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The relationship between teacher's ICT competence and children's digital literacy skills in kindergarten

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Abstract

This study aims to determine how the relationship between teacher ICT competence and children's digital literacy skills in kindergarten Surabaya. This research is a type of survey research with a quantitative approach. The data collection technique used was a questionnaire. The sample used in this study was kindergarten teachers who teach children aged 3-6 years, totaling 98 teachers. Data were analyzed using SPSS 29 for testing analytical requirements, inferential and hypothesis testing. Based on the results of this study, it can be concluded that there is a correlation and positive influence of teachers' ICT competence on children's digital literacy skills in kindergarten Surabaya. This is indicated by the Sig value < 0.05. The correlation and regression test results in the study were 0.001 < 0.05. The results of the regression equation in the study interpret that if the teacher's ICT competency variable increases by 1%, there will also be an increase in the digital literacy ability variable of kindergarten children by 0.800. This proves that it is important for teachers to improve ICT competencies to maximize early childhood digital literacy skills.

Keywords: ICT Competency, Ability, Digital Literacy, Children, Early Childhood Education.

INTRODUCTION

The 21st century world is entering the era of society 5.0 which makes all aspects of life experience the flow of digitalization, including education. Facing the era of society 5.0, educators are required to have 21st century life skills, namely creativity, critical thinking, communication and collaboration (4C) (Mu'minah, 2021). Educators will be faced with many characters of 21st century students who are very dependent on technological advances (Masek et al., 2019).

The need to consider children's developmental levels by age is necessary to be able to adapt to geographical characteristics and current and future educational challenges. Various studies on childhood show that preparing quality human resources must be done from an early age (Simatupang

and Amalia, 2022). Preschool education is another name for preschool early childhood education (Sholikhah et al., 2022).

The attitude and competence of kindergarten educators in the use of technology greatly influences the current learning system because preschool children already have technological skills from their experiences at home. The use of ICT that has been mentioned is closely related to the digitalization of education in the era of independent learning at this time (Natalia and Sukraini, 2021). The context of education in digitalization is defined as an effort to transform various aspects and procedures into diverse digital formats to achieve educational goals (Isma et al., 2022).

Education in digitalization can be introduced to early childhood slowly through literacy activities that are around. Early childhood literacy skills if measured are at the most fundamental level (Purnomosari et al., 2022). Early literacy skills are important because children must acquire early reading skills in order to benefit from the development of their reading skills (Adhe et al., 2023).

The education tri-center (school, family and community) develops six basic literacy skills, according to the Ministry of Education and Culture's national literacy movement plan. The six literacies are reading and writing literacy, numeracy literacy, financial literacy, science literacy, cultural and civic literacy and digital literacy (Prabowo et al., 2023). Digital literacy, which involves teaching fundamental literacies in a digitally intelligent way, has a significant impact on education (Firmannandya et al., 2023).

Digital literacy in education cannot be maximized if there is an imbalance between the use of digital technology and the teacher's mat competence (Chu et al., 2023). According to a survey published by the Data and Technology Center of the Ministry of Education and Culture (2020), the ICT competency mapping of 28,000 teachers is still less than 50%, with the breakdown of ICT literacy skills at only 46% and the ability to apply ICT for learning at 14%. Then the Indonesian Ministry of Education and Culture (2022) said that 60% of the country's teachers still only have limited knowledge of information and communication technology (ICT).

The Indonesian Ministry of Communication and Information Technology (2022) also conducted a face-to-face survey in January with 10,000 respondents from 514 districts or cities. The results of the survey show that although there has been some improvement in digital skills, it is still only at a moderate level in some pillars of digital literacy. Low competence will make teachers unprepared to face the acceleration of the digital age (Radinal, 2021).

Field observations conducted at five kindergarten institutions in Surabaya found that the use of ICT in digital literacy is still relatively low due to limited facilities and ICT competencies owned by educators. This opinion was proven in 2023 when Santo Yosef school held a competition between kindergartens in Surabaya, where the computer dexterity competition participants were in the category of the least number of participants compared to other competitions.

