



Digital Literacy to Improve Pedagogical and Professional Competence of Early Childhood Teacher

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ABSTRAK

Pada era transisi revolusi industri 4.0 menjadi 5,0, guru memerlukan kemampuan literasi komputer dengan kemampuan untuk mencari dan mengelola data secara digital serta mengoperasikan komputer. Para guru kemudian mengikuti Pendidikan Profesi Guru (PPG) dalam jabatan yang difasilitasi aplikasi google suite untuk guru yang profesional pada era revolusi industri 5.0. Penelitian ini bertujuan untuk mengimplementasikan kemampuan digital pada guru Pendidikan Anak Usia Dini (PAUD) dalam pembelajaran PPG PAUD dan meningkatkan kemampuan pedagogi guru PAUD. Metode yang digunakan adalah mixed method dengan pengumpulan data melalui google form, hasil wawancara, studi literatur, dan relevansi data melalui penelitian yang relevan. Hasil menunjukkan kenaikan yang signifikan pada kemampuan profesional guru PPG dalam jabatan tahap 1. Guru mendapatkan pendalaman materi pedagogi dan profesional, pengembangan perangkat pembelajaran, review perangkat pembelajaran, dan tes komprehensif.

ABSTRACT

In the transition era of the industrial revolution 4.0 to 5.0, teachers need computer literacy skills with the ability to search and manage data digitally and operate computers. On these grounds, numerous teachers take part in the teacher professional development program for in-service teachers (PPG dalam Jabatan) facilitated by the Google Suite application for professional teachers in the 5.0 industrial revolution era. This study aims to implement digital skills for early childhood education (PAUD) teachers in PPG and improve the pedagogical abilities of PAUD teachers. The method used is a mixed methods with data collection using Google Forms, interviews, literature studies, and data relevance through relevant research. The results show a significant increase in the professional ability of teachers who join stage 1 of the program. Teachers deepen the pedagogical and professional materials, development of educational materials, examination of learning material, and comprehensive tests.

INTRODUCTION

Indonesia has started the adaptation process in the era of the industrial revolution 4.0 towards 5.0 by increasing the competence of human resources through various programs between education and industry. The characteristics of professional teachers, according to Malawi mastered in deep substance, are able to carry out educational learning, have personality, and have commitment and concern for children's development. Teachers must be able to investigate information and varied sources, including electronic sources, and undertake studies or research to enhance educational learning to develop their competency. The internet is filled with large amounts of data and information, including both true and false messages that can be confusing to consumers and potentially have an impact on societal evolution. As a result, digital literacy should be encouraged to improve users' capacity to use information and communication technology (ICT) (Yuan et al., 2021). As a result, digital literacy has arisen as a means of addressing the digital issues posed by evolving ICT and internet usage trends. COVID-19 has unquestionably shifted our work, lifestyle, and education toward the use of ICTs and the internet.

During a pandemic, teacher competence can be enhanced by providing training on how to manage classroom learning with creativity. The key to successful education is creativity. High instructor inventiveness and skills will help students learn more effectively in the COVID-19 era. It means that the teacher's mastery of competence, abilities, and creativity goes hand in hand with the student's motivation (Jaenudin et al., 2013). Based on the preceding description, it is clear that adaptability is required during a pandemic, particularly in distance education. To increase teacher competence in delivering creativity in the learning process and to greatly strengthen digital literacy contests, competency development, skills, and creativity are required (Sari et al., 2020). In addition, the teacher must become familiar with the school's platform, such as the Google Suite program and the education office, which are both used in the learning process. Thus, in the period of the COVID-19 epidemic, a teacher with competence, abilities, and creativity will be able to solve challenges. This implies that being digitally literate is an integrally primary component of the lifelong learning abilities that individuals must gain to adapt to the post-modern world. Technology is evolving at an astounding rate nowadays, as noted earlier in the text, which has expanded mutual engagement and made it obligatory for teacher candidates and academics to collaborate and responsibly provide educational activities (Guillén-Gómez et al., 2021).

