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Digital Competence of Post-Pandemic Teachers Based on Gender, Work Period, and Certification Factors

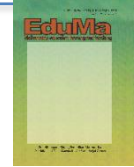Saluky[1*], Onwardono Rit Riyanto[2], Siti Rahmah[3]

1,2,3 Tadris Matematika IAIN Syekh Nurjati Cirebonn

*Corresponding author: Jl. Pilang Raya Gg. Sukajaya No. 11 Kota Cirebon, Indonesia. e-mail addresses: luke4line@gmail.com

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Technological developments must be balanced with the skills of mastering these technological products. Digital competence is highly correlated with the use and awareness of teachers in applying technology to their professional activities. This article presents diagnostic results on Teachers' self-perceptions of their digital competence. The digital competency framework based on DigiComp has five dimensions as an evaluation tool. The sample of this study consisted of 11 upper-middle-level teachers with various characteristics. Questionnaires were used to collect teacher response data. Descriptive analysis is used to diagnose teacher competence. The results showed that teachers have good skills in the aspects of information and data literacy as well as communication and collaboration. Digital content creation and problem solving skills related to the use of technology still need improvement efforts through improving soft skills. Increasing digital competency skills really needs to be pursued to integrate technology into the learning process.

INTRODUCTION

Education must be able to provide human resources to be able to adapt to changes and challenges that occur. This condition becomes a big challenge because educational institutions need to prepare superior human resources. According to Supriatna (2018), the challenge in the industrial era 4.0 is how to build one's skills and mentality to be able to compete and excel. An educator must be able to master the use of technology and digital computing so as to be able to narrow the gaps that occur so that they are able to adapt to developments that occur.

Digitalization in the current era requires teachers to have extra abilities, namely digital competence. This ability is needed so that every teacher can integrate technology into learning and provide technology orientation to students. E-Learning is an online-based learning, where teachers can transfer knowledge via the internet (Riyanto, 2016). Digital competence is an aspect that can explain various uses of digital technology and contribute to the use of these technologies more critically (Karsanti, 2020). Digital competence in fields other than education, of course, has a different way of measuring and evaluating it.

The development seems to require teachers to be able to develop several devices so as to improve student skills. Digital competence in it also includes the ability to recognize and understand educational needs (Ghode, 2020; Sá et al., 2021). This ability is also about how to solve problems conceptually through the use of technology.

According to Ilomaki (2016), digital competence is an ability related to technical skills and the ability to use digital technology for study, work, and in everyday life. In the context of education, digital competence is able to influence students during lessons. According to Pettersson (2018), teachers who have good digital skills are able to have a positive impact on student learning outcomes. Students need teachers who are confident and competent to be able to take advantage of digital technology. However, many teachers have low digital competence. In addition, this ability is also related to how to apply digital technology, critically assess, and motivate so that they are able to participate and commit to digital culture.

Ghomi (2019) through a framework called DigCompEdu offers five main areas of digital competence that apply to all levels of education, namely 1) Literacy, information and data, 2) Communication and collaboration, 3) Digital content creation, 4) Security, and 5) Solution to problem. This concept is applied in this article to determine the digital competence of teachers.

Teacher digital competence includes the ability to collect and analyze data based on students' online learning activities (Lund, 2014; Cabero-Almenara et al., 2022). From here, teachers can incorporate digital technology into the teaching and learning process. In addition, digital competence is also related to the ability to utilize information technology for the public interest.

Studies related to digital competence have been widely studied in the context of education. Gerrit in syafa'at (2020) also explained that the delay of teachers in understanding digital content was due to their age. The longer the age will tend to be more technical problems experienced. The age factor also involves the reliability of operating technology so that habituation or duration of technology use becomes important. States that teachers using

digital technology are very limited to collecting assignments only (Bond, 2018; Godhe, Magnusson & Hashemi, 2020). The use of digital technology in the context of learning from pre to post critical learning has not been fully carried out by many teachers. Mulyo (2022) has researched the digital competence of prospective teachers based on Digicomp consisting of 310 students. The results indicate that the problem-solving aspect is in the good category while the other aspects are in the very good category.

