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Mapping The Readiness of Elementary School Teachers in The Competency of Technology Adaptation in Learning

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Abstract

There are various problems related to the competence of elementary school teachers, especially in pedagogical and professional competence. This study aims to describe and analyze the abilities of elementary school teachers pursuing professional teacher education in technology mastery. This qualitative descriptive research method examined 147 elementary school teachers who participated in professional education at Semarang State University in 2023. Data collection methods include questionnaires, participatory observations, and in-depth interviews. The study results showed that 97% of teachers have laptops and smartphones for online lectures, and more than 80.3% are in areas with strong internet networks, even though they are spread across 13 different provinces. Although 65.9% have experience teaching in elementary schools, they are willing to take part in professional education to improve their competence. The conclusion is that the availability of tools and the mastery of software used in online lectures positively affect the implementation of lectures. Implementing lectures positively influences the level of material mastery and graduation from professional education programs.

Keywords: elementary school teachers; pedagogical competence; professional competence; technology adaptation; teacher professional education (PPG)

INTRODUCTION

Primary school teachers are important in shaping, developing, and evaluating learning. The role of elementary school teachers is to guide students through the learning process, ensuring that students become more capable and skilled (Muhammadiah et al., 2022). The improvement of teacher professionalism significantly improves learning practices in the classroom, leading to a more dynamic and engaging learning environment for students (Ardani et al., 2024). In addition, teachers can help students direct social interactions, build friendships, and develop emotional intelligence. Primary school teachers have an important role to play in shaping children's cognitive, social, emotional, and behavioral development, as well as laying a good foundation for their future academic and personal success (Bukit et al., 2023; Suciati, 2015).

Professional teachers have competence, which has been proven through professional education and experience during their time as teachers. Teacher competence is a set of abilities, knowledge, skills, and attitudes teachers need to carry out their duties effectively. Teacher competence is very important for effective learning, and its development must be the focus of teacher education programs (Pantic´ & Wubbels, 2010; Wordu & Isiah, 2020). In Indonesia, professional teachers must possess four

competencies. Rafsanjani (2022) explained that the four competencies are pedagogical competence, professional competence, personality competence, and social competence.

This research will focus on two teacher competencies, namely pedagogical competence and professional competence. Teacher pedagogical competence refers to the teacher's ability to effectively manage and facilitate the learning process. These competencies include a wide range of skills, knowledge, and attitudes that are essential for creating an optimal learning environment (Wardoyo et al., 2020). Some components that include pedagogical competence are mastering student characteristics, mastering learning theories and principles, mastering curriculum development, organizing learning, using ICT for learning purposes, facilitating student potential, mastering effective communication, mastering assessment and evaluation, and having the ability to reflect.

Teachers' professional competencies are knowledge and skills about the curriculum, mastery of materials, and lifelong learning (Ernawati et al., 2013; Rudkevych et al., 2020). This competency is shown by the ability to understand and implement the curriculum for learning, ensuring that learning is carried out effectively—mastery of learning materials, including structures, concepts, and scientific mindsets. In addition, teachers should always be able to learn through formal and informal education.

Competence includes the pattern of behavior that needs to be demonstrated by a person to successfully achieve professional attainment and carry out related duties, obligations, and responsibilities (Zakiah et al., 2022). However, there are various problems related to the competence of elementary school teachers, especially in terms of pedagogical and professional competence. Teachers do not receive adequate training in pedagogical methods, which can affect their ability to engage students actively (Daga et al., 2023; Lena et al., 2023). Teachers' inaccurate perceptions of curriculum implementation and technology readiness challenges and stakeholder support (Aliyyah et al., 2023). This perception of teachers makes teachers need to move immediately to advance themselves. Especially because the rapid development of technology requires teachers to always keep up with the development of new tools and methods (Lena et al., 2023).

This makes researchers interested in researching further about the condition of technology mastery of elementary school teachers. The purpose of this study is to describe and analyze the abilities of elementary school teachers who are pursuing professional teacher education in the field of technology mastery so that the results can provide appropriate recommendations for elementary school teachers in their efforts to develop themselves and achieve professional and pedagogical competence.

