Journal Visionary : Research and Development in Educational Management
Volume 13 Number 2 October 2025
https://e-journal.undikma.ac.id/index.php/visionary
Email: visionary@undikma.ac.id

The Effect of Online Learning in Teacher Professional Education on the Digital Competence of Kindergarten Teachers

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Abstract: This study aims to analyze the influence of online learning in teacher professional education on the digital competence of kindergarten teachers in Central Lombok Regency. The research employed a quantitative approach with a correlational method. The subjects consisted of 30 participants, including kindergarten teachers and principals. The instrument used was a Likert-scale questionnaire comprising 12 items per variable. Data were collected through Google Forms and analyzed using descriptive statistics and simple linear regression with the assistance of JASP software. The results indicate that online learning has a positive and significant effect on teachers' digital competence, with a coefficient of determination (R^2) of 0.506 and a significance level of $p < 0.001$. These findings suggest that the effectiveness of online learning in teacher professional education plays an important role in improving the digital capabilities of kindergarten teachers. Therefore, strengthening relevant and contextual online learning strategies should be a priority in the future development of teacher education programs.

Keywords: Teacher Professional Education, Digital Competence, Kindergarten Teachers

Introduction

Online learning in teacher professional education (PPG) is an approach that integrates information and communication technology to improve teachers' professional competencies. According to Kurniawan & Zarnita (2020) Online learning in PPG can facilitate the strengthening of teachers' professional competencies through mastery of material, concepts, and technology-based learning innovations. In addition, teachers' digital competencies, which include the ability to use digital technology to support the learning process, are a crucial aspect in today's digital era (Alamsyah, 2024). This competency includes a basic understanding of digital technology, the use of software, and the application of technology in the learning process. Arum (2023).

Although online learning in PPG has the potential to improve teachers' digital competencies, there are several issues that need to be further investigated. Nisak (2021) identifying obstacles in the implementation of online learning, such as limited internet access, varying levels of technological literacy, and incomplete delivery of material. In addition, Novitasari & Fauziddin (2022) found that the quality of online learning is influenced by the professionalism of teachers' performance and their digital literacy skills, indicating that improving digital competence remains a challenge. This issue needs to be researched urgently to understand the impact of online learning in PPG on teachers' digital competence, especially at the kindergarten level.

Research by Agustiningsih et al. (2024) shows that 56% of kindergarten teachers have a fairly good understanding of the basics of digital technology, 64% already use software to support learning, and 71% have implemented technology in the learning process. However, research by Harlistyarintica et al. (2023) revealed that kindergarten teachers face challenges in planning online learning, such as the need to create instructional videos and share online

learning schedules every week. In addition, research by (Krobo et al., 2023) found that some teachers have not yet mastered the use of technology, which has an impact on the implementation of online learning.

In the context of teacher professional education, Mudarris (2022) emphasize that online learning can strengthen teachers' professional competencies through mastery of subject matter and technology-based learning innovations. However, they also note obstacles such as limited internet access and varying levels of technological literacy. Rosmiati et al. (2021) adding that teacher professionalism and digital literacy skills have a significant influence on the quality of online learning, contributing 43.4%. Research by (Arfadila et al., 2021) also shows that educators' professional competence in technology and material delivery can improve the efficiency of online learning.

Research by Nurhayati et al. (2024) highlighted that the digital competence of early childhood teachers is still low, especially in content creation and technical operations. They recommended training that can facilitate teachers' needs in improving their digital competence. In addition, research by Rahmawati et al. (2023) found a positive correlation between teachers' digital competence and students' motivation to learn in online learning. Research by Syahroni et al. (2020) also shows that training in the use of Learning Management Systems (LMS) can improve the online learning skills of kindergarten teachers.

Based on the results of the above study, it appears that online learning in PPG has the potential to improve the digital competence of kindergarten teachers. However, there is a gap in research related to the direct influence of online learning in PPG on the digital competence of kindergarten teachers, especially in the context of Islamic education. The novelty of this study lies in its specific focus on kindergarten teachers and how online learning in PPG affects their digital competence. The objective of this study is to analyze the impact of online learning in teacher professional education on the digital competencies of kindergarten teachers, in order to provide recommendations for improving the quality of learning in the digital age.

