DIGITAL LITERACY SKILLS OF VOCATIONAL SCHOOL TEACHERS

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Abstract

The challenges of digital media in today's learning are complexities that must be resolved by vocational high school teachers. The demand is developing along with the growth of the digital era in people's lives today. Teachers no longer supply instructional resources to conventional learning platforms because it affects students' interest and motivation in obtaining and improving their learning. Teachers must also receive daily training in the use of digital technology in teaching in order to build their confidence towards the use of digital technology in the classroom. This study aims to analyse the level of digital technology literacy skills of vocational schoolteachers in Kota Cimahi, West Java. The participants in this research were 371 respondents from 23 vocational schools in Kota Cimahi, West Java. The method used is a descriptive quantitative approach with data collection techniques using a questionnaire. The results of this study show that teachers' digital literacy level is at level three of the six levels available. The results of this study also show that the teachers already have mastery and understanding of the information and technology they need, and consistently use these standards as a reference for conducting activities. The factors that can hinder a teacher's digital literacy are age and working period because age and working periods greatly affect digital literacy. Older teachers have lower digital literacy compared to young teachers and younger teachers also have higher digital skills.

Keywords: Digital, Literacy skills, Vocational high school teachers.

1. Introduction

The creation and the utilization of digital technology in the 21st century experience the growth of digital technology devices for various purposes in the working places and both in formal and non-formal education [1, 2]. Nowadays, the use of technology has invaded and coloured all aspects of human lives and has become an everyday phenomenon which means it is no longer something that is difficult to create. Besides, the use of digital technology in education is inevitable as it can be used as learning resources and teaching aids.

The challenges of digital media learning today are the market demands that must be addressed by vocational schoolteachers. Along with the emergence of the digital era, these demands towards teachers has been emerging lately. Teachers no longer supply instructional resources to conventional learning platforms because it affects students' interest and motivation in obtaining and improving their learning. Therefore, in order to be literate in digital media learning nowadays, teachers are expected to develop digital technologies [3]. The challenge of digital technology is to bring change to the Indonesian and to ensure that the existence of digital technology enables the community to access various knowledge and to support people in doing daily activities. However, not all people have sufficient access [4]. One of the factors is that people living in remote regions with low levels of education find it difficult to access information from digital technology.

Therefore, attempts will continue to be developed to enhance the quality of education, one of which is using digital technologies to increase teacher quality. The influence of the advancement of digital technology has affected traditional learning patterns towards distance and media [5]. Thus, vocational schoolteachers encounter obstacles in using digital technologies to increase their productivity in the learning process. Therefore, teachers as key elements in education play a key role in educating, teaching, directing, guiding, training, assessing, and evaluating students and responsibility to organize, implement, and evaluate learning.

In addition, teachers are currently expected to have digital technology skills and knowledge. Teachers must be able to incorporate digital technology into the learning process so the advantages can surpass the conventional methods as digital technology has strong reliability in terms of quality and accessibility [6].

The key issue is whether teachers know how to make effective use of digital technologies in learning. The ability to use digital technologies is relevant to teaching literacy in the educational learning process [3]. This is in line with 21st century learning, in which vocational schoolteachers call for constructive skills and attitudes towards the use of digital learning and teaching equipment. Vocational schoolteachers need to incorporate emerging technology into learning, strengthen their role in the classroom, and create a more dynamic learning environment where students can be more engaged and inspired to learn.

There is still a paucity of educational facilities and resources related to emerging technologies to help the learning process in the classroom [7, 8]. Thus, under this circumstance, the achievement of learning goals and the lower competence of the teachers may become obstacles to the learning process. In addition, teachers' expectations of the use of digital technology are still low which affected their willingness to use digital technology [3, 9]. Teachers' competencies, both in digital technology and information technology, have the same direction and competencies

requiring teachers to be constructive, logical, and creative in the use of information technology. Hence why teachers have two positions at once, namely as learners/users and teachers [10]. Information technology competence implies that teachers must have pedagogical and technological abilities [11].