This study aims to determine the opinion of teachers at MA Salafiyah Bode Cirebon Regency on their digital competence. The digital competence of teachers is reviewed based on gender, years of service, and teacher certification.

LITERATURE REVIEW/ THEORETICAL FRAMEWORKS (IF APPLICABLE)

Teachers can develop their digital competency in various ways. While implementing and assessing digital learning in a classroom, teachers must reflect on how they are using digital technologies to enhance teaching and learning. Here are some strategies for implementing and evaluating digital learning in the classroom. To learn more, read the following publications. These publications discuss the different aspects of digital competency in teachers. However, the importance of teacher competency should not be underestimated. The primary responsibility for developing digital competency lies with teachers.

Teacher training is essential for developing digital competence. Teachers should be given the appropriate theoretical background to justify their use of digital technologies in their teaching practice (Caena & Redecker, 2019; Moorhouse & Kohnke (\2022)\). Hence, the use of mixed-learning approaches (classroom and non-classroom training) is a promising way to improve teachers' digital teaching abilities. This approach involves teaching with a variety of technological resources, including websites and apps. Furthermore, teachers can directly train students in the use of digital materials and online learning platforms.

Teachers' professional digital competence operates within a chronosystem, interacting with larger socio-historical and technological changes in society. The notion of TPDC must be understood in this context, as it depends on the context in which teachers practice. It should be constantly redefined and adapted. However, there are many other strategies that teachers can use to develop digital competency in their classroom. They include the use of technology-mediated communication, social media, and collaboration.

Research into the digital divide has shown that digital proficiency varies across countries and universities, and it is highly variable. The first step is to establish what digital competency means to students. This will help them develop their digital skills and enhance their overall education. However, the digital divide may be explained by cultural factors, geographic location, and faculty and department. And this study cannot claim to be the final word on digital competence. However, it does show the need for further study.

Collaborative learning requires students to set aside their personal differences, listen to each other, compromise and differentiate between logical and emotional thinking. While traditional classrooms assign tasks and roles, collaborative learning involves sharing authority and encouraging students to take on more complex projects and independence. These benefits make collaborative learning a great choice for the 21st century classroom.

The following are some tips to create an environment that fosters student collaboration in your classroom. Collaboration builds a sense of community in the classroom. Students share ideas and knowledge, and the teacher can model positive behavior for them (Starkey, 2020). Collaborative learning requires students to share personal and cultural differences and be willing to work with students of different skill levels, as well as those with different backgrounds. Collaboration also discourages traditional 'ability' segregation. Instead, it promotes everyone to contribute and to appreciate the contribution of others. Ultimately, it recognizes that everyone has something to contribute.

A collaborative learning environment is one in which every participant is responsible for their own learning and the success of the team. Participants have the freedom to participate and direct activities. In a collaborative learning environment, no one is assigned a predetermined role, and all activities should be based on the needs of the group, and each participant's individual abilities and interests. Collaborative learning can work well in any online setting and has become a staple of the 21st century.

Collaborative learning is a powerful way to improve employee productivity and morale. Employees can gain insights from their team members, and the organisation as a whole will benefit from this. In addition to improving productivity, collaborative learning will foster positive relationships between different departments and improve teamwork. It can also be beneficial for remote teams. The benefits of this approach include improved relationships and teamwork, which are critical for the overall success of the organisation.

In order to facilitate collaboration, it is necessary to define your goal. Once you have defined your goals, you can begin the process of implementing a collaborative learning environment. For example, the right collaborative learning platform will make sharing files easy. Additionally, RingCentral allows students to access topic syllabuses, course outlines, and standards. These resources are essential in creating an effective collaborative learning environment. If you're unsure of how to make your collaborative learning environment work best for you, consider using an online education platform such as RingCentral.

