

Enhancing Students' Competence in Curriculum and Material Development through the TPACK Approach in 21st-Century Education

Sri Handayani, Hera Heru Sri Suryanti, Ayu Istianasari, Luthfia Fanya Amanda

Slamet Riyadi University, Indonesia

DOI: <https://doi.org/10.51584/IJRIAS.2026.11060236>

Received: 24 June 2026; Accepted: 30 June 2026; Published: 14 July 2026

ABSTRACT

The aim of this study was to examine the improvement of students' competence in independent curriculum and material development through the Technological Pedagogical Content Knowledge (TPACK) approach as a vital component of 21st-century education practices. This research is action research towards the fourth semester students of English language education. Observation and interview were employed to collect data. Meanwhile, descriptive qualitative data was executed to analyzed the collected data. The result of the research shows that the TPACK framework integrates technology, pedagogy, and content knowledge, providing a holistic strategy for creating effective and engaging educational experiences. Key strategies discussed include professional development for educators, the incorporation of TPACK into curriculum design, the promotion of collaborative learning, the encouragement of practical application through projects, reflective practices, regular assessment and feedback, and ensuring access to necessary technological resources. By implementing these strategies, the article highlights how TPACK can boost student engagement, deepen content understanding, and develop essential 21st-century skills. The challenges of limited technology access and resistance to change are addressed, emphasizing the need for institutional support and continuous professional development. Ultimately, utilizing the TPACK framework empowers students to independently create and manage curricula and learning materials, preparing them for the demands of the modern educational landscape.

Keywords: TPACK framework, Curriculum and Material development, Student competence, 21st-century education

INTRODUCTION

In the ever-evolving landscape of education, technology integration has become a cornerstone of effective teaching and learning. One of the most influential frameworks guiding this integration is the Technological Pedagogical Content Knowledge (TPACK) model. This framework emphasizes the intersection of technology, pedagogy, and content knowledge, and it is instrumental in developing students' competence in creating learning modules. Here's how educators can leverage TPACK to enhance students' skills in this area.

In preparing future teachers, it important to give them knowledge that suitable with their future career. Nearest need in young generation as future teachers were technological competence. As 21st century teachers, they have to be familiar of how to conduct teaching learning process using technology, or it was familiar mentioned as instructional design. Nowadays, there is sophisticated learning approach called TPACK (Technological Pedagogical Content Knowledge) in which teaching learning process will be up to date since the content of the lesson is integrated by the use of technology. As future teacher will be challenged in handling modern and creative teaching, so the need of digital skill can not be avoided. As teaching implementation is executed based on learning preparation, so it is important of giving students competence in designing digital instructional design.

Understanding TPACK

The TPACK framework was introduced by Mishra and Koehler in 2006. It extends Shulman's concept of Pedagogical Content Knowledge (PCK) by incorporating technology as a crucial component of teaching. TPACK encompasses three primary domains:

1. **Content Knowledge (CK):** Understanding the subject matter that is to be taught.
2. **Pedagogical Knowledge (PK):** Understanding the methods and processes of teaching and learning.
3. **Technological Knowledge (TK):** Understanding how to use technology tools and resources effectively.

As the Indonesian government recently employed independent curriculum or *Merdeka Belajar*, so we have to prepare them in order they can utilize *Merdeka Belajar* curriculum after graduating from university. As we know that Merdeka curriculum is preparing the students to face the differences, progress, and the design of the learning and teaching that must be creative and innovative that includes an aspect of improved skills, a good attitude, better knowledge, and critical thinking. Merdeka curriculum is different from other curricula that have been applied in Indonesia. This curriculum has a freedom learning concept that is a response to facing the industrial 4.0 era, students must have a skill optimally and be free to take a course in other departments. Nadiem Makarim said, "Freedom of learning is meant learning with the freedom to think." The student has a position to explore the fact and critical thinking to see the development of the world and phenomena that occur.

According to Krishnapatria (2021), the Merdeka curriculum is launched in 2020 that has been implemented in the educational program in Indonesia with some challenges and difficulties like four-year education planning, online course, building a partnership, re-establishing education program and administration system. The implementation of the Merdeka curriculum is almost faced administrative or paperwork and technical issues in the process of the educational program. Besides that, the Merdeka curriculum has a blessing situation that is carried out using the online method. Then, according to Yulita and Inderawati (2021), the lack of details information from the Ministry of Education in Indonesia about the implementation of this curriculum is a little bit confusing for the teachers.