Digital literacy skills of vocational secondary school teachers may also be affected by many demographic factors. As an example, due to social, economic, structural, psychological, and institutional barriers women have lower levels of access and use of digital technology compared to men [12, 13].

In addition, the age factor also affects teachers' digital literacy levels [12-14]. The results found that younger teachers know more about new technologies than older teachers. This shows the various levels of digital literacy of the individual teacher. Furthermore, the use of digital technology often affected by the workplace [15]. Research results showed that the use of digital technology at work is identified as a regular task at work by helping to complete work more effectively and as a valuable tool for professional activities.

Based on the aforementioned issues, the researchers were interested in studying the digital literacy skills of vocational schoolteachers in Kota Cimahi based on their age, gender, and working period.

2. Literacy Concept

Literacy means comprehension, and people who have the ability to read and write are called literate people [16]. According to UNESCO in Mahdi (2020) and Igwe et al., study (2020), literacy is the ability to identify, understand, interpret, create, communicate, and count, print, and write materials related to various contexts [17, 18] stated besides reading and writing, the 21st century literacy also has the following meanings; (1) technological literacy which is the ability to utilize new media such as the internet to access and communicate information effectively, (2) information literacy which is the ability to collect, organize, filter, and evaluate information and to form strong opinions based on that ability; (3) media creativity which is the growing capacity of individuals everywhere to create and disseminate content to a wide range of audiences; (4) social responsibility and competence which is the competence to take into account the social consequences of online publication and responsibility towards children [19].

2.1. Digital literacy concept

Digital technology literacy is a skill that demonstrates a person's ability to search, organize, evaluate, and interpret information using digital technology [20, 21]. Moreover, interactive technology awareness has become an important aspect of teacher competence. Hagu and Payton (2010) states that there are two aspects that teachers need to pay attention to in relation to digital technology literacy, namely digital skills and being able to practice them [22]. Figure 1 is Hague and Payton (2010) state that there are eight digital literacy components that teachers to consider which are:

1. Function skills, abilities, and self-confidence of teachers in using technology.
2. Creativity, the ability of teachers to create products creatively with digital technology.
3. Understand culture and social

4. Collaboration, with digital technology to support the collaboration of teachers and students in developing digital technology development strategies.
5. Communication, with digital technology, teacher and student communication can be done online at any time.
6. The ability to find and select information, the teacher can provide information to students about how to search the web so that students find information in accordance with relevant scientific studies.
7. Critical thinking and evaluation, the teacher can provide opportunities for students to ask questions and opportunities to work
8. E-safety to support children to be more competent in using digital technology [23].

Fig. 1. The components of digital literacy [22].

Based on the eight components listed above, teachers need to consider in teaching what learning resources meet students' needs in the learning process in order to recognize student's active participation in the classroom.

School supports specifically impact the use of digital media by teachers. Digital technology is a globally recognized tool that needs to be completely incorporated in all fields of education particularly in vocational school considering its sophistication to continuously evolve and one of which affects the competence of teachers participating in the learning process.

The integration of digital technology into effective learning in vocational schools is inseparable from the ability of teachers to manage to learn using digital technology, therefore, this is a challenge for the advancement of the world of education. Being based on this, teachers must also be able to inspire themselves to improve learning through new technologies in order to build imagination, critical thinking, innovation, and higher-level thinking skills. This application has been made in Malaysia in view of the need to shift the evaluation culture towards the use of digital technology in schools [24]. Through digital classes, it has been proven to produce pedagogical designs and development of information literacy competencies and critical thinking skills for both students and teachers [25].

2.2. Teacher digital technology competency

Digital technology competencies are abilities related to the use of computers and the internet including hardware operating skills, web navigation, editing skills, and online exploration [26]. Digital technology competencies are related to the ability to access, manage, integrate, evaluate, and produce information [27]. More technically, digital technology competencies are related to computer literacy skills (technical skills), information, and communication literacy skills which consist of using information creatively, evaluating information, and exchanging information [28].