Theory

1. Online Learning
   The development of information technology has revolutionized the world of education, especially in the implementation of online learning. Online learning is a form of learning that utilizes the internet as the main medium for delivering material, conducting interactions, and evaluating learning outcomes. Moore et al. (2011) explains that online learning is a form of distance education that emphasizes the active involvement of students through digital platforms. Furthermore, Garrison et al. (2000) The Community of Inquiry (CoI) framework emphasizes that the success of online learning is greatly influenced by the integration of teaching presence, cognitive presence, and social presence. In the context of professional education, online learning is not only an alternative but also an urgent necessity to ensure adaptive and flexible learning.
2. Teacher Professional Education (PPG)
   Teacher Professional Education (PPG) is a strategic program of the Indonesian government to improve teacher professionalism through systematic training and competency assessment. Guskey (2002) states that changes in teacher competence can only be achieved through structured and reflective professional development, which has an impact on improving student learning. In the context of Early Childhood Education (PAUD) teachers,

the implementation of PPG online poses its own challenges, especially in building practical skills and mastery of technology. Researc by Lestari & Wulandari (2022) shows that the implementation of In-Service PPG can contribute to improving the competence of early childhood teachers, especially in classroom management and the use of digital media. Therefore, it is important to examine how the implementation of online PPG can shape the competencies needed by teachers in the digital age.

3. Teachers' Digital Competence

   Teachers' digital competence is one of the crucial aspects of successful 21st century learning. Redecker (2017) Through the Digital Competence Framework for Educators (DigCompEdu), it is formulated that teachers' digital competencies cover six main domains: professional engagement, digital resources, learning and teaching, assessment, student empowerment, and facilitation of students' digital competencies. In the context of early childhood teachers, the ability to manage digital learning resources and use technology pedagogically is crucial to the quality of learning interactions.

   Wahyuni & Kustiawati (2021) revealed that most early childhood teachers still face obstacles in using digital technology, in terms of access, skills, and motivation. Therefore, improving digital competence must be a focus in teacher professional training, especially those conducted online.

4. Kindergarten Teacher

   Kindergarten teachers play a very strategic role. Sujiono (2012) states that there are nine main roles played by kindergarten teachers, namely as partners in interaction, caregivers, managers of children's emotional stress, learning facilitators, activity designers, enrichment providers, problem solvers, learning implementers, and mentors and maintainers of child development. These roles reflect the complexity of teachers' tasks in supporting children's overall growth and development. In line with this, Law No. 14 of 2005 emphasizes that teachers, including those at the kindergarten level, are professional educators who have the responsibility to educate, teach, guide, direct, train, assess, and evaluate students as part of the implementation of formal education. Kindergarten teachers are required to possess pedagogical, professional, social, and personal competencies as stipulated in Ministry of Education Regulation No. 16 of 2007. Additionally, according to Suyanto & Jihad (2019) Early childhood teachers must have an understanding of child psychology, communication with parents, and the ability to reflect and innovate in teaching. Recent research by Fitriani (2022) shows that kindergarten teachers' competencies have a significant effect on the quality of early childhood education services. The concept of holistic learning places children as the main subjects, paying attention to cognitive, affective, and psychomotor aspects. According to Nugroho & Mulyasa (2020) Kindergarten teachers need to design integrative and enjoyable learning activities. Emphasis on play, art, and exploration activities is part of a holistic strategy in early childhood education. (Miller & Almon, 2009).

Method

This study uses a quantitative approach with a correlational research design. This approach was chosen to determine the extent of the relationship between two variables, namely online learning in teacher professional education as the independent variable (X) and the digital competence of kindergarten teachers as the dependent variable (Y). Correlational research aims to measure the strength and direction of the relationship between two or more variables based

on numerical data, as well as to determine whether changes in the independent variable affect the dependent variable in a particular population.

This study was conducted in Central Lombok Regency with the research subjects consisting of kindergarten teachers and principals. A total of 30 people were the subjects of this study, selected purposively based on specific criteria, namely kindergarten teachers and principals who had participated in the Teacher Professional Education (PPG) program and had experience in online learning. The purposive selection of subjects was intended to ensure that the data obtained truly represented the experiences and perceptions of educators relevant to the focus of the study.