Due to the 2013 curriculum has been changed into Merdeka curriculum, some teachers in Indonesia have to face some difficulties and still adapt to new rules in the Merdeka curriculum and learn to understand the concept and principles of the Merdeka curriculum. Then, in Merdeka curriculum the implementation of teaching and learning should use Information and Technology (IT). Information and Technology (IT) is as computer software and hardware solutions that provide support of management, operations, and strategists in organizations (Thong & Yap 1995). Simply, Information and Technology is electronic tools that help the teachers to implementation in the class, likes computer, laptop, LCD, etc. Therefore most teachers, especially those who are seniors, are left behind in use IT, which causes a new problem in the Merdeka curriculum (Tircahyantil & Zaim, 2023). Some difficulties that teachers face in developing the lesson plan based on Yulita (2021), teachers' difficulty in understanding the competency standards and basic competencies, assessment, and rubrics, then choosing the effective methods to match the indicators.

Since one of the significant changes in Merdeka Belajar is the lesson plan that was called as modul ajar (learning modul). In pendidikan bahasa Inggris Universitas Slamet Riyadi, there was obligatory courses that must be taken by six semester students called Curriculum and Material Development. This course was design to supply material of how to construct lesson plan in teaching English. The learning outcome of this course was (1) Students are able to analyse Types of Syllabus Design in EFL and create their own new syllabus, (2) Students are able to conduct analysis on syllabus made by their classmate; (3) Students are able to analyse lesson plan and create their own new lesson plan, (4) Students are able to conduct analysis on lesson plan made by their classmate; (5) Students are able to construct teaching materials based on the lesson plan they have created. In this research, the researcher focusing on the fith learning outcome in which the students must be able to construct learning module by using TPACK.

MATERIAL AND METHODS

This research was conducted in Curriculum and Material Development Class in sixth semester students of PBI Unisri. This research was descriptive qualitative research. A qualitative descriptive in Lambert (2012) is a study that has comprehensive summarization, in everyday terms of specific events experienced by individuals or groups of individuals. In other words, the primary purpose of a descriptive study is to examine a sample in great detail and depth using a descriptive theory that has been articulated. This method permits participants who are most familiar with the subject under investigation to express themselves and provide the researcher with a better understanding of the situation. In this researcher. In this research, the researcher designing descriptive qualitative research about students' competence in constructing learning module using TPACK approach. The participant of this research was taken purposively, they were students who are taking Curriculum and Material Development course. Questionnaire, interview and observation was employed to collect data. The collected data, then being analyzed using descriptive qualitative research consisting of data collection, data reduction, data display, and last drawing conclusion or verification.

RESULTS AND DISCUSSION

This qualitative research was conducted intensively during six months which mainly passing through all the courses process. Based on the result of problem identification, there are some problems in constructing learning module, namely: (1) students haven't integrating content lesson with technology; (2) students only focuses on lesson material then applying approach in delivering material, and (3) students designing learning module in conventional way. To overcome this problem, the researcher propose alternative solution. But before giving solution, the researcher eager to investigate deeply about the application of TPACK in constructing learning module. Hopefully, it can be precise data about students competence in constructing learning module in accordance with modern learning process, as initial for further research. This research was conducted into two cycles, namely cycle I and cycle II. The researcher stop the cycle since the process of the teaching learning process already improved, it can been from the result of post test.

In cycle one, the research was initiated by identifying problem at classroom. It was found that (1) students tend to use traditional teaching method by choosing conventional media such as picture, realia, and puppet as tool to help learning process; (2) students haven't embodied technology or digital learning in their main activity. They choose methods of teaching English as foreign language but they didn't integrated the use of technology such as using artificial intelligence application in learning English.

From the result of problem identification, then the researcher design research planning to overcome those problems. First, the researcher construct lesson plan in which TPACK was employed. Second, the researcher preparing pre test in form of essay test to know students understanding of constructing learning module. Third, the researcher preparing students worksheet. This worksheet invited students to finish learning module which focus on implementing TPACK approach in learning English. The researcher implementing six steps to Boost Competence Using TPACK, they are:

1. **Incorporating TPACK in Curriculum Design:**

Designing curriculum that explicitly incorporates TPACK can help students understand how to blend these elements. For instance, a module on history can include interactive digital timelines (technology), storytelling techniques (pedagogy), and historical facts (content).

