

Integration of ICT in Preschools: Teachers' Beliefs and Perceptions

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Abstract

In this fast-paced digital world, ECE teachers are moving away from conventional methods and embracing technology to ensure that young children have the skills and knowledge needed for the 21st century. This qualitative research, conducted through convenient sampling, aims to explore preschool teachers' perceptions and ICT usage. The data collected were analysed using a coding method aligned with the determinants of the Unified Theory of Acceptance and Use of Technology (UTAUT) model. Beyond the perceptions and beliefs of preschool teachers, this analysis provided insights into the core aspects of the UTAUT model: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) highlighting their significant influence in effective technology adoption and utilisation in preschool classrooms. In this study, moderating variables such as the teachers' age and teaching experience impact the teachers' beliefs and perceptions towards ICT integration. Hence, the main goal of this research is to determine the significance of teachers' beliefs and perceptions in integrating Information and Communication Technology (ICT) in preschool education. Preschool teachers' beliefs regarding technology can affect how young learners interact with and benefit from digital tools. As policymakers, parents, and educators recognise the importance of embracing and investing in ICT tools in ECE, this study's insights can help better understand the growth and potential of technology in nurturing young children's development. The findings provide valuable guidance to policymakers to integrate new ICT tools that complement ECE teaching and learning rather than disrupting the existing educational practices. The study contributes to understanding preschool teachers' acceptance of ICT and offers practical recommendations for stakeholders to facilitate more effective technology integration.

Keywords: Unified Theory of Acceptance and Use of Technology (UTAUT), Information and Communication Technology (ICT), Early Childhood Education (ECE)

Introduction

Information and Communication Technology (ICT) in ECE is widely acknowledged for enhancing teaching and learning. However, numerous studies indicated that the integration of ICT in preschool teaching and learning is moderate to low (Kamaruddin et al., 2017; Mamat et al., 2020). While ICT tools can alleviate certain challenges, the pedagogy shift and barriers associated with ICT integration in preschool settings remain significant. Factors such as protective measures, adult supervision of technology usage, harmful applications of technology, training opportunities, and the support received all influence the implementation of ICT in educational settings (OECD, 2021). Without adequate understanding and support of ICT tools in ECE, inappropriate usage, reluctance to use the tools, and ineffective implementation may occur (Kaur & Kaur, 2023).

Therefore, it is crucial to explore preschool educators' beliefs and perceptions on the role of ICT in supporting teaching effectiveness and learning in young children. Additionally, it is essential to understand preschool teachers' behavioural intentions and actual usage of ICT, the challenges they encounter during implementation, and the influence of training and support on their practices. Five preschool teachers based in Penang between the ages of 25 and 80 were interviewed using a questionnaire containing 15 questions to explore their perspectives and beliefs in ICT integration in a preschool setting. The research will assess the preschool teachers' beliefs and perspectives of ICT integration based on their perceived Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Self-efficacy, Anxiety, which led to their Behavioural Intention and Actual ICT Usage. The teachers' age is considered a contributing variable to ICT implementation in preschool settings.

While the convenient sampling is practical to fulfil the purpose of this study by the collection of detailed, narrative data, it is important to note that the use of convenient sampling may lack generalisability to a broader population, since participants are not selected randomly, the results may not accurately represent the larger population. Additionally, convenient sampling can introduce potential bias as the study depended on the voluntary participation of accessible educators. The respondents who chose to participate might have differing perspectives, attitudes, and experiences from those who do not. The results obtained via convenient sampling may be skewed toward individuals who are more readily accessible, leading to distorted conclusions. Moreover, the limited diversity of participants, often resulting from an emphasis on convenience over specific demographic characteristics, can hinder the richness of the data collected.

Furthermore, the theoretical framework used in this study, UTAUT, has a limitation in its inflexibility in combining constructs, as the IS discipline has discovered new and more complex ways users can act and react. This is due to the connection between facilitating conditions (FC) and behavioural intentions (BI) requires further investigation, as many studies identify this relationship as significant, which contrasts with the original structure of the UTAUT model (Venkatesh et al., 2012). The UTAUT theoretical framework has several limitations, including reliance on self-reported usage data, focus on a single community or organization, cultural and national constraints, measurement at only one point in time (lacking longitudinal studies), challenges in generalizing findings, and small sample sizes (Dwivedi et al., 2011).

