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Teacher Ability in Digital Learning for Increasing Early Childhood Creativity

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Utilization of technology**;**
Thinking creatively

Abstract

The integration of technology into early childhood education has become a necessity in the Society 5.0 era, particularly to support the development of creativity through interactive and innovative approaches. This study aims to identify the level of kindergarten teachers' understanding of digital learning as a means to foster creativity in children aged 4 to 6 years. A descriptive quantitative method was employed through a survey of 52 kindergarten teachers in the city of Lhokseumawe. Data were collected using online questionnaires and interviews, and analyzed using percentage-based techniques. The findings indicate that the majority of teachers lack understanding of digital learning (87%), are unfamiliar with the concept of constructive play (79%), and report the absence of digital learning guidebooks (85%). These results highlight an urgent need for comprehensive training in digital pedagogy and the development of technology-based educational play tools to enhance creativity in early childhood learners.

Kata Kunci:
Keterampilan pendidik;
Pemanfaatan teknologi;
Berpikir kreatif

Abstrak

Integrasi teknologi dalam pembelajaran anak usia dini menjadi tuntutan pada era Society 5.0, terutama untuk mendukung pengembangan kreativitas melalui pendekatan yang interaktif dan inovatif. Penelitian ini bertujuan untuk mengidentifikasi tingkat pemahaman guru TK mengenai pembelajaran digital sebagai sarana pengembangan kreativitas anak usia 4–6 tahun. Metode yang digunakan adalah kuantitatif deskriptif dengan teknik survei terhadap 52 guru di Taman Kanak-kanak Kota Lhokseumawe. Data dikumpulkan melalui kuesioner daring dan wawancara, lalu dianalisis menggunakan teknik persentase. Hasil menunjukkan bahwa sebagian besar guru belum memahami pembelajaran digital (87%), belum mengetahui konsep

permainan konstruktif (79%), dan menyatakan belum tersedia buku panduan digital (85%). Temuan ini menunjukkan kebutuhan mendesak akan pelatihan pembelajaran digital dan pengembangan media permainan edukatif berbasis teknologi untuk meningkatkan kreativitas anak usia dini.

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1. Introduction

Technology and information are developing very fast in today's global world. The fourth industrial revolution was marked by the widespread use of machines to make human work easier. These devices are sometimes created according to needs for use in various scientific disciplines, including information and communication technology. The field of information and communication technology is currently moving rapidly towards digital technology, which is used in conjunction with the internet to enable rapid access, dissemination, and even dissemination of knowledge, thereby increasing the effectiveness of information and communication. This is where the expression "digital revolution" first appeared.

Almost everyone is familiar with digital in this era of the digital revolution, including adults, teenagers, the elderly, and even toddlers. The current generation is the alpha generation. This group known as the "alpha generation" was born between 2010 and 2024 and grew up in a fast-paced technological era characterized by the coexistence of digital screens and gadgets including smartphones, tablets, video games and laptops. This generation is also known as the "glass generation" because of its very microscopic size (Mutch & Peung, 2021). As this generation ages, they will become more accustomed to digital technology and will encounter increasingly sophisticated technology throughout their lives. Early childhood education also has a big influence on this because when children receive a good education in middle age, it will have an impact on brain development (Sari et al., 2023). This revolutionary period encouraged parents to adjust the way they educate their children by inadvertently creating a generation that has different characteristics from previous generations.

In the current era of globalization, the development of technology and information is very rapid. These technological developments do not only occur in the field of science, where many sophisticated tools have been created to support human life (Söderholm et al., 2019). Digital learning is facilitated by technical advances for instructors. The emergence of IT-based games has created unprecedented challenges in early childhood digital learning. This software provides children with a variety of educational games and activities. Teachers in this technological era have the choice to package educational material in such a way that it is more attractive to students by using digital-based

learning resources (Hendraningrat & Fauziah, 2021). Through digital learning, children can also gain knowledge through playing activities. Games do have an important role in developing children's creativity (García-Monge et al., 2021). In playing, children are often required to use problem-solving, creativity and imagination (Sari & Fauziyah, 2022). Through play, children can also strengthen critical thinking skills, perfect problem-solving techniques, and expand creativity. The younger generation can get to know today's games that utilize the latest technology, thereby reducing the possibility of them playing traditional games at home and school (Sulistyaningtyas & Fauziah, 2019).

