



Analysis of Technological Pedagogical Content Knowledge of Elementary School Lesson Plans

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Abstract. Backgrounds: The purpose of this study was to analyze the lesson plan in terms of technological pedagogical content knowledge.

Methods: This study used a qualitative approach with a content analysis method. The data used were two samples of lesson plans. The data collection technique was documentation, and the data's validity was done by expert judgment. Data analysis used the Miles and Huberman model namely data reduction, data presentation, and conclusion.

Results: The results of this study showed that the use of TPACK in lesson plan 1 was good. All components of TPACK were already contained in lesson plan 1. There has been an integration between technology use and the material's suitability. As for lesson plan 2, it was still very lacking. There was no use of technology by teachers, only focused on the text book.

Implications: There are suggestions for teachers to improve the TPACK aspect in the lesson plan by frequently participating in training programs or teacher working group activities.

Novelty: This study described that technology plays a vital role in student learning. In making lesson plan, teachers have to be able to integrate technology with existing knowledge.

Keywords: Lesson Plans · TPACK · Elementary School

1 Introduction

In essence, the preparation of lesson plan aims to design student learning experiences to achieve learning objectives. According to [1], the importance of making lesson plan is can help teachers think about the lesson so that learning difficulties can be predicted and solutions can be found. Lesson plan must be based on active learning. Students must use their cognitive aspects to build new knowledge during teaching and learning activities. By designing the lesson plan, the teacher can maximize efficient learning for students. Besides, the lesson plan is used by the teacher to avoid mistakes in the learning steps. A teacher in the era of technology education is required to have a good strategy in teaching material to students according to their field [2]. Teachers are also needed to make quality lesson plan. Namely lesson plan with measurable goals, activities that are arranged sequentially well, and media that are practical, effective, and following assessments that accommodate a student-centered learning perspective [3].

Teachers are also expected to be able to develop existing competencies which are commonly referred to as TPACK (Technological Pedagogical and Content Knowledge). TPACK is a concept used by teachers to link technology, pedagogic and content components. TPACK can be used to design teacher education curricula that align with the era and demands of 21st-century learning [4]. TPACK itself consists of several components, namely Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Pedagogical Content Knowledge (PCK) [5].

According to [6], if an educator has a good TPACK, then the teacher can develop his ability to design comparable lesson plan. Lesson plan functions directly in the capacity of TPACK, because it can impact the way or strategy of learning that occurs in the classroom. Based on the description, it can be seen that aspects of TPACK can increase activity and effectiveness in education.

2 Method

2.1 Type and design

According to [7], qualitative study is presented as a narrative text. This qualitative study was used by the authors to describe the results of the lesson plan analysis in terms of the TPACK aspect. The design of this study was content analysis [8]. Content analysis is research on documented information in the form of recordings, writing, images, sounds, or others.

2.2 Data and data source

The data used in this study was qualitative. According to [9], qualitative data can be in the form of charts, matrices, networks, field notes or graphs. Then the source of data used in this study is secondary data. [10] defined secondary data as data obtained by researchers from existing sources; secondary data can be in the form of documentation or records, financial reports, data obtained from magazines. Secondary data from this study was the lesson plans made by first grade and fifth grade teachers at PIPES.

2.3 Data collection techniques

Observation

The data collection technique used in this study was the documentation technique. According [10], documentation in a broader sense, namely the process carried out to prove based on any source, can be in the form of images, writings or documents or verbally. By studying these documents, the authors recognized the culture and values adopted by the object under study. This documentation helped check the data that has been collected. Data collection done gradually and as much as possible was composed. If later there was data that cannot be used or less relevant, the authors can still use other available data [11]. Documentation in this study was in the form of the teacher's writing or lesson plans.

2.4 Data validity

For the validity of the data in this study, the authors used the opinion of experts (expert judgment). In this case, after the instrument had been constructed about certain aspects, it was consulted with experts and asked for their opinion on the tools that have been prepared. This consultation was carried out with the supervisor to see the strength of the items

2.5 Data Analysis

Data analysis of this study used the model Miles and Huberman. This analysis consists of three streams of activities that co-occur, namely: (1) data reduction, namely the presentation of data in the form of descriptions, (2) data presentation, namely the data obtained in the form of descriptions were discussed and compared based on a theoretical basis and (3) drawing conclusions, namely the data collected and compared were summarized and interpreted.

3 Result and Discussion

According to Table 1, in the *Technological Knowledge* (TK) aspect, the results of the lesson plans analysis show that the lesson plan 1 has been able to describe the use of technology in learning. In this case, the teacher explains the material through power point. [12] explained that technology in education has an important influence on students' understanding. When it is associated with 21st-century skills marked by the demands of a teacher to master and utilize information and communication technology in all aspects of life, especially in education. Meanwhile, in lesson plan 2 it has not been seen that teachers use technology for learning. In *Pedagogical Knowledge* (PK), knowledge of learning strategies has been included, namely the scientific approach in both lesson plans. This explains that every teacher's understanding of various approaches is needed. In using the method, the teacher has also included the methods used in the lesson plan, namely observations, lectures, games/simulations, discussions, questions and answers, and assignments. The learning method is a method used by teachers in establishing relationships with students during teaching activities in an effort to achieve goals [13]. However, the two lesson plans have not included the model used in the learning process. The learning model is used as one of the guidelines for planning learning in the classroom [14].