In the aspect of education, teachers in the 4.0 era refer to teachers during the industrial revolution. The industrial revolution was marked by technological advances. Some researchers argue that the existing professional development programs are inadequate to prepare teachers for the 21st century (Friedman, 2007). From this condition, the demands of becoming a teacher in the 4.0 era are to have computer literacy competencies. This literacy is characterized by the ability to process and search data digitally and operate computers. However, these demands do not go smoothly with the existing reality. There are still many teachers who do not have computer literacy, especially Early Childhood teachers.

With the online learning and blended learning methods, it is easier for educators and students to carry out teaching and learning activities in the pandemic era. Based on the results of this study, it is hoped that it can be used as a reference or basis for developing knowledge in the field of education, especially online learning and blended learning, with the research objective of comparing the effectiveness of online learning outcomes and blended learning on motivation and learning outcomes for teacher professional development courses. The use of digital literacy in teacher professional development is as a means of communicating and learning through computers. This concept of media and digital literacy for the next era of learning is very practical. Professional development for teachers refers to the skills, knowledge, and ongoing learning opportunities they have to improve their abilities to execute their jobs well (Utami et al., 2019). Teachers will be able to gain more knowledge through professional development because, according to (Hansen-Thomas et al., 2013).

Teachers learn best when they are actively engaged in examining their regular practice (i.e., teaching and learning) and how professional development activities contribute to their daily work. Teachers should be aware that in this digital era, professional development is critical to their professional development. Some of the old educational institutions' learning procedures were limited to the usage of textbooks. However, it has now adapted to the contextual learning

model through the digital media in the learning process. The rise of digitalization in education has made it simple for anyone to find reference resources using search engines. It is possible to do so at a minimal cost, in a simple manner, and in real-time. People can virtually have everything they need at their fingertips via the internet with just a few minutes of computer time and click of a mouse.

Digital literacy is a critical issue to promote the development of digital competences as well as the professional competence of instructors to improve their knowledge level (Falloon, 2020). Developing technologically literate students has typically entailed prioritizing technical abilities in the use of digital technologies and systems deemed appropriate for the learning setting, as well as identifying how these may be used within specific teacher education modules (Borko, 2004). (Lund et al., 2014) discuss the particular issues faced by teacher educators in building a comprehensive vision of digital competency in their students in connection to teacher education. They argue that teacher educators must not only teach their students how to use current and upcoming digital resources in their professional practice but also how to prepare their students to use technology effectively (Borthwick & Hansen, 2017).

This is particularly difficult to achieve because it necessitates meeting more than students' immediate capability needs to develop transformative competence, which will enable them to translate how to best use digital resources to support their own students' learning into specific instructional, learning design, classroom organization, and assessment practices. In line with this, Kemendikbud that only 40% of teachers are ready with the technology in terms of literacy to today's technology, many constraints affecting lack of teachers to the technology such as the lack of facilities and infrastructure as well as the generation gap with the student's teacher. This is also an obstacle to achieving education that is in accordance with the 4.0 revolution.

ICT (Information and communication technology) needs to be mastered by early childhood teachers to make it easier for teachers to take care of administration and make it easier to make learning designs or technology-based learning activities. As Spires et al. (2018) pointed out, knowledge can come from a multitude of places, and digital literacy encompasses language, phrase, visual display, motion graphics, audio, video, and multimedia. This is needed not only to support educators in mastering ICT but also to teach ICT to early childhood in early childhood (Andrés et al., 2016). Scherer & Siddiq (2015) in a study report that teachers who are confident users of ICT are more likely to adopt ICT as part of their teaching

Unesco (2008) stated that ICT competency standards for teachers, as confirmed eight years ago in the project "ICT Competency Standards for Teachers." One of the initiatives intends to support the professional development of early childhood educators and educational institutions by supporting the development of creative ICT use. Along with the demands for ICT competences that must be possessed by a teacher, the provision of training and understanding to early childhood teachers regarding the importance of ICT in teaching and learning activities in early childhood, one of which is the Online Learning System) through the Google Suite e-learning platform that allows teachers ECD which take teacher professional development can learn and work on tasks through the system online, which will train the teachers through the advancement of technology when it supports the Ministry of Research, Technology, and Higher Education in running the Hybrid Learning Teacher Professional Development in developing professional teachers in the digital era.