Play activities can increase children's creativity in developing talents and interests to express themselves and create forms of play (Pratiwi et al., 2021). Constructive play is a play that helps to create a form. A set of objects may include other objects in the set; for example, building construction can help children develop their creativity. Constructive games hone creative thinking skills to name and identify a series of objects according to appearance, size, or other characteristics. Play is an important factor that needs to be noticed in early childhood education (Sari & Fauziyah, 2022). Playing is an activity that is fun and helps children develop their creativity (García-Monge et al., 2021).. Children often need to use imagination, creativity and problem-solving skills when playing. Children can improve critical thinking, creativity and problem-solving skills through play activities.

The findings of the national education survey show that, in general, the formal education system in Indonesia still does not provide opportunities for the growth of creativity. The cognitive domain which includes knowledge, memory, and the capacity to think logically or be reasoned is the primary focus of education. Meanwhile, attention and development in the affective domain (attitudes and feelings), psychomotor domain (skills), and other areas are still lacking. The capacity for creative thinking is characterized by the following five characteristics (Chee Luen, 2021): First, the ability to generate many ideas; second, the ability to introduce different settings or approaches to problems; third, the ability to handle ideas in new ways; and fourth, elaboration or decomposition is the ability to handle problems, defining a subject in deep detail and, finally, the fifth skill, the ability to recognize problems and provide solutions when faced with new circumstances.

Based on research findings, creativity tends to decline from childhood to adulthood. The study revealed that the original creativity score for children under the age of five was 90%, dropped to 20% for seven-year-olds, and further declined to only 2% in adults (Chee Luen, 2021). Moreover, research conducted by Jellen and Urban (Ocal et al., 2021) on the creativity levels of 10-year-old children in various countries, including Indonesia, produced surprising results. In Indonesia, the study focused on a sample of 50 children in Jakarta. The findings showed that Indonesia ranked the lowest in terms of children's creativity compared to other countries. During daily activities, children were not given specific time for creative engagement; instead, they mostly played during free play sessions or while waiting for their parents after learning activities (Yufitsa et al., 2016). Alongside the decline in

creativity, research also shows that environmental factors and limited play methods significantly influence children's creative development. Therefore, a more structured approach is needed, including the implementation of play-based methods that support creativity. Teachers' understanding in applying digital learning is a key factor in enhancing children's creativity, especially in a modern era that increasingly relies on technology.

Teachers who are skilled in utilizing digital tools and online resources have a great opportunity to design challenging and interactive learning environments that can spark imagination and encourage children to think critically and explore new ideas. As described in Papert (1980) constructionism theory learning becomes more meaningful when children are actively engaged in creating digital artifacts such as stories, animations, or games-activities that stimulate both creative and reflective thinking. Moreover, the effectiveness of digital learning is supported by Mayer & Johnson (2008) cognitive theory of multimedia learning, which states that learning is optimized when material is delivered through an integrated combination of visual and verbal formats, allowing children to gain deeper understanding and generate original ideas. Therefore, teachers who are proficient in using educational technology are not merely facilitators of knowledge but also key supporters in fostering the creative potential of future generations. Based on this explanation, the aim of this study is to examine how teachers' capabilities in digital learning can enhance the creativity of children aged 4–6 years. Unlike previous studies that focused more on theoretical and general application, this research highlights the limited knowledge teachers have regarding constructive play and digital learning, as well as the challenges they face in utilizing technology to boost children's creativity.