The scope of digital technology competencies in the context of learning includes dimensions of knowledge, skills, and attitudes. Aspects of knowledge include professional literacy skills and digital integration into teaching. The skills aspect includes the skills to use digital applications and the skills to integrate it into learning while the attitude aspects include digital knowledge, digital learning, and digital applications [29]. Digital technology competence can be recognized from five aspects which are the ability to access, manage, integrate, evaluate, and create [30]. The ability of teachers to apply digital technology in classroom learning includes knowledge of teaching content and didactic content knowledge [31].

The implementation of digital technology in learning needs to pay attention to several aspects such as Technology Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) which are interrelated to form comprehensive digital competencies [32]. Digital implementation in learning will be influenced by education policies, infrastructure, digital literacy, and learning conditions [33].

Digital technology literacy can also refer to the theory of Personal-Capability Maturity Model (P-CMM) and ICT-Literacy [34] as presented in Table 1.

**Table 1. Digital literacy level in the theory
of personal-capability maturity model (P-CMM).**

Level	Personal-Capability Maturity Model and ICT-Literacy
Level 0	If a person does not know and does not care about the importance of information and technology to everyday life
Level 1	If a person has had one or two encounters, where information is an essential component for the achievement of interests and problem-solving and has included information technology in the search for it.
Level 2	If an individual has repeatedly used technology to help with daily activities and has a repetitive pattern in its use.
Level 3	If a person has a standard of expertise and comprehension of the information and technology that he or she requires, and regularly uses these standards as a guide for carrying out daily activities
Level 4	If a person has been able to substantially increase (can be stated quantitatively) the efficiency of his or her daily activities through the use of information technology.
Level 5	If a person has regarded information and technology as an inseparable part of his or her daily activities and has directly or indirectly shaped his or her actions and culture (part of an information society or a cultured human being).

The challenge in vocational education is to gain a wider and deeper understanding of technological literacy so that it can lead to the advancement of teaching practices in the future. From the above, the digital technology literacy of vocational schoolteachers are believed to have a major impact on the development of education, therefore it is important for teachers to recognize the competence of digital technology. The characteristics of digital literacy are described in Fig. 2.

Figure 2 shows the characteristics of digital literacy which include three levels, namely awareness, praxis, and phronesis. This understanding is the highest level that is logical and aims at developing policies for the use of digital technology. Students need to be literate or have technological awareness. In addition to students, teachers are key persons in knowing and utilizing the use of technology, its basic objectives, and its functions. It is the most basic degree of literacy. Teachers can answer the question "what can technology do or not do?" at the practical level. At the praxis level, teachers are required to be able to practice using digital technology wisely and to start cultivating a culture of using digital technology in learning activities. After that, the teacher is able to complete simple tasks. Someone at this level can answer the question, "how do you use this technology?", it is a procedural form of knowledge [35].

Characteristics of Users at Various Level of Technology Literacy		
Typical Activity		Literacy Question
Awareness	Hear about new technologies Learn of capabilities of new technologies	What can it do?
Praxis	Practice customary implementation explore/attempt variety of applications	How do you _? Do you? Are you
Phronesis	Effective use of technologies capabilities Discerning/appropriate use of technologies	Why are you?

Fig. 2. The characteristics of digital technology literacy [35].

At the phronesis level, it is the highest digital technology literacy level where teachers are able and proficient in using digital technology. They are competent at learning new technologies and are not hesitant to choose using it or not. And at this level, they will be able to answer the question "why?", "why do I use or not use technology in learning?" The highest level of digital technology literacy is able to develop conceptual or conditional knowledge attainment [35, 36].

3. Method

This study used a quantitative approach. Respondents in this study were vocational schoolteachers in Cimahi based on their gender, age, and teaching experience. The purpose of collecting the data was to ensure that there were variations in the data from each teacher studied. Participants in this study were vocational high school teachers with a total of 823 participants spread across 23 vocational schools in Kota Cimahi. The implementation period was from February 2020 to September 2020.