Based on these problems, it provides facilities in the form of ICT (Information and Communication Technology). Teacher Professional Development Online Learning Systems facilities through the Google suite platform to realize a policy of independent learning so that teachers who take PPG can examine knowledge and varied sources, including digital electronic sources, as well as conduct studies or research to promote educational learning to create professional teachers in the era of the industrial revolution 4.0.

METHOD

This research applies mixed methods research by Creswell. As the name suggests, the mixed methods combine two methods, namely qualitative and quantitative. According to Kirk and Miller, qualitative research is a history in the social sciences that is substantially based on human observations both in terms of its scope and vocabulary. Meanwhile, quantitative research refers to a type of scientific study that looks at possible linkages or interactions between variables in a

problem set.

For significant results from the teacher professional development of early childhood program using a quantitative true experiment (regression). The subjects of the research are 71 teachers of early childhood education that took the Teacher Professional Development program, particularly at UNESA, Eastern Java. To make the research effective and meet the objectives, the researcher refers to the research procedure elaborated in [Figure 1](#).

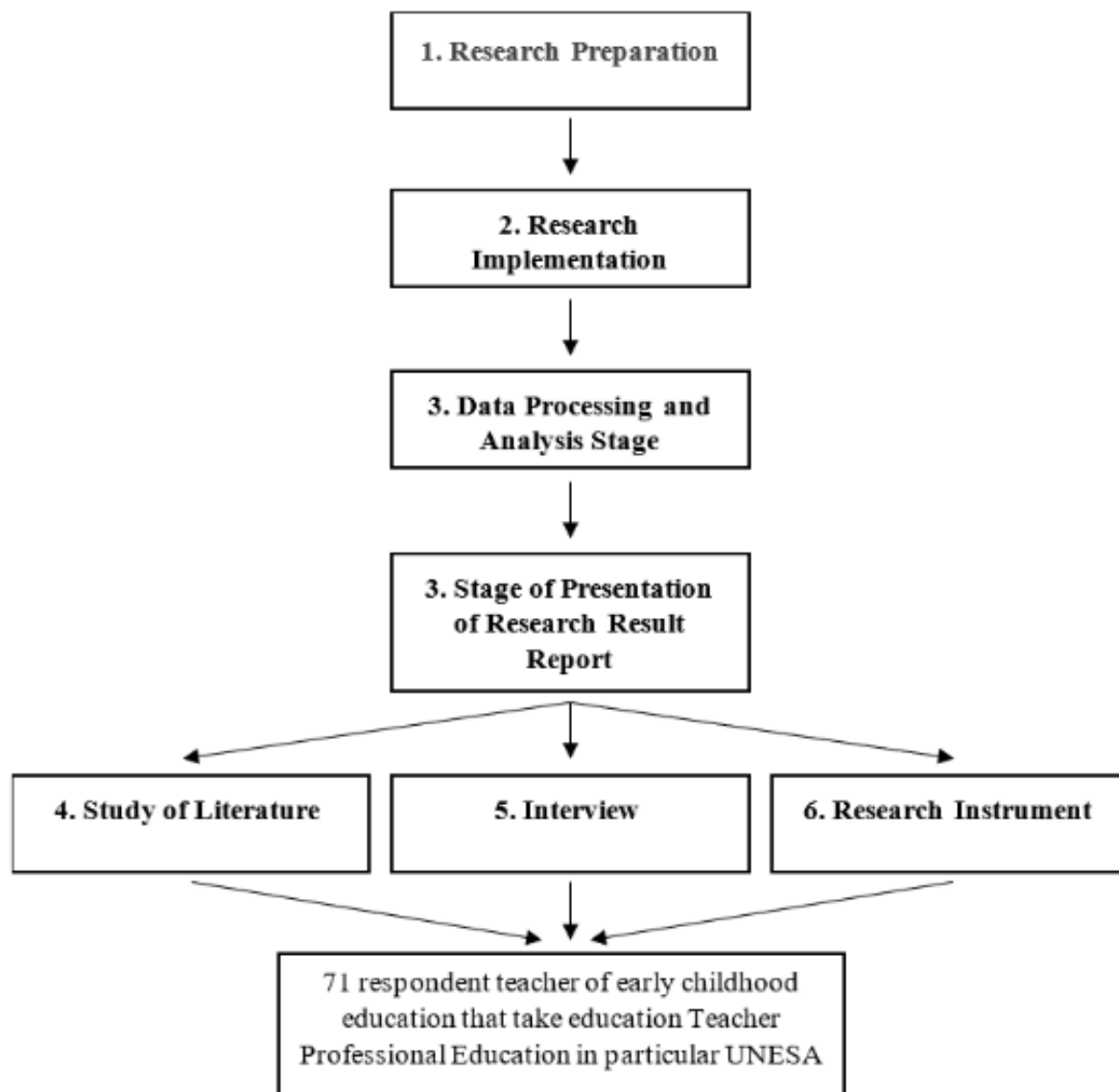


Figure 1. Research procedure

Research preparation

Thus, according to Creswell (2015), the project is designed in such a way that the most efficient study can be possibly carried out, resulting in the greatest amount of knowledge. In other words, the goal of designing the research is to collect as much relevant evidence as feasible with as little effort, time, and funds as possible. The first activity carried out by the researcher as an early stage in the preparation process was to prepare for the research to run smoothly. In this research, the preparations carried out by the researchers were design and determination of research title, formulation of research objectives, and collection of references and research data.

Research implementation

Before conducting the research, the researchers performed a pre-study (initial observation) which is beneficial to detect the problem and find out the extent of the actual field conditions of the object of research. After pre-studying the issues, the researchers conducted several activities,

including distributing the interview form to the respondents through a google form, making the data through the results of interviews, and searching for references and relevant data from the relevant studies.

Data processing and analysis stage

This step focuses on the methods and techniques of data collecting, whereas the research method defines the overall approach to the topic. It refers to the type of sample to examine and the selection and creation of data collection tools such as exams, questionnaires, rating scales, interviews, observations, and checklists (Creswell, 2015).