The design of your learning space is another factor to promote collaboration. If possible, move a flat edged table away from the front of the room. Place chairs around it to encourage student groups to work together. You can also use an Apple TV on a mounted flat screen television. This will mirror student devices during project sessions. In addition to connecting physical spaces and virtual spaces, you can set up global learning teams by using apps. A collaborative learning environment is an ideal way to enhance synchronous distance learning (Karsenti, Kozarenko & Skakunova, 2020). It requires interactive processes, construction of new knowledge and social interactions. New technologies are available for this purpose that can enhance the collaborative learning environment in higher education and the workplace. Chickering identifies seven principles of good practice for undergraduate education. Two of these principles are especially important in developing collaborative learning technology. For example, if a class is held entirely online, it is essential to ensure that participants can participate in every step.

Increasing digital competence is essential for educators in a globalized society. Today's technology is used more than ever, and it has become a necessary part of education. But how do we ensure that teachers are able to keep up with these changes? What is the role of education technology in teaching digital competencies? There are a variety of different approaches, but one that has proven to be successful is a study that focuses on teachers' perceptions of digital competence.

Students perceive themselves as being good at using innovative technologies and solving technical problems. However, these students did not rate themselves as being good at keeping up with technological developments or applying them to innovate. The most effective approach to digital competence is self-education and self-assessment. This can help you to build a stronger foundation and develop skills for the future. In this article, we will explore some of the key elements of digital competence. In addition, we will look at some of the tools and programs that are essential to enhancing your knowledge and expertise.

Training in digital competence should include developing content with the use of digital technologies and solving technical problems. It should also focus on identifying information and data needs and how to control and create them. The final component of digital competence is interaction. In this way, learners can show their critical attitude towards different forms of media. These skills also improve collaboration and creativity. For example, a digitally-native teacher will be able to solve problems more effectively with fewer errors than a non-technical teacher.

It is without question that a major challenge for science and engineering education lies in the rapid and unpredictability of technological and social change. However, research and teaching development must focus on discovering identifiable knowledge assets and specific competences that could, with a certain degree of probability, empower both, engineering and teacher students to adaptively respond to possible future requirements (Gebhardt, Grimm, & Neugebauer, 2015). While there is a body of research on programme development for supporting digital competences in engineering higher education programmes (Gilliot, Garlatti, & Simon, 2010; Kamp, 2020), only few information on digital competences of engineering students are available. One study we found refers to information literacy among Malayan students. Here the researchers found that participants seriously lacked the knowledge and skills to "evaluate internet information, to identify the most efficient search strategy, to use scholarly resources, and to use information ethically." In a survey among 78 business engineering students Fleaca and Stanciu (2019) asked students to estimate their digital competences. Partially drawing on the DigComp, the results show that students are confident in their „information and data processing skills" as well as „communication skills" but show a lack of ability to distinguish reliable online sources from unreliable information. Scores were low for the tasks „constructing different e-profiles" and for Heuling, Wild, & Vest (2021), selecting information to share according to own needs or targets. Furthermore, the survey found that most of the prospective engineers are not confident about their capacities to explore original formats and new ways for content creation and to exploit technological potentials to represent and solve problems. We found another study conducting a comparison of prospective teachers" and engineering students" digital competences: Šerbec et al. (2016)

examined the digital competences of university students from Macedonia and Slovenia using a version of the DigComp. They found for both countries that the biggest gap between current and desired level of digital competences lied in the domains of problem solving and safety. Furthermore, they found that in all five competence areas the engineering students scored higher than the teacher students, but no further information on the majors of the study programs were given

METHODS

Population and Sample

The research population is teachers who teach at MA Salafiyah Bode, Weru sub-district, Cirebon Regency, West Java. The research sample amounted to 11 people from various subject teachers.