Despite these limitations, this study seeks to fill the literature gap, offering insights to inform educational policies and practices, benefiting preschool teachers' professional development, and educational outcomes.

Research Objectives

This research aims to explore the impact of performance expectancy on preschool teachers' integration of ICT in their teaching practices, investigate the challenges contributing to ICT integration in preschool settings and to analyse how effort expectancy, social influence, and facilitating conditions affect preschool teachers' behavioural intentions and actual use towards the use of ICT.

Research Questions

Three research questions were formulated to guide this qualitative research:

1. How does performance expectancy affect preschool teachers' integration of ICT in their teaching practices?
2. What are the challenges contributing to varying levels of ICT integration in different preschool settings?
3. In what ways do effort expectancy, social influence, and facilitating conditions shape preschool teachers' behavioural intentions and actual use towards the use of ICT in their classrooms?

Literature Review

ICT introduced a new educational landscape and teaching methods, transforming the traditional teacher-student relationship and enhancing the quality of education (Toki & Pange, 2012). Tablets are preferred over computers because they are easier to navigate. Yang and Dong's (2024) study depicted that language and numeracy activities are more suitable for ICT implementation than social teaching and well-being activities, such as physical education. ICT tools are seen not merely as supportive tools but as essential components for delivering content-specific instruction, such as introducing a poem or teaching a specific number in China's kindergarten (Liu et al., 2014).

A digital story is a combination of traditional storytelling with digital technologies, creating a narrative on screen using audio, video, images, and text, helping individuals rediscover the art of listening to one another and sharing personal experiences (Pandian et al., 2020). Utilising digital storytelling within an educational setting can widen participation, enabling students to break free from the typical constraints of the curriculum. This approach fosters stronger relationships between educators and students, resulting in a positive transformation in classroom dynamics, enhanced student motivation and engagement in learning activities (Staley and Freeman, 2017). It can help promote learners' engagement in the writing process, especially students who may be reluctant or struggling readers and writers (Samuel, 2023).

A Learning Management System (LMS) is a web-based application designed to manage and deliver e-learning content. With an LMS, educators can create online course sites, providing students access to learning materials necessary for their instruction (Cole & Foster, 2007). This learning platform benefits the children's learning, enhances the communication and collaboration between teachers and parents. LMS allows parents to access real-time updates of their child's learning journey, messaging and chat options with the teachers and school administrators, educational resources, and access to the school's notifications and events at

their convenience. Mobile and technological learning use game elements to encourage desired behaviours and achieve learning objectives called gamification and game-based learning (Zainuddin et al, 2020). Groening and Binnewies (2019) claimed that the efficacy of digital games in education has enhanced learners' motivation, engagement, and social influence, giving students the space to engage in experiential learning.

Challenges of ICT Integration in ECE

Regardless of a teacher's competence, the success of ICT policies in schools also depends on external factors, which include access to training opportunities along with demonstrations of technology applications and hands-on practice, availability of technical support, infrastructure quality, school policies, and leadership (Ertmer, 1999). Also top of mind were concerns about how well the children can focus, their hands-on learning experience, and cyber safety (Nikolopoulou, 2021). Additionally, internal factors as the teacher's ICT competence, belief systems, and teaching philosophies can also impact policy success (Ertmer, 1999). Zainal and Zainuddin (2020) found that internal factors within schools' first-order barriers include the teachers' and administration's attitude, management support, availability of school resources, teachers' time, and workload. Whereas the external barriers outside of the school context comprise the support of educational authorities, including the Ministry of Education, responsible for providing technical assistance, resources, strategies, policies, maintenance, and the operation of training and continuing professional development programs. Other barriers include lack of confidence, experience, motivation, and positive attitude to work with ICT (Hennesy et al., 2005). De Smet et al. (2012) reported that when teachers are willing to use ICT tools, they can integrate them better into their teaching as they are confident in their educational benefits. Al Mulhim (2013) reported that the lack of training the teachers have received is reflected in their lack of knowledge about ICT and technological skills, resulting in low utilisation.

According to Hennesy et al. (2005), the use of ICT in ECE for children as young as 3 years old to be exposed to technologies has raised some serious concerns amongst the preschool teachers which led to the reluctance of ICT implementation in their teaching practices: Some teachers still prefer physical books and are worried that relying too much on ICT could hinder the development of important basic skills significant for young children (Kaur & Kaur, 2023). Students risk losing essential skills like handwriting and basic math because of their increasing reliance on calculators, which can also lead to decreased ability to manually process readings and measurements. The accessibility and technical support available to teachers play a crucial role in their ability to effectively integrate ICT into their teaching practices. Nadzirah Saimi & Yamat's (2021) research proved that non-functional technical support and resources resulted in the low ICT competency.

Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model by Venkatesh et al. (2003) identifies four key factors influencing user acceptance: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). PE reflects the belief that using the system enhances job performance and EE indicates ease of use (Venkatesh et al., 2003), Social influence leads to the adoption of new technologies primarily to meet external expectations rather than personal aspirations (Venkatesh & Davis, 2000) FC relates to the availability of support pertaining organisational and technical infrastructure for system use (Venkatesh et al., 2003).

The model also considers moderating variables of behavioural intentions like gender, age, voluntariness, and experience (Venkatesh et al., 2003). The UTAUT model takes a comprehensive view of antecedents to the integration of ICT in preschool settings in Malaysia, which includes the use of hardware, software, online services, web-based services, intranet, and internet-based applications currently available.

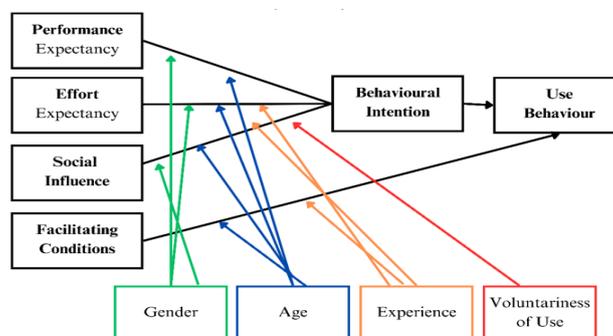


Illustration 1: The Unified Theory of Acceptance and Use of Technology (UTAUT)

Methodology

Research Design

This study employs a qualitative research approach, utilising semi-structured interviews to gather in-depth insights into preschool teachers' perceptions and experiences regarding technology integration in early childhood education. This study explores the ease of use associated with ICT tools for preschool teachers. This study uses convenience sampling to interview preschool teachers, which allows efficient data collection within a limited time and resources.

Research Instrumentation and Sampling

A semi-structured interview guide was developed in this study to ensure consistency across interviews while allowing flexibility for participants to express their views freely. The interview questions are based on the UTAUT model which examines preschool teachers' perception and beliefs about the Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Behavioural Intention (BI), Actual Usage (AU), Self-efficacy (SE), and Anxiety (A) towards the integration of ICT. The interview investigates the teachers' experiences, gender, age, and voluntariness of ICT use. The preschool teachers' Experience level is determined based on their years of teaching. Each interview lasted 45 to 60 minutes and was audio-recorded with the participants' consent for accurate data collection. Table 1.0 summarises the demographics of the preschool teachers participating in the study, including preschool teachers of different ages, teaching experiences, and types of preschools.

Table 1

Demographic Profile of Teachers

Teacher	Gender	Age	Years of Teaching Experience	Type of Preschool
A	Female	38	15	Private
B	Female	28	7	Private
C	Female	27	6	Private
D	Female	38	10	Private
E	Female	73	20	Private

Data Analysis

Data were collected through interviews using a convenience sampling to avoid selection bias. The researcher interpreted the data, analysed it against the transcripts to validate the contents. Key aspects were identified, and conclusions were drawn. For each research question, themes were extracted for further discussion. Cloutier and Ravasi (2021) noted that tables enhance the trustworthiness of qualitative research by organising and condensing data, enabling analysis from multiple perspectives. The findings of this qualitative study are interpreted by the “determinants” extracted from the statements of the preschool teachers.

Findings

The findings from the qualitative data are presented and discussed under **three** themes which respond to each research question.

Research Question 1

How does performance expectancy affect preschool teachers' integration of ICT in their teaching practices?

