

Educators' Behaviors and Activities When Using Technology for Teaching and Learning

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Abstract

This study interprets feelings, perceptions, and beliefs based on the experiences of preschool educators. The purpose of this study is to explain the phenomenon of educator behavior when using technology for teaching and learning preschool students. It is also to elaborate on the phenomenon of educator activities in certain environments when using technology for teaching and learning preschool students. This research uses a phenomenological study design. It collected data through participant observation techniques and in-depth interviews with open-ended question techniques from 25 study participants consisting of certified educators who are teaching preschool students. This study processes qualitative data in an inductive approach using N Vivo Version 11 computer software. The data of this study show that in terms of behavior, most preschool educators have expressed their beliefs about using television, educators have shown their perceptual behavior in searching for teaching ideas or teaching aids through the Internet, and educators have demonstrated their emotional behavior in encouraging students to share experiences. Furthermore, the study's findings show that in terms of hardware activities, most preschool educators, based on their experience and feelings, have carried out teaching activities using computers, televisions, and LCD projectors. In terms of activities involving the use of software and the Internet, most preschool educators, based on their experience and feelings, have carried out teaching activities using various Canva and MS PowerPoint computer software, and educators have used the Google search engine and YouTube video application. This study holds significance in the field of preschool education and educational technology, as it will add to the existing body of knowledge and influence the responses of preschool educators.

Keywords

Behavioral Phenomena, Phenomena Activity, Technology for Teaching and Learning, Phenomenological Study

1. Introduction

This section aims to describe the study's background. Indeed, there is a compelling rationale for conducting this study. This research is in line with the Sustainable Development Goals, which have become one of the focuses of the United Nations Educational, Scientific, and Cultural Organization, or UNESCO. It is to ensure inclusive, equitable, and quality education. It promotes lifelong learning opportunities for all. UNESCO has planned to ensure equal access for all women and men in terms of technical and vocational education by 2030 (UNESCO, United Nations, 2023a).

Also, the rationale why we need to conduct this research is that by 2030, the United Nations, or the UN, will ensure that all girls and boys have access to quality early childhood development. He has been determined to ensure that all human beings can enjoy a prosperous and fulfilling life. Economic, social, and technological progress will occur in harmony with nature (United Nations, 2023b).

For this reason, the National Preschool Standard Curriculum serves as a justification for why we need to conduct this research. This is because science and technology are part of the curriculum. The integration of science and technology in education includes four things, namely 1) knowledge of science and technology; 2) scientific skills; 3) scientific attitude; and 4) the use of technology (Curriculum Development Division, 2017).

The purpose of this section is to explain the problem statement. Ideally, educators of preschool students have a positive attitude, firm trust, and high confidence in technology. Furthermore, preschool teachers have skills in using technology (Dardanou, Hatzigianni, Kewalramani, & Palaiologou, 2023). However, in reality, we found that there are issues in terms of preschool educators' narratives about their experiences and feelings when using technology for teaching and learning.

As a result, we need to conduct this phenomenological research to shed light on the behavior of educators of preschool pupils. This research also aims to elaborate on the activities that educators engage in when they use technology for teaching and learning preschool students in private preschools in Selangor, Malaysia, during the 2023-2024 school year.

Therefore, in response to this issue, we have explored through this research the social-behavioral phenomena that occur that involve specific actions of educators when using technology for the teaching and learning of preschool students. In this study, we have also explored the phenomenon of planned activities involving preschool educators communicating and guiding knowledge and skills with the aim of bringing about learning by using technologies such as radio, television, computer

software, film, recording, the Internet, and communication technology.

This section relates to the objectives of the study. We conducted this research to: 1) Explain the behaviors that involve specific actions of educators when using technology for the teaching and learning of preschool students; 2) Describe the activities that involve educators in specific settings when using technology for the teaching and learning of preschool students.

The purpose of this section is to clearly define the research question. We have conducted studies to address the following research questions: 1) What are the behaviors that involve educators' specific actions when using technology for teaching and learning preschool pupils? 2) How are the activities that involve educators in a specific environment when they use technology for the teaching and learning of preschool students?

The purpose of this section is to elaborate on the scope and limitations of this study. We kept the following in mind before we designed this research study: First, the limited number of participants in these studies made it challenging for us to draw comprehensive conclusions about the phenomenon under study. Additionally, we have avoided biases. Also, we relied on the experience of the study participants, so the accuracy depends entirely on the extent to which the study participants can express their experiences and feelings. In addition, we managed to summarize the results of this study, although it is difficult due to its qualitative nature. Finally, this type of study takes a long time.

This section aims to elaborate on the significance of the studies and the operational definitions. This research is important because it will benefit various parties. First, it will contribute to the body of knowledge. It will fulfill the requirements of the scientific community in the field of preschool education specialization and educational technology. It will provide an opportunity for preschool educators to improve their teaching and learning strategies using technology. In addition, public or private educational institutions have organized courses related to teaching and learning strategies using technology in preschools.

Furthermore, this study is an important achievement for those interested in advancing research in this field. In addition, the state education department can assist institutions in designing effective training programs in the areas of educational technology and teaching to further improve educators' professionalism. The importance of this research lies in its diverse implications. In this regard, the behavior and activities of preschool educators when using technology have implications for the development of relevant training programs. It aims to improve performance, especially in domains closely related to teacher training programs.

The operational definitions for these two educational phenomena are as follows, namely 1) behavioral phenomena that involve specific actions of educators when using technology for teaching and learning of preschool students. 2) The phenomenon of activities that involve educators in a certain environment when using technology for teaching and learning preschool students.

Behaviors that involve specific actions of educators when using technology for teaching and learning of preschool students. Social behaviors in the real

world, known as behavioral phenomena, are not directly visible to the normal senses. The observer builds behavioral phenomena in their mind using cognitive tools (Bates, 1997). In this study, behavior is a specific action of educators when using technology for the teaching and learning of preschool students.

In the meantime, Hyndman (2018) has outlined 11 behavioral characteristics of educators. These characteristics include the following features: 1) The educator acts to ensure that the technology introduced is always prioritized; 2) The educator acts to ensure that he can overcome and master the capabilities and commands of different devices; 3) The educator may need to give various instructions for various things regarding the device. 4) The educator acts to ensure that the student is not distracted. 5) The educator acts to ensure that the technology does not affect the time and flow of lessons. 6) Educators act to ensure that teachers develop more professionally, 7) Educators act to ensure that all students have technology at home. 8) Teachers take action to guarantee that technology can safeguard students. 9) Educators take steps to guarantee that all educators embrace the use of technology, 10) Educators act to ensure that information and communication technology supports resources, infrastructure, or sufficient time, and 11) Educators act to ensure that there is no tension between students and educators.

In this study, we measured the behavioral characteristics of educators using Participant Observation Techniques. In addition, we have used a study instrument in the form of a Structured Observation Checklist.

