



The Effect of Educational Qualifications and Teacher Professional Education Program on the Digital Literacy Skills of Early Childhood Educators

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Abstract

Digital literacy is mastered by Early Childhood Education (ECE) teachers because the first education obtained by early childhood will be the foundation and basis of child development in the future. This study aims to determine whether there is an interaction between academic qualifications and teacher professional education on digital literacy. This research is quantitative research with a survey type. The study was conducted in Malang City, with data distributed through a questionnaire (G-Form). The data collected was analyzed with Two Way Anova with the help of the SPSS 26.0 application. Based on the research findings, it is known that there are differences in digital literacy skills based on the academic qualifications of Early Childhood Education teachers (H1 accepted), there are differences in digital literacy skills based on the participation of Early Childhood Education teachers in the Teacher Professional Education program (H2 accepted), and there is an interaction between academic qualifications and teacher professional education on digital literacy of Early Childhood Education teachers (H3 accept). Skill development programs need to be held by schools to improve teacher competence.

Keywords: *educational qualifications; teacher professional education program; preschool teachers; digital literacy*

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Introduction

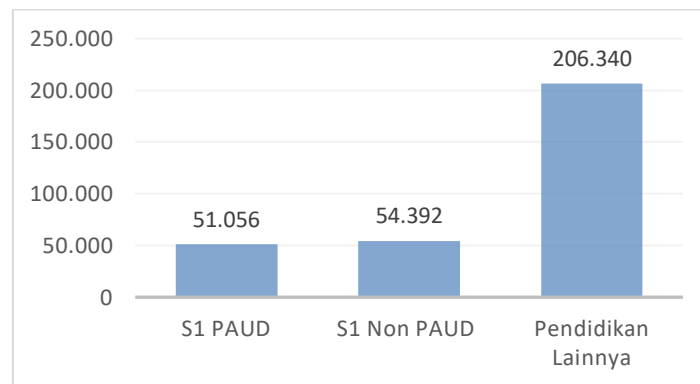
The development of information as it is today causes an unavoidable information explosion. The existence of an information explosion impacts every line of life, including the field of education (Gibson & Smith, 2018; Sutama et al., 2021). The information explosion does make it easier for teachers to access various information. On the other hand, the information explosion can make it difficult for teachers to filter credible and high-quality information from those that are not. This can affect the ability of ECE teachers to present accurate and useful information to students. This condition requires teachers to have digital literacy skills. Digital literacy is necessary for teachers, especially ECE teachers, because the first education obtained in early childhood will be the foundation and basis for children's development in the future (Anisa & Wulandari, 2018). In an increasingly digitized world, ECE teachers are important in preparing early childhood to deal with technological developments. Teachers' digital literacy will help them understand the use of technology wisely and effectively (Atmojo et al., 2022). In addition, as stated in the Ministry of Education and Culture's ECE national standard No.

137 of 2014, it is also required to have digital competencies that enable teachers to manage virtual learning well

Digital literacy is the ability to understand and use information in multiple formats from multiple sources when presented through a computer (Buckingham, 2010). Being digitally literate means processing various information, understanding messages and communicating effectively with others in various forms. In this case, the form in question is understanding when and how technology should be used to achieve goals effectively. Contrary to this condition, research (Sahelatua, 2018) found that teachers still have difficulty using digital tools, such as adjusting PowerPoint backgrounds that have many colors with the text to be used. Teachers have not been able to use the internet as a means to find media and teaching materials that appear when teaching teachers do not use the internet to access various learning media, deliver interesting and innovative online material for early childhood, the ability to use digital devices and applications in the daily lives of ECE teachers is still classified as less proficient (Hardiyanti & Alwi, 2022; Winarti et al., 2022).

Digital literacy is one of the demands teachers for the industrial era 4.0 must meet. It is not enough to master old literacy (reading, writing and math) (Wibawa & Pritandhari, 2020). With digital literacy skills, teachers can seamlessly integrate technology into teaching by utilizing digital tools, applications, and online resources to enrich students' learning experiences. Learning will also be more engaging and interactive as teachers can utilize multimedia elements such as images, videos, and animations to explain material more compellingly (Atmojo et al., 2022).

Based on ECE statistical data related to the number of teachers based on academic qualifications, it is found that there are 311,788 ECE teachers in Indonesia. Only 51,056 teachers come from Bachelor of ECE, 54,392 from Bachelor non ECE, and 206,340 from other education levels (Diploma to high school or below).



