



Correlation between ICT Literacy and Pedagogic Competence of Elementary School Teachers

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ARTICLE INFO

Article history:

Received February 10, 2022

Revised February 15, 2022

Accepted June 12, 2022

Available online August 25, 2022

Kata Kunci:

Literasi TIK, Kompetensi Pedagogik, Guru Sekolah Dasar

Keywords:

ICT Literacy, Pedagogical Competence, Elementary School Teachers

DOI:

<https://dx.doi.org/10.23887/jet.v6i3>

ABSTRAK

Banyak guru yang masih kurang dalam menguasai penggunaan teknologi, informasi, dan komunikasi dalam berlangsungnya pembelajaran. Penelitian ini bertujuan untuk mengetahui dan menganalisis hubungan ICT Literacy dengan Kompetensi Pedagogik Guru Sekolah Dasar. Jenis penelitian ini menggunakan penelitian kuantitatif korelasional. Populasi dalam penelitian ini meliputi guru sekolah dasar swasta pada Kecamatan Bojongsari. Sampel penelitian sebanyak 110 Guru Sekolah dasar yang diambil menggunakan teknik cluster random sampling. Metode pengumpulan data yang digunakan yaitu dengan cara menyebarkan angket atau kuesioner kepada responden. Teknik analisis data menggunakan SPSS dengan melakukan uji coba instrument penelitian, uji pra syarat analisis serta uji hipotesis menggunakan koefisien korelasi dan koefisien determinasi untuk mengetahui adakah hubungan ICT Literacy dengan Kompetensi Pedagogik serta mengetahui besaran pengaruh yang diberikan oleh variabel ICT Literacy kepada variabel Kompetensi Pedagogik. Hasil penelitian ini menunjukkan bahwa terdapat hubungan yang signifikan dan positif antara ICT Literacy dengan Kompetensi Pedagogik Guru sekolah dasar dengan perolehan nilai koefisien korelasi pearson sebesar 0,553. Hubungan ICT Literacy dengan Kompetensi Pedagogik termasuk kedalam kategori berkorelasi sedang. Variabel kompetensi pedagogik dipengaruhi oleh ICT Literacy sebesar 30,6%, sedangkan sisanya sebesar 69,4% dipengaruhi oleh faktor-faktor lain yang tidak menjadi bahasan dalam penelitian ini. Hal ini berarti dapat dinyatakan bahwa hubungan ICT Literacy dengan kompetensi pedagogik memiliki hubungan yang signifikan dan positif serta ICT dapat memberikan pengaruh kepada kompetensi pedagogik.

ABSTRACT

Many teachers still lack in mastering technology, information, and communication in the learning process. This study aims to reveals and analyze the correlation between ICT Literacy and the Pedagogic Competence of Elementary School Teachers. The type of this research was quantitative correlational research. The population in this study was private elementary school teachers in Bojongsari District. The research sample was 110 elementary school teachers who were taken using the cluster random sampling technique. The data collection method used was distributing questionnaires to respondents. The data analysis technique used SPSS to carry out research instrument trials, analysis prerequisite tests, and hypothesis testing using correlation coefficients and coefficients of determination to determine whether there was a correlation between ICT Literacy and Pedagogic Competence and assess how strong the effect of ICT Literacy on the Pedagogic Competence variable was. This study indicates a significant and positive correlation between ICT Literacy and Pedagogic Competence of elementary school teachers with the Pearson correlation coefficient value of 0.553. The correlation between ICT Literacy and Pedagogical Competence is in the moderate correlation category. The pedagogic competence variable is affected by ICT Literacy by 30.6%, while the remaining 69.4% is affected by other factors not discussed. It can be stated that ICT Literacy with pedagogic competence has a significant and positive correlation, and ICT can affect pedagogic competence.

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1. INTRODUCTION

The development of information and communication technology (ICT) is growing rapidly (Cholifah et al., 2020; Huda, 2020). In the current global era, human life will always be connected and dependent on information and communication technology (Gazali & Pransisca, 2021; Taopan et al., 2019; Danuri, 2019). Information technology is the knowledge needed to manage information to be searched easily and accurately (Kasmahidayat & Marcia, 2018; Komalasari, 2020). It has created an opportunity for the public to access all information, resulting in a borderless world phenomenon (Khodijah & Nurizzati, 2018; Aspi & Syahrani, 2022).