Activities that involve educators in a specific environment when using technology for the teaching and learning of preschool students. Preschool educators plan activity phenomena in a pattern or sequence with explicit goals. Preschool educators communicate and guide knowledge and skills with the aim of promoting learning. The language of instruction can also be indirect, for example through radio, television, computer software, film, recording, the Internet, and communication technologies (UNESCO, 2011). In this study, the term “activities” refers to the activities that preschool educators engage in when teaching using technology. This activity takes place over a longer period of time and involves preschool students in a specific setting.

In this regard, Nina (2023) has stated that learning technology in the classroom is a tool, system, and technique that facilitates, enables, and promotes learning. It has nine features, as follows: The features include 1) Gamified Learning, 2) Digital Field Trips, 3) Integrating social media, 4) Collecting Student Feedback, 5) Creating Digital Content, 6) Using the Classroom Calendar, 7) Reviewing and Criticizing Websites, 8) Video/Multimedia Lessons and Presentations, and 9) Online Activities for students who complete early work.

In this study, we measured the characteristics of the activities of preschool educators in teaching using technology using In-Depth Interviews with Open-Ended Questions Techniques. In addition, we have used a study instrument in the form of structured interview open-ended questions.

Educators. In this study, educators refer to male and female certified teachers who are teaching preschool students.

2. Literature Review

2.1. Models Related to the Study

The purpose of this section is to describe the models that are relevant to this study. In this regard, technology is the application of conceptual knowledge to achieve practical goals, especially in a reproducible way (Skolnikoff, 1993). Westwood (2008) has stated that teaching methods are broader techniques used to help students achieve learning outcomes. Meanwhile, the teaching method helps students master the course content and learn how to apply it in a specific context. According to Robinson, Molenda, and Rezabek (2016), educational technology is a combination of the use of computer hardware, computer software, educational theory, and educational practices to facilitate teaching and learning.

Technology refers to the use of hardware such as radios, televisions, video recorders, and computers. Additionally, technology refers to the use of software such as learning materials, strategies, and programmed devices. Furthermore, technology refers to the use of educational theory in educational technology, including the application of behaviorism theory, cognitivism theory, and constructivism theory. Finally, technology refers to the use of educational practices to facilitate teaching and learning, such as the use of technological tools and media.

We conducted a study on the behavior and activities of educators in teaching and learning using technology among preschool students. Therefore, a model that fits this field of study is the Model for Teaching and Learning with Technology (Kaplan & Zhu, 2011). According to Kaplan & Zhu (2011), teaching and learning with technology involves four main types of components: 1) students, 2) educators, 3) course content, and 4) technological tools. The examination of each component raises a set of issues that educators need to consider for successful technology integration. For example, educators can evaluate content based on the learning outcomes and disciplines they teach. The experience of technology, the time spent planning and teaching, and insights into its role in teaching and learning can also be considered. Furthermore, educators must carefully consider students' exposure and access to technology, as well as their preferred learning style. Finally, educators can turn to the technology itself and analyze it according to its function.

2.2. Past Studies Related to the Study

Behaviors that involve specific actions of educators when using technology for teaching and learning of preschool students. In this regard, Alotaibi (2023) has examined the effective use of technology in kindergarten educators' teaching techniques. This study uses a mixed-method approach with a sequential explanation design. The study's findings indicate that the opinion on the importance of technology in supporting student learning significantly influences the use of technology. Additionally, we found that the beliefs, knowledge, and attitudes of preschool educators, along with their access to technology and media resources, influence the frequency and quality of technology and media use in preschool

classrooms. Finally, these findings underline the importance of extrinsic elements such as policy, resources, and support, as well as intrinsic elements such as trust and confidence.

Next, Rad, Egerău, Roman, Dughi, Kelemen, Balaş, Redeş, Schipor, Clipa, Măță, Maier, Rad, Runcan, & Kiss (2023) have examined how perceived compatibility and pleasure affect the relationship between the intention to use and the actual use of technology in Romanian preschool education. A valid and accurate scale that assesses the behavior of preschool educators towards the use of technology was included in the questionnaire. This study revealed a positive correlation between intention to use, compatibility, felt pleasure, and actual use. The conclusion of this study is that perceived compatibility and pleasure partly mediate the relationship between the intention to use and the actual use of technology in the classroom by Romanian preschool educators.

Prior to that, Lee Jiale (2021) examined the relationship between the teaching experience of preschool educators and the trust and use of technology in the education of preschool students. The study's findings revealed that there was no significant relationship between teaching experience, preschool educator beliefs, or the use of technology in preschool education. Educators should incorporate technology into their lessons and introduce preschoolers to virtual learning.

Then, Dong and Mertala (2019) examined the perception of preschool educators towards technology and its capabilities. Studies have found that technology is capable of providing efficiency and assistance, especially for educator-centered practices, but also for curbing preschool pupils' touch and practical experience. The findings of this study also show that it emphasizes the importance of sociocultural contexts such as practical places and educational traditions in shaping educators' perceptions of the use of technology.

Also, Magen-Nagar & Firstater (2019) have examined the beliefs of preschool educators as a barrier to the implementation of technology in preschool settings. The findings of this study show that information and communication technologies do not play a significant role in the educational philosophy of preschool educators. Additionally, preschool educators primarily use information and communication technologies as sources of information and for instructional illustrations, rather than as tools for implementing new instructional strategies. The findings also revealed that computer use has an impact on preschool students' social development, especially those with special needs.

In addition, Casillas Martín, Cabezas González, & García Peñalvo (2019) have examined how educators of preschool pupils are in terms of their digital competence. The study employed non-experimental and descriptive quantitative methodologies. We collect data using electronic surveys. The findings of this study show that the educators of these preschool students self-assess their attitude towards information and communication technology, that is, they give good grades. Moreover, they demonstrate proficiency and understanding of the subject matter.

Later, Ye and Sitthiworachart (2023) studied concrete and interesting teaching methods for teaching the science of "exploring space." This is because students

are required to use abstract thinking and imagination. The study sample consisted of children aged 3 - 6 years. A total of 166 preschool students from Ningbo, China, participated in the preschool learning behavioral science. The results show that the science learning system promotes more active learning behaviors and improves learning attitudes. The study also confirms that the acceptance of preschool learning behavioral science greatly influences learning attitudes and behaviors.

Prior to that, [Kulaksız & Toran \(2022\)](#) studied the knowledge of technology integration of pre-service preschool teachers. It relates to the process of skill development in the context of instructional technology courses through a pragmatic approach. The data was analyzed based on three emerging themes, namely challenges, learning processes, and learning outcomes. This study found that pre-service teachers are not familiar with such teaching and learning methods. Additionally, they generally have a positive attitude towards technology in education.

