignment between the materials and personal needs as only fair. This response suggests that a uniform training model may not meet the needs of teachers with different subject specializations, varying levels of digital competence, or varying levels of prior technology experience. Context is an essential dimension of TPACK because school characteristics, subject matter, student needs, facilities, policy, and teacher experience influence technology integration decisions (Rosenberg & Koehler, 2015). Future programs should therefore begin with a more detailed needs assessment and provide differentiated practical assignments.

Training Quality and Duration

Participants evaluated the facilitator's competence and the material's adequacy positively. Effective technology professional development requires conceptual explanation, modeling, hands-on activities, feedback, reflection, and expert support (Darling-Hammond et al., 2017).

Although time allocation was positively rated, a larger proportion of participants selected a score of 3 for this indicator than for material relevance or facilitator competence. Thirty-two instructional hours may be sufficient to introduce concepts and provide initial practice, but may not be sufficient to develop stable, transferable technical skills. Professional development for digital and blended learning is more effective when sustained and supported by ongoing pedagogical and technical assistance (Philipsen et al., 2019). Follow-up activities such as digital media clinics, peer-sharing groups, online mentoring, and classroom assignments would strengthen the program.

Differences Between Knowledge and Skill Development

The most important finding was the difference between perceived knowledge and skill improvement. All participants reported increased knowledge, and 93.8% selected the highest rating. In contrast, one participant reported no perceived improvement in technical skills.

Conceptual knowledge and practical skill do not develop through identical processes. Participants may understand the purposes and procedures for using digital media but still have difficulty producing instructional media independently. Technical skill requires repeated practice, problem-solving, feedback, and opportunities to apply technology to specific subject matter. Authentic practice, collaboration, modeling, reflection, and continuing support are central to technology integration development (Tondeur et al., 2012). The lowest rating should therefore not be dismissed as an insignificant outlier. It indicates that the training did not benefit all participants equally and that differentiated assistance is required.

Motivation and Confidence

Participants reported positive changes in motivation, ideas, confidence, and optimism. However, the proportion selecting the highest rating for confidence in using digital learning media was substantially lower than the proportion selecting the highest rating for knowledge. Technology integration is influenced not only by knowledge but also by confidence, pedagogical beliefs, organizational culture, and available support (Ertmer & Ottenbreit-Leftwich, 2010). Teachers may understand digital applications but remain reluctant to use them independently when they anticipate technical difficulties or lack institutional support. Successful experience is an important basis for confidence. Teachers should therefore be given opportunities to implement their media, observe student responses, discuss challenges, and revise their products.

Facilities and Institutional Support

The training media and handouts were positively evaluated, while the training room received fewer highest-category ratings. Technology-based training requires not only a physical room but also reliable internet access, electricity, appropriate equipment, suitable seating arrangements, and timely technical assistance. Teacher knowledge and confidence represent internal factors, whereas infrastructure, technical support, leadership, time, and school culture represent environmental factors influencing technology integration (Ertmer & Ottenbreit-Leftwich, 2010). Training outcomes are unlikely to be sustained if teachers return to school environments that do not support digital media use. Institutional support should therefore include access to devices and connectivity, professional learning communities, technical assistance, and school policies encouraging meaningful digital learning.

Interpretation Within the TPACK Framework

The findings indicate perceived improvements in technology-related knowledge, experience, motivation, and readiness. However, they do not establish improvement across all TPACK domains. The questionnaire evaluated the training and participants' perceived immediate outcomes, rather than separately measuring technological, pedagogical, and content knowledge and their intersections. The study should therefore be understood as an evaluation of TPACK-based digital media training rather than a comprehensive assessment of teachers' TPACK.

TPACK is a complex construct that has been assessed through self-report questionnaires, interviews, knowledge tests, lesson plan analyses, observations, and performance assessments (Voogt et al., 2013). Future evaluations should require teachers to produce media and lesson plans that can be assessed for content accuracy, pedagogical appropriateness, technological relevance, usability, and potential student engagement.

Interpretation of Highly Positive Responses

Most indicators received positive ratings from 93.8% to 100% of participants. These responses demonstrate strong acceptance of the program, but should be interpreted with caution. The questionnaire was administered immediately after the training, and responses may have reflected satisfaction with the facilitators, materials, atmosphere, or organizers rather than durable

competency change. Because the study involved only 16 participants, each response accounted for approximately 6.3% of the total, and individual responses therefore had a noticeable influence on the percentage distributions.

High-quality professional development evaluation should connect program characteristics with teacher knowledge and beliefs, classroom practice, and student outcomes (Desimone, 2009). The present study addressed only program implementation and perceived immediate outcomes. It does not provide causal evidence that the training improved comprehensive TPACK competence.

Implications for Practice

Future TPACK-based training should begin with a detailed assessment of teachers' digital competence, subject specialization, experience, and individual learning needs. Participants should be grouped or given differentiated assignments based on their initial competence. The proportion of hands-on practice should be increased. Participants should design media, present their products, receive feedback from peers and facilitators, revise their work, and implement it in actual classrooms. Follow-up mentoring through digital media clinics, professional learning communities, online assistance, and classroom observations may help convert training experiences into sustained teaching practices. Program evaluation should move beyond satisfaction and self-reported outcomes. Pretests and posttests, validated TPACK instruments, product assessment rubrics, classroom observations, interviews, and student response data should be incorporated.

Limitations

This study involved only 16 teachers from one school, making the findings context-specific. The questionnaire was developed for program evaluation and lacked documented evidence of psychometric validity and reliability. The study did not include a pretest, posttest, comparison group, product assessment, or classroom observation. Data were collected immediately after the training and therefore cannot demonstrate whether the perceived outcomes were sustained or transferred to classroom practice. Accordingly, the findings should be interpreted as evidence of program implementation, participant responses, and perceived immediate benefits rather than objective evidence of comprehensive TPACK improvement.

CONCLUSION

The TPACK-based digital learning media training program was implemented as planned and was positively received by teachers at SMP Satu Atap Negeri 1 Poncomulyo. All 16 participants completed the program and engaged in presentations, discussions, and practical digital media development. Most participants rated the relevance of the materials, implementation quality, facilitator competence, time allocation, media, and handouts positively. Nevertheless, one participant indicated that the materials did not fully meet individual needs. Participants generally reported improvements in knowledge, experience, motivation, confidence, and optimism regarding digital learning media. Knowledge improvement received the strongest response. However, one participant reported no perceived improvement in technical skills, demonstrating that conceptual understanding may develop more rapidly than practical competence.

The program can therefore be considered successful in terms of implementation, participant acceptance, and perceived immediate benefits. However, the findings do not establish that the training objectively or causally improved teachers' comprehensive TPACK competence. Future programs should incorporate differentiated needs analysis, longer practical sessions, individual mentoring, subject-specific assignments, product assessment, and classroom implementation support. Future research should employ validated TPACK instruments, pretest-posttest designs,

product assessment rubrics, and classroom observations to obtain stronger evidence of changes in teacher competence and instructional practice.

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