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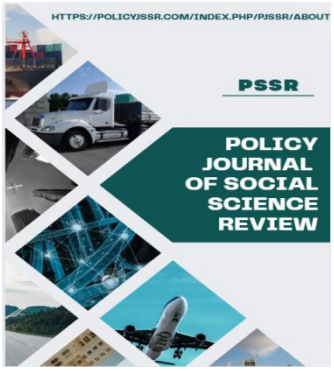

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AVAILABILITY AND USAGE OF ICT RESOURCES IN EARLY CHILDHOOD EDUCATION CLASSROOMS

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ABSTRACT

Information and Communication Technology (ICT) has rapidly emerged as one of the most effective tools in the education of young learners. Integration and usefulness of ICT in Early Childhood Education (ECE) is a researchable area as School Education Departments Pakistan are in the process of revamping their ECE programs in accordance with international standards. It has been found essential to investigate the status and use of ICT resources in ECE classrooms, as well as the demographic profile of the sample in terms of gender, age, educational qualification, teaching experience, ICT-related training, knowledge of ICT, technical skills, use of ICT in the classroom, age groups of children taught and the school sector. The study was quantitative in nature. 200 ECE teachers of 50 schools of Lahore city were selected as sample for data collection through random sampling technique. An adapted survey questionnaire was used and descriptive statistics were employed for data analysis. Findings revealed that television was the most available ICT resource, whereas video recorders were the least available in ECE classrooms. Young learners' usage time of music and movement tools has been found to be the highest, whereas playing games on computers has shown the least usage time. The sample was predominantly female, relatively young, highly educated, and moderately experienced, with most having received professional training and demonstrating adequate ICT awareness and usage. Respondents mainly taught early preschool children (3-4 years), and were largely from private pre-schools. It has been recommended that continuous professional teachers training targeting integration of ICT into ECE teaching is essential. Funds should be allocated to ensure availability of required ICT resources for positive and effective early childhood education learning and development outcomes.

Keywords: *Early Childhood Education (ECE), ECE classrooms, ECE learners, Information and Communication Technology (ICT), ICT resources*

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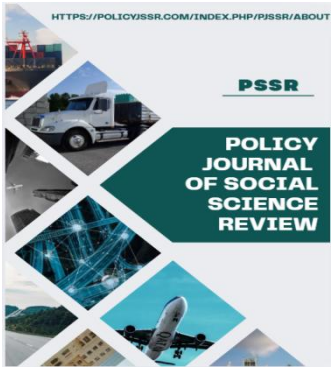

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Introduction

Information and Communication Technology *(ICT)* refers to anything that uses electronic or digital equipment to supply information, facilitate communication among people, or have an impact on the environment (Rekha, 2022). ICT tools comprise a wide range of equipment and resources, including programmable toys, virtual platforms, websites, digital cameras, video cameras, the internet, and telecommunications tools (Adebanjo & Rasheed, 2021; Rafiq et al., 2024). These tools may be utilized in preschools to enhance the teaching and learning process and spice up the curriculum.

Technology already has an impact on the people and surroundings that surround young children's development in some manner. ICT is increasingly being employed on a worldwide scale as a means of communication and engagement in the physical and social environment that young children inhabit. It has shown some negative impact on most people's personal and professional life, whether they are parents, family members, caretakers, or early childhood educators according to few studies (Odegbo & Aina, 2020). Studies have repeatedly demonstrated that young children's early experiences are more likely to mirror and relate to their experiences in the larger world. ICT is important in early childhood education and ought to be incorporated into the preschool curriculum (Karanja, 2023).

The introduction and use of ICT in preschools, however, should be founded on a comprehensive grasp of the goals, procedures, and social environment of *Early Childhood Education* (Konca & Erden, 2021). ICT may play a number of roles in the activities, functions, and connections that kids and adults have in early childhood education settings.

Due to its potential to improve teaching and learning processes, *Information and Communication Technology (ICT)* integration in educational settings has recently attracted a lot of attention (Nikolopoulou, Akriotou, & Gialamas, 2019). The purpose of this study is to examine the current status of ICT and how its usage in Early Childhood Education *(ECE)* settings.