It seems clear to us that overall, these past studies have discussed behaviors that involve specific actions of educators when using technology for teaching and learning with preschool pupils. This has been thought about by several researchers, who stated that the frequency and quality of the use of technology and media in the preschool classroom are influenced by the beliefs, knowledge, and attitudes of preschool educators ([Alotaibi, 2023](#); [Kulaksız & Toran, 2022](#); [Rad, Egerău, Roman, Dughi, Kelemen, Balaş, Redeş, Schipor, Clipa, Măță, Maier, Rad, Runcan, & Kiss, 2023](#); [Ye & Sitthiworachart, 2023](#)).

Similarly, we can deduce from what [Dong and Mertala \(2019\)](#), [Casillas Martín, Cabezas González, & García Peñalvo \(2019\)](#), and [Lee Jiale \(2021\)](#) have stated that the experiences and feelings of educators of preschool students are in terms of beliefs in the use of technology, the importance of sociocultural context in the use of technology, educators' perception of the use of technology, awareness of the value and application of technological tools, and attitudes towards technology.

Activities that involve educators in a specific environment when using technology for the teaching and learning of preschool students. In this case, [Eliasson, Peterson, & Lantz-Andersson \(2023\)](#) have studied technology education in preschools. [Eliasson, Peterson, and Lantz-Andersson \(2023\)](#) aim to investigate the implementation of technological activities in preschools and the nature of knowledge, which aligns with the five dimensions of technology. It allows children to learn when intersubjectivity is created in the interactions between participants. The empirical data included three video-documented technology activities, involving five children and a preschool educator. The results show that educators, through a clear and sensitive orchestration, formulate goal-oriented activities by allowing for a game-oriented approach. While the findings also show that intersubjectivity on technology has been created in relation to four of the five dimensions of technology.

Prior to that, [Bay \(2022\)](#) studied the activities of preschool student educators on the use of digital technology in early childhood learning environments in Turkey. The data were obtained qualitatively through closed interview questions and

open interviews with preschool educators. According to the study's findings, preschool teachers are proficient in web-based technology. They also use a majority of smartphone apps.

Then, [Isotalo, Ukkonen-Mikkola, Lämsä, & Rutanen \(2024\)](#) examined the interaction between educators of preschool students and preschool students. This study investigated the visual gaze behavior of three preschool educators during pedagogical activities with a group of three-year-old minors in Finland. It is intended to gain an understanding of how educators use their views to facilitate interaction and pedagogy. We collected the data through observation and recording. The findings showed that preschool pupils' goals to interact with children were associated with their visual gaze behavior on episodes initiated by educators and children. Furthermore, the study found that preschool educators' activity structure and position also played a role in how they focused their visual views.

Prior to that, [Batrakova, Ushanov, & Ioseliani \(2023\)](#) had studied the categories of information technology used in preschool institutions. It pertains to interactive technologies for preschool teachers in Russia. The survey results show that information technology is heavily involved in the educational process. In addition, the majority of respondents use information technology in teaching and learning. Furthermore, the results of this study show that the majority of preschool teachers prefer technology and carry out activities based on interactive technology.

In conclusion, when the studies of [Bay \(2022\)](#), [Eliasson, Peterson & Lantz-Andersson \(2023\)](#), [Batrakova, Ushanov, & Ioseliani \(2023\)](#), and [Isotalo, Ukkonen-Mikkola, Lämsä, & Rutanen \(2024\)](#) are looked at closely, we have found that the experience of preschool pupils educators when using technology for teaching and learning is in terms of goal-oriented activities by allowing for a game-oriented approach, web-based activities, activities using smartphone applications, activities for instructional illustrations, activities concentrating visual views, and activities based on interactive technology.

2.3. Conceptual Framework of the Study

We are very interested in explaining the behaviors that involve specific actions by educators when using technology for the teaching and learning of preschool students. We'd also like to elaborate on activities that involve educators in certain settings when using technology for preschool students' teaching and learning. The title of this research is "Educators' Behaviors and Activities When Using Technology for Teaching and Learning." So, we conclude that this research question is "What are educators' behaviors when using technology for teaching and learning preschool students? When using technology to teach and learn preschool students, how are educators' activities in a given environment?"

In this regard, we have read about various publications related to teaching using technology. We identified this research phenomenon in publications such as journal articles, books, and doctoral theses. A research phenomenon is any problem, issue, or topic chosen as the subject of study, as well as anything that originates from the practical world, theoretical disciplines, experiences, or personal insights

(Van de Ven, 2016).

Therefore, we have chosen to explain and elaborate on the following educational phenomena, namely the types of phenomena that can be encoded: behavioral phenomena in the form of specific actions of educators and activity phenomena involving educators in a certain environment (Bogdan & Biklen, 2006). We have constructed a diagram, as shown in **Figure 1**, to clearly determine the behavioral and activity phenomena, as well as their relationship with the experience of preschool educators using technology for teaching and learning.

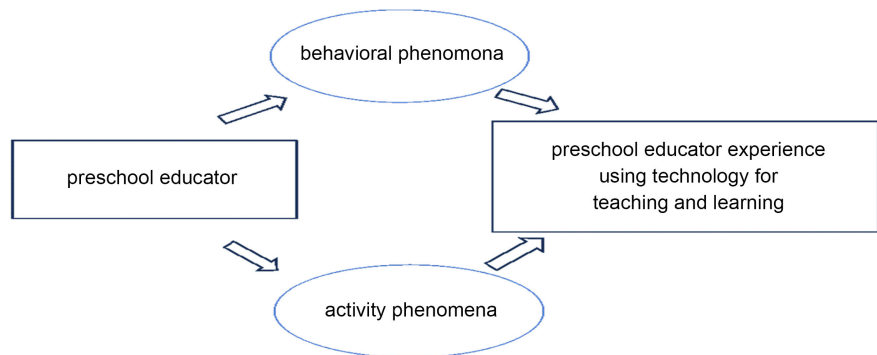


Figure 1. Conceptual framework.

3. Methodology

3.1. Design and Research Methods

We have used a qualitative phenomenological research design. Phenomenological research is the study of the meaning of phenomena in order to investigate experiences from an individual's perspective. Phenomenology primarily examines the life experiences of study participants. It aimed to examine how study participants behaved in a particular way based on their perspectives. Phenomenological studies focus on explaining phenomena from the perspective of those who have experienced them (Cleland, 2017).

We have applied phenomenological design according to the pattern as follows: First, we have identified the educational phenomenon at hand. Secondly, we have developed a detailed description of the phenomenon. Third, we have avoided personal prejudices and assumptions. Fourth, we collected data from study participants. Fifth, we analyzed the data, which involved reading the data, marking it, eliminating irrelevant information, collecting and naming the data into constituents, and organizing the data into themes that accurately and fully describe the study participants' life experiences.

