

MATHEMATICS TEACHER'S PROFESSIONALISM IN TECHNOLOGY AND THE RELATIONSHIP TO THEIR TEACHING

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Received 06 August 2022; Received in revised form 27 November 2022; Accepted 28 December 2022

Abstrak

Penelitian ini dilatarbelakangi oleh pentingnya melibatkan teknologi dalam proses pembelajaran. Penelitian ini bertujuan untuk melihat minat, keyakinan, dan proses mengajar pendidik menggunakan perangkat lunak Adobe Premiere Pro untuk mengkategorikan profesionalisme pendidik. Selanjutnya, penelitian ini juga menjabarkan hubungan antara minat, keyakinan, dan proses mengajar pendidik. Jenis penelitian ini adalah penelitian kualitatif dengan metode studi kasus. 19 (sembilan belas) pendidik dari 11 (sebelas) SMP di Padang, Indonesia dipilih sebagai subjek penelitian. Proses penelitian memiliki durasi yang cukup lama. Pada awal penelitian, pendidik diberikan pelatihan untuk mengembangkan video pembelajaran menggunakan software Adobe Premiere Pro. Pelatihan dilakukan sebanyak 5 kali pertemuan. Setelah itu, para pendidik diberikan angket untuk melihat minat mereka terhadap pelatihan. Pendidik diberikan pertanyaan terbuka untuk melihat keyakinan pendidik dalam menggunakan teknologi dalam pembelajaran. Tahap terakhir dari penelitian ini adalah mengamati pembelajaran dengan menggunakan lembar observasi. Hasil penelitian menemukan tiga jenis pendidik dalam penggunaan teknologi: pendidik berteknologi canggih, berteknologi rutin, dan berteknologi naif. Pendidik berteknologi canggih adalah pendidik yang meyakini bahwa teknologi sangat berperan penting dalam proses pembelajaran. Pendidik berteknologi rutin adalah pendidik yang kadang – kadang menggunakan teknologi dalam proses pembelajaran, dan pendidik berteknologi naif adalah pendidik yang tidak menggunakan teknologi dalam proses pembelajaran.

Kata kunci: Adobe Premiere Pro; berteknologi canggih; berteknologi naif; berteknologi rutin; Kategori; TPACK.

Abstract

The background of this research is the importance of involving technology in the learning process. This study aims to see teachers' interests, beliefs, and teaching processes using Adobe Premiere Pro software to categorize teachers' professionalism. Furthermore, this study also describes the relationship between interests, beliefs, and the teaching process of teachers. This type of research is qualitative research with a case study method. 19 (nineteen) teachers from 11 (eleven) junior high schools in Padang, Indonesia were selected as research subjects. The research process has a reasonably long duration. At the beginning of the study, teachers were given the training to develop learning videos using Adobe Premiere Pro software. The training was carried out in 5 meetings. Afterward, the teachers were given a questionnaire to determine their interest in the training. In addition, teachers are given open-ended questions to see teachers' beliefs in using technology in learning. The final stage of this research is to

DOI: <https://doi.org/10.24127/ajpm.v11i4.5902>

observe learning using observation sheets. This study found three types of teachers using technology: Technologically advanced teachers, technologically routine teachers, and technologically naive teachers. Technologically advanced teachers believe that technology plays an essential role in learning. Technologically routine teachers are teachers who sometimes use technology in the learning process, and technologically naive teachers are teachers who do not use technology in the learning process.

Keywords: *Adobe Premiere Pro; category; technologically advanced; technologically naive; technologically routine; TPACK.*



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INTRODUCTION

Technological Pedagogical and Content Knowledge (TPACK) is one of the new types of knowledge that must be mastered (Koh, Chai, et al., 2013; Mouza et al., 2014; Oster-Levinz & Klieger, 2010; Tokmak et al., 2013). Understanding this knowledge, in general, is integrating technology into the learning process (Graham, 2011; Polly & Brantley-dias, 2009).