However, in the local contexts, educators are still unsure about the potential of ICT for early education, in particular, in a low-income country Pakistan. Due to a lack of ECE gadgets, as well as parents' and teachers' misinformed fears regarding the benefits and drawbacks of ICT usage at this age, Croatia and its non-EU neighboring nations lag behind in the adoption of ICT in early childhood education (Weber & Greiff, 2023)

Since the core of their job is face-to-face interactions and practical learning experiences, most educators, unlike the young children in their care, began using

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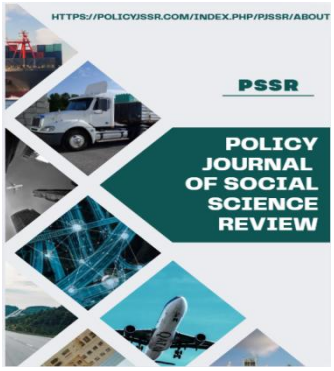

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ICT in their maturity and frequently exhibit reluctance to its usage in early childhood education (Leung & Choi, 2023). Technology that supports teaching and learning at all learning levels, from preschools to higher educational institutions, has replaced the traditional blackboard as the primary source of learning and teaching resources (Kerckaert, Vanderlinde, & Braak, 2015). As a result of the recent changes in the way that teaching and learning are done, younger learners are now being homeschooled. The years spent in preschool are among the most crucial and significant in a person's life (De Rose, 2015).

Any child's reading proficiency and comprehension rely on the training and upbringing the youngster receives (Lee & Hong, 2023). It is important for parents and guardians to spend more time and money on resources and tools that may help their children learn and succeed in their future academic and professional endeavors. In the past, learning and teaching took place in formal settings like schools, but as technology has advanced, children's learning styles have evolved (Agudo, 2010; Aldhilan et al., 2026).

Information and communication technologies have been increasingly popular and in demand in recent years, making them a necessary component of any educational system. This is because it can accommodate varied students' learning needs (Magen-Nagar & Firstater, 2019). It promotes learners' self-efficacy and resourcefulness. Additionally, it enhances the development of teachers' skills and opens doors for schools to be connected to the outside world as learning extends beyond the confines of the classroom (Xiao & Sun, 2022).

Majority of the studies found the lack of use of ICT as the primary teaching and learning tool in the early years of education. Policy and curriculum support for its development in the early childhood education sector need to be investigated (O'Hara, 2004; Sheridan & Samuelsson, 2003; Stephen & Ploughman, 2003). Some nations, including Scotland, have developed ICT techniques in recent years for use in early childhood education (Learning and Teaching Scotland, 2003b). Numerous academics, academicians, and practitioners have released books, articles, and guidelines that give information and recommendations regarding using ICT in early childhood education (Palomino, 2017). These works of literature aimed to assist educators and professionals in accessing materials that were developmentally appropriate (Aman & Muneer, 2023). Through different workshops, seminars, and conferences introducing school-sector ICT literature, teachers and practitioners may be given helpful instructions and conditions of using ICT in the early childhood education sector (Leung & Choi, 2023). Use of developmentally appropriate resources and

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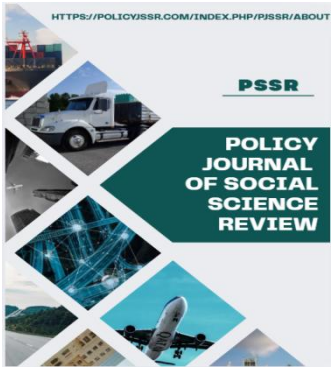

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ICT in early childhood education can be aided by the literature. Due to ICT's increasing pervasiveness, concerns have been expressed by parents, teachers, and practitioners on how ICT relates to the cognitive, emotional, social, and developmental requirements of young children (Stephen & Ploughman, 2003).

According to Rahimi & Tafazoli (2020), the use of ICT in the classroom may be significant whether used as a delivery method or as a teaching tool. The educational initiatives to promote the use of ICT in learning, particularly in early childhood education, are under progress (Shahid, 2020).

The lack of interest among teachers and one of the key parties involved in education, in using ICT to facilitate teaching and learning has led to the government's reluctance to provide schools with the necessary ICT resources (Vanderlinde, Dexter, & Braak, 2012). Early childhood educators must be aware about all information and communication technologies now in use to understand the critical role that teachers play in supporting technology for young children. The challenge for early childhood educators is to come up with strategies that fully exploit the opportunities for children to receive scholarships while minimizing the risk of misuse and overuse of ICT (Ali, Pigou, Clarke, & McLachlan, 2017). This is true even though these tools have novel user interfaces that make them more alluring and useful.

Young learners are given engaging materials at school so they may learn via play. Play is an expression of inner feeling, curiosity, and creativity that incorporates exploratory behavior and problem-solving, according to Adesanya, Adebanjo, and Yusuf (2018). According to Su & Yang, (2023),preschool offers children a dynamic play environment that promotes their physical, intellectual, and emotional growth. Handling, touching, and manipulating items to play captures the learner's interest and eventually leads to learning. Children are able to interact utilizing all five senses, according to Zafri, 2018). who proposed that multisensory learning is highly qualitative. Children are encouraged to take an active part, making it realistic. The current study is an attempt to investigate the usefulness and engagement of young learners with ICT activities for their cognitive, social and physical development.