The instrument used in this study was a questionnaire designed in the form of a Likert scale with five response options, namely: strongly disagree, disagree, neutral, agree, and strongly agree. The questionnaire contained 12 statements, with 5 statements to measure the variable of online learning in teacher professional education (X) and 7 statements to measure the variable of digital competence of kindergarten teachers (Y). The questionnaire was developed based on the indicators of each variable and had been tested for validity and reliability before being used in the main data collection.

Data collection was conducted online through the distribution of questionnaires using the Google Form platform. This was chosen to facilitate the reach of respondents spread across various regions in Central Lombok Regency, while also aligning with the context of online learning, which is part of the research substance. Respondents were asked to complete the questionnaire based on their perceptions and experiences regarding the implementation of online learning in PPG and their digital competencies in the context of learning at kindergarten.

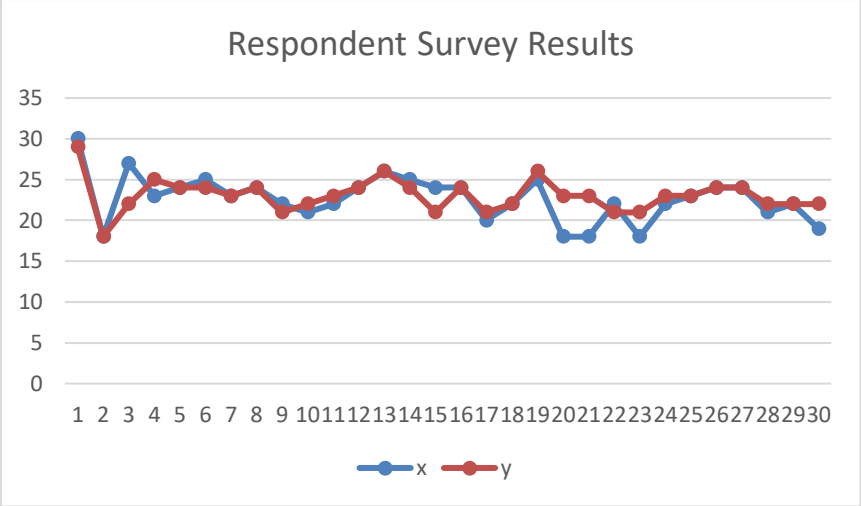
The data obtained from the questionnaire results were analyzed using descriptive and inferential statistical analysis techniques. Descriptive analysis was used to describe the characteristics of the data in the form of minimum, maximum, mean, and standard deviation values for each variable. Furthermore, to determine the effect of online learning in PPG on the digital competence of kindergarten teachers, multiple linear regression analysis was used. The data analysis process was carried out with the help of JASP (Jeffrey's Amazing Statistics Program) software, which facilitated quantitative and accurate data processing and interpretation.

The research steps were carried out systematically, starting with formulating the problem and designing relevant research instruments. After that, the researcher collected data by distributing questionnaires online, then tabulated the data for further analysis. The data analysis stage was carried out using JASP software to obtain statistical test results. Next, the researcher interpreted the analysis results and drew conclusions based on the relationship between the variables studied. This process was carried out with the aim of providing an empirical description of the extent to which online learning in the PPG program contributes to improving the digital competence of kindergarten teachers in Lombok Tengah.

Result and Discussion

The presentation of data and descriptive statistical analysis in this study aims to provide an overview of the perceptions of kindergarten teachers and principals in Central Lombok Regency regarding online learning in teacher professional education and their level of digital competence. Descriptive analysis is used to determine the distribution of data for each variable through minimum, maximum, mean, and standard deviation values. With this approach,

researchers can understand the characteristics of the data comprehensively before proceeding to the inferential analysis stage, so that the interpretation of the results obtained is more accurate and in line with the empirical conditions in the field.



Gambar 1. Respondent Survey Results

Tabel. 1 *Descriptive Statistics*

	X	Y
Valid	30	30
Mode	24.000[a]	24.000[a]
Median	23.000	23.000
Mean	22.667	23.033
Std. Deviation	2.808	2.008
Variance	7.885	4.033
Minimum	18.000	18.000
Maximum	30.000	29.000

[a] The mode is computed assuming that variables are discreet.