Picture 1. Data on Academic Qualifications of Early Childhood Teachers in Indonesia

Source: Early Childhood Statistics 2020/2021

The mismatch of academic qualifications will have an impact on differences in teachers' ability to understand students' characteristics, also affecting the preparation of learning plans according to needs and development (Putri Nazidah, 2021). ECE teachers who are not linear will have a different perspective on students and their mastery of competencies because their previous education was not focused on early childhood. The academic qualifications related to ECE teachers have been explained in the Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 137 of 2014 Chapter VII concerning Educator and Education Personnel Standards, namely having a Diploma Four (D-IV) or Bachelor certificate in the field of ECE, and other education relevant to the ECE system, or psychology obtained from an accredited study program, and having an ECE Teacher Professional Education (PPG) certificate from an accredited university.

Sadaf & Gezer (2020); Syah et al., (2019) explain that the education obtained by teachers also affects digital literacy. Sugini (2011) states that the higher the academic qualifications owned will make the teacher more skillful, thus making it easier to achieve the goals of ECE. Conceptually, the quality that needs to be achieved by each teacher is the same but different from the quality of ECE teachers contextually, which refers more to the development and achievement of early childhood. Thus, the linearity of ECE teacher education also affects all aspects of teacher competence (Putri Nazidah, 2021)

The success of education in the realm of ECE is supported by teachers who have high commitment and dedication and can creatively teach their students (Mappapoleonro, 2019). Permendikbud Number 137 of 2014 has also explained ECE National Standards around ECE teacher qualifications, including having an ECE Teacher Professional Education (PPG) certificate from an accredited university. Professional education can help teachers develop skills to design and implement technology-based learning.

Teacher Professional Education known as Pendidikan Profesi Guru (PPG) in Indonesian is a continuing education program that aims to improve teachers' skills and professionalism. Teacher Professional Education (PPG) aims to equip teachers with in-depth knowledge and skills in pedagogy, leadership, curriculum development, and learning management. The program is designed to prepare teachers for the increasing complexity of learning and to meet established professional standards (Al Mustaqim, 2023). Teacher Professional Education (PPG) also contributes to improving the quality of learning through effective learning methods, the use of technology, comprehensive evaluation, and collaboration with educational institutions. By updating their knowledge and skills, teachers can keep up with the latest developments in education, apply innovative teaching methods, use educational technology effectively, and become active and collaborative facilitators of learning.

Appropriate academic qualifications supported by Teacher Professional Education will further improve the digital literacy skills of ECE teachers. This statement is supported by research findings (Kustiawan et al., 2021; Lismawati & Trihantoyo, 2021) that increasing academic qualifications through training activities can improve the literacy of the school community, including teachers and parents. The academic qualifications taken during the ECE undergraduate education more solidify the knowledge of ECE teachers regarding their main duties and functions as professional educators compared to educators who come from non-ECE graduates. Digital literacy skills are further improved when ECE teachers participate in Teacher Professional Education. During Teacher Professional Education (PPG), ECE teachers gain the knowledge and skills to integrate technology effectively into their teaching.

Professional teacher education provides opportunities for early childhood teachers to develop creativity in using technology. Teachers who take part in professional education receive materials that update their digital literacy skills so that teachers are better prepared to face changes by teaching through the integration of digital platforms.

This research is interesting because research related to the academic qualifications of ECE teachers is mostly related to professional competence, so minimal research has yet to review digital literacy skills (Elan et al., 2022; Karimah et al., 2019). Academic qualifications and Teacher Professional Education are important to review because more than being a professional teacher, it needs to be supported by a diploma or Teacher Professional Education (PPG) certificate. Mastery of digital technology is important for teachers when searching, selecting, using and distributing learning materials because, nowadays many early childhood children are proficient in technology. Based on the above background, this study was conducted to determine whether 1) there are differences in digital literacy skills based on academic qualifications? 2) there are differences in digital literacy skills based on teacher professional education? 3) is there an interaction between academic qualifications and teacher professional education on digital literacy?

Methodology

This research is quantitative research with survey research type. The population in this study were all ECE teachers in Malang City. The sample in this study was selected by simple random sampling because the study population was not known with certainty. In addition, taking sample members from the population is done randomly without regard to strata in the population (Amin et al., 2023). Data in the study were obtained by distributing questionnaires via G-form to the Malang City ECE teacher group. Two-way ANOVA analyzed the collected data with the help of the SPSS 26.0 application. Digital literacy skills in this study were measured using indicators from (Raharjo and Winarko, 2021), described in the **table 1**.

