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# ICT Literacy of Vocational High School Teachers of Construction and Property Engineering Expertise Program

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## Abstract

The purpose of the research is 1) to elaborate the understanding of ICT for vocational school teachers in the Construction and Property Engineering expertise program. 2) to describe the ICT literacy of teacher's to use technology. 3) to explain the difference the teachers' ICT literacy based on their years of service. This research was conducted at the province of South Sulawesi. Data collected and anlyzed between March – June 2021. The sample used was 75 respondents. The result of the study explain the understanding of SMK teachers about ICT is quite good, most of them needs to be improved. The ability of teachers to use technology without networks in learning is good, but it still needs to be improved in terms of making mind maps and video editing. There is no difference on the ICT Literacy of teachers to use technology according to their working period.

**Keywords:** information and communication technology, vocational high school, construction and property engineering.

## 1. Introduction

The 21st century presents its challenges for the world of education. Teachers as the spearhead of education must be able to integrate various Information and Communication Technology (ICT) devices in the learning process (Gao, 2021; Yasak & Alias, 2015). Various Literacy is carried out to create a knowledgeable society. One of the literacies that are promoted is technological literacy which encourages teachers to build communication with the outside world so that there is an increase in competence to become professional teachers (Erol et al., 2016; Gao, 2021).

ICT is a means that the learning process can be effective, efficient, and fun. ICT is a means to achieve learning goals, not a learning goal (Alazam et al., 2012; Ghavifekr & Rosdy, 2015). Along with the use of ICT in the learning process, the factor of mastery of ICT by teachers is one of the problems that often arise. Therefore, teachers must be able to master ICT to improve teacher professionalism (Moye, 2009; Widana, 2020).

One indicator of teacher creativity in learning is the use of ICT (Destiana & Soenarto, 2014). The integration of ICT in the dynamic and interactive learning process will provide opportunities for students to learn effectively (Oliver, 2002). Chandra & Lloyd (2008) also stated that to improve

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student achievement, it is better to use ICT optimally. For this reason, teachers must also be able to adapt to using ICT in the network (Anas Arfandi, 2020).

The number of ICT users in the work environment will have an impact on the motivation and diversity of ICT tools used by teachers (Elmunsyah, 2014). The more co-workers who use ICT and the length of time they use it will form a conducive work environment. The interaction of the use of ICT by users through the interaction of asking questions and helping each other in the work environment will help accelerate the mastery of ICT. The more subjects of ICT users in the school environment will encourage the widespread use of ICT and have an accompanying impact on the willingness of teachers to increase the use of ICT (Lamanauskas, 2008).

Teachers must be able to integrate their ability to use ICT to optimize their performance. The use of ICT by teachers in the learning process and other administrative work in schools can improve teacher performance (Bakar & Mohamed, 2008). Reliable teachers will use ICT not only as a learning aid. ICT can also be used in preparing lesson plans, collecting materials, making student worksheets (LKPD), and processing student grades (Fitriyadi, 2012). Effective use of media can be done by utilizing ICT tools (Oliver, 2002).

There are five important things in teacher performance in the learning process, namely: mastery of the material, use of appropriate learning methods, effective use of media, being able to motivate, and evaluating learning outcomes (Restiyani, 2014). Optimizing the use of ICT not only as a tool but also as an integrated media in making interactive learning media (Purnamawati et al., 2019). Effective and efficient learning is one indicator of the achievement of educational development in an area.

As one of the benchmarks for the development of education in eastern Indonesia, South Sulawesi (South Sulawesi) has 446 public and private vocational high schools (SMK). 32 schools of them hold the Construction and Property Engineering (TKP) expertise program. Based on the results of interviews with the head of the Vocational School of the Education Office of South Sulawesi Province, information was obtained that many teachers who teach at the TKP expertise program have retired and many of them have ended their term of service in the next 2-3 years, while the learning process should not stop.

The acceptance of public servant teachers for crime scene expertise programs has been very low in the last 2 decades. Therefore, almost all schools accept assistant teachers (teachers) as assistants and supporters of the learning process at school. The impact that occurs is the gap in the number of senior teachers and junior teachers. Senior teachers with longer tenures often place more burdens on junior teachers in terms of using ICT. The age of the teacher is also one of the causes of the ineffective implementation of learning.

Seeing these conditions, researchers will study further the ICT competence of vocational school teachers in the crime scene expertise program in the learning process in the classroom. For this reason, the formulation of the problem in this research is 1) how is the understanding of ICT for vocational school teachers in the Construction and Property Engineering expertise program? 2) How far is the ICT literacy of teacher's to use technology? 3) how difference the teachers' ICT literacy based on their years of service?