Based on the descriptive statistical output obtained through JASP analysis, it can be explained that the number of respondents who provided valid data for both variables, namely online learning in teacher professional education (X) and digital competence of kindergarten teachers (Y), was 30 people each. The mode value for both variables is 24, indicating that this number appears most frequently in the respondents' data distribution. The median for each variable is 23, meaning that half of the respondents scored below 23 and the other half above 23.

The mean for variable X is 22.667 and for variable Y is 23.033, indicating that, in general, respondents' perceptions of online learning in PPG and their digital competencies are at a moderate to fairly high level. The standard deviation for variable X is 2.808 and for variable Y is 2.008, indicating that the data distribution for variable X is larger than that for variable Y, resulting in higher variability in perceptions of online learning compared to digital competencies.

The variance values also support this, with a variance of 7.885 for variable X and 4.033 for variable Y. Meanwhile, the score range of both variables shows that the minimum value

obtained is 18 for both, while the maximum value is 30 for variable X and 29 for variable Y. This indicates that although there are differences in perception among respondents, most values remain within a relatively high range. Overall, this data indicates that both the implementation of online learning in the PPG program and the digital competency level of kindergarten teachers are in the "fairly good" category, but still show variations that can be further analyzed in the inferential stage.

Hypothesis Testing

To test the hypothesis in this study, linear regression analysis was used to determine the extent to which online learning in teacher professional education (variable X) affects the digital competence of kindergarten teachers (variable Y). This analysis aims to identify the causal relationship between the two variables and to measure the statistical contribution of variable X to variable Y. The regression test results are presented in Table 2, which contains information on the regression coefficient, significance, and strength of the relationship between the independent and dependent variables. This data forms the basis for determining whether the hypothesis formulated in the study is accepted or rejected.

Tabel 2. *Model Summary - Y*

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df 1	df 2	p
M_0	0.000	0.000	0.000	2.008	0.000		0	29	
M_1	0.711	0.506	0.488	1.437	0.506	28.679	1	28	< .001

Note. M_1 includes X

Based on the regression test results shown in Table 2 (Model Summary), it can be explained that the regression model that tests the effect of online learning on teacher professional education (X) on the digital competence of kindergarten teachers (Y) shows a fairly strong relationship, with a correlation coefficient (R) value of 0.711. The coefficient of determination (R^2) value of 0.506 indicates that 50.6% of the variation or change in teachers' digital competencies (Y) can be explained by online learning in the PPG program (X), while the remaining 49.4% is explained by other variables outside the model.

The adjusted R^2 value of 0.488 reinforces that this model is quite good despite considering the sample size and the number of predictors used. The Root Mean Square Error (RMSE) of 1.437 indicates the average prediction error of the model against the actual value of Y. Additionally, the F change value of 28.679 with a significance level of $p < 0.001$ indicates that the regression model used is statistically significant, or in other words, there is a significant influence between online learning in teacher professional education and the digital competence of kindergarten teachers.

Thus, it can be concluded that the research hypothesis is accepted, namely that there is a positive and significant influence between online learning in teacher professional education and the digital competence of kindergarten teachers in Central Lombok Regency.

Journal Visionary : Research and Development in Educational Management
Volume 13 Number 2 October 2025
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Tabel 3. *ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	59.184	1	59.184	28.679	< .001
	Residual	57.783	28	2.064		
	Total	116.967	29			

Note. M_1 includes X
Note. The intercept model is omitted, as no meaningful information can be shown.
tabel 3

Based on the results of the ANOVA (Analysis of Variance) analysis shown in Table 3, it was found that the regression model testing the effect of online learning on teacher professional education (X) on the digital competence of kindergarten teachers (Y) was significant overall. The Sum of Squares value for the regression is 59.184, indicating the amount of variation in the Y variable that can be explained by the X variable. Meanwhile, the Sum of Squares residual value is 57.783, reflecting the variation not explained by the model.