Table 1. Dimensions and Indicators of Digital Literacy

No.	Dimensions	Indicator
1.	Access	Using digital media devices, Using search engines, Using various apps
2.	Selecting	Selecting information as needed, Ignore information that does not meet the need Delete information that does not meet the needs
3.	Understand	Understand written information, Understand the symbols used, Understand the video
4.	Distribute	Disseminate information according to the target message, Tailor the message to the media application

The collected questionnaire data was analyzed using Two Way Anova analysis to test the following hypotheses: 1) H1: Are there differences in digital literacy skills based on academic qualifications? 2) H2: Do digital literacy skills differ based on the teacher's professional education? 3) H3: Is there an interaction between academic qualifications and teacher professional education on digital literacy?

Result and Discussion

Hypothesis Prerequisite

Test The normality test in this study was conducted to determine whether digital literacy data distribution was normally distributed (**table 2**). The normality test used the Kolmogorov-Smirnov formula with the following conditions: 1) Data is normally distributed if it has a Sig. Score > 0.05; 2) Data is not normally distributed if it has a Sig. < 0.05.

Table 2. Normality Test Results

	Kolmogorov-Smirnova		
	Statistic	df	Sig.
Standardized Residual for Result	.057	200	.200*

Table 3. Homogeneity Test Results

Levene's Test of Equality of Error Variances					
		Levene Statistic	df1	df2	Sig.
Hasil	Based on Mean	1.27	3	196	.28
	Based on Median	1.35	3	196	.25
	Based on the Median and with adjusted df	1.35	3	195.44	.25
	Based on trimmed mean	1.36	3	196	.25
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.					
a. Dependent variable: Digital Literacy					
b. Design: Intercept + Status + Education + Status * Education					

Similar to the normality test, the homogeneity test was conducted to determine whether the digital literacy data obtained was homogeneous. The homogeneity test results are presented in the **table 3**.

Hypothesis Test

The normality and homogeneity tests are prerequisite tests for two-way ANOVA hypothesis testing. The data proved normal and homogeneous based on the testing results, and the analysis continued with hypothesis testing. Hypothesis testing is carried out to prove all proposed hypotheses. In this study, the hypothesis was tested using a two-way analysis of variance (two-way ANOVA) assisted by the SPSS 26.0 application. The results of hypothesis testing with two-way analysis of variance can be shown as **table 4**.

Table 4. Hypothesis Test Results

Tests of Between-Subjects Effects					
Dependent Variable: Digital Literacy					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4994.36	3	1664.78	16.55	.00
Intercept	1198152.00	1	1198152.00	11913.66	.00
Status	1362.42	1	1362.42	13.54	.00
Pendidikan	3026.42	1	3026.42	30.09	.00
Status * Pendidikan	605.52	1	605.52	6.02	.01
Error	19711.64	196	100.57		
Total	1222858.00	200			
Corrected Total	24706.00	199			

a. R Squared = .202 (Adjusted R Squared = .190)

Strengthening the results of hypothesis testing, based on the calculation results, it is known that 50 teachers from Bachelor ECE who have not participated in the Teacher Professional Education program have an average digital literacy ability of 79.32, the score is higher than teachers from bachelor non-ECE, who get an average of 71.24. The average score of digital literacy from teachers who have participated in the teacher professional program from Bachelor ECE is 80.44 higher than teachers from Bachelor ECE who get an average digital literacy score of 76.16. When comparing digital literacy skills between bachelor ECE and bachelor non-ECE teachers, the digital literacy score is higher than Bachelor ECE teachers with an average of 79.88, while digital literacy from bachelor non-ECE is 76.79. In more detail, the acquisition of each sample group can be seen in the **table 5**.

Table 5. Descriptive Statistics Test Results

Descriptive Statistics				
Dependent Variable: Digital Literacy				
Status	Education	Mean	Std. Deviation	N
Not Yet_PPG	Bachelor in ECE	79.32	10.37	50
	Bachelor non ECE	71.24	8.93	50
	Total	75.28	10.45	100
Already_PPG	Bachelor in ECE	80.44	11.03	50
	Bachelor non ECE	76.16	10.88	50
	Total	78.30	11.11	100
Total	Bachelor in ECE	79.88	10.67	100
	Bachelor non ECE	73.70	10.21	100
	Total	76.79	10.87	200

Differences in Digital Literacy Skills Based on Academic Qualifications

Based on the results of hypothesis testing, it is known that there is a difference in digital literacy skills based on the academic qualifications of ECE teachers with a Sig. Score 0.00 (Sig.<0.05). A linear academic qualification allows ECE teachers to understand better the main tasks of ECE teachers and their functions. The professionalism of ECE teachers in mastering teaching materials with relevant qualifications will be different from teachers from Senior High School or Bachelor qualifications in other fields. The quality of ECE learning will increase if teachers have high professionalism in teaching early childhood and understand how ECE learning is more interesting for child development with the digital literacy they have. Teachers who have Bachelor ECE qualifications will easily search for various teaching materials from various sources on the internet that are tailored to aspects of child development. Research by (Syah et al., 2019) explains that academic achievement also affects digital literacy.