METHODS

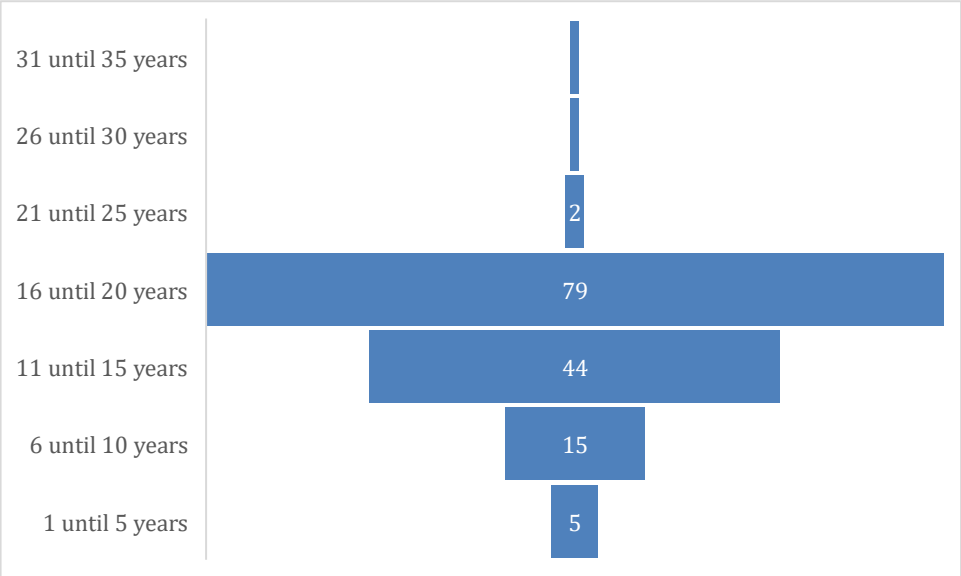
This research is qualitative descriptive research focusing on the mastery of technology for teachers in positions who are pursuing teacher professional education at Semarang State University in 2023 batch 3. The research stages begin with preparing a research design by determining the problem being studied clearly and specifically. Then, the researcher builds a conceptual framework about the phenomenon that is researched based on existing theories or the results of previous research.

The next step is to determine a representative and accurate data source. The data source comes from a group of in-service elementary school teachers undergoing professional education in 2023 batch 3. The number of elementary school teachers in positions who took PPG Batch 3 in 2023 at Universitas Negeri Semarang was 147 people. Data collection through questionnaires, observations, and interviews. The questionnaire fills in personal data and teachers' perceptions of technology mastery. Participatory observation was carried out during the teacher professional education (PPG) learning process, which was carried out online through Google Meet and LMS. In-depth interview activities are carried out to obtain more information needed by researchers.

Qualitative data analysis techniques through coding, memo, and theme interpretation. Data reduction is carried out if necessary during the data analysis process, and data is presented in tables and diagrams. After analyzing the data, the researcher must interpret the results to answer the research problem.

RESULTS AND DISCUSSION

The number of in-service teachers who are undergoing teacher professional education at Semarang State University in 2023 batch 3 is 147 people. If you look at the length of teaching experience in elementary schools, there is a distribution that varies greatly from 2 years to 34 years. This distribution can be seen more clearly in **Graph 1**.



Graph 1. Spread of Teachers' Teaching Experience in Elementary Schools

Graph 1 shows that the most experienced teachers teach in primary schools in the span of 16 to 20 years. When viewed from this time span, the teachers participating in PPG are quite senior teachers in terms of teaching experience in elementary schools. Another interesting thing that was obtained from the teacher's data was the distribution of the location of the teacher's home area. They come from 13 provinces in Indonesia. These twelve provinces are spread across several large and small islands from east to west of Indonesia (**Figure 1**).