Since learning occurs online (in a network) due to the COVID-19 pandemic, innovative technology-based teaching tools are required to support students' at-home learning. (Archambault & Barnett, 2010; Graham, 2011; Nelson et al., 2009; Young et al., 2012). Therefore, training that increases teachers' professionalism to develop their TPACK competencies is necessary (Erdogan & Sahin, 2010; Graham et al., 2012; Hsu, 2015; Kabakci et al., 2012; Maeng et al., 2013a, 2013b).

The use of technology for education has been running before the COVID-19 pandemic, but it has not been maximized. Limited technology knowledge is the biggest challenge because teachers are not ready to face the digital era (Charles R. Graham et al., 2009; Graham, 2011; Jang & Tsai, 2012; Koh, Woo, et al., 2013; Pamuk, 2012; Polly & Brantley-dias, 2009). However, a person's technological skills

can be trained and improved through frequent practice (Koh, Chai, et al., 2013; Mouza et al., 2014). Therefore, the skills of teachers in TPACK can be developed.

Various education experts have conducted pieces of training on improving technology for teachers. For example, training on making teaching modules, animated videos, and learning media has been carried out (Chai et al., 2011; Hardianto, 2012; Jang, 2010; Koh, Woo, et al., 2013). In addition, teacher training in GeoGebra software has also been carried out (Subhan et al., 2020). Furthermore, teacher competency development studies on online learning platforms have also been conducted (Astuti, 2015; Elyas, 2018).

Based on the analysis of previous expert research, there are still new studies on using Adobe Premiere Pro software for making learning videos. Content creators often use this software to create videos on YouTube content. This software is considered quite complex, and this research used this application as a proper digital literacy measurement. In this research, 19 teachers from 11 schools will be given training.

The background of this research is that teachers are still not proficient in using software to design digital learning media that can facilitate online learning. Based on observations from 19 teachers

DOI: <https://doi.org/10.24127/ajpm.v11i4.5902>

from 11 junior high schools. Teachers still use conventional media and printed teaching materials in class. As a result, it isn't easy to adapt to online learning.

This study aims to see teachers' interests, beliefs, and teaching processes using Adobe Premiere Pro software to categorize teachers' professionalism. Furthermore, this study also describes the relationship between interests, beliefs, and the teaching process of teachers.

Many studies have examined the relationship between teacher interests and teacher beliefs about learning practices. Beswick's research has highlighted the categories between teacher beliefs and the method of learning mathematics and their categorization. (Beswick, 2012). This study shows that instrumentalist teachers who believe that mathematics focuses on performance will teach by only conveying material without instilling concepts in students. Spiritual teachers emphasize understanding, so in the learning process, they will press students on understanding, not rote memorization. Finally, problem-solving teachers will suppress learning to students' creativity by teaching materials using various methods and learning models.

Furthermore, Harisman's research (Harisman et al., 2020) has also connected teachers' beliefs with what students learn about how to solve mathematical problems. For example, the teacher category is divided into three parts: good, very good, and excellent teachers. This research is also related to teachers' belief in problem-solving—learning and how the teaching is carried out in class. Several studies conducted similar research in categorizing teachers starting from teachers' beliefs, attitudes, and

reflections on the didactic and pedagogical learning process (Harisman et al., 2018, 2019a, 2019c).

It is still rare for research to see or categorize how teachers' interest or belief in technology relates to their teaching process in the classroom. This study will explain the categorization and the relationship between the interests and beliefs of teachers towards the use of technology and how teachers apply it in their learning process.

RESEARCH METHOD

This research is qualitative and uses a case study method. The research steps are: 1) determining the research subject, 2) collecting data, 3) data analysis, 4) data reduction, and 4) data presentation.

In this research, 19 junior high school teachers from 11 schools in Padang were chosen as research subjects. First, teachers attended training about how to make learning videos using the Adobe Premiere Pro application. This application is one application that is difficult to learn. The training was conducted in five meetings.