## 2. Methods

This study is an ex post facto research with a survey method conducted to get profile of digital literacy level of mathematics students in relation to learning motivation. Research activities begin with the study of various literatures, documents, research results.

This research was conducted at the Vocational High School which organizes the Construction and Property Engineering Expertise Program (TKP) in the province of South Sulawesi. The study was conducted in March – June 2021. The population of this study was all productive teachers from 32 public and private vocational schools that held TKP expertise programs in the province of South Sulawesi. The total population of the study was 93 teachers. Determination of the number of samples using the Slovin formula with an error rate of 0.05. Thus, the sample used was 75 respondents consisting of 39 men and 36 women, 64 respondents who graduated with a bachelor's degree, and 11 respondents who graduated with a Masters's degree.

The characteristics of the respondents are described as follows:

Table 1. Characteristics of respondents by age and years of service

| | | Years of service | | | |
|---|---|---|---|---|---|
| | | < 5 Years | 5 - 10 Years | > 10 Years | Total |
| Age | < 31 years old | 6 | 0 | 0 | 6 |
| | 31-40 years old | 5 | 24 | 14 | 43 |
| | 41-50 years old | 3 | 5 | 15 | 23 |
| | > 50 years | 0 | 0 | 3 | 3 |
| Total | | 14 | 29 | 32 | 75 |
| Percentage | | 18.67 | 38.67 | 42.67 | 100.00 |

Based on Table 1, shows that the dominant respondents are aged 31-40 years, and among them have a working period of 5-10 years. However, the majority of respondents have more than 10 years of service.

Table 2. Characteristics of respondents based on years of service and certification

| | | Years of service | | | Total |
|---|---|---|---|---|---|
| | | < 5 Years | 5 - 10 Years | > 10 Years | |
| Certification | Already | 1 | 25 | 28 | 54 |
| | Not yet | 13 | 4 | 4 | 21 |
| Total | | 14 | 29 | 32 | 75 |

Based on Table 2. The dominant respondents have received certification, and they have served more than 10 years. Respondents who have not been certified are dominant teachers who have recently been active, namely less than 5 years.

The variables studied were the understanding of ICT, the ability of ICT. This questionnaire instrument has met the valid and reliable rules that adopt the previously developed instrument (A. Arfandi et al., 2020). Understanding of ICT is the teacher's knowledge of hardware and software commonly used by teachers and education personnel in schools and also specifically used by TKP teachers. ICT ability is the teacher's ability to use hardware and software commonly used in the crime scene. The research data was collected using a questionnaire instrument which was distributed online using the google form facility. The data that has been collected is then analyzed using quantitative descriptive and inferential analysis.

## 3. Results and Discussion

### 3.1. Understanding of ICT for SMK teachers TKP Expertise Program

Based on the data collection that has been done, the following is a description of the teacher's ICT understanding. The results described are also related to the status of teachers who already have an educator certificate and who do not have an educator certificate.