Statement of the problem

The current study is designed to investigate the availability and usage time of ICT resources in ECE classrooms, and the demographic profile of the ECE teachers. A small number of studies have so far focused on the availability and the functional time of ICT in fostering and developing an interactive learning environment for ECE (Early Childhood Education) programs. ICT integration in

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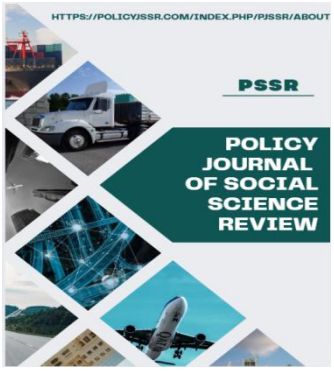

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the school sector aids in the improvement of physical, social and cognitive abilities, that contribute to educational advancement. Pakistan has started integrating ICT in ECE classrooms by establishing ECE centers. Pilot programs have recently been launched in the provinces of Punjab, Sindh, and Khyber Pakhtunkhwa. The provincial department of education has effective plans for ECE. Therefore, it was found crucial to fully comprehend the current status of ICT resources and their usage time in ECE classrooms in the Pakistan education setting, which is the key purpose of this research work.

Objectives of the Study

The objectives of this research are as follows:

1. To find out the available ICT resources in the ECE schools of Lahore city.
2. To identify the young learners' usage time of ICT activities in ECE classrooms in Lahore city.
3. To describe the demographic profile of the sample across key variables including gender, age, qualification, teaching experience, ICT-related training, ICT knowledge, technical skills, ICT usage, children's age groups, and school sector.

Research Questions

Following are the research questions of the study:

1. What are the available ICT resources in the ECE classrooms of Lahore city?
2. What is the young learners' usage time of ICT activities in ECE classrooms in Lahore city?
3. What is the demographic profile of the sample in terms of gender, age, educational qualification, teaching experience, ICT-related training, knowledge of ICT, technical skills, use of ICT in the classroom, children's age groups, and school sector?

Significance of the Study

Following is the significance of the study:

This study may be very helpful for the education sector to make and analyze further decisions regarding integration of ICT in ECE programs. The stakeholders of this research are policy makers, education department, teachers, parents, members of ECE classrooms. This study will add to the body of knowledge by presenting a thorough analysis of the status and the usage time of ICT resources in ECE classrooms. The results would likely provide information on the availability of the ICT resources, and need of type of resources. Additionally, the demographic profile of the sample will provide stakeholders with essential insights to design targeted training, allocate resources effectively, and develop context-specific policies for improving ICT integration in ECE classrooms.

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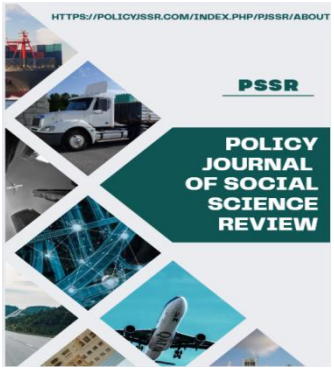

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The aim of the study was to provide a clear picture of the presence of ICT resources and their functionality time at ECE level highlighting possible advantages of ICT usage, and contribute to the creation of recommendations for using ICT in ECE classrooms. The findings of the research may encourage the improvement of young children's educational growth and preparation for the digital era through improved teaching and learning experiences as it is the need of the hour.

Literature Review

Most nations throughout the world officially acknowledge and encourage the value of early childhood educators' ICT skills. According to the most recent studies conducted in Turkey, kindergarten teachers utilize ICT to create their daily lesson plans, but they seldom, if ever, include it into children's activities. When they do, it's mostly for musical activities and only happens once or twice a week (Leung & Choi, 2023). Educators see ICT only as a supplement to current activities rather than as a vital component of the early life and preschool curriculum (Mansoor & Paul, 2022; Aldhilan et al., 2025).