Theme 1

Preschool teachers' perceptions and beliefs towards the effectiveness of ICT in ECCE

Table 4.1

Positive and Negative Perceptions of Preschool Teachers on the Use of ICT tools that Enhance Teaching Effectiveness

Positive Perceptions of Preschool Teachers on the Use of ICT tools that Enhance Teaching Effectiveness			
Determinants	Teacher's statements	Total Responses	Percentage (%)
Learners' Engagement	<i>"ICT tools draw students' attention to learning." "ICT tools make lessons more interactive, engaging, and accessible."</i>	2	40
Enables Interactive Lessons	<i>"The use of simultaneous videos and applications in teaching are more attractive and effective." "Easier to teach with ICT, more fun, interactive"</i>	2	40
Tracking students' Progress and Providing Feedback	<i>"ICT allows easy tracking of student progress and offers immediate feedback, enabling me to tailor my teaching based on individual needs."</i>	1	20
Flexibility and Accessibility	<i>"Tools like virtual classrooms and educational apps provide flexibility, making learning more accessible outside the traditional classroom."</i>	1	20
Simplify complex topics for better comprehension	<i>"Tools like multimedia presentations, simulations, and online resources help explain complex topics cater to different learning styles and encourage active participation. "</i>	1	20
Facilitates Communications	<i>"These interactive tools facilitate the communication between teacher and students."</i>	1	20
Negative Perceptions of Preschool Teachers on the Use of ICT tools that Enhance Teaching Effectiveness			
Lack of motor skills development and social interactions	<i>"Prefer hands-on for the kids to have more motor skills and interaction."</i>	2	40

Table 4.2

Positive Perceptions of Preschool Teachers on the Use of ICT tools that Enhance Learners' Engagement

Positive Perceptions of Preschool Teachers on the Use of ICT tools that Enhance Learners' Engagement			
Determinants	Teacher's statements	Total Responses	Percentage (%)
Learners' Engagement	<i>"Students engage in a game or activity while learning through educational multimedia." "The vibrant colours and animations capture students' attention, especially this era."</i>	2	40
Enables Interactive Lessons	<i>"ICT tools can boost student engagement by making learning more interactive and visually appealing." "A variety of learning materials can be obtained via the Internet, which enables students to assess their learning through digital quizzes and games."</i>	2	40
Increased Motivation	<i>"ICT tools motivate students' learning."</i>	1	20
Fun learning and Accessibility	<i>"Tools like online quizzes, discussion boards, and interactive apps also encourage active participation and allow students to learn at their own pace."</i>	1	20
Connection to real-world information	<i>"ICT connects students to real-world information."</i>	1	20
Collaborative learning	<i>"ICT tools provide collaborative opportunities, making lessons more relevant." "The online platforms available enable physical interaction and students' participation."</i>	2	40
Negative Perceptions of Preschool Teachers on the Use of ICT tools that Enhance Learners' Engagement			
Attention Span Concerns	<i>"Students might not be paying attention fully when we use multimedia during the lesson."</i>	1	20

Research Question 2

What are the challenges contributing to the integration of ICT in preschool settings?

Theme 2

Challenges and Barriers of ICT integration in preschool classrooms

Table 4.3

Positive and Negative Perceptions of Preschool Teachers Anxiety Levels on the Use of ICT tools

Positive Perceptions of Preschool Teachers' Anxiety Levels on the Use of ICT tools			
Determinants	Teacher's statements	Total Responses	Percentage (%)
Comfortable with ICT use	<i>"I am quite comfortable using ICT tools in my teaching."</i>	2	40
Encouragement of Peer Collaboration	<i>"I feel less anxious when using ICT with a tech-savvy colleague."</i>	1	20
Negative Perceptions of Preschool Teachers on the Use of ICT tools on Anxiety Levels			
Technical issues	<i>"I am anxious only when technical issues arise."</i>	1	20
Time for Adaptation	<i>"It takes time to implement technology in teaching"</i>	1	20
Administrative stress	<i>"At the initial stage, it was stressful to navigate the management system, especially with government-related platforms and new software." "It is stressful when systems are laggy at times, which disrupts the workflow we need to meet certain requirements."</i>	2	40
Training and Tutorials Needed	<i>"Anxiety often comes from the fear of technical issues or not understanding the tool's usage. Additional training, reliable support, and guide for troubleshooting common problems could also reduce stress." "Video tutorial or physical onboarding training process when introducing a new system or software"</i>	2	40

Table 4.4

Positive and Negative Perceptions of Preschool Teachers on the Level of Self-Efficacy on the Use of ICT tools