Information and communication technology (ICT) in the era of 4.0 is growing rapidly and affecting all aspects of people's lives and making it easier for humans to fulfill their needs (Maulana, 2020; Rohmy et al.,

2021). The ICT development has penetrated the education sector (Anwariningsih & Ernawati, 2013; Huda, 2020; Talebian et al., 2014). Information and communication technology development in education utilizes computers and the internet in learning (Munti & Syaifuddin, 2018; Huda, 2020). Information technology is a technology used for data processing, including obtaining, processing, storing, compiling, and manipulating data in various ways to produce quality information, namely accurate, relevant, and timely information.

The positive impact of advances in information and communication technology in education today is that educators and students can easily search and find information and knowledge through the internet network. ICT is indispensable in the learning process in educational institutions (Z. Siregar & Marpaung, 2020; Mukaromah, 2020). Information technology in education means the availability of facilities and networks that can be used to broadcast educational programs (Talebian et al., 2014; Wungguli & Yahya, 2020). ICT utilization is an essential factor supporting education progress (Kasmahidayat & Marcia, 2018; Yanuarti & Rusman, 2018). The existence of technology will be useless if it is not accompanied by technology-literate teachers and learners (Zam, 2021; Aspi & Syahrani, 2022). In using technology in learning, it is essential to use and manage information and communication technology systems, often referred to as ICT literacy. Literacy is not limited to reading and writing but extends to other fields such as financial literacy, ICT, numerical literacy, and others (Helaluddin, 2019; Pentury, 2018).

Technological literacy is an ability that consists of aspects of science, critical thinking skills, and decision making, as well as utilizing technology/innovation made by humans effectively, especially in the world of education (Santoso & Lestari, 2019; Marwani et al., 2021). ICT literacy is defined as the ability to utilize and use new media such as the internet to disseminate, access, manage, integrate, evaluate, create, and communicate information effectively and ability that includes principles in ICT (Helaluddin, 2019; Kim et al., 2019; Saepudin, 2019). An individual's ICT literacy or digital literacy can be interpreted as finding online resources to help solve problems related to ICT (Yazon et al., 2019; Santos et al., 2019).

ICT in learning can help teachers design and deliver learning content to students (Mukaromah, 2020; Prasetyo et al., 2019). Teachers as professional teaching staff must know and understand the importance of ICT in learning (Anwariningsih & Ernawati, 2013; Kundu & Bej, 2021; Talebian et al., 2014). Utilization of information and communication technology in the implementation of teacher duties, both in planning, implementation, evaluation, and follow-up, helps a lot and makes work easier so that teachers can be more motivated to continue to improve the quality of their performance (Mukaromah, 2020; Fatmawati & Safitri, 2020). ICT literacy is not just being able to access information and communication technology but also the ability of teachers to benefit from ICT according to their own needs and to use ICT to be disseminated to others to a minimum for their students.

Education policies in Indonesia have placed ICT literacy in the national curriculum as one of the skills that teachers must possess in the teaching process in the 21st century, both at the primary and secondary levels. Every teacher must have the ability to utilize ICT for learning purposes (Hafifah & Sulisty., 2020; Syahid et al., 2021). Technology is a mandatory choice that must be applied in education, not only in the general context of education but also in a particular context, namely in learning (Helaluddin., 2019; Putrawangsa & Hasanah, 2018).

However, based on researchers' observations, many teachers still do not master the use of information and communication technology. The use of information and communication technology that supports the continuity of learning is very limited. Teachers have ICT devices such as smartphones and laptops with a good enough network to access the internet. Based on information from students' parents, learning takes place only to the extent of giving assignments using the WhatsApp application by the teacher. The provision of material is also limited, only in photos of material in books or whiteboards without providing e-modules to students. Learning with video conferences such as google meetings and zoom is rarely done. Even some teachers do not use them, so the learning is less motivating the students to be enthusiastic in the learning process and think critically. Based on this information, it can be seen that learning is becoming less effective, less motivating for students in learning, and it is not optimally utilizing ICT in the learning process.

Considering the current condition that online learning is being carried out, technology is crucial in learning implementation. The technology that can support the continuity of online learning today is the Learning Management System or often referred to as LMS (Akhmalia et al., 2018; Dewi & Hilman, 2018). LMS is an application used to distribute, create, and manage the delivery of learning materials in various types of data forms such as text, video, and audio (Mardiana & Faqih, 2019; Sanova, 2018). Applications that are widely used to support learning today include Google Classroom, Kahoot, Edmodo, as well as using video conference applications such as zoom meetings, google meetings, and using the WhatsApp application to send materials, assignments, and e-modules for student learning needs (Anggriawan, 2019; Hildayanti & Machrizzandi, 2021).