At this stage, the activities carried out were formulating a theme, interpreting the results of data analysis from interviews and verifying its credibility, transferability (dependability), and certainty (confirmability), and formulating findings and conclusions.

Stage of presentation of research result report

At this stage, the formulation and typing of the final report, editing of the final manuscript, getting approval from the reviewers and ratification of the leadership of the research institute were carried out. The data and information of this study were obtained in several ways and techniques from various sources. In this study, data and information collection techniques were literature studies, interviews and observations, and Teacher Professional Development assistance.

Study of literature

It is necessary to analyze and examine all available material on the subject, including applicable theories, reports, data, and other relevant literature. This would assist the researcher in identifying the data that is accessible as well as the approaches that may be applied. This literature study is intended to reveal the various theories that are relevant to the issues that are being investigated. This technique was done by reading, studying, and reviewing literature related to computer literacy ICT (Information and Communication Technology), and the Online Learning System Google suite is one of the applications used. Literature review for the purposes of this research is in the form of technical and non-technical literature. The technical literature includes reporting of research review and works provisional written or disciplinary in paper form theoretic philosophical. While non-technical literature refers to biographies, books daily, manuscripts, notes, catalogs, and other materials that can be used as the main data or as supporters.

Interview

Interviews are used as a data collection technique by conducting a preliminary study to find out problems to be investigated. Besides, researchers want to figure out things from the respondents. In this study, structured interviews were used using the google form, so that it was right on target and more time efficient, and reached more respondents. Interviews were conducted with early childhood teachers, Teacher Professional Development managers, the head of the coordinator, and the Teacher Professional Education IT team.

Research instrument

The research instrument is a tool used to measure observable natural and social phenomena (research variables). Research instruments are tools that can be used to collect research data or information. Based on the given description, it can be determined that the researcher was also the instrument of this study. In this study, we used a research instrument in the form of a questionnaire filled out by 71 respondents.