2. Methods

This study employed a quantitative descriptive method, which aims to objectively describe a phenomenon through the use of numerical data. This approach enables researchers to systematically collect, analyze, and interpret data in order to understand the existing conditions without manipulating variables. The quantitative descriptive design in this research was integrated with a survey technique, which is commonly used to gather information about perceptions, attitudes, behaviors, and the relationships between variables within a defined population. The survey method allows for the exploration of sociological and psychological factors that may influence the research subject, and it also provides a foundation for testing preliminary assumptions or hypotheses. In this study, the survey was distributed to a sample of kindergarten teachers to assess their knowledge, readiness, and skills in implementing digital learning to support children's creative development. The main objective of this research is to describe the digital teaching capabilities of early childhood educators, particularly in enhancing the creativity of children aged 4 to 6 years in Lhokseumawe City. The study model aims to provide a comprehensive overview of how teachers utilize digital tools and strategies in early childhood education,

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and how these efforts contribute to fostering creativity in young learners within the context of 21st-century learning demands.

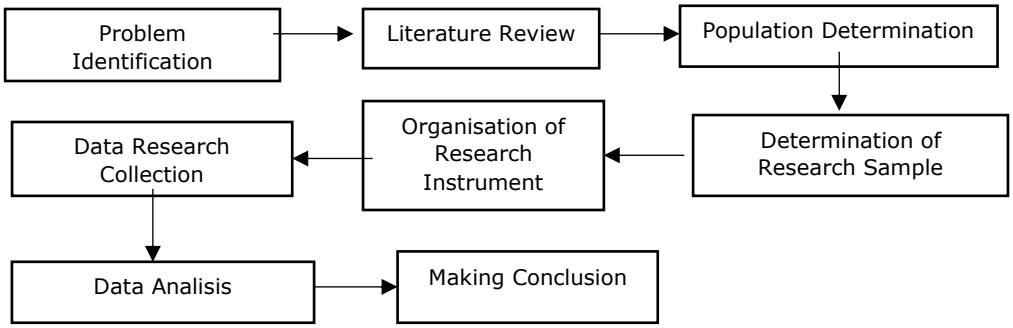


Fig 1.
Research Design for Analysis of Teacher Abilities in Digital Learning to Increase The Creative Development Of Children 4-6 Years Old
Source: Sugiyono (2015a).

The population consisting of all components that will be used as a generalization area is the source of research data (Mustafa et al., 2020). The research population was 60 kindergarten teachers from 8 schools in Lhokseumawe City. Meanwhile, the sample consists of some of the size and characteristics of the population. If the behavior of a population was not certainly known, then the sample in this study determines the minimum sample size using the Slovin calculation formula 52 teachers are the result of applying the Slovin formula with an error rate of 2%. Apart from that, the sampling technique used in this research is a purposive sampling technique which is a method of selecting samples with certain considerations, The selection of respondents with certain characteristics for example, teachers who have five years of teaching experience was carried out by considering several things. To improve the creative development of children 4-6 years old, the data collection method uses a questionnaire containing indicators of teacher proficiency in game-based constructive digital learning.

Table 1. Description of teacher ability instruments in game-based digital learning constructive to increase the development of children's creativity

Aspec
The children's ability to play activities.
A method used in games.
The teacher's understanding of digital learning.
The teacher's understanding of constructive playing.
Teachers' knowledge of constructive play in learning.
The availability of digital learning books

Source: Nurhayati & Zarkasih Putro (2021), Zaini (2019), Sulistyarini & Fatonah (2022), Bachtiar (2021) and Rice & Cun (2021).

This study used a questionnaire distributed through a teacher WhatsApp group from January to April 2023. The questionnaire was designed using non-parametric statistical calculations, which do not rely