The degrees of freedom (df) for the regression is 1, and for the residual is 28, resulting in a total of 29 degrees of freedom. The Mean Square value for the regression is 59.184, and for the residual is 2.064. The F calculation results show a value of 28.679 with a significance value (p) < 0.001. This means that the regression model is statistically significant at a 99% confidence level, or it can be said that there is a significant influence between online learning in teacher professional education and the digital competence of kindergarten teachers.

Thus, the ANOVA results reinforce the previous regression results that the online learning variable (X) contributes significantly to teachers' digital competencies (Y), and the regression model used is appropriate for explaining the relationship between the two variables.

Tabel 4. *Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M_0	(Intercept)	23.033	0.367		62.818	< .001
M_1	(Intercept)	11.502	2.169		5.302	< .001
	X	0.509	0.095	0.711	5.355	< .001

Based on the output results in Table 4, which shows the regression coefficient values, we can see the details of the influence of online learning variables in teacher professional education (X) on the digital competence of kindergarten teachers (Y).

1. Intercept (Konstanta):

   In model M_1, the constant (intercept) value is 11.502 with a standard error of 2.169. The t-value for the intercept is 5.302 with a significance value of $p < 0.001$, indicating that this constant is statistically significant. This means that when the variable X (online learning) is zero, the digital competency score of teachers is estimated to be around 11.502.

2. Online Learning Coefficient (X):
   The coefficient for variable X is 0.509 with a standard error of 0.095. This coefficient indicates that every one-unit increase in online learning will increase teachers' digital competence by 0.509 units. The t-value for variable X is 5.355 with $p < 0.001$, indicating that the effect of variable X on Y is highly significant.

In addition, the Standardized Beta value of 0.711 indicates the strength of the influence of variable X on variable Y, which means that online learning has a fairly strong influence on improving the digital competence of kindergarten teachers. Overall, these results indicate that the online learning variable (X) has a positive and significant influence on teachers' digital competence (Y). In other words, the better or more improved the online learning received by teachers, the higher their digital competence.

Conclusion

Based on the results of the regression analysis conducted, it can be concluded that online learning in teacher professional education has a positive and significant effect on the digital competence of kindergarten teachers in Central Lombok Regency. This is indicated by the coefficient of determination (R^2) value of 0.506, which suggests that 50.6% of the variation in teachers' digital competencies can be explained by the online learning variable, while the remainder is influenced by factors outside the model. The regression coefficient of 0.509 with a significance level of $p < 0.001$ reinforces that improvements in the effectiveness of online learning contribute to increased digital competencies among teachers.

Based on these findings, it is recommended that providers of teacher professional education continue to develop interactive, practical, and teacher-centered online learning models, particularly in terms of digital technology proficiency. For future research, it is recommended to add other variables such as learning motivation, institutional support, or teaching experience as factors that may also influence teachers' digital competencies, as well as to expand the sample size to strengthen the generalizability of the results.

References

Agustiningsih, R., Dardiri, A., & Suardiman, S. P. (2024). Kemampuan Guru Taman Kanak-kanak di Era Digital. **Jurnal Pendidikan Anak*, 13*(2), 239–249.

Alamsyah, S. (2024). Integrasi Strategis: Pengaruh Implementasi Teknologi Informasi terhadap Efisiensi Pengelolaan Sumber Daya Manusia. *Jesya*. https://doi.org/10.36778/jesya.v7i1.1497

Arfadila, A., Hafsah, N. N., Aulia, S. N., & Windayana, H. (2021). Pengaruh Kompetensi Profesional Pendidik Terhadap Hasil Pembelajaran Daring. **Aulad: Journal on Early Childhood*, 4*(3).

Arum, D. M. (2023). Strategi Manajemen Pendidikan untuk Meningkatkan Kualitas Pendidikan di Era Digital. *JME Jurnal Management Education*. https://doi.org/10.59561/jme.v1i2.70

Fitriani, R. (2022). *Pengaruh kompetensi guru terhadap layanan PAUD berkualitas*. Jurnal Pendidikan Anak.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2–3), 87–105. https://doi.org/10.1016/S1096-7516(00)00016-6

Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching: Theory and Practice, 8*(3), 381–391. https://doi.org/10.1080/135406002100000512

Harlistyarintica, Y., Anjarsari, I., & Furi, A. Z. (2023). Pembelajaran Jarak Jauh dengan Metode Daring: Tantangan Guru Taman Kanak-kanak. **Early Childhood Research Journal*, 6*(1).