RESULT

The initial research covered batch 1/stage 1 Teacher Professional Development program participants totaling 71 people; to see further what the problem was and to find out how far the actual field conditions of the object of research. This stage focuses on five attitudes of the participants in the online learning model, five indicators of participant response to problems that arose, and seven indicators related to the response towards the learning at Teacher Professional Development. Table 1 show that Teacher Professional Development participants have a positive attitude toward online learning and have good adaptation, indicated by their response that there were no problems in online learning.

Table 1. Participant Response

No	Indicator	Response
1	attitude of participants in the online learning model	70 participants responded agreeing to the online learning process at Teacher Professional Development and the rest strongly agreed.
2	participants' responses to problems that arise	50 participants responded that there were few problems in online learning, and 53 responded that there were no problems in online learning.
3	response to how to study at Teacher professional Education Program	55 participants admitted that they were very adaptive to the learning offered at Teacher Professional Development and the rest needed adjustment.

Table 2. Comprehensive test

No	Score	Explanation	Percentage
1	76	Pass	3%
2	80	Pass	21%
3	84	Pass	28%
4	88	Pass	24%
5	92	Pass	15%
6	96	Pass	9%
Total			100%

Table 3. Result of Knowledge Test

No	Results	Percentage
1	Pass	100%
2	Fail	0%

Table 2 demonstrates the result of the comprehensive test, which is the implementation of pedagogic and professional competencies that the comprehensive graduates of the said program were 100%. We present the results of the teachers' knowledge of ICT, including knowledge of hardware and knowledge of online resources through search engines such as using one of digital media such as Yahoo, Ask, Google, MSN, Bing, and Altavista. It was unveiled that 85.7% of respondents who joined a preschool professional teacher program are accustomed to using internet search engines to find information and rearrange information sources that have been obtained from search engines. According to the empirical data, a variety of digital technologies are being used in Indonesian preschools. Teachers also have tools that are used for technology-based learning. With this pandemic situation, preschool teachers are learning more about using technology in learning. In accordance with the results of the study, from Table 3, it was found that 100% of preschool teachers could follow the invitation of other teachers to study together in the use of ICT in learning in preschool.

Access to ICT technology, according to the teachers interviewed, was rarely a constraint. They were familiar with using information and communication technology to improve and modify data processing and procedures. New technologies provide a wealth of options for reviewing and changing current data processing and procedures. The data collected backs up the idea that ICTs can improve preschool procedures. The teachers' behaviors and justifications of using ICT in preschool practices reflected this. For all practitioners, especially preschool instructors, the Internet offers a variety of learning tools. The teachers also spoke about how primary the specific applications and programs are in improving the quality of the teaching activities. Similarly, the instructors' use of ICT to obtain knowledge and resources was validated by observations. Teachers, for example, have used search engines (such as Google) to locate pedagogical materials such as photographs, videos, and information on multiple occasions. It also shows that the participants' awareness knowledge was sufficient for analyzing websites. The teachers' awareness of how to examine online pages was reasonably high (strongly agree = 22.9%; agree = 67.1%; and disagree = 22.9%) based on the findings. The findings also revealed that participants had a high level of awareness of how to examine websites.

DISCUSSION

From the interview data distributed through a google form, there are 17 interview questions from indicators that support improving pedagogical competence and professional competence. Learning takes place during the implementation of an in-service Teacher Development. A professional development program is intended for teachers who have not been certified, of which implementation consists of in-depth material of pedagogy and professional, learning tool development, learning tool review, comprehensive tests, PPL in home schools is divided into PPL, cycle 1, cycle 2, cycle 3, and UKIN (performance test).

Teacher Professional Development participants guided by teachers who have met the requirements in assisting the Teacher Professional Development implementation process with the hope that after graduating through the TPACK approach, teacher professional development must be able to incorporate critical thinking abilities, interaction and team up, thinking and new skills, technology and communication literacy, context-specific learning skills, and also information and media literacy. The systematically designed Teacher Professional Development program is expected to generate future professional teachers, starting with selection, learning ability, and assessment, and ending with a competency test, superior, competitive, and with character, and able to answer current problems.