Positive Perceptions of Preschool Teachers on the Level of Self-Efficacy on the Use of ICT tools			
Determinants	Teacher's statements	Total Responses	Percentage (%)
Resource Utilisation	<i>"Use online resources and guides to find solutions for the technical issues when needed and reach out for support if the issue is more complex."</i>	1	20
Ability to troubleshoot Technical Issues	<i>"Confident in my ability to troubleshoot common issues with ICT tools. I have some experience in identifying the cause of a technical issue for both my colleague and me." "I would rate 8/10 in troubleshooting technical issues. I would usually be able to deal with USB and wiring connectivity issues, starting up the computer and software."</i>	2	40
Negative Perceptions of Preschool Teachers on the Level of Self-Efficacy on the Use of ICT tools			
Inability to troubleshoot Technical Issues	<i>"Not confident in troubleshooting ICT issues by myself. Need guidance for the first few times to identify and fix the problem." "Sometimes I have problem with the Internet connection or have problems using the computer software." "We encountered various technical issues, such as internet connectivity problems and software malfunctions, which hindered our ability to conduct classes effectively online. My older colleagues usually have a tough time resolving these technical issues."</i>	3	60

Research Question 3

In what ways do **effort expectancy (EE)**, **social influence (SI)** and **facilitating conditions (FC)** shape preschool teachers' behavioural intentions and actual use towards the use of ICT?

Theme 3

Support systems in place for effective ICT integration in preschool classrooms

Table 4.5

Positive and Negative Perceptions on Effort Expectancy that shapes Preschool Teachers' Behavioural Intentions towards the Use of ICT

Positive Perceptions on Effort Expectancy that shapes Preschool Teachers' Behavioural Intentions towards the Use of ICT			
Determinants	Teacher's statements	Total Responses	Percentage (%)
Integration with other ICT Tools	<i>"Several ICT tools with a variety of functions integrated, like presentation and quizzes, help the kids to have better understanding of their learning."</i>	1	20
Ease of Use	<i>"The educational multimedia allows teachers to accomplish their teaching tasks or goals with minimal frustration. Some can be used without an internet connection." "The ICT tools provided are user-friendly, with simple interfaces and clear instructions that make them easy to use. Many tools offer tutorials or help features, so even those less familiar with technology can quickly get started. "Most ICT Tools for teaching and lesson planning are simple and quite straightforward for use, easing my workload and teaching experience."</i>	3	60
Negative Perceptions on Effort Expectancy that shapes Preschool Teachers' Behavioural Intentions towards the Use of ICT			
Difficulties using ICT tools	<i>"A few tools could be improved in terms of accessibility and ease of navigation." "I often have difficulty using the educational software that comes with the curriculum." "Sometimes the Internet connection and old PC can cause slow loading pages and buffering videos, which can be quite frustrating and might disrupt the flow of lesson."</i>	3	60

Table 4.6

Positive and Negative Perceptions on Social Influence that shapes Preschool Teachers' Behavioural Intentions towards the Use of ICT

Positive Perceptions on Social Influence that shapes Preschool Teachers' Behavioural Intentions towards the Use of ICT			
Determinants	Teacher's statements	Total Responses	Percentage (%)
Peer acceptance motivates ICT Usage	<p><i>"If I see that a new technology is widely accepted in my field or by my team, it reassures me of its value."</i></p> <p><i>"Seeing colleagues use technology effectively inspires me to try similar approaches."</i></p> <p><i>"If I see my colleagues using new technology helpful for my teaching, I am willing to learn and adopt."</i></p>	3	60
Leadership Support	<p><i>"The encouragement of school leadership on ICT integration through training, resources, and support motivates me to use these tools more confidently."</i></p>	3	60
Collaborative Learning of ICT Use	<p><i>"My colleagues and I often share tips and experiences. Their encouragement and the collaborative culture make it easier to explore new methods with ICT."</i></p> <p><i>"The sharing of information and experiences on using educational multimedia between colleagues motivates me to use ICT."</i></p>	2	40
Negative Perceptions on Social Influence that shapes Preschool Teachers' Behavioural Intentions towards the Use of ICT			
Independent from Peer Influence	<p><i>"I am not influenced by my colleagues. Only if the situation demands ICT use such as during the Covid-19 pandemic."</i></p> <p><i>"Since I am not a tech-savvy person, I would only use ICT only if I am required to."</i></p>	2	40

Table 4.7

Positive and Negative Perceptions on Facilitating Conditions that shapes Preschool Teachers' Behavioural Intentions towards the Use of ICT