In this study, we have interpreted the feelings, perceptions, and beliefs of preschool educators to explain and elaborate the essence of the educational phenomenon of how educators behave when using technology for teaching and learning of preschool students and how educators' activities in a certain environment when using technology for teaching and learning of preschool students based on the perspective of educators. We employed phenomenological design data collection

techniques, specifically Participant Observation Techniques and In-Depth Interviews with Open-Ended Questions Techniques, as recommended by [Qutoshi \(2018\)](#).

3.2. Study Phenomena

This study involves the following educational phenomena. It's an educational phenomenon that can be coded. The first is a behavioral phenomenon that involves specific actions by educators. The second phenomenon pertains to the activities that educators engage in within a specific environment. The purpose of this research is to clearly define the educational phenomenon and its relationship with the use of technology among preschool educators.

3.3. Study Instruments

We developed two research instruments to collect qualitative data, namely 1) a Structured Observation Checklist on Educators' Behavior When Using Technology for Teaching and Learning with Preschool Students. We have used this observation checklist to interpret the feelings, perceptions, and beliefs of preschool educators to explain and elaborate on how educators behave when using technology for teaching and learning with preschool pupils. 2) The Structured Interview Questions Focus on The Activities That Educators Engage in When Using Technology for Teaching and Learning Preschool Students. We have used these structured interview questions to interpret the feelings, perceptions, and beliefs of preschool educators to explain and elaborate on how educators are doing in a given environment when using technology for teaching and learning with preschool students.

3.4. Validity of the Study

This study's measuring tool has two types of validity: construct validity and content validity. We evaluate the construct's validity to determine if the gauge accurately reflects our intended actions. To achieve construct validity, we carefully developed indicators and measurements based on relevant existing knowledge. Then, assess the validity of the content to assess whether the instrument covers all aspects related to the phenomenon being measured in order to produce valid results. In this study, we have avoided plagiarism. In this regard, we have accepted the recommendations of [Fernandez-Gomez, Martin-Selvador, Luque-Vara, Sanchez-Ojeda, Navarro-Prado, and Enrique-Miron \(2020\)](#), which suggest that two experts should evaluate the study instruments in terms of strength, adequacy, and coherence.

Therefore, we have taken the following steps, i.e., we have consulted information from the literature highlights to determine that the coverage of the interview questions really covers the area studied. Additionally, we have asked experts to review the first draft of the question item to assess whether it covers the dimensions studied, comment on the content and construction, and ensure there are no biased elements, and no overlapping questions. Next, we have devised a detailed

plan for conducting the observation and interview sessions, which includes identifying the conducted method and selecting the observation and interview participants prior to the session's start. We also constructed interview questions based on the study's objectives. In addition, we have set the date, time, and place of the session. Finally, before the observation session and interview session began, we briefed the study participants on the procedure.

3.5. Study Reliability

We considered the reliability of these studies. The degree to which the study methods yield stable and consistent results determines the reliability of these studies. In order to improve the reliability of this research instrument, we have taken the following steps: Firstly, we gathered evidence to substantiate the assertion that repeating the same studies would yield identical findings. Second, we managed bias by engaging in self-reflection, avoiding direct knowledge of the study participants, and excluding them from the study design. Finally, we have ensured that all theories, models, and past study highlights are compatible with the interview question items and observation checklist items.

3.6. Study Population

We have defined the population of these studies, which is the target population from which the sample has actually been selected. Private preschool educators across Malaysia are considered to be the target population. According to the [Department of Statistics Malaysia \(2022\)](#), the number of private preschools in Malaysia is 11,142. We've decided to study private preschool educators in urban areas of Selangor, Malaysia. We have estimated that this study had a population of 500 private preschool educators.

3.7. Study Sampling

This study's sampling method has been determined. We have used a cluster random sampling method. In this regard, the study population, i.e., preschool educators in urban areas throughout the state of Selangor, was divided into groups based on municipal areas in Selangor, Malaysia. We randomly selected the sample according to the municipal district. It's good because the cluster sample gets each member from several groups by district, which reflects the population as a whole. We have accepted the recommendation of [Creswell & Creswell \(2022\)](#), which states that study participants ranged between 5 and 25 people for phenomenological studies. However, we chose 25 private preschool educators to participate in this study.

3.8. Qualitative Data Collection Procedures

Before we visited the preschool for the observation session and the interview session with the study participants, we obtained official permission from the school first. We have carried out the process carefully. We collected the data using

standard procedures and lawful means to ensure high validity and reliability of the findings. We gathered data for this investigation using observation and interview techniques.

Observation techniques. We used observational techniques on five study participants to investigate their experiences from their point of view. It aims to interpret preschool educators' feelings, perceptions, and beliefs in order to explain and elaborate on how educators behave when using technology for preschool students' teaching and learning. We have observed and recorded the behavioral information of educators during the teaching and learning process by using a checklist form. This procedure is consistent with the view of Farah, & Chandler (2018), who say that we need to observe and record information based on the set of activities identified using a structured checklist. In this context, we have observed educators instructing pupils in the classroom and are aware of our observations.

Interview techniques. We used interview techniques to investigate the study participants' experiences. The study aims to interpret the feelings, perceptions, and beliefs of preschool educators, with the goal of explaining and elaborating on their activities in a specific environment when using technology for teaching and learning. We have scheduled an appointment to determine the date, time, and venue where the interview session will take place. After the educators finished the school session, we conducted interviews so as not to disrupt the implementation of the teaching and learning process. We have run it in a suitable location that is free from noise interference.

Just before the interview session begins, we give a briefing and ask participants to read the instructions on the semi-structured interview form first. In this regard, we have chosen to use the group interview technique, which involves asking face-to-face open-ended questions. There were five study participants in each group. We accept the opinion of Kosar (2020), which states that a sample size of seven to ten study participants is sufficient for group interviews. However, we selected a total of 25 participants for this interview. In this regard, the relationship between the research question, data collection techniques, study instruments, data analysis techniques, and data processing tools is shown in Table 1.

Table 1. Data collection techniques and data analysis techniques.

Study Questions	Data Collection Techniques & Research	Data Analysis	Data Processing
	Instrument	Techniques	Tools
1) What are the behaviors that involve specific actions of educators when using technology for teaching and learning of preschool students?	Participant Observation Techniques by using a Structured Observation	Themed Approach	Recording of
	Checklist	Analysis	Observation Transcripts
2) How are the activities that involve educators in a particular environment when using technology for teaching and learning of preschool students?	In-Depth Interviews with Open-Ended Questions	Themed Approach	N Vivo Version 11
	Techniques by using a Structured Interview Open-Ended Questions.	Analysis	Computer Software

3.9. Pilot Studies

We conducted pilot studies to assess the study's important components. Thus, we have identified three types of components as follows: First, the main steps in the actual study were assessed, such as the number of study participants and the study participant criteria. Secondly, resources, i.e., assessing the problems in terms of time and resources that may occur during the actual study, such as how much time the actual study will take to complete, whether the use of some equipment is feasible, or whether the instruments selected for the actual study are reliable or not. Finally, management, i.e., the problem of data management, and our team members involved in real studies, such as the problem of collecting all the data needed for future analysis, whether the data collected is highly variable, and whether data from different preschools can be analyzed together.