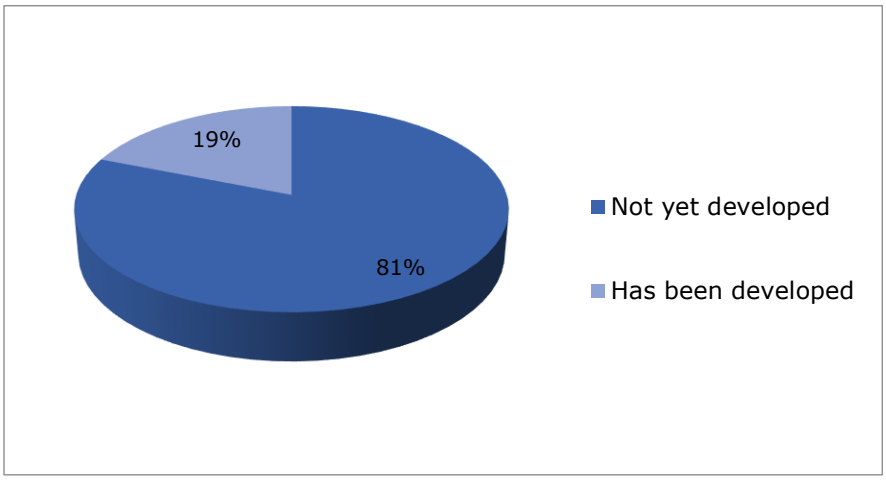
on distribution or population parameters. Non-parametric statistics were used to measure the level of teacher proficiency in digital learning to support the creative development of children aged 4-6 years. Data were collected through in-depth interviews via the WhatsApp voice application and analyzed using percentile and central trend techniques. These techniques provide insights into the extent to which kindergarten teachers can enhance children's digital literacy and creativity.

3. Result and Discussion

The findings of this study reveal the actual conditions of kindergarten teachers' readiness and understanding in fostering early childhood creativity through digital approaches. The survey focused on six interrelated indicators: children's creative abilities in play activities, the use of methods in games, teachers' understanding of digital learning, knowledge about constructive play, the application of constructive games in the learning process, and the availability of digital learning guidebooks. Each of these indicators provides insight into how well technology, pedagogy, and play-based approaches have been integrated by teachers to support child development in the digital age:

Children's Creative Abilities in Play Activities

Fg.2 Children Development Diagram



Source: Data Analysis Results using Microsoft Excel

Based on Picture 2, it can be explained that the number of teachers who stated that children's creativity had not yet developed was 42 children or 81%, while there were 10 children or 19% who had developed.

The information above shows that children's creativity is still very lacking, they are not able to come up with new ideas or things, lack curiosity, lack the courage to take risks, and they are still unable to come up with original ideas, or an extraordinary answer, poor. According to Piaget, play is a pleasant activity that is usually done repeatedly (Nikkola et al., 2022). Parten states that play is a socialization tool that provides opportunities for children to explore, discover, create, express emotions, and learn in a fun way (Nurhayati & Zarkasih Putro, 2021).

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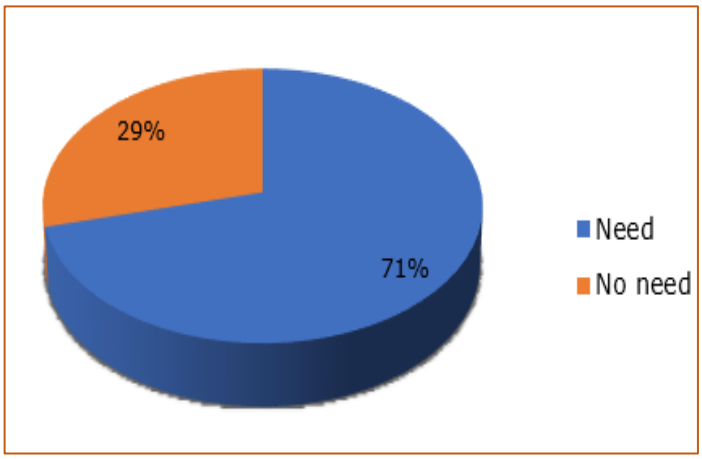
Children will then learn about themselves and their surrounding environment through play. Besides the numbers provided, Dockett shared his thoughts on the game. Dockett says that play is like having a need that must be fulfilled because it helps you grow as a person whose knowledge is expanding. Playing has special characteristics that differentiate it from work or study activities.