Research Design

This research is a quantitative descriptive research with the type of survey research. Survey research is used to evaluate a condition (Adiyanta, 2019).

Data Collection and Analysis

Questionnaires were used as a data collection technique in this study which were distributed online. The questionnaire scale used is a Likert scale with four options. Descriptive data analysis was used to diagnose and describe the mapping of teachers' responses to their digital competencies. The descriptive results are then combined with the results of relevant studies from various sources to strengthen the research results.

RESULT AND DISCUSSION

Description of data

The distribution of the questionnaires presented through googleform has succeeded in gathering responses from teachers regarding their digital competencies. Evaluation of digital competence is viewed from five aspects or categories, namely information and data literacy; Communication and collaboration; Digital content creation; Security; and problem solving. The collected questionnaires were then mapped out to determine their frequency, including gender, years of service, and certification. The results of processing data on the characteristics of these respondents can be seen in table 1.

Table 1. Frequency of Respondents by Factor

Factor	frequency
Gender	
Man	4
Woman	7
Years of service	
1 s/d 4 years	2
5 s/d 9 years	3
More than 10 years	6
Certification	
Already	7
Not Yet	4

The characteristics of the sample used are gender, years of service, and teacher certification. It is known from the gender factor that there are 4 men and 7 women. The factor of working period at intervals of 1 to 4 years is 2 people, the interval of working period of 5 to 9 years is 3 people, and the interval of working period of more than 10 years is 6 people. On the certification factor, there are 7 teachers who have not been certified and 4 teachers who have been certified.

Table 2. Average Score of Digital Competency Aspects by Factor

Factor	information and data literacy	Communication and collaboration	Digital content creation	Security	Problem Solving
Gender					
Man	3,54	3,5	3,4	3,45	3,45
Woman	3,68	3,48	3,14	3,3	3,22
Years of service					
1 s/d 4 years	4	4	4	4	4
5 s/d 9 years	3,46	3,46	3,25	3,3	3,26
More than 10 years	3,4	3,3	3	3,2	3,1
Certification					
Already	3,48	3,48	3,4	3,42	3,4
Not Yet	3,6	3,5	3,15	3,3	3,15

Table 2 describes each aspect of teacher digital competence descriptively. It is known that there is a diversity of competencies based on gender factors, years of service, and certification. In terms of gender, men are superior in digital competence than women. In terms of years of service for 1 to 4 years, the digital competence is superior to the working period of more than 4 years. On the certification factor where teachers who have not been certified are superior to teachers who are already certified. Different aspects of digital competence are spread across various factors, namely gender, tenure and certification. Table 3 shows the details of the teacher's response questions regarding their digital competence which were collected from 25 questions.

Table 3. Frequency Percentage of each Statement

No	Statement	Score Frequency Percentage			
		SS (4)	S (3)	TS (2)	STS (1)
1	I identify my needs when searching for data, information or digital content in an online environment	55%	45%	0%	0%
2	I use an information search strategy to access data, information and digital content in an online environment	64%	36%	0%	0%
3	I critically evaluate the accuracy of the data, information or digital content I access	55%	45%	0%	0%
4	I investigate from various sources whether the data, information or digital content I access is reliable	45%	55%	0%	0%