The development of science and technology requires teachers to develop their professionalism and are expected to master the various competencies needed to become professional teachers (Akbar, 2021; Somantri, 2021). If the teacher has adequate competence, the teacher can professionally carry out his duties as an educator

and learning agent (Ningsih & Nurhafizah, 2019; Dudung, 2018). Teacher pedagogic competence is one of the four professional competencies that teachers can learn or prepare because it is one of the determinants of success in the learning process (Wulandari & Hendriani, 2021; Yurizki et al., 2018). The development of science and technology requires teachers to be able to develop competencies in carrying out their profession and develop their professionalism and are expected to be able to master the various skills needed to become professional teachers in the learning process (Akbar, 2021; Somantri, 2021).

Pedagogic competence is one of the competencies that need to be mastered by teachers because it is a teacher's ability to manage student learning in the classroom (Lubis, 2018). Pedagogic competence at least includes: designing and implementing educational learning activities, understanding students, understanding the development of students in actualizing their potential optimally, mastering the characteristics of students, mastering the principles and theories of educational learning, communicating with students, assessing and evaluating learning outcomes (Irwantoro & Suryana, 2016; Perni, 2019; Purwatiningsih, 2020; Selviani et al., 2020). Teachers who have good pedagogic competence can manage the learning better so that learning objectives can be achieved and the teaching and learning process can run effectively (Sudiarthi, 2021; Romlah et al., 2019).

Previous research stated that pedagogic competence could be improved through ICT media. Information literacy and technology literacy also affect increasing teacher pedagogic competence. It needs to be a concern to improve teacher competence related to the teaching and learning process because, during the information technology era, teachers need to master the currently developing literacy, namely literacy related to information and communication technology (Sulistiyarini & Sabirin, 2018; Nenden, 2020). Based on the information described above, there has been no in-depth research about the correlation between ICT literacy and the pedagogic competence of elementary school teachers. Therefore, the researchers researched whether there is a correlation between ICT literacy and the pedagogic competence of elementary school teachers.

2. METHOD

The research method used was a quantitative method with a correlational approach to examine the correlation between ICT literacy and the pedagogic competence of elementary school teachers. Correlational research aims to determine the strength or direction of the correlation between two variables and assess how strong the effect caused by the independent variable on the dependent variable is (S. Siregar, 2017). The population in this study was private elementary school teachers in the Bojongsari sub-district with 274 teachers. The number of samples in this study was 40% of the existing population because the total population exceeded 100, namely 274 teachers. Thus, the sample obtained was $40\% \times 274 = 109.6$, and the sample of this study was rounded up to 110 elementary school teachers from 7 schools in Bojongsari District. The research locations were SD Islam Nurul Hidayah, SDIT AMEC, SDIT Bina Cendekia, SDIT Azkia, SDIT Al-Iman, SDS Tadika Puri and SD Islam Daarun Ni'mah.

The researchers divided the cluster in the research sample based on the sub-districts in the Bojongsari District. There are seven sub-districts in Bojongsari District, namely Curug, Sub-Districts, Bojongsari Sub-Districts, Pondok Petir Sub-Districts, Serua Sub-Districts, Duren Seribu Sub-Districts, Bojongsari Baru Sub-Districts, and Duren Mekar Sub-Districts. From each sub-district, one school was taken whose teachers were used as the research sample. This research was conducted by distributing ICT literacy and pedagogic competency questionnaires. There were four alternative answers in the questionnaire using a Likert scale. The grid of research instruments is presented in Table 1 and Table 2.

Table 1. ICT Literacy Questionnaire Grid

No	Aspects	Question points
1	Basic Knowledge (have knowledge of technology)	1,2,3,4,5,6,7,8,9,10,11,12
2	Technical Skills (have the ability to use ICT such as accessing, integrating, managing, evaluating, and creating)	13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33
3	Attitude	34,35,36,37,38,39,40,41,42

Table 2. Pedagogic Competency Questionnaire Grid

No	Aspects	Question points
1	Mastering the characteristics of students,	1,2,3,4,5,6
2	Mastering the principles and theories of educational learning	7,8,9,10,11,12
3	Curriculum development	13,14,15,16
4	Educational learning activities	17,18,19,20,21,22,23,24,25,26,27
5	Developing of student potential	28,29,30,31,32,33,34

No	Aspects	Question points
6	Communicating with students	35,36,37,38,39,40
7	Assessing and evaluating	41,42,43,44,45

(Irwantoro & Suryana, 2016)

The data analysis technique in this study consisted of research instruments testing, namely validity and reliability testing, to find valid and reliable instruments (Ghozali, 2011; Trijono, 2015). The following testing was the analysis prerequisite test. It consisted of a normality test to determine whether the residual value was normally distributed or not and a linearity test to determine whether there was a linear correlation between the two variables. Furthermore, the final testing was hypothesis testing. It consisted of a correlation coefficient and a coefficient of determination test to measure a significant correlation between ICT literacy and pedagogic competence and assess how strong the effect of ICT literacy on the pedagogic competence variable was.