Chee Luen (2021) research findings show that creativity is relatively low, thus indicating that the creativity of early children in Indonesia is relatively low. In Indonesia, very few children receive education that can grow their creativity. According to a national education survey conducted in Indonesia, opportunities to develop creativity are still very limited in the formal education system in this country The cognitive domain which includes knowledge, memory, and the capacity to think logically or be reasoned is the main focus of teaching in schools. Meanwhile, attention and development in the affective (attitudes and feelings), psychomotor (skills) and other fields are still lack.

Use of a Method In The Game

Fg 3. The use Playing Result Method Diagram



Source: Data Analysis Results using Microsoft Excel

From Picture 3 it can be seen that the number of teachers who feel there is a need for methods in games is 36 teachers or 71%, while teachers who say they do not need methods in games are 15 teachers or 29%.

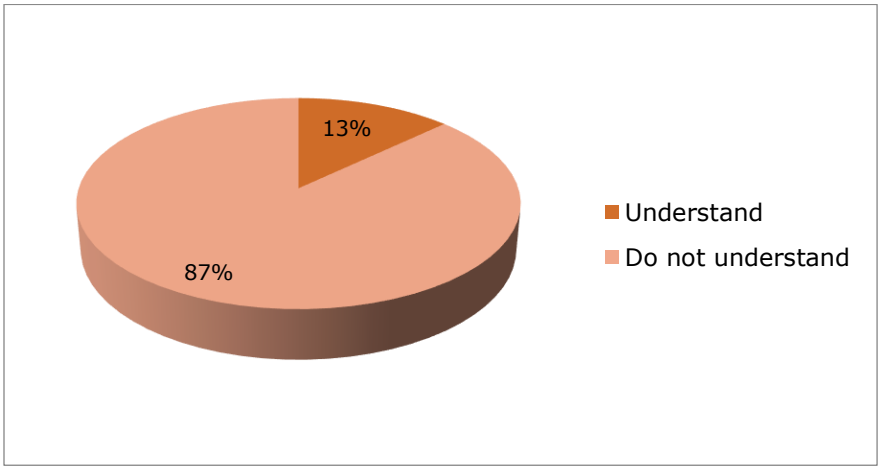
From the explanation above, it is clear how important play strategies are, especially those that grow children's creativity. Playing is one way of implementing early childhood education. One way to carry out educational activities in early childhood is through play. Children can have fun playing games if interesting strategies, materials and media are used in an engaging (Zaini, 2019). Children are encouraged to use, explore and discover objects around them through play (Oktama Yurita et al., 2023).

There are several studies related to playing methods. Among them is using the demonstration method to implement play activities (Sutriana et al., 2019). And uses the preparation, implementation and evaluation stages in the playing process (Adi et al., 2020). However, it

is still rare to focus on the development of children's creativity through play activities, only a few research but only limited to play methods, so children's creativity is not stimulated in children's development.

Teacher Understanding of Digital Learning

Fg 4. Understanding Digital Learning Diagram



Source: Data Analysis Results using Microsoft Excel

Based on Picture 4, it can be explained that the number of teachers who understand digital learning is 7 teachers, 13%, while 45 teachers do not understand digital learning or 87%.

From the description of the data in the research results section, it is clear that children's creative abilities are still quite low. With advancements like these, the use of educational technology should be demonstrated as a method to improve teaching standards (Hoffman & Mangino, 2022). Education experts or reformers should take more consideration into digital era learning (Sulistyarini & Fatonah, 2022). However, because digital learning demands bigger potential in its implementation, so the era of digital learning is basically different. Therefore, educational reform is needed in this situation to support learning in the digital era and provide answers to various problems that arise in the field of education (Benawan et al., 2023).

The low ability of children is caused by educators' ignorance about how to grow children's creativity related to the teaching strategies and resources they use. Based on the results of interviews, not many teachers have received training in using digital learning due to the lack of teacher ability in digital learning implemented in schools. Digital learning in its ideal form is learning that utilizes online media and supporting networks. However, because of these limitations, educators are forced to use ancient techniques and materials in carrying out learning activities. Survey results support this Rice & Cun (2021) which states that the limited use of digital learning resources by instructors is due to their ignorance that these resources are just play tools for children and should not be fully utilized to grow children's creative tendencies. Children can learn through play as well as through digital learning.