The research instrument used in this study was a questionnaire. The instruments in this study were divided into two parts; part one includes teacher information on the basis of gender, age, and working period; part two describes the teacher's ability to use digital equipment in the context of hardware and software and the ability of teachers to build digital media for learning. The questionnaire given in this study used a Likert scale; the first questionnaire used Never (N), Ever (E), Often (O), and Very Often (VO), the second questionnaire used Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). In order to quickly figure out whether the respondent reacts respectfully or carelessly, the questionnaire should be based on positive statements and negative statements. For positive statements, the answer scores are as follows: SA = 4; A = 3; NA = E = 2, and SD = N = 1 and as for negative statements are the opposite.

In order to check the validity of this instrument, we asked an expert in the field of vocational education and training at Universitas Pendidikan Indonesia to validate the questionnaire. The trial was conducted with 31 vocational schoolteachers, who were not included in this study. The reliability of the instrument used Cronbach's alpha coefficient with a level of reliability at 0.923.

The researchers distributed questionnaires randomly to vocational schoolteachers in Kota Cimahi, West Java using Google Form. The Google Form collected 371 respondents who filled out the questionnaire.

Then, the researchers used IBM SPSS V.23 software to analyse data starting from the number of respondents and percentages for demographic information, mean (M) and standard deviation (SD) to analyse a series of digital literacy skills for vocational schoolteachers.

4. Result and Discussion

4.1. Findings on the digital literacy ability of vocational secondary school teachers based on gender, age and working period

There were 371 participants for this study and the digital literacy of vocational school in Kota Cimahi based on their gender, age, and working period can be seen in Table 2.

Based on Table 2 female respondents contributed more data than males by gender. In addition, based on the age range, respondents who contributed most of the data were respondents between 26-35 years old, then respondents between 36-45 years old, respondents between 46-56 years old respectively, and respondents who contributed the least of the data were respondents over 56 years old.

Based on their working period, the teachers who contributed the most data were those who had worked 6-10 years, then those who had worked for 16-20 years, then followed by those who have been working in less than 5 years (19%), then the teachers who contributed the least data were teachers who have worked for more than 20 years.

Most respondents belong to a group aged 26-35 which is 37% and the majority of the working period belongs to 6-10 years at 35 %. This demonstrates that the age of the teachers is relatively young, and they are relatively new to teaching work. This makes it easier for young and less work experience teachers to adapt to changes in learning [37].

Table 2. Demographic characteristics of
respondents based on gender, age and working period.

Aspect	Recapitulation	Total	Percentage (%)
Gender	Male	175	47%
	Female	196	53%
Age (year)	< 25	35	9%
	26 – 35	136	37%
	36 – 45	92	25%
	46 – 56	77	21%
	> 56	31	8%
Working period (year)	< 5	70	19%
	6-10	129	35%
	11-15	56	15%
	16-20	82	22%
	>20	34	9%

4.1.1. Findings of the digital literacy skills of teachers by gender

The results for the teachers' digital literacy level based on gender can be seen in Fig. 3. Figure 3 shows that there is no significant difference in the degree of digital literacy of teachers based on their gender. However, based on the given percentage value, there were more male teachers than female teachers.
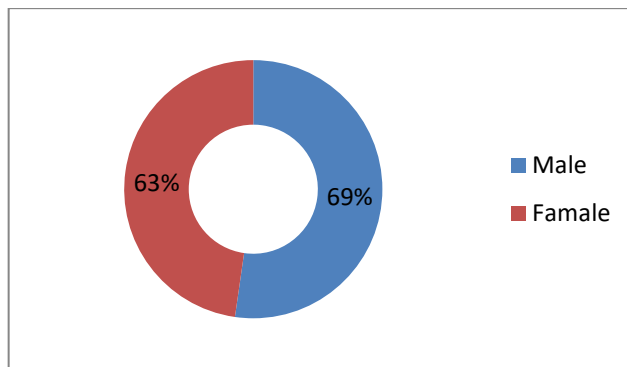
Fig. 3. Teacher digital literacy skills based on gender.