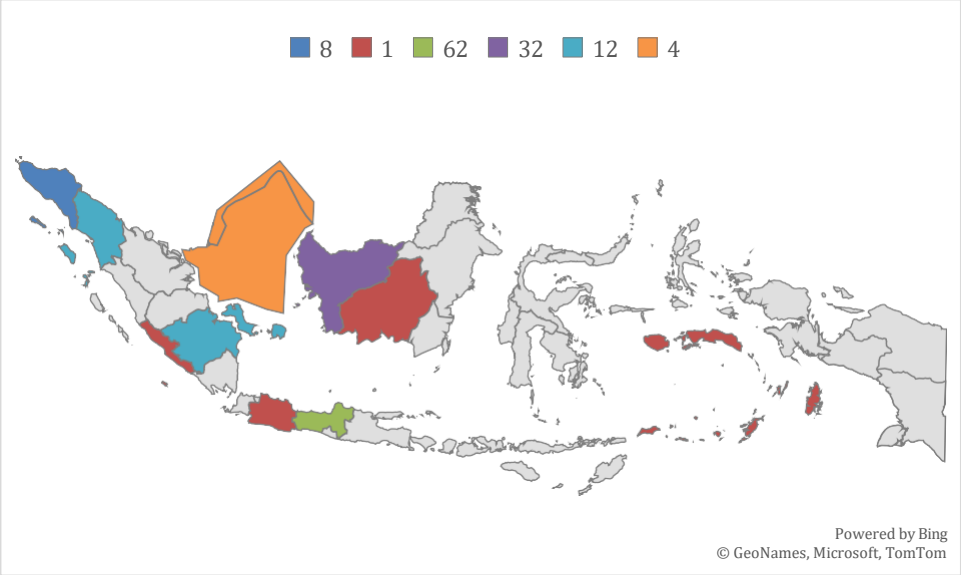


Figure 1. Distribution of the Location of Origin of Elementary School PPG Teachers Batch 3 of 2023 in Universitas Negeri Semarang

The following are details of the data on the location of the PPG Elementary School teacher Batch 3 of 2023 at Semarang State University (Table 1). The most cases were from Central Java province, which was 62 people (42.2%), followed by West Kalimantan province with 32 people (21.8%). Ranked third (8.2%), namely the provinces of Bangka Belitung Islands, North Sumatra, and South Sumatra.

Table 1. Distribution of Origin Locations by Province

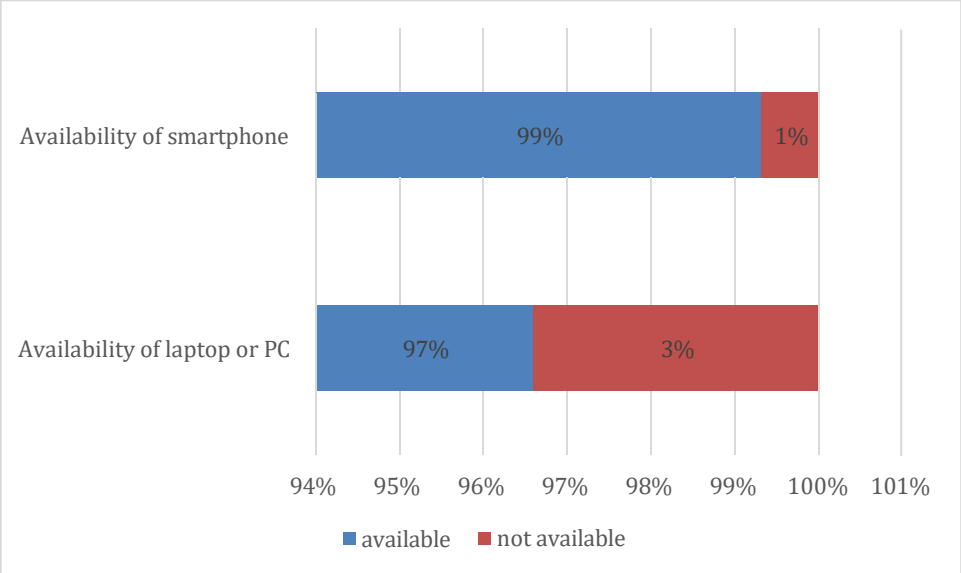
Province	Person	Percentage
Aceh	8	5,4%
Bengkulu	1	0,7%
Jawa Barat	1	0,7%
Jawa Tengah	62	42,2%
Kalimantan Barat	32	21,8%
Kalimantan Tengah	1	0,7%
Kepulauan Bangka Belitung	12	8,2%
Kepulauan Riau	4	2,7%
Lampung Selatan	1	0,7%
Maluku	1	0,7%
Sumatera Selatan	12	8,2%
Sumatera Utara	12	8,2%