Educational qualifications are important in understanding digital literacy. Teachers with linear educational qualifications are more ready to integrate technology into learning activities. During their studies, teachers have been equipped with various courses that can give them an in-depth understanding of everything related to teaching early childhood. The provision during the study is also supported by teaching experience so that ECE teachers with linear academic qualifications are more proficient in using digital devices and applications to improve learning.

Differences in Digital Literacy Skills Based on Teacher Professional Education (PPG)

Based on the results of hypothesis testing, it is known that there are differences in digital literacy skills based on the participation of ECE teachers following Teacher Professional Education (PPG) with a Sig score. 0.00 (Sig.<0.05). The results of this study follow the findings (Al Mustaqim, 2023), which state that Teacher Professional Education (PPG) can improve teacher professionalism, create an inclusive, creative, and interactive learning environment, and improve teachers' ability to motivate and inspire children in achieving optimal personal development. The Teacher Professional Education (PPG) program has a structured curriculum structure with integrated theoretical and practical components. It is complemented by supervision and supervision from among teachers so that ECE teachers can get the theory and practice of teaching with a balanced proportion.

Early childhood that participate in Teacher Professional Education (PPG) can improve their pedagogical, social, professional and personality competencies to start their career as professional teachers (KEMDIKBUD). The Teacher Professional Education (PPG) program is systematically designed by applying quality principles from selection, learning process, and assessment to competency testing so that the Teacher Professional Education (PPG) program can produce ECE teachers. Teacher Professional Education (PPG) can produce ECE teachers who are professionally excellent, competitive, and characterized (Zulfitri et al., 2019). Teacher Professional Education (PPG) has become a means of improving teachers' abilities and a strategic step in refreshing and developing ECE teachers' expertise to meet the demands of the times (Nazilah, 2022; Sabilah et al., 2021).

The Interaction Between Academic Qualifications and Teacher Professional Education on Digital Literacy

Based on the results of testing the third hypothesis. The score obtained is 0.01 (Sig <0.05), which means there is an interaction between the educational qualifications of preschool teachers and teacher professional education on digital literacy. A linear undergraduate education has equipped early childhood teachers with various theories supporting their teaching ability. For eight semesters, ECE graduates have explored child development, how to stimulate early childhood, and what not to do. ECE graduates learn how to teach, train, guide, and educate early childhood to have good insight, character, and physical development. This provision cannot be found for educators with non-ECE majors. The capabilities of bachelor in

ECE graduates who become teachers will be different from bachelor non-ECE and lower levels who become teachers.

The academic qualifications obtained are a provision for teachers to search, select, distribute and utilize various digital learning resources in learning. Research (Sadaf & Gezer, 2020) suggests that teachers with different fields of knowledge can provide different ways of integrating digital technology into learning. Digital literacy skills increase when teachers with bachelor ECE qualifications follow the Professional Teacher Education program. In PPG, teachers are taught about effective classroom management strategies, including managing student behavior, building a positive learning climate, and resolving conflicts in the classroom. They are also trained to manage learning time well, organize learning resources, and utilize available technology or tools. Through PPG, teachers are introduced to various technological tools and applications relevant to learning. Professional Teacher Education (PPG) is important for teachers to integrate technology into their learning practices. The implementation of technology in learning has great potential to improve the quality of learning in Indonesia (Huda et al., 2021)

Conclusion

Based on the research findings, it is known that H1, H2, and H3 are accepted that there are differences in digital literacy skills based on the academic qualifications of ECE teachers, there are differences in digital literacy skills based on the participation of ECE teachers in the Teacher Professional Education program, and there is an interaction between academic qualifications and teacher professional education on digital literacy of ECE teachers. The ability to be adaptive and creative by integrating digital technology is important for ECE teachers to master. Skill development programs need to be held by schools to improve teacher competence. Research related to the digital literacy of ECE teachers needs to be done in more depth by involving various variables such as geographic location, age and teaching experience.

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