Moreover, based on the results above, male teachers have a higher level of literacy whereas men are typically curious about something new than women. Meanwhile, women typically only use digital devices when required. The attitude of teachers towards digital technology has an effect on the use of information and communication technology in the classroom, and the gender of the teachers can have an effect on the use of information and communication technology, where male teachers use digital technology more often than female [1, 37, 38]. The more frequently people use digital technologies, the stronger their skills would be since they are getting used to the accesses.

4.1.2. Findings of the digital literacy skills of teachers by age

The results of the survey questions on the comparison of the digital literacy level of teachers from their ages can be seen in Fig. 4. Figure 4 indicates that the digital literacy skills of teachers are seen from various ages, where teachers under 25 years have the highest score at 57%, teachers between 26 and 35 years at 53%, teachers between 36 and 45 years at 47%, teachers between 46 and 56 years at 47%, and teachers with the lowest score at 47 %.
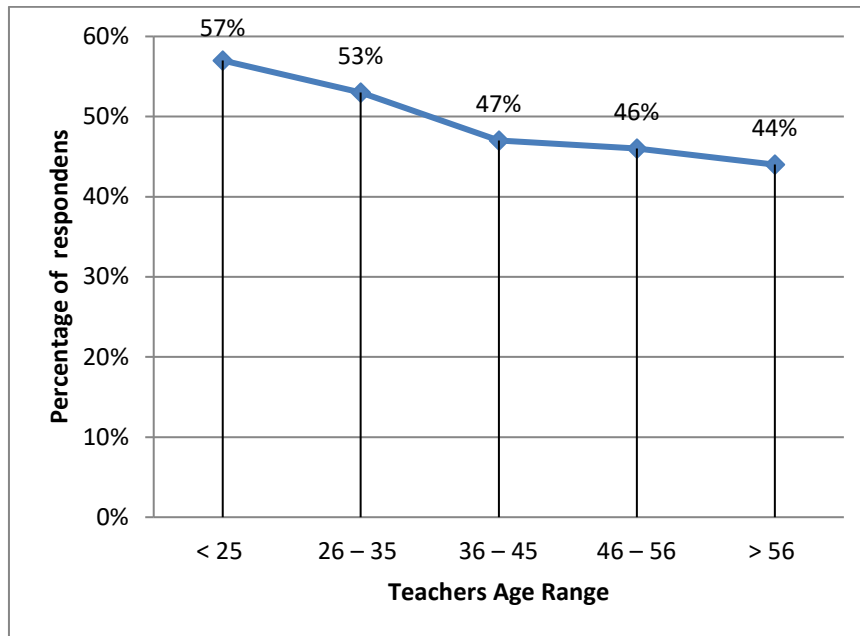

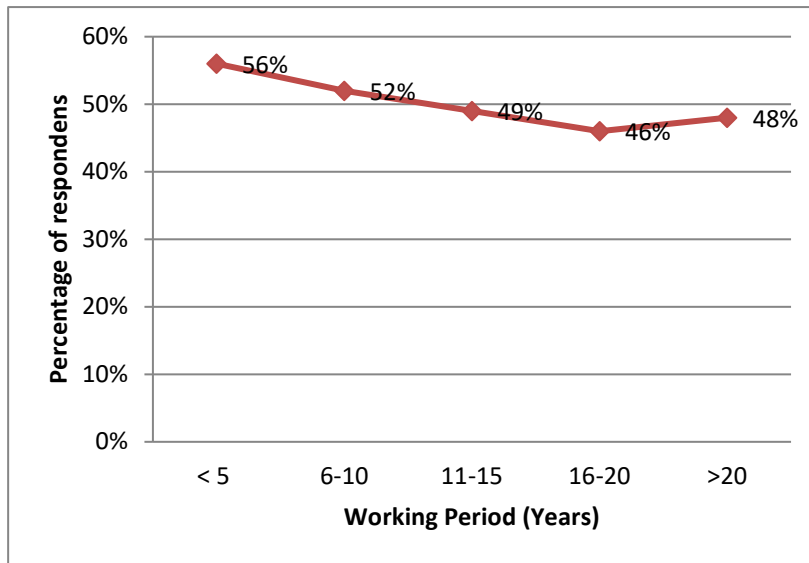**Fig. 4. Teacher digital literacy skills based on age.**