After the training, the data collection about the teachers' interests, beliefs, and teaching process is conducted. The data collection can be seen in Table 1. The indicators of the teachers' interest questionnaire, teachers' belief interview guide, and the observation sheets can be seen in Tables 2, 3, and 4.

Table 1. Data collection

| Observed aspects | Instruments |
|----------------------------|--|
| Teachers' Interest | Questionnaire |
| Teachers' Belief | Open interview guide |
| Teachers' Teaching Process | Observation sheets and learning videos |

DOI: <https://doi.org/10.24127/ajpm.v11i4.5902>

Table 2. Indicators of teacher’s interest questionnaire

| No | Indicator | Sub Indicator | No. Item | |
|----|---------------------|---|----------|----------|
| | | | Positive | Negative |
| 1. | Feeling happy | The opinion of teachers about mathematics learning media | 12, 14 | 1,13 |
| | | The use of applications in making the mathematics learning media by the teacher | 15,17 | 2,16 |
| 2. | Attention | The ease of applications in making mathematics learning media by the teacher | 25, 26 | 23, 20 |
| | | The focus and thoroughness of teachers in using applications to make mathematics learning media | 27 | 22, 28 |
| 3. | Interest | The interest of teachers in using applications to make mathematics learning media | 3, 5 | 19, 30 |
| | | Persistent in trying to use applications in making mathematics learning media | 4,18 | 21,24 |
| 4. | Student Involvement | Efforts to make students active in learning | 6, 7 | 9 |
| | | Efforts to make learning media interesting | 8,29 | 10,11 |

Source: Elendiana (2020)

Table 3. Indicators of teacher’s belief questionnaire

| No | Aspects of teacher belief |
|----|--|
| 1 | Teachers' beliefs about learning about the involvement of technology in mathematics learning. |
| 2 | The teacher's beliefs toward students in learning about the involvement of technology in mathematics teaching. |
| 3 | Teachers' beliefs on mathematical knowledge for learning about the involvement of technology in mathematics learning |

Source: Harisman(2019a)

Table 4. Aspects of observations on the teacher's learning process

| General Aspect | Special Aspect |
|---|---|
| The depth and breadth of the teacher's pedagogical and didactic aspects are related to the involvement of technology in learning. | Involvement of technology in the learning process Involvement of technology in the process of making learning materials. |

The questionnaire analysis is carried out by:

- 1) Tabulated score data from the questionnaire. Table 5 is a guideline for scoring teacher responses using a Likert scale of 1-5.

Table 5. Teacher Questionnaire Score Guidelines

| Category | Statement Score | |
|---------------|-----------------|----------|
| | Positive | Negative |
| Very Agree | 5 | 1 |
| Agree | 4 | 2 |
| Neutral | 3 | 3 |
| Disagree | 2 | 4 |
| Very Disagree | 1 | 5 |

DOI: <https://doi.org/10.24127/ajpm.v11i4.5902>

- 2) Calculate the average score of each indicator using the formula.

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{N} \quad \dots 1)$$

Information:

\bar{x} = Average Score

x_i = *i*th students' score

N = Number of items

- 3) Converting the average score of each into a qualitative value based on the five scale assessment criteria using Table 6.

Table 6. Criteria guidelines

| Score Interval | Criteria |
|--------------------------|---------------|
| $\bar{x} > 4.2$ | Very good |
| $3.2 < \bar{x} \leq 4.2$ | Good |
| $2.6 < \bar{x} \leq 3.4$ | Pretty good |
| $1.8 < \bar{x} \leq 2.6$ | Not good |
| $\bar{x} \leq 1.8$ | Very Not Good |

Source: Suswina (2016)

Furthermore, the data analysis technique is the descriptive method for the interview and observation results.

RESULT AND DISCUSSION

Teachers' Interests

The teachers' interest in making learning videos using Adobe Premiere Pro software are presented in Table 7.