Krobo, A., Sumantri, M. S., & Dhieni, N. (2023). Sikap Guru dalam Pemanfaatan Teknologi Informasi dan Komunikasi di Taman Kanak-Kanak Kemala Bhayangkari 06 Sentani. **Jurnal Ilmiah Pesona*

*PAUD**, *11*(1).

Kurniawan, M. W., & Zarnita, Y. (2020). Pembelajaran daring dalam pendidikan profesi guru: Dampak dan kendala yang dihadapi. **Jurnal Pendidikan Profesi Guru**, *1*(2).

Lestari, H. P., & Wulandari, S. A. (2022). Implementasi Program PPG Dalam Jabatan dalam meningkatkan kompetensi guru PAUD. *Jurnal Pendidikan Anak*, *11*(2), 101–110. https://doi.org/10.21009/jpaud.112.07

Miller, E., & Almon, J. (2009). *Crisis in the Kindergarten: Why Children Need to Play in School*.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education*, *14*(2), 129–135. https://doi.org/10.1016/j.iheduc.2010.10.001

Mudarris, B. (2022). Profesionalisme Guru di Era Digital ; Upaya dalam Meningkatkan Mutu Lembaga Pendidikan. *ALSYS*. https://doi.org/10.58578/alsys.v2i6.640

Nisak, H. (2021). Efektivitas Literasi Digital Pembelajaran Jarak Jauh Pada Masa Pandemi Covid-19 Di Sman 1 Palembang. *SEMINAR NASIONAL PENDIDIKAN PPs UNIVERSITAS PGRI PALEMBANG 2021*, 143–153.

Novitasari, Y., & Fauziddin, M. (2022). Analisis Literasi Digital Tenaga Pendidik pada Pendidikan Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*. https://doi.org/10.31004/obsesi.v6i4.2333

Nugroho, S. E., & Mulyasa, E. (2020). *Pendidikan Holistik di PAUD*.

Nurhayati, S., Wahyuningsih, T., Alim, C. N., Khristianto, K., Pujiyatno, A., & Rakhmawati, F. (2024). Peningkatan Keterampilan Pembelajaran Daring untuk Guru Taman Kanak-Kanak. **JPPM (Jurnal Pengabdian Dan Pemberdayaan Masyarakat)**, *5*(1).

Rahmawati, D., Aruan, M., & Yunus, S. (2023). Kompetensi Digital Guru dan Motivasi Belajar Siswa di Era Pembelajaran Daring. **Sindoro: Cendikia Pendidikan**, *2*(1).

Redecker, C. (2017). *European framework for the digital competence of educators: DigCompEdu*. Publications Office of the European Union. https://doi.org/10.2760/159770

Rosmiati, R., Sinurat, J. Y., Wahyuni, U., Putra, H. R. F., Rukhmana, T., Mulyati, S., & Hutabarat, Z. S. (2021). Analisis Kualitas Pembelajaran Daring Ditinjau dari Pengaruh Profesionalisme Kinerja Guru dan Kemampuan Literasi Digital Guru. **Jurnal Pendidikan Edutama**, *8*(1).

Sujiono, Y. N. (2012). *Konsep Dasar Pendidikan Anak Usia Dini*.

Suyanto, & Jihad, A. (2019). *Menjadi Guru Profesional PAUD.* Menjadi Guru Profesional PAUD.

Syahroni, M., Dianastiti, F. E., & Firmadani, F. (2020). Pelatihan Media Pembelajaran Berbasis Teknologi Informasi untuk Meningkatkan Keterampilan Guru dalam Pembelajaran Jarak Jauh. *International Journal of Community Service Learning*, *4*(3), 170–178. https://doi.org/10.23887/IJCSL.V4I3.28847

Wahyuni, S., & Kustiawati, D. (2021). Kompetensi digital guru PAUD di masa pandemi Covid-19. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *5*(2), 1700–1707. https://doi.org/10.31004/obsesi.v5i2.1047