Determinants	Teacher's statements	Total Responses	Percentage (%)
Professional Development Provided	<p><i>"The school sends teachers for training to acquire knowledge and skills on using educational multimedia in teaching."</i></p> <p><i>"I have attended trainings for new classroom presentation software."</i></p> <p><i>"The school provides training to use specific software related to the curriculum, presentation software such as PowerPoint."</i></p>	3	60
Reliable Infrastructure Provided	<p><i>"Computers and PCs are provided."</i></p> <p><i>"Basic technical support is accessible, and most equipment functions well."</i></p> <p><i>"Sufficient for my use. We share tv and ICT device in a common space."</i></p>	3	60
Collaborative Workplace Environment	<p><i>"As an older teacher, I deeply appreciate it when the school implemented a buddy system to facilitate learning how to use the ICT tools and preparing lessons using ICT tools."</i></p>	1	20
Negative Perceptions on Facilitating Conditions that shapes Preschool Teachers' Behavioural Intentions towards the Use of ICT			
Areas of Professional training and technical support required	<p><i>"Proper training on the basics, technological teaching tools, interactive apps and learning platforms from professionals can be very helpful."</i></p> <p><i>"Most of my ICT skills are self-acquired and through self-discovery. It will be helpful for teachers to receive training and hands-on workshops."</i></p> <p><i>"I do need to explore on my own to integrate certain new technology and software in my teaching and planning."</i></p>	3	60
Unreliable Infrastructure	<p><i>"Connectivity issues, outdated devices can disrupt lessons. Having consistent access to reliable internet and up-to-date technology would make a big difference."</i></p> <p><i>"Certain software and systems need to be updated, along with the stabilisation of Internet connectivity."</i></p> <p><i>"There are no ICT facilities provided at my current workplace."</i></p> <p><i>"Due to the limited devices provided in the classroom hinders opportunity for students to participate in ICT integrated learning activities, like online quizzes at the same time."</i></p>	4	80
Limited Lesson Time	<p><i>"The lesson duration is limited. ICT usage time is shortened to ensure students have enough time to complete their activity books."</i></p>	1	20

Table 4.8

Positive and Negative Comments on Preschool Teachers' Behavioural Intentions towards the Use of ICT

Positive Comments on Preschool Teachers' Behavioural Intentions towards the Use of ICT			
Determinants	Teacher's statements	Total Responses	Percentage (%)
Use ICT in the classroom/ Voluntariness of ICT Use	<i>"The trend of integrating technology in education is evident." "I seek to use more efficiency ICT tools for my future teaching." "I am very likely to continue using ICT tools in my teaching." "I use ICT in my teaching and lesson planning daily."</i>	4	80
Ease of Use	<i>"Some ICT tools are user-friendly and easy to use. Makes teaching easier." "New technologies bring convenience to the classroom." "I am willing to adopt new technologies if they make my work more efficient or improve the quality of my results. I am also motivated when the technology is user-friendly and backed by good support or training resources."</i>	3	60
Maximise learning goals	<i>"ICT tools help to increase students' engagement, maximize lesson outcome, and ensure lesson objective achievement."</i>	1	20
Alignment with Long-term Goals	<i>"If technologies can align with my long-term goals and contribute to my career, I will adopt them in my classroom."</i>	1	20
Negative Comments on Preschool Teachers' Behavioural Intentions towards the Use of ICT			
Unlikely to use ICT tools	<i>"I use ICT if required by the school because I prefer hands-on experimentations and traditional teaching with whiteboard and workbooks."</i>	1	20

Table 4.9

Preschool Teachers Actual Use of ICT in Classrooms

Preschool Teachers Actual Use of ICT in Classrooms			
Determinants	Teacher's statements	Total Responses	Percentage (%)
Daily/ Weekly	<i>"I use ICT tools around 3 times a week." "I use ICT in my class daily." "I incorporate ICT in my lessons several times a week."</i>	3	60
Once every few weeks	<i>"Once or twice a month."</i>	1	20
Once every few months	<i>"Almost none. Once in a few months to watch a video."</i>	1	20
Most frequently used ICT Tools	<i>"Computer for lesson preparation, designing teaching aids, games for students, finding videos and songs for children." "Accessing software applications, educational videos, games, Wordwall for quizzes, digital flashcards, animations, PowerPoint, and YouTube for songs." "Smart TV to show students some videos related to the lesson on YouTube"</i>	Not Applicable	Not Applicable