Table 7. Teachers' interest questionnaire result

| Score Interval | Interest Average | Criteria |
|---------------------|------------------|-----------|
| Feeling Happy | 4.37 | Very good |
| Attention | 3.95 | Good |
| Interest | 4.14 | Good |
| Student involvement | 4.18 | Good |

Table 7 shows that the teacher's interest in each indicator is in the very good and good categories. The

enthusiasm of teachers in participating in the training can be seen in Figure 1. In Figure 1, it can be seen that the teacher paid close attention to the trainer and practiced on their computers. The teachers also did a project enthusiastically and creatively. One of the teachers' projects can be seen in Figure 2.



Figure 1. Teacher's enthusiasm in the training



Figure 2. Screenshots of one of the teacher's project

From Figure 2, it can be seen that the teacher can combine media display with creation by combining moving graphics with visualization of the teacher who is explaining.

Teachers' Belief

Data descriptions of teachers' beliefs in learning involving technology are presented in the results of interviews with 19 teachers. There are three different types of answers from all teachers. The three different types of answer can be seen in the result of interview.

DOI: <https://doi.org/10.24127/ajpm.v11i4.5902>

Question : What do you think about integrating technology into teaching, students learning, and knowledge of mathematics?

study with the black-board and are explained.

Answer : I believe technology will help students learn because times are changing, and when developing learning materials, teachers must be innovative.

From the three variations of the answers, it can be concluded that the type of teacher in believing in technology; (1) the teacher is convinced that technology can facilitate students, (2) the teacher worries about technology, and (3) the teacher cannot adapt to technology because they believe that students understand better learning material if learning is done conventionally without the help of technology.

Answer : I strongly believe that technology can help students in learning, but it will take time in the learning process, and I'm also not very good with technology.

Teacher's Teaching Process

The observation results are that there are also three forms of the learning process carried out by teachers using technology in the classroom, which are presented in Table 8.

Answer : I rarely use technology in learning, and I can't use technology. Students understand better if they

Table 8. The description of the teacher's learning process in technology engagement

| General Aspect | Special Aspect | Category |
|---|--|---|
| The depth and breadth of the teacher's pedagogical and didactic aspects are related to the involvement of technology in learning. | Involvement of technology in the learning process. | Always involve possible technology in the learning process. |
| | | Uses technology in the learning process infrequently. |
| | | Never involve technology in the learning process. However, always use the whiteboard media in the learning process. |
| | Involvement of technology in the process of making learning materials. | Utilize technology wherever possible to create learning materials. |
| | | Rarely make learning materials using technology. |
| | | Never make learning materials using technology. |

Table 8 shows three types of teachers in the learning process in the classroom; (1) Teachers are very enthusiastic about using technology to produce learning materials using tools like GeoGebra, Macromedia Flash, and others. (2) teachers who infrequently

incorporate technology into the learning process, and (3) teachers who exclusively use the chalkboard for all learning activities while never using technology in the learning process. In Figure 3, it can be seen that the teacher uses technology in the learning process.

DOI: <https://doi.org/10.24127/ajpm.v11i4.5902>



Figure 3. Screenshot of learning process involving technology

Furthermore, in Figure 4, it can be seen that the teacher directs students to use printed material based on a flipbook in the mathematics learning process.



Figure 4. Teacher and Student Accessing the Flipbook Module

Students seemed enthusiastic about learning the material using a module designed by the teacher using a Flip PDF Book. Then the teacher who uses the blackboard media can be seen in Figure 5.



Figure 5. Teachers teach conventionally using the blackboard

The Relationship between Interests, Beliefs, and Teacher Teaching Processes

The research results obtained three categories: technologically advanced teachers, Technologically routine teachers, and Technologically naive teachers. The descriptions of the three variations are presented in Table 9.