The learning process of PPG In-Service Teachers through online lectures using LMS (Learning Management System) and Google Meet. Each class consists of 25 to 30 elementary school teachers. The challenge is faced by the supporting lecturers and elementary school teachers participating in PPG because every day, they have to work on the LMS and face each other virtually through Google Meet for 120 minutes to 180 minutes. The first cause of the challenge is the geographical location which causes a one-

hour time difference between eastern, central, and western Indonesia. This difference causes difficulties in determining the timing of virtual face-to-face meetings through Google Meet.

Lectures use an online system, requiring the availability of learning tools, namely laptops or PCs and smartphones. At the beginning of the lecture, the PPG elementary school teachers almost 100% owned laptops or PCs and smartphones (Graph 2). This is an obligation for all teachers who will take part in PPG online.

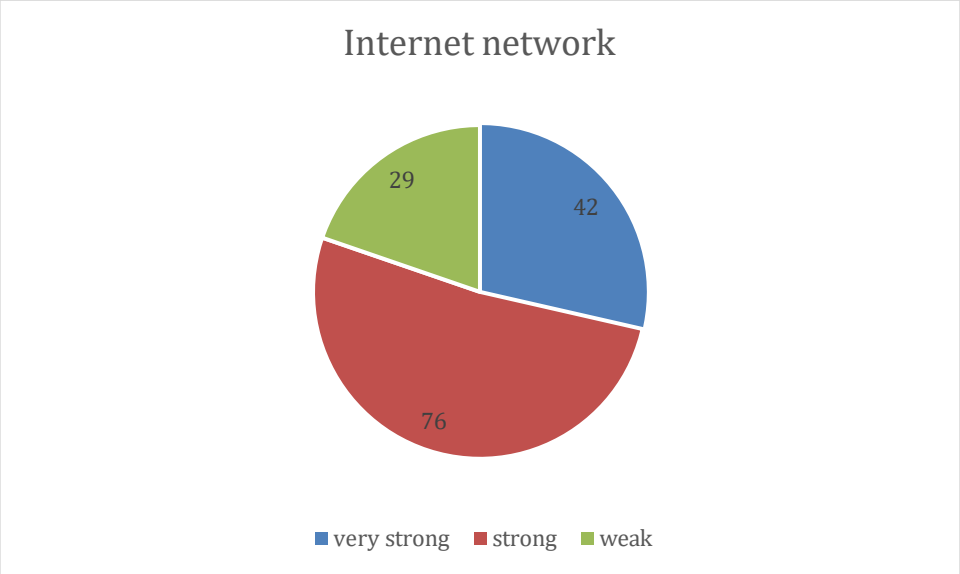
The relationship between laptop ownership and proficiency in using a laptop for learning is multifaceted, with various studies highlighting both the benefits and the challenges. Studies show that when students have a laptop, their engagement in learning increases significantly. For example, a study showed that students with laptops tend to have positive attitudes toward school and are more involved in the learning process compared to those without laptops (Mouza, 2004). Laptop ownership improves important skills such as technology proficiency and problem-solving abilities. The use of laptops in educational environments encourages online collaboration, and better assignment management, and improves communication between students and teachers (Ahiauzu et al., 2020). Effective use of laptops for educational purposes often requires adequate training for students and teachers. Without proper training, the potential benefits of laptop ownership may not be fully realized. Several studies emphasize the need for ongoing professional development to help educators effectively integrate technology into their teaching practices (Moses et al., 2009).



Graph 2. Availability of tools needed in online system lectures

In addition to the availability of these equipment, the internet network in the region is also an important thing needed by elementary school teachers who take part in PPG. This is the second obstacle in the implementation of online lectures. Geographical problems are the cause of the variation in the smoothness of the internet network in an area. The following is data on the smooth internet network in the area of origin of elementary school teachers participating in PPG (**Graph 3**).