The use of computers and video games by young children has been the subject of all the inquiries and discussions. According to research, youngsters who use computers more often may exhibit antisocial behaviors including aggression or social isolation (Zhang & Kohler, 2023). Previous studies also show that youngsters who use computers excessively may be exposed to inappropriate information in addition to having their eyesight negatively affected. These could include offensive gender, cultural, or societal stereotypes, sexual or violent content, and they might take the place of other important play and learning activities (Ojile, 2015). The majority of the current system does not support assessment, which will make it challenging for parents and teachers to assess children's development levels, progress, and performance, according to the previous study and investigations on the use of ICT in early childhood education (Costa & Ntsobi, 2022).

What is Early Childhood Education (ECE)?

Early Childhood Education is crucial for a child's emotional development as well as their cognitive and physical growth during the first eight years of life. Shahid (2020), stated that the learning environment in the early childhood education classroom ensured that the pupils were learning, and the researcher verified with the instructor about the effects of the daily learning activities. Therefore, it is essential to lay a solid foundation early on (during the early years) for greater growth and development of cognitions, emotions, and the physical body since only with a solid foundation can a durable building be built. Early

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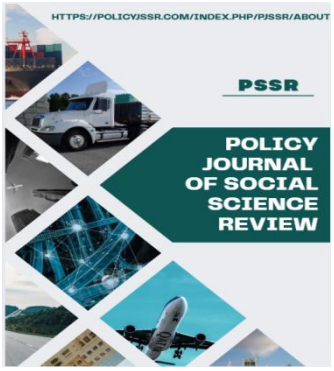

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Childhood Education (ECE) is crucial to a person's personality development (Santamaria, 2018).

Early childhood education is a vast area of study, but it strongly suggests that classroom learning environments, which stimulate teaching and learning through many modules of classroom ambiance, are important factors in student learning (Pölzl-Stefanec, 2021). Numerous studies in the field of early childhood education strongly suggest that the learning environment in the classroom affects children's capacity for learning through supporting teaching and learning various teaching environment components (Hafifah & Sulistyo, 2020).For students, classroom learning chances are improved by the physical arrangement of the learning space, accessibility and usability of a suitable stimulant to learning as a material, instructional design, and peer interaction. The size of the classroom, the right equipment, and the amount of space allow students to move freely, work independently, and participate in group activities. As a result, sharing, cooperation, self-control, executive function, and discipline are encouraged (Prentzas, 2016). ECE can happen in a variety of places, such as preschools, childcare facilities, in-home programs, and more. Depending on the programmed philosophy, cultural concerns, and the age group being addressed, the specific curriculum and approach to early childhood education may change. Quality early childhood education may significantly improve a child's long-term academic achievement, social skills, and general well-being, according to research. It aids in laying the foundation for a lifetime of growth and learning (Masoumi, 2015).

Impact of ICT in 21st century education

Information and Communication Technology (ICT) has had a transformational and extensive influence on 21st-century education. ICT has fundamentally altered how education is provided, accessible, and experienced, posing both possibilities and difficulties. Several of the major effects of ICT in 21st-century education are listed below:

- ICT has democratized information access. Through the internet, students and teachers may have access to a wide range of educational resources, such as textbooks, research papers, and multimedia content, from any location in the globe.
- The popularity of e-learning programs and online learning platforms has increased the flexibility and accessibility of education. Without geographical restrictions, students can enroll in Massive Open Online Courses (MOOCs), participate in remote learning, and pursue higher education at prestigious universities (Weber & Greiff, 2023).
- ICT makes it possible to create unique learning opportunities. Adaptive learning systems adjust the educational speed and material to meet the unique

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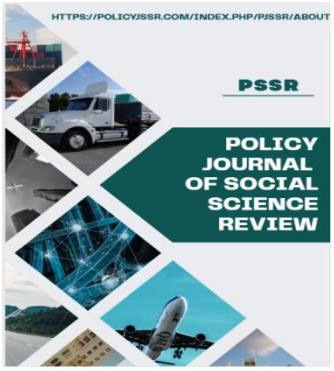

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requirements and learning preferences of each learner using data and algorithms.

- The use of ICT has converted conventional classrooms into online learning spaces. Tablets, computers, and interactive whiteboards enable engaging and multimedia-rich education.
- Simulators, instructional tools, and multimedia presentations may make hard subjects more approachable and interesting (Ihmeideh & Al-Maadadi, 2018).
- ICT streamlines evaluation and feedback procedures. Automated grading, online tests, and learning management systems assist teachers in giving students quick feedback so they may monitor their development.
- Students may get a global viewpoint through ICT. They have access to global news, literature, and cultural materials, which promotes a more global perspective.
- In the 21st century, ICT skills are crucial. In order to educate students for the modern workforce, educational institutions frequently incorporate computer programming and digital literacy into their curricula (Murcia, Campbell, & Aranda, 2018).
- Access to instructional information is improved through the use of screen readers, captioning, and assistive technology. The digital divide, worries about screen time and technology addiction, cyber security risks, and the need for teacher training and professional development are all difficulties related to the use of ICT in education (Vitoulis, 2017).