The number of participants in the pilot study was five. Once we have finished conducting a pilot study to assess how appropriate the question item is to collect accurate information and to ensure that the information is clear as well as not out of scope, we have made corrections in the case of vague items, irrelevant items, and difficult-to-understand items. We concluded after interpreting the results that we could conduct the actual study without making any changes to the study protocol.

3.10. Qualitative Data Processing and Analysis

In this regard, we have used a theme-based content analysis method. We agree with Braun & Clarke (2022), who stated that thematic analysis is a method of analyzing qualitative data. Additionally, we apply it to a set of texts, such as interviews or transcripts. Also, it involves a six-step process, which is familiarization, coding, generating themes, reviewing themes, defining and naming themes, and writing. Furthermore, this approach is effective in gaining insights into people's experiences and values from qualitative data sets like interview transcripts.

We have used an inductive approach to thematic analysis. An inductive approach entails justifying the data to define a theme. We analyze data without relying on a previously established theoretical framework. We have used a theme-based content analysis method, which consists of three steps as follows: First is Step 1: Step 1 involves identifying the themes or categories (ideas, concepts, terms, and keywords) derived from the transcript. This identification process is subject to open coding. The purpose of identifying this theme or category is to choose words or phrases that are relevant and necessary. Next, we collect words and phrases in themes or categories on a blank sheet of paper in the form of a table map or mind map and start cutting out the information over and over again. This is referred to as the data reduction process.

Step 2 involves reviewing the resulting categories to ensure that there are no similar categories. We refer to this process of associating categories and sub-categories as axis coding. Step 2 also involves interpreting the exposed data using scientific principles and experience. To verify this, we engage third parties, such as

peers or “critical partners.” Finally, in Step 3, we begin the process of writing, which involves describing and summarizing the study results to address the research questions.

3.11. Research Ethics

In this regard, we have adhered to Resnik’s recommendations on the five principles of research ethics (Resnik, 2020). First, we, as researchers, did not interfere with the personal rights of study participants. Second, we do not pose a physical, mental, or moral risk. Third, we did not engage in any form of fraud to obtain data from study participants. Fourth, we obtained the consent of the relevant preschool educators before using them as study participants. Finally, we can use the results of the studies in a variety of situations.

3.12. Work Schedule and Research Period

This section is about the time frame for which we conducted the study. We have used Gantt charts to manage research activities. We used 32 weeks of time to collect data.

4. Finding

4.1. Study Participant Profile

We selected study participants who consisted of preschool educators. The profiles of study participants include aspects of gender, age, academic qualification, and work experience. **Table 2** provides a summary of the study participant profiles.

Based on **Table 2**, in terms of gender, most of the study participants were female. In addition, most of the study participants were aged 24 to 29 years. Further, most of the study participants had a diploma in early childhood education. Finally, most of the study participants had five years of experience as preschool educators.

Table 2. Summary of the study participant profiles

Gender	Frequency
Male	3
Female	22
Total	25
Age	Frequency
18 - 23 years	4
24 - 29 years	12
30 - 35 years	4
36 - 41 years	3
42 - 47 years	1
48 - 53 years	1
Total	25

Continued

Academic Qualification	Frequency
Diploma in Early Childhood Education	16
Bachelor of Early Childhood Education	9
Total	25

Years of Work Experience	Frequency
1 year	4
5 years	17
10 years	4
Total	25

4.2. Conclusions Drawn from Study Question 1

The purpose of this section is to explain in what circumstances or forms of behavior involve specific actions of educators when using technology for the teaching and learning of preschool students. Using Participant Observation Techniques, we measured educators' behavioral characteristics. In addition, we have used a study instrument in the form of a Structured Observation Checklist. As shown in **Table 3**, we recorded the observations on the checklist form.

Table 3. Findings from participant observation techniques.

Num.	In a state or form, what is the behavior of feelings, perceptions, and educator belief?	R1	R2	R3	R4	R5	ΣF	Level*
1	Educators have shown their belief in teaching using technology	✗	✗	✓	✓	✓	3	M
2	Educators have shown their belief in using television to play songs and videos for teaching	✓	✗	✓	✓	✗	3	M
3	Educators have shown their trusting behavior in using technological tools form LCD projectors	✗	✗	✓	✗	✓	2	L
4	Educators have shown their perceptual behavior in searching for teaching ideas or teaching aids through the Internet	✓	✓	✓	✗	✓	4	H
5	Educators have demonstrated their trusty behavior in using MS PowerPoint or Canva slides in teaching	✗	✗	✗	✗	✓	1	L
6	Educators have shown their emotional behavior in using the learning through play approach	✓	✓	✓	✓	✓	6	H
7	Educators have shown their belief in carrying out learning activities involving group work	✓	✗	✓	✓	✗	3	M
8	Educators have shown their perceptual behavior in providing creative and engaging teaching aids	✗	✓	✓	✗	✓	3	M
9	Educators have shown their trusting behavior in implementing two-way communication	✓	✓	✓	✓	✓	5	H
10	Educators have shown their emotional behavior in encouraging students to share their experiences	✓	✓	✗	✓	✓	4	H

*Indicator: ✓ = Yes, ✗ = No, F = Frequency, H = High, M = Medium, L = Low.

Based on **Table 3**, findings from observation techniques show that most preschool educators have demonstrated their belief behavior in teaching using technology. Additionally, the findings revealed that a majority of preschool educators had demonstrated their beliefs about using television to play songs and videos for instruction. Additionally, most preschool educators have demonstrated their belief behavior in carrying out learning activities that involve group work. Furthermore, the findings indicate that the majority of preschool educators have demonstrated their perceptual behavior by providing creative and engaging teaching aids.

Table 3 also shows that almost all preschool educators have shown their perceptual behavior in searching for teaching ideas or teaching aids through the Internet. The findings also revealed that nearly all preschool educators exhibited emotional behavior while implementing the play-through learning approach. Also, almost all preschool educators have demonstrated their emotional behavior in encouraging students to share their experiences.

However, the findings found that it is rare for preschool educators to show their trust in using technology tools in the form of LCD projectors. Finally, these findings reveal that preschool educators rarely demonstrate their belief in the use of MS PowerPoint or Canva slides in instruction.

4.3. Conclusions Drawn from Study Question 2

This section aims to describe in what way, in what form, or under what circumstances the activities that involve educators in a given environment when using technology for the teaching and learning of preschool students. We used thematic analysis as a qualitative data analysis method. We deduced the meaning behind the study participants' words by discovering recurring themes in the interview transcripts. We have also used inductive analysis, which involves generating new ideas based on data.