3. RESULT AND DISCUSSION

Result

As described in the previous background, this study aims to measure a significant correlation between ICT literacy and pedagogic competence and assess how strong the correlation is by using a questionnaire. Previous research questionnaires or questionnaires have been tested on 24 primary school teachers. After that, the questionnaire is tested for validation by experts and used SPSS version 26. The result shows that all the questionnaires from the two variables are declared valid. The reliability test is conducted to determine whether the questionnaire has consistency if the test is repeated. The reliability test result on the ICT literacy variable is 0.973, and the pedagogic competence variable is 0.967. Thus, the questionnaire of the two variables is declared reliable because Cronbach's Alpha value is > 0.60 . After distributing questionnaires to 110 respondents, the next step is to process the research data after the research is carried out. The data processing used in the analysis prerequisites is the normality and linearity tests. Based on the data above, the significance value obtained is 0.159, greater than 0.05. It means the tested data is normally distributed. Furthermore, if the data has been declared normal, the next step is the linearity test. The results of the linearity test are presented in Table 3.

Table 3. Linearity Test

	Statistic		Sum of squares	Df	Mean Squares	F	Sig.
Pedagogic	Between	(Combined)	11480.924	41	280.023	1.903	0.009
Competence	Groups	Linearity	6577.076	1	6577.076	44.686	0.000
*ICT Literacy		Deviation	4903.849	40	122.596	0.833	0.731
		of Linearity					
	Within Groups		10008.567	68	147.185		
	Total		21489.491	109			

Based on the ANOVA table above, the Deviation from linearity value data is 0.731. Linearity test decision-making is based on the significant value of the Deviation from the linearity value. If the significance value is greater than 5% or 0.05, the correlation between the independent and dependent variables is linear. On the other hand, if the significance value of Deviation from linearity is less than 5% or 0.05, the correlation between the independent and dependent variables is not linear. Based on the result, the correlation between the independent and dependent variables is linear because the Deviation from the linearity value is 0.731, greater than 0.05. After conducting the analysis prerequisite test, a hypothesis test is conducted to determine a correlation between ICT literacy and pedagogic competence. Hypothesis testing consists of the correlation coefficient test and the coefficient of determination test. The result of the correlation coefficient test using the Product Moment Pearson is presented in Table 4.

Table 4. Correlation Coefficient Test

	Statistic	Variable	Variable Y
Variable X	Pearson Correlation	1	0.553
	Sig. (2-tailed)		0.000
	N	110	110
Variable Y	Pearson Correlation	0.553	1
	Sig. (2-tailed)	0.000	
	N	110	110

Based on the Pearson product-moment correlation result above, the significance value of variable X is 0.000, and variable Y is 0.000. It means there is a correlation between variables X and Y. Then, the correlation value of variables X and Y is 0.553, and both variables show a positive correlation. The degree of correlation between the two variables can be seen in [Table 5](#).

Table 5. Interpretation of Correlation Coefficient

Coefficient Interval	Correlation Level
0.00-0.20	Very low correlation (Uncorrelated)
0.20-0.40	Low correlation
0.40-0.60	Moderate correlation
0.60-0.80	Enough correlation
0.80-1.00	High correlation

Based on the interpretation table of the r value, it can be seen that the correlation between ICT literacy and pedagogic competence is 0.553, which means it has a moderate correlation. After knowing the correlation between the ICT literacy variable and pedagogic competence, the coefficient of determination test is then carried out. It aims to determine how strong the effect of variable X (ICT literacy) has on variable Y (pedagogic competence). The results of the coefficient of determination test can be seen in [Table 6](#).

Table 6. Coefficient of Determination Test

Model	R	Model Summary		
		R Square	Adjusted R Square	Std. Error Of the Estimate
1	0.553 ^a	0.306	0.300	11.751

Based on data obtained, R Square of $0.306 \times 100 = 30.6\%$. It shows that the variable of pedagogic competence is affected by ICT literacy by 30.6%. The remaining 69.4% is affected by other factors not discussed in this study.