ICT has transformed education in the 21st century by enabling personalized learning, worldwide cooperation, and enhanced teaching and learning processes. Its continuous adoption within educational frameworks has the ability to improve instruction and equip students for the possibilities and difficulties of the digital era (Mahali, 2018).

Children now have early access to the internet, social media, and digital gadgets thanks to technology, which is considered as a crucial force for change. Tablets and touchscreens are becoming more available and affordable, therefore the topic of integrating technology in ECE has to be thoroughly examined (Gayatri, 2020; Rideout & Katz, 2016). This is a result of young children using digital devices more often. According to Berris and Miller (2011) the majority of parents and teachers appear to understand the value of technology in young children's education.

Even though the majority of educators consider technology to be an integral element of children's education, some still oppose its usage in preschools because they would like to see kids playing outside more often. But studies have demonstrated how crucial it is to integrate technology into the early learning environment, particularly for kids who don't have much

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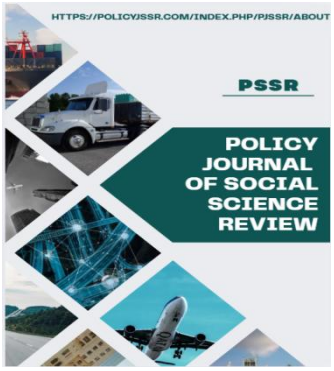

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access to it at home (Ogegbo & Aina, 2020).

However, it is claimed that many kids do not have access to or exposure to digital technology because of inequality, poverty, cultural limitations, and financial constraints (Edwards, 2013). Developmentally appropriate technology must be utilized carefully in the early years in order to provide children the possibility to learn how to use new technologies effectively and take part in the teaching and learning process. Additionally, integrating ICT into early childhood classrooms allows teachers the ability to explore and try out novel teaching strategies as well as broaden their perspectives on the learning and development of young children (Ihmeideh & Al-Maadadi, 2018).

ICT is significant in early childhood education for three reasons. ICT affects the individuals and environments that surround young children's learning, to begin with. Second, new potential for improving a range of early childhood education practices are provided by modern technology. Third, the whole education sector supports and is interested in the development and integration of ICT into educational policy, curriculum, and practice. These three concepts are covered in more depth below (Helen & Blaise-Okezie, 2020).

The development and integration of ICT into educational policy, curriculum, and practice is supported by the whole education sector. The development of ICT policies and the integration of ICT into curricula and practices are presently top concerns for the whole education sector. The importance of "e-learning" and "ICT" has increased in primary, secondary, and postsecondary education. Early childhood education policies and curriculum have generally trailed behind those offered to the education sector (Berris & Miller 2011).

Play is seen as a crucial component of early childhood education because it helps children develop their social, emotional, cognitive, and physical skills. Several diverse theories concerning the function and possible benefits of ICT in children's play are supported by the literature. Recall the notion raised in the introduction that kids should start learning about technology (i.e., what it is, how it works, and the role it plays in their lives and the lives of others) and learning through technology as early as possible. Both these types of learning are thought to benefit from play (Ramírez, Clemente, Recamán, Martín-Domínguez, & Rodríguez, 2017).

The Status of Early Childhood Education in Pakistan

The condition of Early Childhood Education (ECE) in Pakistan faced a number of obstacles and concerns which are as follows:

- In rural regions, access to high-quality early childhood education is still

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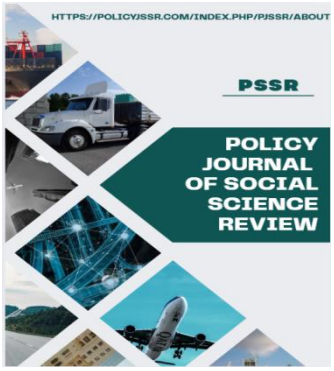

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quite limited. Many kids, particularly those from lower-income households, are unable to enroll in preschools or ECE programs.

- Even when ECE programs are offered, there is a broad range in the standard of instruction. Some programs lack competent instructors, suitable settings, and age-appropriate educational resources (Shah, Nazir, & Arshad, 2021).
- Access to ECE differs significantly across urban and rural places. Compared to their peers in rural regions, children in urban centers often have easier access to high-quality ECE services Nuri & Cagiltay, 2017).
- In Pakistan, ECE services are provided by both the public and commercial sectors. Depending on the industry, these services' accessibility and quality might change (Malik, Asghar, & Khalid, 2021).