Table 9. Teacher category in using technology reviewing from interest, belief, and teaching process

| No | Teacher Category | Interests | Beliefs | Teaching Process |
|----|--------------------------|-----------|--|---|
| 1 | Technologically advanced | Very good | Convinced that technology can help students in the learning process. | Always use technology for materials and also like to use technology to develop learning materials. |
| 2 | Technologically routine | Good | Half believe that technology can help. | Rarely incorporate technology into the teaching and learning process. |
| 3 | Technologically naive | Good | Teachers are not sure if technology can help the learning. | Never utilize technology to help you study; instead, stick to traditional methods like using blackboards and markers. |

Based on the result, it is evident that the teacher's interest and belief in technology significantly impact how the

teachers conduct the learning process in the classroom. If the teacher believes technology can help students learn, the

DOI: <https://doi.org/10.24127/ajpm.v11i4.5902>

teacher's learning process also involves technology. The situation is in line with other research that teacher teaching depends on how they believe in the teaching subject (Ernest, 1989; Kagan, 1992; Nespor, 1987). Likewise with interest, if teachers are interested in technology, they will do their best to develop learning tools and manage classes by involving technology (Alsubeh, 2013; Özokcu, 2018; Wagoner & O'hanlon, 1968).

How teachers handle their classes will affect student achievement and learning attitudes. If teachers always involve technology in their learning, students will quickly adapt to the times (Rosdiana et al., 2022; Tristanti & Iffah, 2022). The relationship between teachers and students is very close and influences each other, especially in behavior, perceptions, and student learning outcomes (Ansyah & Perspective, 2018; Harisman et al., 2019b). Teachers who are technologically advanced in the learning process will produce students who are also technologically advanced in the learning process both from learning outcomes, gestures, and student problem-solving (Harisman, 2021; Harisman et al., 2020, 2021; Harun et al., 2019; Noto et al., 2017).

The findings in this study are three categories of teacher professionalism in technology based on interest, belief, and the teachers' teaching process. The factors that cause this category is the teacher's age, educational background, and teaching place. The contribution of this research is that it can provide information about how the profile of teachers in technology. Thus, an overview for stakeholders to provide training on the use of technology in the learning process. Therefore, teachers categorized

as naive in using technology can be upgraded to technologically advanced teachers.

It is required to conduct further studies to compare student learning outcomes taught by involving technology with students trained using ordinary learning. However, based on a literature review, students' learning involves various methods, including technology, which will be more creative, critical, and sophisticated in behavior. Furthermore, in the digital era, many kinds of technology can help teachers in the learning process. For example, several countries have used robotic technology to help students develop their creative thinking skills (Karahoca et al., 2011).

In addition, the era that COVID-19 now hits requires teachers to be technologically proficient. Learning is done online. The situation requires teachers to be experienced in using various platforms, such as e-learning, to send the learning materials (Dunn et al., 2011). The situation makes learning indirectly active in developing teachers' ability to master the latest technologies. One way to achieve this is for teachers to continue to be given motivation, training, and various views on the importance of using technology in learning. The situation is consistent with the study's results that there are still teachers who believe students do not need technology in their learning process. This view is correlated with spiritual teachers who assume that learning will only be successful if all learning materials are delivered regardless of how students think and understand the material (Dunn et al., 2011).

DOI: <https://doi.org/10.24127/ajpm.v11i4.5902>

CONCLUSION AND SUGGESTION

The research results obtained three types of teachers in the use of technology. This study named these types of technologically advanced teachers, technologically routine teachers, and technologically naive teachers. Technologically advanced teachers are very interested in technology, believe that students need technology in learning, and always use technology in learning and developing teaching materials. Technologically routine teachers have a good interest in learning, believe that technology can help students in the learning process, and rarely involve technology in developing learning tools. Finally, technologically naive teachers have a pretty good interest in technology.

Future researchers should increase the number of research subjects and look at other aspects of teacher professionalism in technology besides aspects of belief, interest, pedagogy, and didactic. Factors that can be seen include the teacher's reflection on learning that uses technology, teacher skills in technology, and so on.

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