Discussion

Based on the analysis prerequisite test in this study, it is known that the normality test is normally distributed because this decision making based on the if the value of Sig. Kolomogorov-Smirnov is greater than 0.05. Then, the linearity test result from the Deviation from the linearity value declares a linear correlation between the independent and dependent variables. Furthermore, the results of hypothesis testing also confirm a significant and positive correlation between the two variables, which means that the higher the ICT literacy level of the teacher, the higher the level of pedagogical competence. Otherwise, the lower the level of ICT literacy in teachers, the lower the level of pedagogical competence. Then, the level of correlation between the variables of ICT literacy and pedagogic competence is a moderate level of correlation. The effect of the ICT literacy variable on the teacher's pedagogic competence in the coefficient of determination test is 30.6%. It shows that the percentage of pedagogic competence is affected by ICT literacy by 30.6%. It is caused by other factors that can affect pedagogic competence, as researchers found during research in the field, including the facilities and infrastructure available in schools, training experience by teachers, and teacher motivation in expanding their knowledge through ICT.

The findings of this study are in line with several previous studies which analyzed the effect of ICT on teachers' pedagogic competence ([Sulistiyarini & Sabirin, 2018](#); [Nenden, 2020](#)). In addition, this study also strengthens several previous research results, which state that the use of technology in supporting learning activities positively impacts teacher pedagogic competence. The use of online features that utilize ICT can also improve the pedagogic competence of teachers. Increasing pedagogic competence is a tangible manifestation of teachers' continuously updating their knowledge and improving the quality of education ([Purnasari & Sadewo, 2020](#); [Syahrudin et al., 2019](#)). The role of technology can also help smooth the implementation of learning so that learning objectives can be achieved. Teachers can take advantage of available online learning resources and use ICT-based media to create fun learning, and the implementation of learning in the 4.0 era will be easy to do.

Teachers have a responsibility to carry out their role as educators in schools. Therefore, teachers' competence needs to be improved to achieve quality learning goals because it is directly related to classroom learning ([Ambarita & Septiawan, 2019](#); [Saprudin et al., 2019](#)). Teachers must carry out educational learning in an interactive atmosphere so that learning can be active, innovative, creative, and fun ([Sagala, 2011](#)). In improving pedagogic competence, teachers must seek a lot of insight and information about learning and

classroom management. Teachers who understand everything about information and communication technology can easily access as much information as possible. The number of programs presented by information and communication technology-based media can create new ideas that students and teachers can develop. Teachers must improve ICT literacy skills in using information and communication technology (Kivunja, 2015; Wungguli & Yahya, 2020). Understanding ICT literacy can also affect higher-order thinking skills, present creative learning to students, and participate actively in learning (Fatmawati & Safitri, 2020; Oye et al., 2012). On the other hand, information and communication technology also brings many benefits and plays an essential role in education. It can improve human resources, such as teachers (Arkorful et al., 2021; Razak et al., 2018).

ICT literacy consists of knowledge, critical thinking abilities, skilled attitudes, and making decisions to use technology or information, encouraging critical and innovative thinking in the education field (Jannah et al., 2021). Therefore, ICT is expected to support the improvement of pedagogic competence and professionalism for teachers (Herliani & Wahyudin, 2018). This research has found important findings that contribute to the world of education. Various advantages are identified if teachers master ICT literacy, such as facilitating the teachers to improve the quality of learning in the classroom and helping teachers to improve their knowledge continuously in managing learning in the classroom. It can affect the improvement of teacher pedagogic competence. This study's correlation between ICT literacy and pedagogic competence proves that ICT literacy is one-factor affecting pedagogic competence. The limitation of this study is that this study only focuses on the correlation between ICT literacy and the pedagogic competence of elementary school teachers without examining the factors that can affect pedagogic competence through ICT literacy. Thus, future researchers are expected to use this article to develop a media or ICT literacy-based program to improve teacher pedagogic competence and conduct more in-depth research on ICT literacy in education to improve the quality of learning following the times

4. CONCLUSION

The analysis of ICT literacy level that has been carried out can be reported to have a significant correlation with pedagogic competence, and both have a positive correlation. It can be interpreted that the increase in the pedagogic competence of a teacher can be affected by the ICT literacy of the teacher. Therefore, it is recommended that every teacher should have ICT literacy in carrying out learning activities, especially in this 21st-century era. In utilizing various kinds of ICT applications and devices, teachers are expected to improve pedagogic competencies, which are indispensable in the learning process in the classroom.

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