The government and non-government organizations have worked to solve these issues and enhance Pakistan's early childhood education. These efforts encompass programs to broaden access, raise the standard of ECE programs, and improve teacher preparation. There is still work to be done to guarantee that all children in Pakistan have access to high-quality early childhood education, however progress in this area has been slow (Tomlinson, Hasan, Hentschel, Zamand, & Ersado, 2023).

Integration of ICT in Early Childhood Education – Global Perspective

An increasing trend with advantages and difficulties is the incorporation of Information and Communication Technology (ICT) in early childhood education. ICT integration in early childhood education has several advantages.

- Young children may learn in a more dynamic and engaging way with the help of ICT resources like educational applications, interactive websites, and multimedia material. They give people access to a variety of learning tools and resources (Vitoulis, 2017).
- ICT can adapt to different learning styles, enabling kids to advance at their own rate of learning. Different interests and abilities may be catered to through personalized learning experiences.
- The COVID-19 epidemic hastened the use of ICT in early childhood education. Children were able to continue studying even when they were geographically separated from their classrooms (Gayatri, 2020).

Challenges and Considerations

- Not all digital media is appropriate for young children. It might be difficult to guarantee the reliability and security of educational websites and apps (Ardiç & Çiftçi, 2019).
- To successfully incorporate ICT into their teaching approaches, early childhood educators may need training. They must be aware of how to choose

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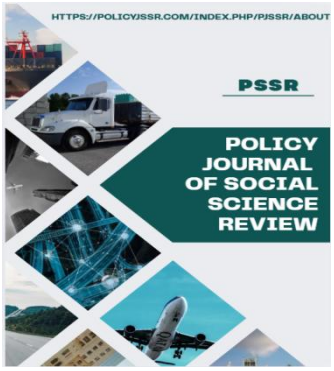

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acceptable materials and control kids' online interactions.

- Not every child has access to the internet and digital gadgets at home or in their early development programs. The difficulty of ensuring fair access to ICT resources exists everywhere (Archard & Archard, 2015).

Global Initiatives

Various approaches are being used by nations all over the world to include ICT into early childhood education:

Use of ICT in early childhood education is a global trend that presents both opportunities and difficulties. It calls for thorough planning, teacher preparation, and a dedication to granting everyone access to technology. To promote a well-rounded early childhood education experience, it is crucial to strike a balance between technology and other play-based learning methods (Liu & Hwang, 2023).

Potential of ICT in ECE classrooms

Early Childhood Education (ECE) classes might benefit greatly from Information and Communication Technology (ICT) in a number of ways (Zhang & Kohler, 2023). There are some of the main advantages and potential outcomes of using ICT in ECE classrooms. Young children may learn more effectively and enjoyably with the use of ICT resources including interactive educational applications, games, and multimedia material (Malik, Asghar, & Khalid, 2021). This can help draw their interest in learning activities and keep it there. ICT can adjust to each child's unique learning requirements and aptitudes. It can give tailored learning experiences, allowing students to proceed at their own speed and study areas of interest (Hu & Yelland, 2017).

Teachers believe that incorporating technology into the classroom can help young students succeed academically. People acknowledged the importance of possessing the knowledge and abilities to use technology as a factor that influences how people see its use. The instructors' positive views towards technology use in the ECE classroom show that they are prepared to utilize it to teach young children. Age, gender, employment experience, marital status, and educational level are all demographic criteria, but they don't really affect how instructors see the use of technology (Mulet, Martínez, & Cabezas, 2021).

According to Huang & Liaw (2008) teachers' abilities, perspectives, and attitudes affect how they embrace and implement the value of ICT in attaining targeted learning outcomes. Nikolopoulou (2020), who discovered a connection between teacher competency, perceptions, and attitudes, and ICT use in the classroom, lends credence to this. Teachers were more inclined to utilize ICT in the classroom the more proficient they were with it. According to research on the use of ICT in classrooms in Germany, teachers' attitudes towards the technology are the key to a

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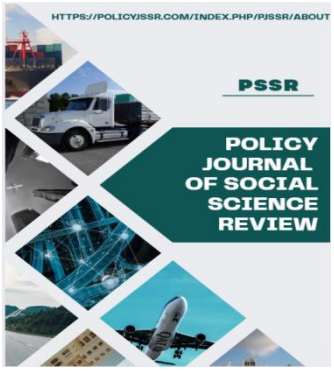

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successful implementation of the technology (Petrescu, 2012).