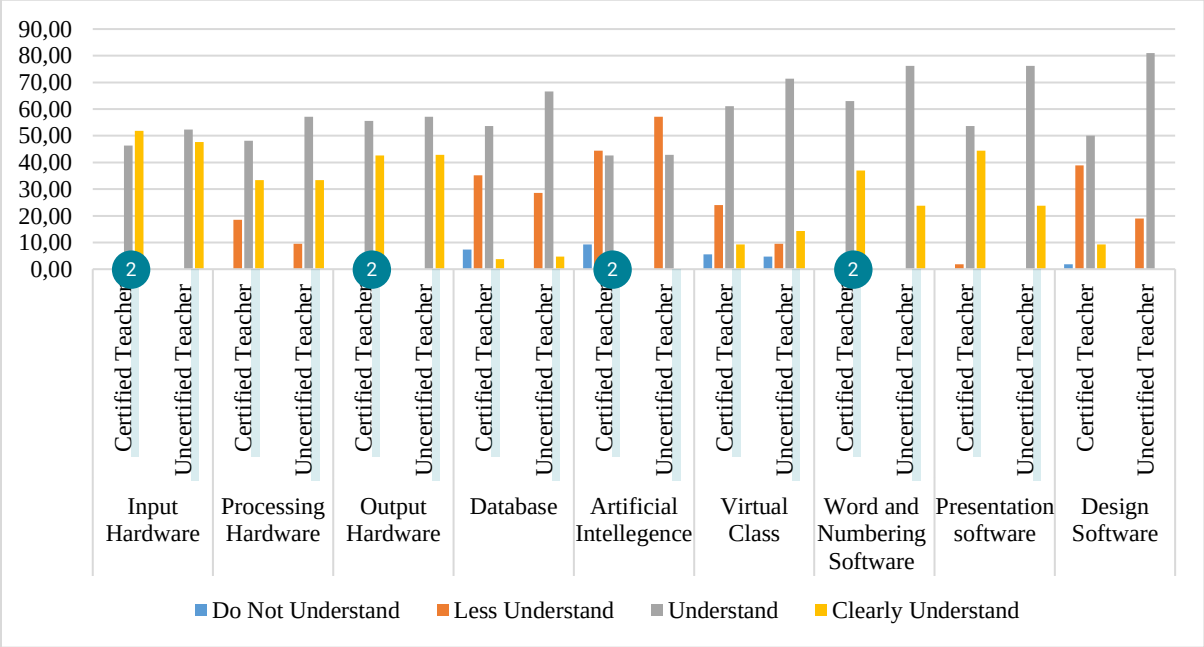


Figure 1. Teachers' ICT understanding based on certification

Figure 1 shows that the percentage of teachers who have not been certified have a higher understanding when compared to teachers who already have certification. However, at the point of understanding artificial intelligence, both uncertified and certified teachers do not understand it. This indicates that teachers of the TKP expertise program in South Sulawesi need to be strengthened in facing the challenges of industry 4.0 (Janti, 2014; Oliver, 2002; Tondeur et al.,

2017; Van Couvering, 2008). Given the increasingly rapid technological developments, the understanding of teachers' ICT in the millennial era should no longer be limited to the use of word processing software, numbers, and presentations, but teachers have to improve technological literacy skills in the 21st century (Alazam et al., 2012; Arnold et al., 2009; Caldarola et al., 2018; Durmuş & Dağlı, 2017; Saud et al., 2011)

2) Teacher's ability to use technology

Table 1. Teachers' ability to use technology based on years of service

| Ability in using software | | Years of service | | | Total |
|---|---|---|---|---|---|
| | | < 5 years | 5 - 10 years | > 10 years | |
| Word software | Unable | 0.00 | 0.00 | 0.00 | 0.00 |
| | Less able | 0.00 | 0.00 | 1.33 | 1.33 |
| | Able | 8.00 | 21.33 | **25.33** | **54.67** |
| | Very Capable | 10.67 | 17.33 | 16.00 | 44.00 |
| Numbering software | Unable | 0.00 | 0.00 | 0.00 | 0.00 |
| | Less able | 0.00 | 0.00 | 2.67 | 2.67 |
| | Able | 9.33 | **25.33** | **25.33** | **60.00** |
| | Very Capable | 9.33 | 13.33 | 14.67 | 37.33 |
| Presentation software | Unable | 0.00 | 0.00 | 0.00 | 0.00 |
| | Less able | 0.00 | 0.00 | 2.67 | 2.67 |
| | Able | 9.33 | 21.33 | **25.33** | **56.00** |
| | Very Capable | 9.33 | 17.33 | 14.67 | 41.33 |
| Design software | Unable | 1.33 | 0.00 | 5.33 | 6.67 |
| | Less able | 4.00 | 10.67 | 21.33 | 36.00 |
| | Able | 13.33 | **25.33** | 9.33 | **48.00** |
| | Very Capable | 0.00 | 2.67 | 6.67 | 9.33 |
| Drawing software | Unable | 0.00 | 0.00 | 1.33 | 1.33 |
| | Less able | 1.33 | 5.33 | 17.33 | 24.00 |
| | Able | 16.00 | **32.00** | 16.00 | **64.00** |
| | Very Capable | 1.33 | 1.33 | 8.00 | 10.67 |
| mind mapping | Unable | 0.00 | 2.67 | 6.67 | 9.33 |
| | Less able | 12.00 | 20.00 | **21.33** | **53.33** |
| | Able | 6.67 | 16.00 | 14.67 | 37.33 |
| | Very Capable | 0.00 | 0.00 | 0.00 | 0.00 |
| File management | Unable | 0.00 | 0.00 | 0.00 | 0.00 |
| | Less able | 0.00 | 0.00 | 2.67 | 2.67 |
| | Able | 9.33 | 22.67 | **28.00** | **60.00** |
| | Very Capable | 9.33 | 16.00 | 12.00 | 37.33 |
| Video editing | Unable | 0.00 | 2.67 | 6.67 | 9.33 |
| | Less able | 6.67 | **18.67** | 17.33 | **42.67** |
| | Able | 10.67 | 14.67 | 17.33 | **42.67** |

| | | | | | |
|---|---|---|---|---|---|
| | Very Capable | 1.33 | 2.67 | 1.33 | 5.33 |
| Software Installation | Unable | 0.00 | 0.00 | 2.67 | 2.67 |
| | Less able | 2.67 | 6.67 | 13.33 | 22.67 |
| | Able | 10.67 | **28.00** | 18.67 | **57.33** |
| | Very Capable | 5.33 | 4.00 | 8.00 | 17.33 |
| Uninstall | Unable | 0.00 | 0.00 | 2.67 | 2.67 |
| | Less able | 2.67 | 4.00 | 12.00 | 18.67 |
| | Able | 8.00 | **29.33** | 20.00 | **57.33** |
| | Very Capable | 8.00 | 5.33 | 8.00 | 21.33 |
| Using LCD | Unable | 0.00 | 0.00 | 0.00 | 0.00 |
| | Less able | 0.00 | 0.00 | 1.33 | 1.33 |
| | Able | 9.33 | 22.67 | **28.00** | **60.00** |
| | Very Capable | 9.33 | 16.00 | 13.33 | 38.67 |