Previous study by Safitri (2021)revealed that the significance and need to introduce digital literacy to early childhood is necessary due to the increased use of digital technology in the child's world. In addition, Agung and Elise (2021), also revealed that, during the COVID-19 pandemic, teacher engagement in kindergarten was 57.42%, falling into the less engaged category. Previous research and observations emphasize the need for digital literacy for early childhood as the use of digital technology increases in daily learning. Teachers need ICT skills to integrate digital activities in learning and prepare students for future technologies (Hadiyanto et al., 2021).

Based on the above review, this study aims to fill the gap that has not been investigated in previous studies regarding the implications of the direct relationship between teachers' ICT competencies on the digital literacy skills of kindergarten children in Surabaya. This research contributes in providing an overview to measure, analyze and identify the unique challenges and opportunities faced by teachers and kindergarten children in Surabaya in developing digital literacy.

MATERIALS AND METHOD

This research is included in correlational research that uses a quantitative approach with survey methods. The population used is the entire number of educators in kindergarten institutions who teach in Surabaya, totaling ± 5,077 teachers (Source: BPS Surabaya). This study used random sampling techniques and the Slovin formula, resulting in a sample size of 98 kindergarten teachers located in five parts of Surabaya.

Table 1. Surabaya City Area Teacher Data

Surabaya City Kindergarten Teacher Data	
Group	Kindergarten/KB Group
Amount	± 5.077

Source: Dapodikdasmen 2023/2024

The data collection technique used a questionnaire via google form. The data obtained was then analyzed and hypothesis tested with the help of the SPSS (Statistical Package for the Social Sciences) application program version 29. The questionnaire used was a closed questionnaire, which is a questionnaire with alternative answers that match the existing conditions. This study uses a Likert scale with variable X, namely teacher ICT competence and variable Y, namely children's digital literacy skills.

The reference in collecting data, this study uses two instruments, including the first instrument of teacher ICT competence by Yelvita (2022), which was developed and the second is digital literacy skills made by Siberkreasi & Deloitte (Isrokatun et al., 2022), which was developed.which was developed. Examination of the instruments in this study through expert judgment and using the help of SPSS version 29 to test the validity and reliability of the instrument. After the validation is complete and the instrument has been declared valid and reliable, the questionnaire will be distributed to respondents.

The data obtained from the distribution is then tested for classical assumptions (normality test and linearity test) and when it has been declared to meet the assumptions, then correlation and simple linear regression analysis can be carried out using SPSS version 29. The research design is described in the form of a simple chart consisting of only two variables, namely the independent variable X (dependent) and variable Y (independent) as follows.

Chart 1. Correlation Model

Description:
X : Teacher's ICT Competency
Y : Digital Literacy Skills of Preschool Children

RESULT AND DISCUSSION

The general distribution of each sample group based on the latest education, teaching grade and teaching location is described in the table below.

Table 2. Overview of Respondents' Last Education

	Last Education	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School	43	43.9	43.9	43.9
	D1/D2/D3	10	10.2	10.2	54.1
	D4 / S1	44	44.9	44.9	99.0
	S2	1	1.0	1.0	100.0
	Total	98	100.0	100.0	

Table 3. Overview of Respondents' Teaching Classes

	Last Education	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Playgroup (KB)	45	45.9	45.9	45.9
	Kindergarten A	31	31.6	31.6	77.6
	Kindergarten B	22	22.4	22.4	100.0
	Total	98	100.0	100.0	

Table 4. Overview of Respondents' Teaching Locations

	Last Education	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	West Surabaya	26	26.5	26.5	26.5
	East Surabaya	18	18.4	18.4	44.9
	North Surabaya	22	22.4	22.4	67.3
	South Surabaya	23	23.5	23.5	90.8
	Surabaya Center	9	9.2	9.2	100.0
	Total	98	100.0	100.0	

Based on the table of 98 respondents above, it can be seen that the highest percentage of the last education of kindergarten teachers in Surabaya is D4 / S1. 44 people with a percentage of 44.9% and the lowest is S2 as many as 1 person with a percentage of 1.0%. Furthermore, it can also be seen that the highest percentage of teaching classes taught by kindergarten teachers is the playgroup group as many as 45 people with a percentage of 45.9%. Finally, the table also interprets that the highest percentage of teaching location is West Surabaya with 26 people with a percentage of 26.5% and the lowest is Central Surabaya with 9 people with a percentage of 9.2%.