Following figure shows the connection of play through ICT with cognitive, physical, emotional and social development:

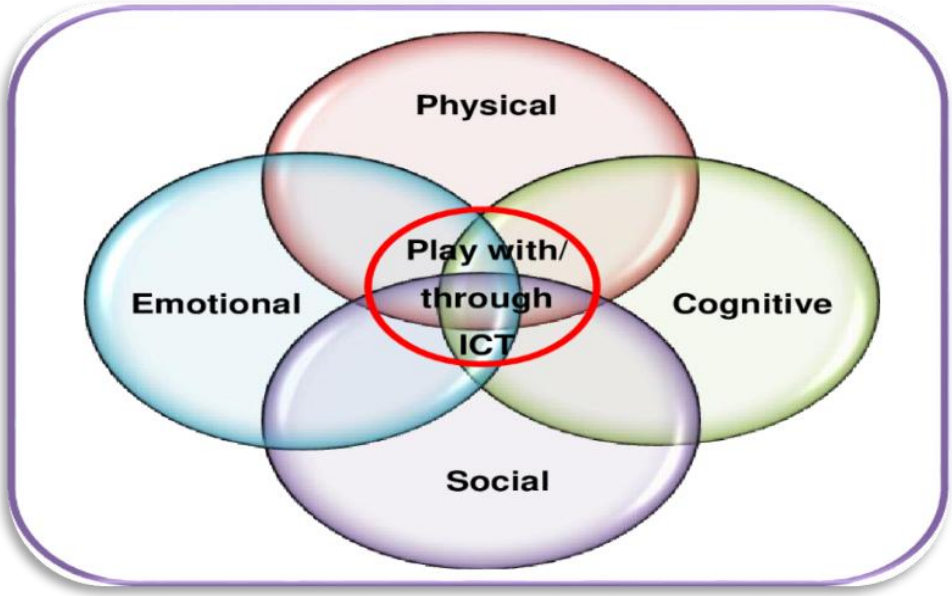

Figure 1: (Hammed, 2014).

Technology enables youngsters to swiftly adapt to a variety of learning methods and offers schedule flexibility to meet the demands of today's "learners" as contemporary society creates additional opportunities. Hatzigianni & Margetts (2012) assert that ICT provides young children with a fresh environment for exploration and discovery, delivers demanding tasks, and satisfies their natural curiosity. On the other hand, other academics contend that using ICTs causes poor exercise habits, solitary lives, poor focus, and impeded language development. While this concept has been debatable, ICT has emerged as the most practical means of coping with the "new normal" as the epidemic sweeps the globe (Korosidou, Bratitsis, & Griva, 2021).

Methodology

Following is the methodology of the study:

Research Paradigm

The prevailing research study is grounded in the "Positivism" philosophical framework. The positivist paradigm, which is based on measurement and reason, holds that knowledge may be discovered by unbiased, objective, quantitative, and objective observation of behaviour, action, or response (McGlinchey, 2022).

Research Design

The study was quantitative (descriptive) in nature. Research that uses descriptive methods explains the population,

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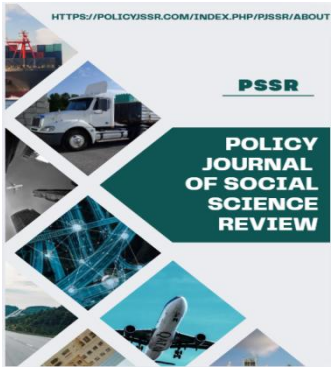

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environment, or phenomena under study. In the present research, the researcher has found out the status of available ICT resources and its degree of usage in the context of time in the ECE classrooms, and demographic characteristics of the sample to examine the patterns.

Population of the Study

A large group of individuals or objects that are the main focus of an examination for a scientific study is referred to as the research population. The welfare of the populace is the primary consideration when doing research. However, due to the size of the populations, researchers often are unable to do so since it would be highly expensive and time-consuming to evaluate every person of the community. Researchers thus employ sample techniques (Ravikiran, 2023).

Population constituted of teachers of ECE classrooms in public and private schools of Lahore city.

Total population of ECE schools in Lahore 1224, the researcher selected 50 ECE schools selected randomly through a lottery method. Every unit in a lottery approach has an equal chance of being chosen since each one is chosen at random from the population.

Sampling

In order to evaluate the characteristics of the entire population and derive statistical conclusions, a procedure known as sampling is used to choose certain individuals or a subset of a population (McCombes, 2023).