No	Statement	Score Frequency Percentage			
		SS (4)	S (3)	TS (2)	STS (1)
5	I pay attention to source representation and citations when sharing data, information or digital content	45%	55%	0%	0%
6	I easily organize and store data, information and content in an online environment	55%	45%	0%	0%
7	I use digital technology to communicate in an online environment	45%	55%	0%	0%
8	I can share data, information or digital content using different digital technologies (such as drives)	45%	55%	0%	0%
9	I use digital technology to collaborate in an online environment	45%	55%	0%	0%
10	I adhere to behavioral norms (rules of ethics) when interacting in an online environment	55%	45%	0%	0%
11	I develop content in simple form using digital technology	45%	55%	0%	0%
12	I can develop content in various formats (video, visual, animation, sound, etc.) using digital technology	36%	55%	9%	0%
13	I pay attention to copyrights and licenses when developing digital content	55%	45%	0%	0%
14	I produce digital content by making changes to ready-made content	27%	27%	36%	9%
15	I know what to look out for when creating a digital identity (profile) in an online environment	45%	55%	0%	0%
16	I realized that I left a digital footprint when I finished using the internet	36%	55%	9%	0%
17	I am aware of the risks and threats in the online environment and can address threat issues	27%	73%	0%	0%
18	I take different measures to protect my device and digital content	45%	55%	0%	0%
19	I have my own strategy/trick to secure personal data and privacy in online environment	45%	55%	0%	0%
20	I know the data policy (how to use personal data) of the digital services I use (social networks, etc.)	45%	55%	0%	0%
21	I identified the cause of the technical problems I encountered when using digital media and devices	36%	64%	0%	0%
22	I solved a technical problem I encountered when using digital media and devices	36%	64%	0%	0%
23	I attended training to improve digital competence	27%	73%	0%	0%
24	I identify opportunities for the development of my digital competence	27%	64%	9%	0%
25	I develop my digital competence by keeping up with new developments	36%	64%	0%	0%

The result of calculating the percentage of each question in the questionnaire proves the diversity of teachers' responses regarding their digital competence knowledge and skills. The questions presented are an operational form of the five aspects of digital competence according to DigiComp. Each teacher with various backgrounds influences their response

to the habit of using technology in learning. The existence of diversity in the percentage of each statement represents the homogeneity of a research data. The percentage results presented in general are MA Salafiyah Bode teachers have known and applied technology for their work activities as teachers, both in the learning process and administrative work as well as self-professional development
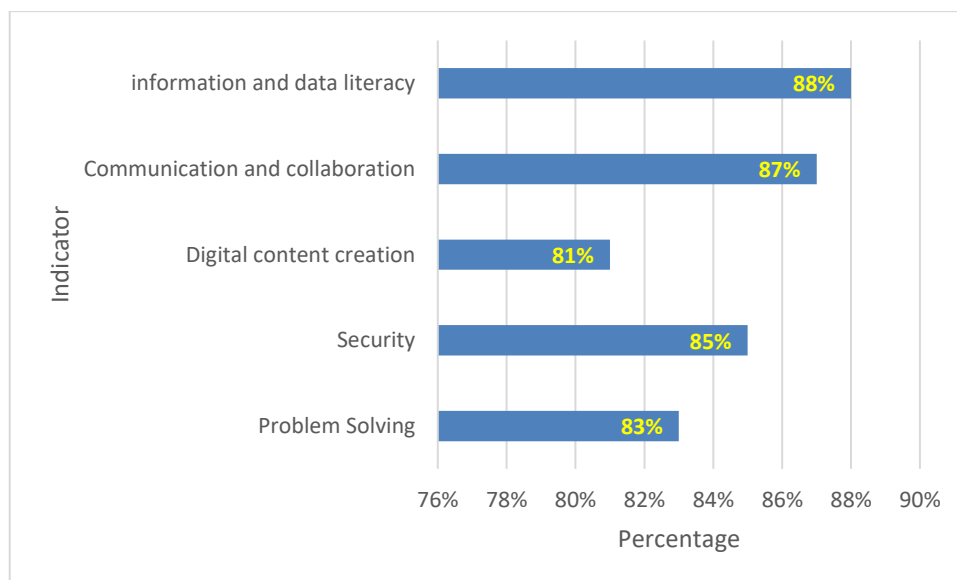

Diagram 1. Percentage of Digital Competency Aspects

Aspects of the digital competence of the MA Salafiyah Bode teachers, Cirebon Regency, there are differences. Aspects of information and data literacy have the best percentage of 88%. While the smallest aspect is the creation of digital content by 81%. Mapping the percentage of digital aspects of competence illustrates the skills of teachers in understanding and practicing the use of technology in their work. This diagnostic provides a basic understanding of teachers regarding teacher competencies.