Based on the findings in the field, it is crystal clear that numerous aspects of the learning process need to develop, particularly the teacher's ability to design and manage learning. Education and learning patterns will surely experience a transition in the advanced and modern era. Digital literacy is a 21st-century talent that teachers and students alike require. There are numerous transitions that teachers must go through to improve their digital literacy expertise (Nahdi & Jatisunda, 2020). The capacity to digitize is a critical component of obtaining an education in the digital age. Reading, writing, comprehending symbols, and calculating numbers are all part of understanding the digital era. However, in online learning, this skill refers to the ability to use software, create files comprising text and graphics, and share files on digital platforms (Irhandayaningsih, 2020).

Solikhathi & Pratolo (2019) describe literacy as the ability to read using digital technology to absorb visual data in today's environment, based on their research. This idea is supported by Özden (2018) who defines digital literacy as "the ability to digest information and interpret goals from a digital monitor. When comparing it to the various experiences by Ranieri et al. (2017), all media analysis exercises were deemed advantageous and pleasurable by the participants between the teacher and student, who believed them to be relevant and appropriate. Despite the fact that we live in a time of "spreadable media", where the emphasis is on material creation and exchange, evaluation and critical thinking appear to be still significant. Lecturers' academic programs could be better documented using e-learning. Because learning activities can be done online without the need to meet in person in a class, e-learning will considerably improve lecturer and students' usage of digital literacy abilities. Aside from access and skill, communicative talents or communication skills and media participation are crucial. Communicative abilities include things such as forming social bonds and contributing to the society through the media. These communicative skills also comprise the ability to create and develop media material. Information updates and debates in e-learning forums make up the communication abilities indication.

Considering the lack of technology in some conditions, the teacher better begins the learning process early. As a result, the teacher may ensure that technology is present in the classroom. The main reason for this is because classroom settings might alter at any time, which motivates teachers to be innovative. The instructor has dealt with a variety of problems in the classroom and has had to deal with diverse difficult situations. It allows the instructor to overcome the unexpected state of the classroom scenario by arranging for backup. This finding is in line with Harmer (2004) statement that having a back-up plan is necessarily required in the teaching process.

CONCLUSION

The study's conclusions are described as follows. Regarding the levels of ICT knowledge and use, independent variables associated with ICT knowledge and use, and attitudes toward the internet and computers. Through the TPACK approach, graduates of Teacher Professional Development must be able to incorporate critical thinking abilities, interaction and collaborative

skills, innovation and creative skills, information and communications technologies numeracy, contextual skill training, and information and media literacy. This shows the importance of preschool teachers to use ICT skills, especially in this era.

Raising teacher professional development, particularly in regard to digital literacy, is the duty of the teachers themselves, but the role of the institution where the teachers work is also vital. The institution's support and motivation contribute to the teachers' success. They will feel encouraged and inspired to continue their professional development with the support of their institutions. They will believe that the institution cares deeply about them. ICT courses are offered by a number of prominent academic institutions for early childhood education teachers. However, they are mostly elective. Students will be able to interact with technologies such as e-learning through these activities. Because kindergarten is a child's first school, it must address cognitive, interpersonal, and emotional development issues while also connecting them to key technologies. These academic institutions should undoubtedly be addressed in terms of media pedagogy and the development of digital abilities among current preschool teachers. The Teacher Professional Development program, which has been meticulously planned from classification to active learning to assessment to proficiency test, is expected to create educators who are competent, superior, competitive, and of good character, as well as capable of solving current problems.

For this research to be more effective, efficient, focused, and able to be studied more deeply, it was necessary to limit the problem. The limitations of the problems studied in this study are that the problems studied are limited to testing and implementing digital skills for early childhood education teachers in early childhood professional teacher learning at the State University of Surabaya (UNESA) and improving the pedagogical abilities of early childhood teachers. A professional teacher preparation program for early childhood educators need to know that technology has become an important part of the present and future education. The major is expected to optimize the use of technology for education in the early childhood professional teacher program study program, both in practice and in its application to early childhood learning. For further researchers who want to conduct similar research, this research can be expanded.

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