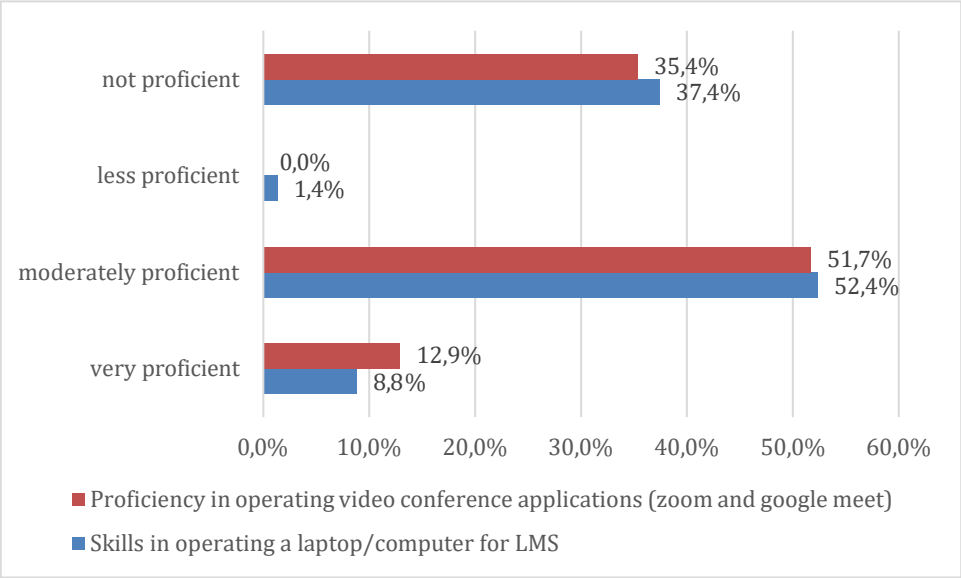
Online learning organizes student knowledge through networks, where students connect and interact with a variety of nodes, including people, resources, and tools. These interactions facilitate self-paced learning but may not fully meet the competency standards required by higher education graduates in the era of industry 4.0, which emphasizes skills such as communication, collaboration, and innovation (Alfiriani et al., 2022). The quality of internet access significantly affects learning outcomes. Students with unreliable internet connections face barriers to online learning, which can affect their performance and adaptability to online pedagogy. The stability of the internet affects learning outcomes indirectly through interaction and adaptability, with adaptability playing a stronger mediating role (Ren et al., 2024).



Graph 3. The strength of the internet network in the PPG teacher area

Graph 3 shows that the majority of internet networks are strong, only 19.7% of teachers participating in PPG stated that the internet network in their area is weak. This internet network has an effect on the smooth implementation of online lectures, which are in the form of synchronous and asynchronous activities. Synchronous activities are facilitated using video conferencing, namely Google Meet or Zoom. Meanwhile, asynchronous activities are facilitated using LMS.

Mastery of the software used in the online lecture process greatly affects the results obtained. Elementary school teachers participating in PPG have varying skills in mastering LMS and video conferencing applications. The data in Graph 4 is the initial ability of elementary school teachers participating in PPG. However, with the passage of time from the beginning, middle to the end of the lecture, there was an increase in their skills in mastering LMS and video conferencing applications. At the end of the lecture period, based on the observation results, almost all students (90%) have increased to reach the advanced category.



Graph 4. The initial ability of elementary school teachers participating in PPG in mastering LMS and video conferencing applications

The Platform LMS can be paired with a variety of video conferencing tools, to enhance the learning experience. This integration allows for seamless communication and interaction between instructors and learners, making online learning more engaging and effective. Furthermore, the ICT that teachers must master in order to improve their professional competence and pedagogy needs to be updated. The necessary improvements include the use and creation of digital learning materials, planning and use of the digital learning environment, and digital assessments (Ekantiningsih & Sukirman, 2023). The results of the study concluded that the use of ICT is very important for pedagogic and professional competence.

CONCLUSION

The conclusion, in accordance with the purpose of this study, is to show that the availability of tools and mastery of software used in online lectures has a positive effect on the smooth implementation of lectures. The smooth implementation of lectures has a positive influence on the level of material mastery and graduation from professional education programs. Recommendations that are appropriate for elementary school teachers in their efforts to develop themselves in achieving professional competence and pedagogical competence can focus on the use and creation of digital learning materials, planning and using digital learning environments, and digital assessments.

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