Table 5. Correlation Test Results between X and Y Variables

Correlations		Teacher ICT Competency	Children's Digital Literacy Skills
Teacher ICT Competency	Pearson Correlation	1	.489**
	Sig. (2-tailed)		<,001
	N	98	98
Children's Digital Literacy Skills	Pearson Correlation	.489**	1
	Sig. (2-tailed)	<,001	
	N	98	98
**. Correlation is significant at the 0.01 level (2-tailed).			

Based on the table above, the correlation level between the teacher ICT competency variable (X) and the kindergarten children's digital literacy ability variable (Y) using Sig. (2-tailed) <0.05 so that it can be called data that has a correlation. Both variables have shown that Sig. (2-tailed) has a value of 0.001 which means less than 0.05, it can be concluded that there is a correlation between the two variables. Then according to the degree of closeness of the correlation coefficient, the data shows a correlation coefficient of 0.489 which can be categorized as a sufficient correlation range.

Table 6. Regression Test Results between X and Y Variables

Coefficients [a]						
Model		Unstandardized Coefficients		Standardized Co-efficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.133	3.526		.888	.377
	Teacher ICT Competency	.800	.145	.489	5.498	<,001
a. Dependent Variable: Children's Digital Literacy Skills						

Based on the table above, it is obtained that the constant is the constant value () of the regression equation, while for the teacher ICT competency row is the regression coefficient value of the independent variable (). Therefore, the simple regression equation model in this study is Y = 3.133 + 0.800. The test in the study has a positive regression coefficient (+), so it can be said that the teacher's ICT competence (X) has a relationship with the digital literacy skills of kindergarten children (Y).

Next is to test the hypothesis by comparing the significance value with a probability of 0.05. Based on the data in the table, it is known that Ho is rejected and Ha is accepted because the significance value of 0.001 is smaller than 0.05 (0.001 < 0.05). This indicates that there is a relationship between the digital literacy skills of kindergarten children and the ICT competence of teachers. The following table can then be used to determine the percentage relationship between the independent variable (X) and the dependent variable (Y) in this study.

Table 7. Results of the Research Determination Coefficient

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.489a	.239	.232	4.520
a. Predictors: (Constant), Teacher ICT Competency				

The table above shows the R square value of 0.239. The R square number is the square of the correlation coefficient (0.489 X 0.489 = 0.239). R square can be referred to as the coefficient of determination, meaning that 23.9% of the kindergarten children's digital literacy ability variable has a relationship with the teacher's ICT competence. While the rest (100% -23.9%) has a relationship with other variables.

This study aims to examine the relationship between teachers' ICT competencies and children's digital literacy skills in Surabaya kindergarten institutions. The population in this study is all kindergarten teachers who teach children aged 3-6 years with a sample size of 98 teachers who are active in Surabaya. The results of descriptive data found in the study showed that most kindergarten teachers took the last level of education, namely D4 / S1. Then the highest percentage of teaching classes taught by kindergarten teachers is the playgroup group with a percentage of 45.9% and the lowest is Kindergarten B with a percentage of 22.4%.

The gap in competency qualifications and their implementation in the field found in the above results raises many question marks because basically teachers in Kindergarten A or Kindergarten B as

formal educators often have higher qualifications than teachers in playgroup as non-formal educators, such as degrees in early childhood education or special training in child development (McFarland and Laird, 2020). The qualifications possessed should not be inversely proportional to the application of learning in the field. However, this study found a significant difference, where the data showed that playgroup teachers seemed to want and maximize the use of ICT in digital literacy more than kindergarten A and kindergarten B teachers.

The results of the validity and reliability tests of the instruments on the independent and dependent variables with 8 statement items and 9 statement items have been declared valid and reliable. Then the data from the normality test and linearity test results of this study provide normal and linear data results. Furthermore, the correlation and simple linear regression tests were carried out. Based on the results of the correlation test on the teacher ICT competency variable (independent) with the kindergarten children's digital literacy ability variable (dependent) shows that Sig. (2-tailed) has a value of 0.001 which means less than 0.05, which means that it is found that there is a correlation (relationship) between variables. Furthermore, a simple linear regression test was conducted on both variables, where the results of the simple regression equation were found to be $Y = 3.133 + 0.800$.