Based on the findings above, it can be concluded that the younger the teacher, the higher the digital abilities. Since older teachers are typically restless and hesitant to learn something new, in this case, digital technology learning. Besides, older teachers can quickly overlook something that might discourage them from learning digital technology. Meanwhile, younger teachers are content and enthusiastic about something different and have stronger memory. As Sirait points out, aging will discourage a person from learning and adjusting to something new, including technology, because older people usually are oriented and used to long-established circumstances and have less direct contact with new things so that they are less inspired to learn [39].

4.1.3. Findings of the digital literacy skills of teachers by working period

The results of the survey questions on the comparison of the digital literacy level of vocational high school teachers from their working period can be seen in Fig. 5.

Figure 5. shows that the digital literacy skills of teachers are not the same as their working period. Teachers who teach less than 5 years have the highest score, namely 56%, followed by teachers who teach for 6-10 years at 52%, then teachers who teach

for 11-15 years at 49%, and then teachers who teach for 11-15 years 49%, then teachers who teach for more than 20 years are 48%, and the lowest number is teachers who teach for 16-20 years at 47%.

Fig. 5. Digital literacy skills based on working period.

Thus, it can be inferred that the longer a teacher works, the lower the literacy rate; except for teachers who have taught for more than 20 years, the digital literacy level is moderately 2% higher than that of teachers who teach for 16-20 years.

Based on the finding, the digital literacy skills based on the teachers' working experience, it is found that the longer a teacher teaches, the lower the digital literacy rate because teachers who have been teaching for a long period of time are usually old, so the comparison of digital literacy levels is inversely related to digital literacy, except for teachers who have taught for more than 20 years, there is a slight increase in teachers who have taught 16-20 years. Young teachers have higher digital literacy skills than middle group teachers (6-10 years and 16-20 years) and older groups (over 25 years) because the younger generation exposes more to digital technology [1]. Rahimi and Yodollahi [40] stated that the amount of teaching experience and age is inversely proportional to the digital access teaching process.

4.2. The digital literacy capability of teachers

4.2.1. The digital literacy capability of teachers in using digital technology devices for the learning process

The data for the frequency of teachers in using digital technology obtained by looking at the level of frequency teachers use digital technology. In this context, there are 11 statements given. The mean and standard deviation of each statement are presented in Table 3.

Table 3 shows that the average teacher's skills to use digital technology is 77%, where this score is included in category 3 out of 6 levels. As shown in Table 3 above,

most of the teachers have and often use a computer, print documents, save and transfer files using flash disks, type using MS Word application, use Ms. PowerPoint application, use Ms. Excel application, and download files to a computer. In addition, most of the teachers often search for information using a web browser, both to find teaching materials and to find the information they need, also many teachers often use social media to communicate with colleagues and other people.

Table 3. Data on teacher skills in using digital technology.