Discussion

The pandemic condition as the basis for the issuance of a Ministerial Regulation related to the implementation of online-based education and learning is actually from the other side as a policy that all teachers must study technological developments. Digital competence must be firmly entrenched through education policies in order for better learning changes to occur (Newland & Handley, 2016). The increased use of the internet during the pandemic does not mean that digital competence is also high.

There are no formal educational standards for digital competence. However, it is important for children to be familiar with coding and basic computer programming skills. For example, many schools offer classes in e-learning. This can lead to a number of benefits. It can also lead to more efficient use of resources and a better job-matching process. These benefits may be attainable if children acquire the required skills. In addition, teaching them these skills can help them deal with the many challenges of learning online.

As a teacher, your primary role is to provide opportunities to engage students in digital literacy and technology. Regardless of age, students should learn to integrate technology into their daily life. Despite the complexities that come with these technologies, it is important to keep these skills in mind to make the most of the tools available. With a strong understanding of the differences between these two factors, you can tailor a digital literacy course to fit your child's learning style.

Digital competence is the ability to use information technology for personal gain. It comprises a variety of skills, such as searching for and processing information, identifying real information from virtual content, and using various internet-based tools and services. These skills support critical thinking, creativity and innovation. This involves a critical and reflective attitude, responsible use of interactive media, and an interest in various communities. It is not a prerequisite for higher education, but may be a necessary prerequisite for employment.

Even though the use of technology is increasing, it does not mean that people have adequate digital skills. High technology consumption only leads to operational level skills, and does not imply higher cognitive abilities. For example, users can stay on the same level if they only use certain apps. Consequently, high consumption of digital technology should not be interpreted as a measure of digital competence. There is a difference between digital skills and a person's level of digital competence.

Developing digital competence requires a holistic understanding of how to use information and technology. Having a broad general knowledge of ICT and its uses is essential for a successful career (Asmarani et al., 2022; Nowak, 2019). The aim is to empower students with a wide range of skills and knowledge to use these technologies effectively. Developing digital competencies requires a multifaceted approach that includes assessment of skills and attitude development. The most effective way to improve this is to teach students about new technologies, enhance their existing knowledge, and provide access to relevant online resources.

Developing and improving school infrastructure plays an important role in developing teacher digital competencies in schools. Infrastructure as a means owned by schools to be accessed for school construction and improving the skills of human resources so that they are more proficient in the use of technology. Supporting facilities will create independent learning so that teachers and students will increase their competence, especially regarding the use of digital technology.

Digital competence as an interpretation of various uses of technology that teachers do pedagogically. The application of original digital content helps teachers to construct new knowledge when using digital technology. When creating content teachers involve technological and pedagogic knowledge (Spiteri & Chang Rundgren, 2020). Portillo (2020) mentions that there is a gap in digital teacher competence based on gender, where women have lower competencies which may come from women's emotions and high workloads.

MA Salafiyah Bode teachers are generally able to identify in order to investigate digital information and data as needed and then evaluate it. Teachers are able to choose teaching materials to be delivered to their students based on the results of searching for information on the internet properly, choosing and reading internet sources according to their teaching needs. However, the teacher is still unable to pay attention to the representation of sources and citations when sharing data. This relates to the originality of the source because both data and information are difficult to identify. Anggrasari (2020) has sought to increase digital literacy through the implementation of e-learning. The use of e-learning by preparing tutorials and uploading digital assignments to e-learning done regularly can improve digital literacy.

MA Salafiyah Bode teachers are generally able to organize and store data and the stored data can be shared via various digital communication tools to collaborate for learning activities such as whatsapp, zoom meeting and google classroom. Teachers are familiar with the term google drive to organize and store data online so that teachers don't have to bother looking for files before using them in the future. Irman (2020) builds digital communication tips for students through PBL-based module products. Module products

that have been validated both in design and content quality can improve students' digital communication.