The results of the regression equation above can be interpreted that if the teacher's ICT competency variable increases by 1%, there will also be an increase in the digital literacy ability variable of kindergarten children by 0.800. Then in this study also shows that there is a positive influence between the two variables. This data proves that the better the teacher's ICT competence, the better the digital literacy skills of early childhood. A teacher must have knowledge of digital media in addition to the four required competencies, because the 21st century demands a higher level of digital knowledge as participation in the use of digital media increases from all walks of life (brosimova, 2020). This is in line with research which found that preschool teachers with ICT skills can effectively integrate digital literacy skills into the educational process (Metafisika et al., 2022).

Technology in everyday life has a major impact on children's growth and education (Sabiela et al., 2022). According to research, children are exposed to digital technologies from an early age, and these devices are increasingly used in their play, education and communication (Kontkanen et al., 2023). The widespread use of digital devices among children is evident in the results of a survey that said that 88% of parents reported that their children under 12 years old use television, and some other parents of young children also reported that their children use tablets, computers or laptops, and smartphones (Auxier et al., 2020).

Addressing the negative impact of the widespread use of digital devices among children, it is imperative to focus on ICT competence and the introduction of digital literacy skills among children as well as adults who play a critical role in shaping children's digital literacy. ICT competence refers to the ability to use ICT effectively for a variety of purposes, including communication, learning, and problem-solving (Amini and Oluyide, 2020). Digital literacy on the other hand covers a range of skills, including the ability to navigate digital devices and platforms, critically evaluate online information, and communicate effectively using digital tools (Vanek et al., 2020).

In early childhood the development of digital literacy skills and ICT competencies can go together. As children interact with digital devices and technologies, they naturally develop basic digital literacy skills such as using a mouse or touch screen, navigating simple interfaces, and understanding cause and effect relationships in digital environments (López-Escribano et al., 2021). In addition, exposure to ICT tools and educational software can improve children's cognitive and socioemotional development, as well as their problem-solving skills (Syarfina et al., 2023).

Research conducted by Weber & Greiff, (2023) shows that early exposure to ICT and opportunities to develop digital literacy skills can provide long-term benefits for children, including improved academic achievement, enhanced communication skills, and better preparation for the demands of a digital workforce. Therefore, integrating ICT into early childhood education in a thoughtful and developmentally appropriate way is critical to preparing children for success in today's digital society.

Based on the coefficient of determination in this study, it can be interpreted that there is a relationship between teacher ICT competence and digital literacy skills of kindergarten children by 23.9% while as much as 76.1 can be influenced by factors outside the teacher's ICT competence. This finding is supported by previous research which states that other factors that can affect digital literacy skills include age, technology use, education level, cognitive ability and others (Leoste et al., 2022).

CONCLUCION

Based on the results of the research conducted, it can be concluded that there is a significant relationship between teachers' ICT competence and children's digital literacy skills in kindergarten Surabaya. Normality and linearity tests produced results consistent with normal and linear data. Then the results of the product moment correlation test show that there is a relationship between the teacher's ICT competence variable and the digital literacy ability variable of kindergarten children. This relationship is indicated by the correspondence value of teacher ICT competence on digital literacy skills of kindergarten children in Surabaya, which is 0.001. The results of the simple linear regression equation test interpreted the relationship built on both as positive (+), so that the higher the ICT competence of teachers, the higher the digital literacy skills of kindergarten children.

Given the correlation between teacher ICT competence and digital literacy skills of kindergarten children which is multifaceted, it is recommended to be able to examine more deeply the components of the teacher ICT competence variable and the variable digital literacy skills of kindergarten children as well as other factors that might affect the variables. In addition, it is suggested that the Surabaya local government needs regulations to improve the ICT competence of teachers at all levels of kindergarten. Then school managers need to re-evaluate the ICT competencies of teachers at school and also better facilitate supporting needs in digital literacy learning.

AUTHOR CONTRIBUTION STATEMENT

The authors of this study declare that they have NO affiliation or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speaker's bureaus; membership, employment, consulting, stock ownership, or other equity interests; and expert testimony or patent licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

DECLARATION

The study's authors disavow any affiliations or involvement with organizations or entities that have a financial interest in the subject matter or materials discussed inthis manuscript,as well as non-financial interests,such as personal or professional relationships,interest afiliations,knowledge,or beliefs,membership,employment,consultacies,stock ownership,interest or other equity interest.

DATA AVAILABILITY

The datasets generated during and/or analyzed during this study are available from the corresponding author upon reasonable request.

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