In this case, we have processed the data using N Vivo11 Windows. This desktop computer application focuses on various topics and identifies emerging trends and themes. The three steps to perform qualitative data analysis are as follows: 1) collect and manage data; 2) encode data and analyze data; and 3) report the results of data analysis.

Findings from interview questions about hardware usage. Step 1, which is to collect and manage data. In this regard, we have compiled the interview results in the form of transcript notes according to each interview item. The data, presented in the form of interview transcript notes, can be found in **Table 4**.

Step 2, which is to encode data and analyze data. In this case, we have processed the data using N Vivo11 Windows. This desktop computer application focuses on various topics and identifies emerging trends and themes. As shown in **Figure 2**, Tree Map N Vivo11 reveals trends and themes regarding the use of hardware.

The third step involves reporting the results of the data analysis. According to **Figure 2**, findings from interviews on the use of hardware revealed that most

preschool educators, based on their experience and feelings, have carried out teaching activities using computers, televisions, and LCD projectors. In addition, most preschool educators have carried out activities of singing songs to music using computers.

Table 4. Data interview questions about hardware usage.

Item/Respondent	Data/Information
Item 1	<p>In what ways do educators, based on their experiences and feelings, apply television in teaching in preschool?</p> <p>In addition, in what form do educators, based on their experience and feelings, apply computers to teaching in preschool?</p> <p>Finally, under what circumstances would educators, based on their experience and feelings, use LCD projector facilities in classroom teaching?</p>
Respondent 1 (R1)	<p>I have carried out activities using television when I want to open children's stories, dawn lectures, and learning involving the use of television.</p> <p>I have used computers in planning daily lesson plans.</p> <p>I don't use LCD projectors in preschool.</p>
Respondent 2 (R2)	<p>I have carried out activities using television when I want to show animation or songs because the use of television in learning can make the learning atmosphere in preschool more fun because students are interested in animation and songs.</p> <p>I have used the computer when I want to find teaching aids.</p> <p>This preschool does not use LCD projectors.</p>
Respondent 3 (R3)	<p>I have carried out activities using television if I want to show children's stories, open prayers, and songs in circle time sessions.</p> <p>I've been using a computer when creating teaching slides using Canva software.</p> <p>I have used LCD projectors to illuminate students, such as experimental demonstrations, to make them clearer and bigger.</p>
Respondent 4 (R4)	<p>I have carried out activities using television during learning sessions that involve tasks such as experiments and storytelling.</p> <p>We use experiments to demonstrate concepts to students.</p> <p>I have used computers in the preparation of teaching aids.</p> <p>There is no LCD projector facility at this preschool.</p>
Respondent 5 (R5)	<p>I have carried out activities by putting up stories or songs through television.</p> <p>I have been using a computer because it can measure children's development quickly and effectively. The various software programs used are also able to increase children's knowledge.</p> <p>I have used an LCD projector to project the teaching slides so that all students in the class can see clearly.</p>

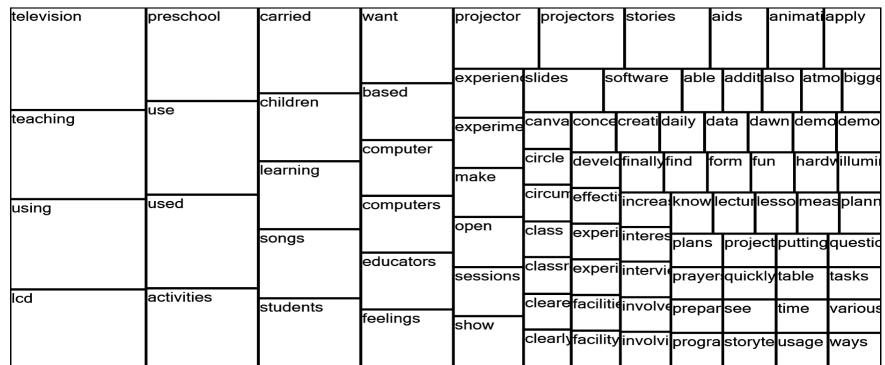


Figure 2. Tree map about hardware usage.

Findings from interview questions about software usage and the Internet.

Step 1, which is to collect and manage data. In this regard, we have compiled the interview results in the form of transcript notes according to each interview item. The data, presented in the form of interview transcript notes, can be found in **Table 5**.

Table 5. Data on software usage and the Internet interview question.

Item/Respondent	Data/Information
Item 2	In what ways do educators, based on their experience and feelings, use software in designing instruction? Also, under what circumstances does an educator, based on his experience and feelings, integrate Internet-based activities in teaching?
Respondent 1 (R1)	I have carried out activities by designing lesson plans using MS Word. I have been using my phone to access the Internet to find interesting teaching activities using the Google search engine.
Respondent 2 (R2)	I've been engaged in activities where I edit teaching slides using Canva software.
Respondent 3 (R3)	I have carried out activities by making interactive games using MS PowerPoint. I have used the Internet to create worksheets, tests, and exercises that can help educators further improve the effectiveness of teaching.
Respondent 4 (R4)	I have carried out activities by using software such as MS Word to plan and type daily lesson plans using a computer. I used the Internet when I opened YouTube to install songs that involved aerobics or free movement.
Respondent 5 (R5)	I have carried out activities by broadcasting teaching slides using MS PowerPoint and Canva. I used the Internet when I wanted to open YouTube to show my lessons on television.

Step 2, which is to encode data and analyze data. In this case, we have processed the data using N Vivo11 Windows. This desktop computer application focuses on various topics and identifies emerging trends and themes. Tree Map N Vivo11

reveals the trends and themes regarding the use of software and the Internet, as shown in **Figure 3**.

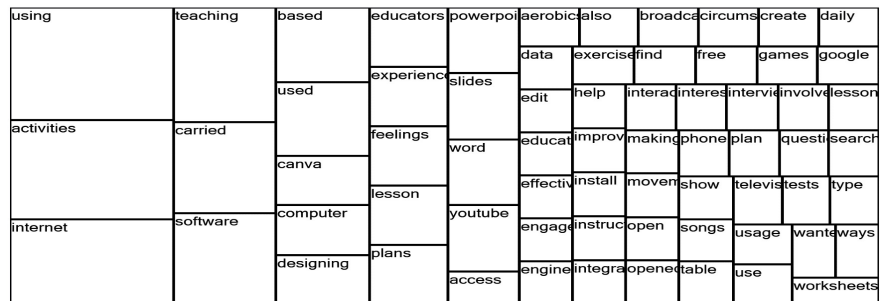


Figure 3. Tree map about software and Internet usage.

Step 3, i.e., reporting the results of data analysis. Based on **Figure 3**, findings from interviews on the use of software and the Internet found that most preschool educators, based on their experience and feelings, have carried out teaching activities using various computer software such as Canva and MS PowerPoint applications. In addition, most preschool educators have carried out activities through Internet access using the Google search engine and YouTube video application.