2. **Collaborative Learning:**

Encouraging collaboration among students can enhance their TPACK skills. Group projects that require the use of technology to present content can help students learn from each other and understand different ways to integrate technology and pedagogy.

3. **Practical Application through Projects:**

Hands-on projects where students create their own learning modules can be highly effective. These projects should require students to use various technological tools, apply pedagogical strategies, and present accurate content. For example, a science project might involve creating a digital simulation of a scientific experiment.

4. **Reflective Practices:**

Reflection is a key part of the learning process. Encourage students to reflect on their use of TPACK in developing learning modules. Questions such as "How did technology enhance my understanding of the content?" and "What pedagogical strategies were most effective?" can guide this reflection.

5. **Assessment and Feedback:**

Provide regular assessment and constructive feedback on students' use of TPACK. Rubrics that assess the integration of technology, pedagogy, and content knowledge can help students understand their strengths and areas for improvement.

6. **Access to Resources:**

Ensure students have access to the necessary technological resources. This includes hardware like computers and tablets, software applications, and internet access. Additionally, provide access to a variety of digital content that can be used in their learning modules.

After research planning was completed, then the researcher conducting research implementation by teaching students how to construct learning module using TPACK approach. To ensure correct implementation at TPACK approach, the observation was executed using observation sheet. From this observation, it was found the weakness and strength. This was used to make reflection.

In cycle two, the researcher revising research planning using the result of reflection. From the reflection we know that students still find difficulties in understanding each element in TPACK. Refer to this reflection, the researcher focusing different aspect of TPACK in cycle two. The researcher delivering material of how to adjust the type of material (particular language skills) in teaching learning process with technology.

The observation in this cycle was focusing in designing content knowledge using digital media. From the observation result, it was found that students already catch the idea of how to implement TPACK in constructing learning module. It can be seen from the result of post test. Students answered the test correctly with detail explanation.

Discussion

From the implementation of cycle one and cycle two, it was clear that this action research was success in overcoming students' problem in constructing learning module. The results of this action research demonstrate that using the TPACK approach assisted the researcher in knowing how the interconnection of technological, pedagogical, and content knowledge could help incorporate learning modules in the teacher education program. Conventionally, the incorporation of technology is isolated from the content and pedagogical knowledge (Baran, Chuang, & Thompson, 2011). The present study provides evidence that a systematic alignment of course materials could increase preservice teachers' knowledge, practices, and critical thinking skills. With an increasing number of online learning resources being incorporated in teacher education programs, TPACK serves as a tool for teacher educators to reflect on their own teaching and to improve the quality of both teaching and learning.

Adopting TPACK in the two courses raised the researcher's awareness of what challenges the preservice teachers may encounter when incorporating technology in the classroom. For example, the participants explained that even if they could find the usefulness of the course materials, the tension in the real-life classroom did not allow them to apply what they had learned or had been taught to the field placement. Such feedback provides an invaluable educational opportunity for the researcher to discuss how educators can flexibly adjust their knowledge and teaching skills to meet different learning needs in different contexts with the participants. As Mishra and Koehler (2006) stated, developing an effective class with technology integration requires instructors to employ all of the key sources of knowledge—technology, pedagogy, and content—and to be aware of how these sources of knowledge are interconnected

CONCLUSION

The TPACK framework provides a robust foundation for integrating technology into education. By focusing on the intersection of technology, pedagogy, and content knowledge, educators can enhance students' competence in developing effective learning modules. This not only prepares students for the demands of the modern world but also enriches their learning experience, making education more engaging, relevant, and effective. By implementing the strategies outlined above, educators can ensure that students are not just passive recipients of information but active creators of knowledge, equipped with the skills needed to thrive in an increasingly digital world.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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Author Profile



Sri Handayani received Bachelor and Doctoral degrees in Education of Sebelas Maret University, Indonesia in 1999 and 2014, respectively. During 1997-1999, concern in conducting research and publication on Education Practices, especially in curriculum and material development, multiple intelligence. She now a Dean of Teacher Training and Education Faculty. Recently, she volunteer as reviewer in international journal.