Statement	Mean	SD
1. **Use a computer**	2.83	0.826
2. **Print the document using the printer.**	3.00	0.925
3. **Use the projector to display teaching materials.**	2.99	0.906
4. **Save or transfer files using a flash.**	3.01	0.877
5. **Type using Microsoft Word**	3.02	0.986
6. **Use Microsoft PowerPoint application.**	2.98	0.925
7. **Use Microsoft Excel to process data.**	3.15	1.044
8. **Use cell phones to communicate via WA/SMS/Line etc. and telephone.**	3.49	0.794
9. **Search for information using a web browser (google chrome, Mozilla Firefox, internet explorer).**	3.20	0.946
10. **Download files to the computer**	2.99	0.926
11. **Use social media (Facebook, WhatsApp, Line, etc.) to communicate with other people.**	3.25	1.022

In terms of communicating with others using cell phones, teachers are in the high category, either using WA/SMS/Line, or telephone. Even more than half of the number of respondents often use it in their daily activities. As for using a projector to display teaching material in class, there are still some teachers who have not used projectors in classroom learning. This point indicates that the use of mobile phones is the most commonly used to communicate either by WA/SMS/Line, etc or telephone. The accessibility and the affordability make its intensity usage is high either to texting or telephoning, and the basic capabilities of short messages system or telephone are considered the easiest for all people compared to other features [4].

Based on the aforementioned results, the capacity of the teacher to use modern technology can be seen in Table 3, where this attribute is included in the second level category. The average percentage of the subject is 77%, indicating that teachers have mastery and understanding of the information and technology they need, and consistently use these standards as a reference for conducting daily activities. In accordance with the competency standards of Information and Communication Technology for teachers according to UNESCO where teachers must be able to operate the basics of hardware and software [17].

4.2.2. Teachers digital literacy skills in making learning media

The results for the items on the questionnaire regarding the digital literacy skills of teachers in making learning media are as can be seen in Table 4. It can be seen in Table 4 above that the average value of the teacher's capacity to build digital media is 72%, and this value is found in category level 3 out of the 6 categories. The highest percentage value for each answer is in making slide presentations with the

Microsoft PowerPoint application. However, there are still many teachers who cannot create and design images and also create images using Paint, CorelDraw, Photoshop, etc. In addition, some teachers still cannot use Adobe Flash Player to create interactive learning media.

**Table 4. Data on the results of digital
literacy skills of teachers in making learning media.**

Statement	Mean	SD
1. Make a slide presentation with the Microsoft PowerPoint application	3,27	0,890
2. Design presentation slides using multimedia (in the form of images, text, video, sound)	3,10	1,105
3. Create an image using Paint, CorelDraw, Photoshop, etc.	2,44	0,716
4. Create and design images using CorelDraw, Photoshop, etc.	2,74	1,031
5. Make a list of student grades in the Microsoft Excel application	3,08	1,010
6. Create interactive learning media using Adobe Flash.	2,71	1,104
7. Making learning media according to the subjects being handled by the application being mastered	2,90	1,000

Based on the findings above, the average percentage of the subject is 72%, indicating that teachers have mastery and understanding of the information and technology they need, and consistently use these standards as a reference for conducting daily activities. Park categorizes some of the teachers' roles, including teaching, learning, guiding, managing class, doing school administration, and developing skills [41]. Teachers can determine how important technology is in daily life, both at home and in classroom. In order to use technology effectively in the learning environment, attitudes towards technology can be considered essential [40]. In line with this, the value of digital technology's participation in learning is to help teachers enhance the quality of classroom learning and to help teaching and learning activities become more productive in the learning process, starting from the preparation, execution, assessment, and class administration [42].

5. Conclusion

This study was to determine the digital technology literacy skills of vocational schoolteachers in Kota Cimahi. The aspects measured include the demographic factors which include teachers' digital literacy level in Kota Cimahi based on their age, gender, and working period. Other aspects measured include the ability of teachers to use digital technology and the ability of teachers to make learning media.

Based on the findings and discussion, it can be concluded that the literacy level of Vocational School teachers in Cimahi City based on the theory of the Personal Capability Maturity Model (P-CMM) is in the third level category of the six existing levels. This means that teachers have mastery and understanding of the information and technology they need, and consistently use these standards as a reference for carrying out their daily activities. Factors that can hinder a teacher's digital literacy are age and years of service because age and years of service greatly affect digital literacy, where teachers who are older and work longer hours have lower ICT literacy than younger teachers.

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