Findings from Interview questions about creativity and learning through play. Step 1, which is to collect and manage data. In this regard, we have compiled the interview results in the form of transcript notes according to each interview item. **Table 6** presents the data in the form of interview transcript notes.

Table 6. Item interview question data on creativity and learning through play.

Item/Respondent	Data/Information
Item 3	In what ways do educators, based on their experiences and feelings, use technology in teaching to help educators increase student creativity? In addition, in what form do educators, based on their experience and feelings, carry out learning activities through play through technology in the classroom?
Respondent 1 (R1)	I have carried out activities by using games that can be accessed through Google.
Respondent 2 (R2)	I've been doing activities by building Kahoot games. Besides that, I also showed a video of a children's song from YouTube.
Respondent 3 (R3)	I have carried out activities by doing digital games.
Respondent 4 (R4)	I have carried out activities by making interactive games to encourage students to think creatively in building and solving problems. I have made interactive games using tablets or computers.
Respondent 5 (R5)	I have carried out activities by implementing interactive games such as drawing and building to see the creativity of the students. I have a game.

Step 2, which is to encode data and analyze data. In this case, we have processed the data using N Vivo11 Windows. This desktop computer application focuses on various topics and identifies emerging trends and themes. Tree Map N Vivo11 reveals the trends and themes regarding creativity and learning through play, as shown in **Figure 4**.

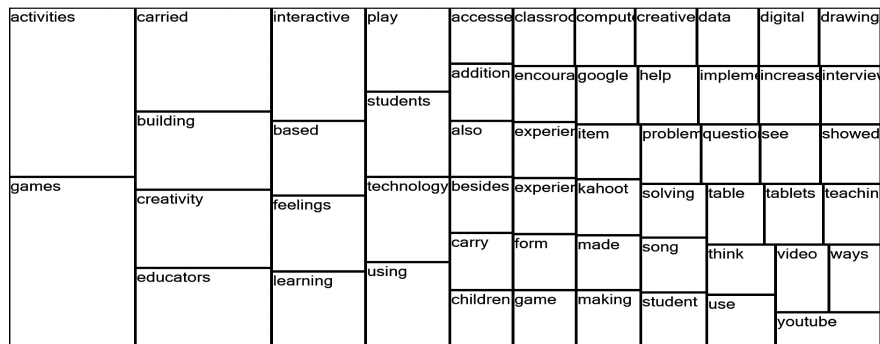


Figure 4. Tree map about creativity and learning through play.

Step 3, i.e., reporting the results of data analysis. Based on **Figure 4**, findings from interviews on creativity and learning through play found that most preschool educators, based on their experiences and feelings, have carried out teaching activities using computer games to increase students’ creativity. In addition, most preschool educators have conducted interactive play activities using computer technology to foster problem-solving skills and enhance the students’ experience.

Findings from Interview questions about teaching materials and student assignments or projects. Step 1, which is to collect and manage data. In this regard, we have compiled the interview results in the form of transcript notes according to each interview item. **Table 7** presents the data in the form of interview transcript notes.

Table 7. Interview question data on teaching materials and student assignments or projects.

Item/Respondent	Data/Information
Item 4	<p>Under what circumstances do educators, based on their experiences and feelings, use technology to assist educators in producing interesting teaching aids?</p> <p>Also, in what form do educators, based on their experience and feelings, use technology to help in demonstrating demonstrations to explain the projects that preschool students need to produce?</p>
Respondent 1 (R1)	I have carried out activities by searching for various types of teaching aids through Facebook, Google, and TikTok applications.
Respondent 2 (R2)	I have been carrying out activities by opening TikTok in search of teaching aids.

Continued

	I have used learning videos about a project that students need to produce so that students have a better understanding of how to produce it.
Respondent 3 (R3)	I have been doing activities by searching for ideas on TikTok to get inspiration to produce interesting teaching aids. I have used LCD projectors in class.
Respondent 4 (R4)	I have been engaged in activities by opening my computer and searching Google for ideas for interesting teaching aids. I have made videos and taken pictures so that students can easily understand.
Respondent 5 (R5)	I have carried out activities by surfing the Internet in search of interesting teaching aids, such as looking on the Internet and Google platforms. I have used television to show demonstrations of projects.

Step 2, which is to encode data and analyze data. In this case, we have processed the data using N Vivo11 Windows. This desktop computer application focuses on various topics and identifies emerging trends and themes. Tree Map N Vivo11 reveals the trends and themes regarding teaching materials and student assignments or projects, as shown in **Figure 5**.

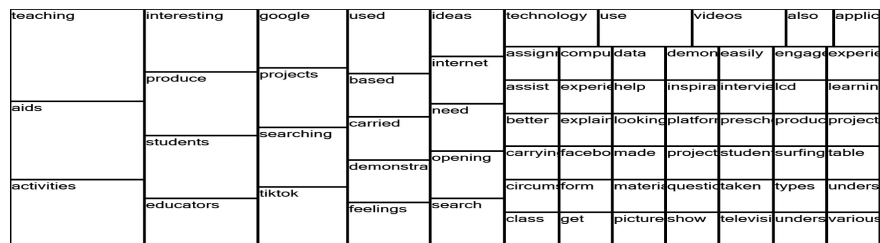


Figure 5. Tree map about teaching materials and student assignments or projects.

Step 3, i.e., Reporting the Results of Data Analysis. Based on **Figure 5**, the findings from interviews on teaching materials and student assignments or projects indicate that most preschool educators, based on their experiences and feelings, have carried out teaching activities by creating teaching aids using the TikTok application and Google search engine. Additionally, the majority of preschool educators have conducted teaching activities on student projects by sourcing ideas from the Internet and videos.

5. Conclusion

5.1. Summary of Study Findings

Behaviors that involve educator-specific actions when using technology to teach preschool students. The data show that the behaviors that involve educator-specific actions when using technology to teach preschool pupils are as follows: Firstly, the majority of preschool educators have expressed their beliefs about using television to play songs and videos for instructional purposes. Secondly,

the majority of preschool educators have demonstrated their beliefs by engaging in learning activities that involve group work. Also, the majority of preschool educators have demonstrated their perceived behaviors by providing creative and engaging teaching aids.

Also, thirdly, almost all preschool educators have shown their perceptual behavior in searching for teaching ideas or teaching aids over the Internet. When implementing the learning through play approach, the majority of preschool educators display emotional behaviors. In addition, almost all preschool educators have demonstrated their emotional behavior in encouraging pupils to share experiences. Finally, it is rare for preschool educators to demonstrate their faith in using technological tools in the form of LCD projectors.