In the Content Knowledge (CK) component, the teacher has described material that follows the core competencies and essential competencies contained in the lesson plans and the teacher has been able to develop each material and also provide new information related to the material being taught which is taken from various sources, such as textbooks, internet sources, modules, other supporting books. The depth of the material in this case the teacher has included every material contained in lesson plan 1 and lesson plan 2 in detail. The material presented by the teacher is following core competencies, essential competencies, and indicators in learning. This is in line with [15] stated that each teacher not only has a deep understanding of specific materials but teachers can

also have a broad knowledge. [16] also revealed that a teacher must be able to describe or present exciting material in front of students; one example is by providing examples in everyday life or contextual ones.

The Technological Pedagogical Knowledge (TPK) component in the teacher's lesson plan 1 has included technology-based learning media. While in lesson plan 2 the teacher has not included it. According [17], the advantages for teachers in using computers will make it easier and faster for students to work and can also cause students to feel happy because students can see pictures, listen to sound (audio), and see videos instantly. It can be said that this situation can be a supporting factor or critical to achieving learning effectiveness. Aspects of Technological Content Knowledge (TCK) in lesson plan 1, teachers can include technology-based material or technology integration in the material, such as pictures with power points and utilizing internet facilities. When associated with technological developments in the 21st century, it is a concern for teachers to continuously develop their teaching abilities [12]. In lesson plan 2 the use of the media follows the learning material, but the teacher has not linked it to existing technology.

Aspects of Pedagogical Content Knowledge (PCK) is the teacher's understanding of practical learning approaches and methods to deliver learning materials. The results show that lesson plan 1 and lesson plan 2 teachers have been able to use several methods and media in learning. [18] found that teachers were required to have the ability to use various methods or combine several suitable methods. According to [19], Pedagogical Content Knowledge (PCK) is a combination of content and pedagogic knowledge in terms of understanding organized material which is then assisted by integrating learning approaches and methods with content in learning. Aspects of Technological Pedagogical and Content Knowledge (TPACK) is the peak of knowledge, technological knowledge, pedagogics, and content. The lesson plans analysis results show that lesson plan 1 has included materials, models, methods, and learning media with materials. Meanwhile in lesson plan 2 it was still not appropriate because there was no use of technology in the lesson plan. [20] stated that TPACK can improve mastery of concepts/materials and student learning activities. Implementing TPACK can also make students feel happy, and motivated, help them understand concepts, and help solve problems related to learning [21]. So it can be said to be excellent knowledge for a teacher because TPACK contains three main elements:

4 Conclusion

4.1 Novelty and Contribution

Previous studies have mainly analyzed teachers' understanding of TPACK. This study itself described that technology plays a vital role in student learning. In making lesson plans, teachers must be able to integrate technology with existing knowledge. This way, later learning can run effectively and efficiently for teachers and students. This finding would be important in the future not only for teachers, but also for education in Indonesia. This study would be critical for later teachers to make lesson plans that can assist in implementing learning.

Table 1. TPACK Indicators in Technology Utilization

Aspect	Indicator	Lesson Plan 1	Lesson Plan 2
<i>Technological Knowledge (TK)</i>	The use of software or applications in learning. Can integrate technology into learning.	Found Found	Not Found Not Found
<i>Pedagogical Knowledge (PK)</i>	Some learning methods or strategies follow the model, approach and material. There is a learning model that follows the material.	Proper Not Found	Proper Not Found
<i>Content Knowledge (CK)</i>	Presentation of material following core competencies, essential competencies and learning indicators.	Proper	Proper
<i>Technological Pedagogical Knowledge (TPK)</i>	There are ICT technologies that are applied in models, approaches, or learning strategies. We are utilizing ICT-based learning media to achieve learning objectives.	Found Found	Not Found Not Found
<i>Technological Content Knowledge (TCK)</i>	There is the use of learning media following the material. Can use ICT to describe the material.	Proper Found	Proper Not Found
<i>Pedagogical Content Knowledge (PCK)</i>	There is the use of multiple methods of learning that are adapted to the material. There are multi-learning media according to the material.	Found Found	Found Found
<i>Technological Pedagogical and Content Knowledge (TPACK)</i>	There is a suitability of materials, models, media, and ICT in learning.	Proper	Not Proper

4.2 Limitations and Future Study

This study has the limitation of only examining two sample lesson plans made by the teacher, so it is hoped that further studies can be carried out using several examples of lesson plans from lower to upper class. In the subsequent study, the authors hopes there will be something new about the lesson plans analysis in terms of this TPACK.

4.3 Implication

There are suggestions for teachers to improve the TPACK aspect in the RPP made by frequently participating in training programs or teacher working group activities. Schools are also expected to contribute by providing the facilities needed by every teacher. In this way it is hoped that there would be an increase in the ability of teachers.

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