Discussion

In response to Performance Expectancy (PE) 40% of teachers believe that ICT tools increase learners' engagement and enable interactive lessons; 20% of teachers believe that ICT enhances teaching efficiency by tracking students' progress and provides immediate feedback. Overall, 60% of teachers recognise the benefits of ICT tools in their teaching practice based on their perceived usefulness towards learners' engagement, teaching efficiency and effectiveness. The experienced teachers (40 %) believed that the ICT tool lacks the development of motor skills and social interactions. This group of teachers aged between 38- 72 years old, prefer traditional teaching and hands-on approach as compared to digital learning. However, the perceived lack of motor skills development and reduced opportunities for social interaction point to a need for balanced integration strategies. Teachers can opt to combine the use of digital resources with hands-on activities and collaborative activities in their lessons to ensure holistic development.

In response student engagement, 40% of the of preschool teachers believe that ICT tools enhance learners' engagement, facilitate interactive lessons, and promote collaborative learning; 20% of preschool educators have observed an increase in motivation among students, highlighting the potential of ICT tools to make learning enjoyable and accessible, while also helping learners to connect with real-world information. Digital interactive learning activities can easily capture children's attention and interest, resulting in learners' active participation and facilitating learning throughout the process. Conversely, 20% of the teachers express concerns regarding students' attention spans and disruptions towards students' learning caused by ICT.

The findings indicate that younger teachers recognise the improved learning outcomes, specifically in students' engagement. As we transitioned into a technology-driven society

where automation is in play, it is crucial to equip future generations to be digitally literate from young (Abdul Wahab et al., 2020). Despite the high apprehension of Performance Expectancy in learners' engagement, teachers of the older age groups are concerned of the constant screen time may reduce focus, hinder critical thinking and problem-solving skills. Research indicates that despite having positive perspectives towards the use of ICT into early childhood education, this does not always translate into a high degree of ICT integration (Hammed, 2014; Rafiq, 2023). One of the issues identified by several studies related to preschool teachers is the anxiety and the belief in their capacity to integrate technology into their classrooms which is referred as self-efficacy (Waddington, 2023). Wagner (2020) proves that the weekly small group teacher inquiry program enhanced collaborative learning as the teachers are provided opportunity to share their perspectives and reflect on their teaching practices. They highlighted the importance of having access to technical resources and support to reduce teachers' anxiety and stress; enabling hands-on experience in learning new technologies and tools to increase proficiency of use at their own pace would increase teachers' confidence and motivation for ICT adoption. The findings suggest that teachers should be better prepared and equipped with the necessary skills and knowledge to effectively integrate technology into their teaching practices, which would also benefit their students while enhancing their learning experiences. A concerning 60% of preschool teachers struggle with troubleshooting technical issues, particularly emphasising difficulties with Internet connectivity. The lack of adequate functioning ICT tools, such as computers and the Internet, could induce anxiety in teachers as they may struggle to facilitate student learning. 40% of the preschool teachers in this study reported to be less anxious when teamed up with a colleague when implementing ICT in their lessons.

Theme 3 seeks to understand how effort expectancy, social influence and facilitating conditions impact technology integration and shape teachers' intentions and behaviours when it comes to using ICT in their classrooms. 20% believe that the integration of ICT tools enables the creation of interactive and more engaging teaching materials, like presentations and quizzes, which will help their students have a better understanding of complex concepts. Conversely, 60% of teachers reported difficulties when using ICT tools which affects their intentions toward ICT integration. It is noted that some ICT tools may have minor limitations in terms of accessibility and navigation and require improvements to enhance user experience. User-friendly technology can help teachers create engaging, interactive activities that capture children's attention and promote active learning.

The findings reveal how Social Influence (SI) impacts preschool teachers' behavioural intentions toward ICT usage. This study revealed positive factors of SI include peer acceptance motivating ICT usage (60%), teachers' collaborative learning (TCL) of ICT use (40%), and leadership support (20%). These findings reveal that the teacher's willingness to adopt new technologies is directly tied to their perception of their colleagues' opinions and behaviour. Educators may need support and encouragement from their peers to feel comfortable trying out new technologies, especially if they are not familiar with them (Liu et al., 2023). 40% of the teachers find that Teacher Collaborative Learning (TCL) directly influences the teacher's behaviour and perceptions towards ICT integration. Having to grow up in a digital age, younger teachers are more comfortable experimenting with new tools and integrating them into their teaching practices. Additionally, they recognised the potential of technology to facilitate personalised learning experiences that can accommodate different learning styles

and paces. In contrast, negative perceptions among preschool teachers aged 50 years and above, reflect that 40% of teachers are independent from peer influenced and not motivated by their colleagues to use ICT tools, stating that they only engage with ICT, when necessary, such as during the Covid-19 pandemic or specific requirements by the school.