Based on Table 1, it can be seen that of the 11 lists of measured abilities, almost all abilities are in the Able category. It's just that, on the ability of teachers in video editing, the percentage of the number of teachers who are in the same category, namely Able and Less Able is 42.67%. There is one indicator where the dominant teacher is in the Less Capable category, namely the indicator of the ability of mind mapping.

The number of teachers with a tenure of fewer than 5 years out of the total number of teachers in the sample was 18.67%, while the number of teachers with a tenure of 5 – 10 years was 38.67%, and the number of teachers with a tenure of more than 10 years was 42.67%. Referring to Table 1, it can be seen that the percentage of teachers who have worked for less than 5 years has a better ability than the percentage of teachers who have worked for more than 5 years. However, to see more clearly, it will be analyzed statistically using SPSS. The recapitulation of the results is described in Table 2.

Table 2. The results of statistical tests on the comparison of teachers' abilities based on years of service

| Variable | df | t | Sig | $t_{table}$ |
|---|---|---|---|---|
| $X_1 - X_2$ | 41 | 1.515 | 0.143 | 2.019 |
| $X_2 - X_3$ | 59 | 0.775 | 0.441 | 2,001 |
| $X_1 - X_3$ | 44 | 1992 | 0.055 | 2.015 |

Based on Table 2, it can be seen that the three comparisons of tenure variables do not show any differences in the ability to use ICT. As can be seen from the t-table value which is greater than the t-count value. In addition, it can also be shown that the magnitude of the significance value is greater than the probability of 0.05.

This shows that there is no difference in the ability of all teachers to use ICT in learning. Senior teachers who have worked for more than 5 years have not been able to use ICT in making

concept maps and video editing. This is also experienced by Junior teachers who have less than 5 years of service. These results are in line with research which states that teachers have used ICT in learning, and there is no difference between the use of ICT and teacher demographics (Aberšek & Flogie, 2017; Rahman et al., 2017; Schuster et al., 2015).

Strengthening the role of teachers in industry 4.0 is urgent to consider the role of vocational education in preparing graduates who are qualified, competitive, and able to adapt to changes that occur in the world of work (Ahmad et al., 2016; Nurhabibah et al., 2018). Vocational education emphasizes the importance of the relevance of industrial needs so that individual improvement and development needs to be aligned with the conditions and needs that exist in the industry (Asrib & Arfandi, 2017; Purnamawati et al., 2019).

One of the movements launched by the government to strengthen the quality of education in response to the industrial era 4.0 is the new literacy movement. This movement integrates digital literacy, technological literacy, and human literacy in every component of education. In addition, current conditions require teachers to also increase competence in the ability to connect online. A work environment that continues to do work online will "force" teachers to also improve their ability to adapt to a dynamically evolving work environment (Aoun, 2018; Ayoub & Payne, 2016; Lamanauskas, 2008; Vernanda et al., 2018).

Therefore, Mishra and Koehler offer the concept of The Technological Pedagogical Content Knowledge (TPACK) as a framework to see the level of teacher ability at various levels and demonstrate the skills of teachers in integrating their ability to work in an online environment (Mishra & Koehler, 2006). Since the application of technology to learning, teachers' skills in delivering subject matter have also become more adaptable. Especially when learning will be done online, the understanding and technical ability to use technology must also increase (Roddy et al., 2017).

The teacher's understanding and ability to use technology must be able to keep up with technological developments. Every change that occurs requires high teacher adaptability in its application. One thing is certain that the use of technology is a tool that helps teachers in presenting knowledge more effectively and becomes a means of facilitating students in achieving learning goals.

## 4. Conclusion

Based on the results and discussion, it can be concluded that:

a) The ICT literacy of SMK teachers is quite good, but most of them needs to be improved.
b) The ability of teachers to use technology without networks in learning is good but still needs to be improved in terms of making mind maps and video editing.
c) There is no difference on the ICT Literacy of teachers to use technology according to their working period. Therefore, strengthening the ability of teachers can be given to anyone who wants to learn information and communication technology.

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