MA Salafiyah Bode teachers still need to improve their skills in developing digital content. Teachers often use digital content taken directly from the internet. Teachers are also able to understand various digital content formats such as pdf, mp4, mp3, jpg or png as well as blog links. In other words, teachers still need to create content independently so that they get other benefits, namely content that considers students' cognitive conditions. This is reinforced that teachers are aware of copyrights and licenses when using digital content, so it is necessary to improve skills in developing digital content.

Ghofur (2021) proposes the Screencast-O-Matic application for the design of interactive learning videos as interactive learning content. This application also does not require internet access so that teachers can practice without signal interference. Meanwhile, Rahayu (2019) develops an online learning module by combining the Rowntree development model and the ILDF (Integrative Learning Design Framework) model as learning content for students.

The MA Salafiyah Bode teachers are generally quite vigilant when creating digital identities. Teachers understand when providing identities such as name, email and telephone number for the purposes of using technology products. Teachers have not predicted that there will be a digital track record that can have a negative impact or harm in the future. Teachers are aware of the risks and threats when uploading digital content to a personal account that will be used as teaching material due to the digital content data policy.

MA Salafiyah Bode teachers are generally quite capable of protecting their own devices and digital content. Teachers can protect their devices and digital content properly and have a strategy for securing their personal data. The two-step verification feature, set passwords and even separate emails for work and other things, and so on so that the device or account is safe.

Hidayanto (2020) provides education on digital privacy and security management on how to manage digital privacy and security, starting from selecting dangerous and suspicious sites, identifying hoax information, creating passwords that are difficult to hack, how to report negative content and accounts that violate the rules. social media platforms, as well as scenarios for dealing with cyberbullying and crime on social media.

Sidyawati (2021) argues that socialization activities in the form of questions and answers, and evaluations can provide an understanding of digital security literacy so that it can avoid online fraud, spreading hoax news, copyright plagiarism, and other digital security issues. Especially in this pandemic era, the use of online-based media activities is increasing. The increasing intensity of the internet needs to be balanced by digital competence to make it more useful.

The MA Salafiyah Bode teachers are generally quite able to identify the causes of technical problems but not all of them can be solved. The limited technical knowledge of teachers regarding the use of digital technology becomes an obstacle when using it, so it is not uncommon to ask for help from others even though they have followed video tutorials. Help from an expert certainly gives pleasure to teachers who need it.

The pandemic emergency has forced teachers to learn independently through video tutorials to carry out the learning process. It is very rare for teachers to attend online training given the limited time. This situation holds both opportunities and challenges. Teacher confidence in adopting online learning can help the obstacles that occur (Udin,

2022). Teachers who master the use of digital can facilitate learning activities that are integrated with technology. Prayogi (2019) believes that digital competency skills can improve digital problem solving. Skills will require teachers to always actively develop their abilities so that active learning will be realized. Digital competence should also include the ability to recognize needs and solve conceptual problems through technology.

CONCLUSION AND IMPLICATION

Conclusion

The digital competence of MA teachers has a good average, especially related to literacy and data information. Teachers still need skills in creating digital content as teaching materials. Teachers still have difficulty finding solutions when facing technical problems so that time is less efficient. MA Salafiyah teachers are generally able to communicate and collaborate digitally using devices commonly used in their work. Awareness about security in the digital world still needs to be improved in order to maintain personal identity. Educational institutions (schools) need to schedule training related to digital competence and/or implement policies for teachers to participate in activities to increase digital competence independently with the support of the school.

Implication

Use the Century Schoolbook font, 11 pts. space 1. Adjust to the writing / research used. Conclusions and implications for further implementations should be provided. Theoretical implications and practical significance of the study are discussed. Implications for further implementations, suggestions for further research, and limitations of the current study are provided.

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