Activities involve educators in a specific environment when they use technology for the teaching and learning of preschool pupils. The findings show that the activities that engage educators in certain settings when they use technology for the teaching and learning of preschool pupils are as follows: Firstly, in terms of hardware use, most preschool educators, based on their experience and feelings, have carried out teaching activities using computers, televisions, and LCD projectors. Most preschool educators have used computers to conduct activities such as singing songs to music. Secondly, in terms of the use of software and the Internet, most preschool educators, based on their experience and feelings, have carried out teaching activities using various computer software such as the Canva application and MS PowerPoint. Most preschool educators have conducted activities via the Internet, using the Google search engine and the YouTube video application.

Further, thirdly, in terms of the use of technology for creativity and learning through play, most preschool educators, based on their experience and feelings, have carried out teaching activities using computer games to enhance students' creativity. Most preschool educators have conducted interactive play activities using computer technology to foster problem-solving skills and improve the student experience. Finally, when it comes to the use of technology for teaching materials and student assignments or projects, the majority of preschool educators, based on their experiences and feelings, have created teaching aids using the TikTok app and Google's search engine. The majority of preschool educators have carried out teaching activities on student projects using ideas from the Internet and videos.

5.2. Discussion

This research aims to elucidate the behaviors that involve educator-specific actions when using technology for the teaching and learning of preschool students. The research also aims to elaborate on the activities that educators engage in a specific setting when using technology for the teaching and learning of preschool students. Based on a qualitative analysis, the behavior of educators when using technology for teaching and learning, as well as the activities they engage in, have yielded significant findings.

This discussion attempts to conceptualize the findings in this research with those in previous studies. This research revealed that preschool educators not only demonstrated their beliefs about using television to play songs and videos for teaching, but also demonstrated their perceptual behavior when searching for teaching ideas or aids on the Internet. This finding is in line with the finding of [Alotaibi \(2023\)](#) that the use of technology supports pupil learning and influences the beliefs, knowledge, and attitudes of preschool educators.

Additionally, the study found that preschool educators exhibited emotional behaviors while implementing the play-through learning approach. In addition, preschool educators have demonstrated their emotional behavior in encouraging pupils to share experiences. This finding aligns with the findings of [Rad, Egerău, Roman, Dughi, Kelemen, Balaş, Redeş, Schipor, Clipa, Măţă, Maier, Rad, Runcan, & Kiss \(2023\)](#), who found a positive correlation between intention to use, compatibility, perceived pleasure, and actual use. Additionally, they found that these factors mediate the relationship between intention to use and actual use of technology in the classroom among preschool educators.

Further, this research found that preschool educators have shown their faith in using technological tools in the form of LCD projectors and using MS PowerPoint or Canva in teaching. However, these findings are not in line with claim of [Lee Jiale \(2021\)](#) that there is no significant relationship between teaching experience, preschool educator beliefs, or the use of technology in preschool education.

Furthermore, this research found that preschool educators, in terms of hardware usage, based on their experiences and feelings, have carried out teaching activities using computers, televisions, and LCD projectors. This finding is in line with finding of [Batrakova, Ushanov, & Ioseliani \(2023\)](#) that information technology is heavily involved in the educational process and that preschool educators prefer technology as well as carrying out interactive technology-based activities.

Also, this study found that preschool educators, in terms of software and Internet usage, based on their experience and feelings, have carried out teaching activities using various computer software such as Canva and MS PowerPoint applications and have carried out activities through Internet access using Google search engines and YouTube video applications. These findings are in line with [Eliasson, Peterson, & Lantz-Andersson \(2023\)](#) that goal-oriented activities allow a game-oriented approach, and intersubjectivity on technology has been created in relation to four of the five dimensions of technology. These findings are also in line with Bay's ([Bay, 2022](#)) that preschool educators are proficient in web-based technologies and use smartphone apps.

We have found that the use of technology for teaching and learning has many advantages. However, the use of technology for teaching and learning also has its disadvantages. Consider the TikTok application as an example. Among the drawbacks of preschool educators to teaching aids using the TikTok app is that it can be a major distraction. Preschool educators may spend hours on that application. Additionally, a lot of content on TikTok is inappropriate for preschoolers, such as

explicit language and violence ([Learning Space, 2024](#)). While the drawbacks in terms of the use of Google's search engine are that it can be costly and technical issues arise, such as a faulty Internet connection that can disrupt teaching and learning ([Educatly, 2023](#)).

5.3. Implication

The data of this study contribute to a clearer understanding of educator behavior when using technology for teaching and learning. Additionally, the study's findings offer a comprehensive and detailed understanding of the activity's educators engage in when using technology for teaching and learning preschool students. In addition, the findings of this study are consistent with existing knowledge. The way it fits with existing knowledge lies in the finding that almost all preschool educators have demonstrated their perceptual behavior in searching for teaching ideas or aids via the Internet. Also, almost all preschool educators exhibit emotional behaviors while implementing a play-through learning approach.

In addition, almost all preschool educators have demonstrated their emotional behavior in encouraging pupils to share experiences. This aligns with the existing knowledge of previous researchers, who have stated that preschool educators' experiences and feelings are shaped by their beliefs about technology use, the significance of the sociocultural context in this use, their perception of technology use, their awareness of the value and use of technological tools, and their attitudes towards technology.

Furthermore, the findings of this study contribute to the body of knowledge, which is to meet the needs of the scientific community in the areas of specialization in preschool education and educational technology. The circumstances in which it can contribute to a change in response involve findings that indicate most preschool educators, drawing on their experience and feelings, have conducted teaching activities utilizing computers, televisions, and LCD projectors. It can contribute to a change in the response of preschool educators when educators try to create activities, such as the recommendations of previous researchers who stated that the experience of preschool educators when using technology for teaching and learning is in terms of goal-oriented activities by allowing for game-oriented approaches, web-based activities, activities using smartphone applications, etc. The activities include instructional illustration, visual insight gathering, and interactive technology-based activities.

5.4. Limitations

This research does have its limitations. Several possibilities limit the generalizability of this study's findings. Among them, limitations may be due to the design of this research, in which study participants find it difficult to narrate their experiences but prefer to give insights. The limitation may also be due to the small sample size. Furthermore, limitations may arise from the time-consuming and difficult work of collecting and analyzing data. Also, limitations may be due to

studies' findings that require interpretation without bias by researchers. Finally, limitations may exist because these studies do not produce easily generalizable data.

5.5. Recommendations

Based on the discussion of the findings of this study, we made some recommendations for practical implementation or further research. First, the proposal is to consider the implications of the study's findings for theory and practice. Based on this conclusion, preschool educators should consider the statements from previous researchers who stated that the frequency and quality of the use of technology and media in the preschool classroom are influenced by the beliefs, knowledge, and attitudes of the educators themselves. Second, it is proposed to conduct future studies to understand the implications of these findings. Future studies should take into account research methods, study locations, and study participants. Finally, a proposal to conduct further research. The impact of technology use on preschool student achievement requires further research. Recommendations for future studies and further research are to confirm, build, and enrich the findings and conclusions of these studies.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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