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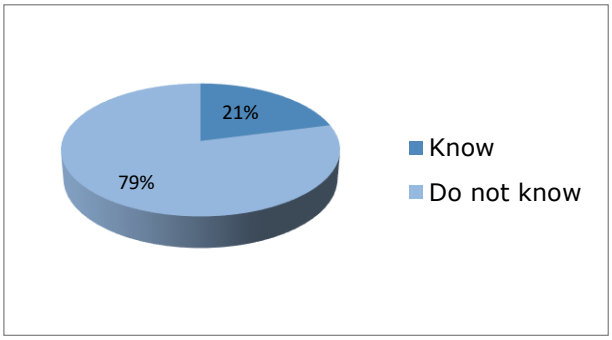
Teacher Knowledge About Constructive Play

Fg 5. Constructive Play Knowladge Diagram



Source: Data Analysis Results using Microsoft Excel

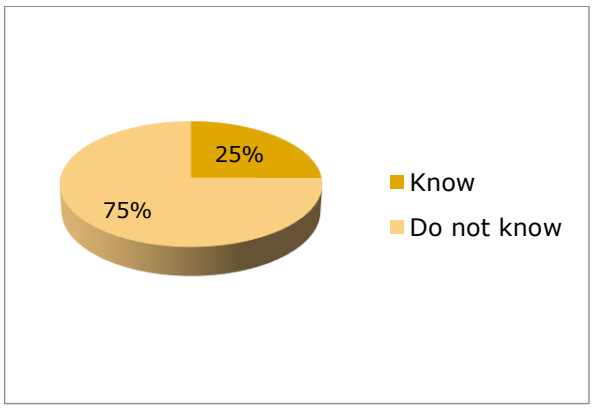
From the presentation in Picture 5, it can be known that the number of teachers who know about constructive games is 11 teachers or 21%, while there are 41 teachers or 79% who do not know about constructive games.

From the data description in the research results section, it is clear that teachers have a constructive understanding of games. Teachers engaged in various activities during constructive play that produce specific works (Bachtiar, 2021). Constructive play shows children how to turn their ideas, thoughts and concepts into real work. Constructive play comes in two forms: unstructured construction play with toys such as Lego and blocks, and structured construction play with tools such as water, sand, and whiteboard markers (Koutsoukos, 2022).

Constructive play in which children create shapes with blocks, sand, mud, dab, paint, glue, scissors, and colored pencils. When kids play games they really like, they won't get bored, even if they play them over and over again. Children will get creative through this constructive game, building multi-story houses or arranging puzzle pieces into one complete shape (for example 4-6 pieces). When children engaged in constructive play, they use materials to create things just for fun and not for practical purposes.

Teacher Knowledge About Constructive Games In Learning

Fg 6. Diagram of Constructive Play In Learning



Source: Data Analysis Results using Microsoft Excel

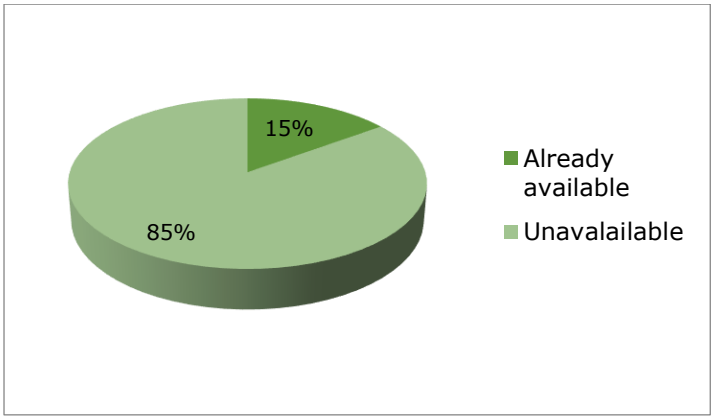
From the presentation of Picture 6 above, it can be explained that the number of teachers who know that constructive games can be applied as learning is 13 or 25%, while there are 39 or 75% of teachers who do not know about constructive games as learning.