60% of teachers indicate that professional development and the provision of reliable infrastructure in place such as computers, Internet access, and other devices, is a significant motivator that supports their ICT usage. 20% of the preschool teachers expressed their willingness to use ICT in a collaborative workplace environment. The school's provision of training to use specific software related to the curriculum, such as PowerPoint, further reinforces a positive FC. The study reveals that 20% of the respondents face a constraint on lesson duration, which restricts the amount of time available for ICT usage, leading to a compromise on activity completion due to the need to allocate sufficient time for other aspects of the lesson. Mertala's (2019) study indicated teachers are concerned that the increased use of technology in educational institutions will lead to excessive screen time for students as they already spend a significant amount of time using technology at home.

Finally, this study revealed the actual use of ICT among preschool teachers with notable patterns in ICT use frequency that correspond to teacher demographics. 60% of preschool teachers, specifically the group aged 20 to 40, reported integrating ICT in their teaching practices daily or weekly. In contrast, 20% of teachers use ICT only once every few weeks, and another 20% integrate ICT just once every few months, indicating a significant divide in technology adoption. This significant difference suggests that younger preschool teachers have stronger inclination towards integrating technology into their teaching practices, while the teachers above 50 years old suggest a varying level of comfort and confidence in the implementation of ICT in preschool settings.

Future Recommendation

Based on the findings, future recommendations should focus on ongoing support, training, and reliable resources to facilitate effective technology integration in ECCE. Educators must recognise the importance of being self-equipped with computational skills and digitally literate to empower future generations and young learners. With this, educators can ensure that students are prepared to meet the challenges and opportunities of the 21st century. More innovative strategies, personalized training, user-friendly tools, on-site technical support, flexible lesson planning, reliable infrastructure, stable internet, updated software, and adequate devices are essential to reduce technical barriers and teacher anxiety. Future research could investigate how integrating digital tools affects developmental domains in young children and which type of training is most effective in building confidence and skills among early childhood educators, especially older or less tech-savvy teachers.

Conclusion

As technology advances, it is essential to explore how traditional educational approaches adapt to or resist the integration of digital tools and media within early childhood education (ECE) settings. Results show that younger teachers have integrated the proposed technologies into their practices, while older teachers used few to none in their classroom. Findings show a strong correlation between the behavioural intention to use ICT influenced by the key factors (i.e., Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI),

Facilitating Conditions (FC), Self-efficacy, and Anxiety), moderating variables (i.e., age, experience, voluntariness of use), and the actual use of ICT in the classroom. The intention of use may be attributed to their familiarity with digital tools, as well as their awareness of the future needs of both society and the education field. Moreover, Behavioural intention (BI) of ICT integration is complemented by fostering a positive attitude among preschool teachers. This indicates that teachers confident in using the relevant technologies are likely to use technology in their classrooms. Other facilitating conditions and support from the institutions pose a determinant of whether teachers will integrate technology into teaching.

On the other hand, Ng & Gunstone (2003) reported that even though most of the teachers had favourable attitudes regarding ICT in education, ICT was not used frequently in their practices, which signifies the possibility of other pertinent factors that hinder the use of ICT. The findings coincide with the results of this study, as it indicated that although teachers may acknowledge the potential benefits of using ICT, there could be various reasons that led to the reluctance or infrequent use of ICT in their teaching practices. Internal and external factors that can hinder the success of the integration of ICT must be addressed. This study has deepened our understanding of the perceptions and beliefs of preschool teachers on ICT integration based on their personal experience and insights to enhance the development of strategies to improve ICT integration in early childhood education.

Contributions of This Study

As educators are the key agents for change, their beliefs, and perceptions of ICT usage in preschools influence the success or failure of ICT initiatives. Thus, school leaders, curriculum developers, and policymakers can design differentiated professional 21st-century skills and digital reforms for diverse teachers to empower the educators to reflect on their own beliefs and overcome the challenges faced from ICT usage. This will enable teachers to use digital tools effectively and bridge the gap between their positive and negative perceptions and the classroom practices.

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