Based on the survey results above, it can be said that some teachers do not understand constructive play in learning for children. A set of objects may include other objects in that set; for example, building construction can help children develop their creativity. Constructive play hones creative thinking skills to name and identify a series of objects according to appearance, size, or other characteristics (Kodsi, 2022).

Constructive play follows these steps: 1) the teacher models constructive play with basic examples; 2) the teacher is involved in constructive play, 3) students have the opportunity to follow the teacher's model, 4) children are allowed to try it themselves after they have had the opportunity to try it (Liu & Li, 2021). Constructive play is a type of play that is common in elementary schools, both inside and outside the classroom. One of the few game-like activities allowed in the classroom is constructive, work-focused play. For a very long time, elementary schools have been able to use constructive play to further develop students' academic skills, critical thinking abilities, and acquired thinking skills.

Availability of Digital Learning Books

Fg 7. The available of Playing constructive guidebook diagram



Source: Data Analysis Results using Microsoft Excel

Based on Picture 7, it can be explained that the number of teachers who stated that there were digital learning guidebooks was 8 or 15%, while 44 or 85% of teachers stated that there was no guidebook.

Based on the survey results, the lack of digital learning guidebooks hinders teachers from exploring game-based digital learning for preschool children. This gap arises because many teachers in underfunded schools lack access to digital devices, training, and other supporting resources, which prevents them from fully utilizing technology. Without such support, teachers face difficulties in optimally integrating technology into the learning process, resulting in low-quality interactions between children and digital media that should be

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educational and stimulate creativity (Yelland, 2011; Plowman et al., 2010). Therefore, to overcome these obstacles, it is essential to develop structured professional training for teachers, provide digital guidebooks tailored to the early childhood education context, and implement institutional policies that promote innovation and inclusive use of technology in early learning environments.

Rice & Cun (2021) explained in their research that having experience with digital media is very important for educators to achieve learning goals effectively because it allows them to acquire operational and functional skills in using technology. To be able to produce content that works for study. There is a research that supports this statement (Behnamnia et al., 2020) which shows that teacher ability influences the success of digital learning in improving academic achievement. Teaching in the application of reasonable and appropriate teaching techniques to create a pleasant learning environment for students who are ready to take advantage of online education. Digital learning in early childhood is currently experiencing extraordinary challenges due to the development of IT-based games, for example, online games and other digital games. This app offers a wide variety of games and activities to help children to learn. The entire opinion above is reinforced in research (Puspita & Edvra, 2022) which states that through digital learning, children can also learn through play activities which can develop children's creativity.

4. Conclusion

The conclusions from the results of this study are: (1) teachers who stated that children's creativity had not yet developed was 42 children or 81%, while there were 10 children or 19% who had developed, (2) teachers who feel there is a need for methods in games is 36 teachers or 71%, while teachers who say they do not need methods in games are 15 teachers or 29%, (3) teachers who understand digital learning is 7 teachers, 13%, while 45 teachers do not understand digital learning or 87%, (4) teachers who know about constructive games is 11 teachers or 21%, while there are 41 teachers or 79% who do not know about constructive games, (5) teachers who know that constructive games can be applied as learning is 13 or 25%, while there are 39 or 75% of teachers who do not know about constructive games as learning, and (6) teachers who stated that there were digital learning guidebooks was 8 or 15%, while 44 or 85% of teachers stated that there was no guidebook. However, this study is limited by the number of participants, involving only 52 teachers from Lhokseumawe City. This may restrict the generalizability of the findings to other regions in Indonesia. Therefore, further research is recommended to include a larger sample size and cover more diverse geographical areas in order to obtain a more representative picture of teachers' knowledge and the development of children's creativity across Indonesia.

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