The research study used a random sampling method to gather data. In a form of probability sampling known as random sampling, a group of individuals is selected at random from a population. It only requires one random choice and a very limited amount of demographic knowledge. Because of the randomization that was done, any research that uses this sample should have great internal and external validity and be less susceptible to biases like selection and sampling bias (Creswell & Creswell, 2017).

Sample of the Study

200 teachers were selected as a sample of the study. 180 teachers from private schools, and 20 teachers from public schools.

Sample distribution is as follows:

1.	Total no. of schools	50	Private: 40 Public: 10
2.	Teachers	200	Private schools: 180 Public schools: 20
Male		40	
Female		160	

Instrument of the Study

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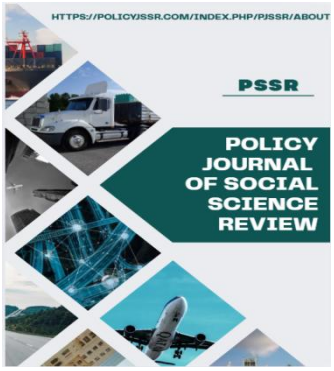

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A questionnaire was adapted for data collection to be used in study. Following is the procedure of instrument development.

Instrument Development

- An adapted Questionnaire *(Dong, 2018)*

A questionnaire was adapted by the researcher based on the framework of (Dong, 2018). Instrument was named, "Early Childhood Education Information and Technology (ECEICT) questionnaire after the adaptation by the researcher.

Section A covers the demographic information of the sample.

1. Gender
2. Highest qualification
3. Teaching experience
4. Professional training related to ICT
5. Knowledge of ICT policies or research
6. Technical skills (ICT)
7. Frequency of the usage of ICT resources
8. Age range of children taught
9. Sector of the school

Section B covers two variables which are as follows:

1) Availability of ICT equipment/resources in the schools (*PIE SCALE* = YES-NO)

2) Young learners' usage time of ICT activities in ECE classrooms (*SCALE* = NEVER-MONTHLY-WEEKLY-DAILY)

Reliability and Validity of the Instrument

Reliability

Reliability pertains to an instrument's capacity to consistently deliver the same results throughout several trials. Through an analysis of the consistency of results across time, among several observers, and within the test itself (Kothari, 2004).

The reliability and consistency of the construct was checked through Cronbach Alpha. The Cronbach Alpha value must be greater than 0.7 (Hair, 2013). The construct was found reliable with a **0.75 value.**

Validity

The instrument was validated by three experts of the field. Content validity of the instrument was done by the experts.

Pilot testing

The main benefit of pilot testing is that it enables to identify issues prior to the publication of the full survey. Pilot experiments are used in both qualitative and quantitative studies (Lowe, 2019).

In the current study, 50 ECE teachers who were not included in the sample took part in a pilot study to evaluate the instruments' reliability.

Data Analysis

Descriptive statistics were used to analyze the data, including frequencies, percentages, means, and standard deviations to summarize the demographic characteristics of the sample. Frequency distribution was calculated to analyze the variables of availability of ICT equipment, and the most and least used ICT gadget by

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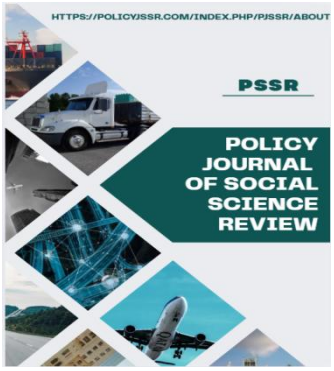

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children in ECE classrooms in their activities.

Following is the demographic analysis of the sample:

Findings of the Study

Table 1

Demographic Analysis of the Sample

Sr.#	*Description*	*f*	*%*	*Mean*	*S.D*
I	*Gender*				
1	Male	40	20		
2	Female	160	80	1.20	0.40
	Total	*200*	*100*		
II	*Age*				
1	Under 20				
2	20-29	20	10.0		
3	30-39	122	61.0	2.24	0.70
4	40-49	47	23.5		
5	Above 50	11	5.5		
	Total	*200*	*100*		
III	*Highest Qualification*				
1	PGD	2	1.0		
2	Bachelors	7	3.5		
3	B.Ed	16	8.0	4.46	.86
4	M.Ed	47	23.5		
5	Master/M.Phil	127	63.5		
6	PhD	1	.5		
	Total	*200*	*100*		
IV	*Teaching Experience*				
1	Less than 5 years	10	5.0		
2	5 years	80	40.0		
3	10 years	82	41.0	2.71	.94
4	15 years	16	8.0		
5	20 years	10	5.0		
6	More than 20 years	2	1.0		
	Total	*200*	*100*		

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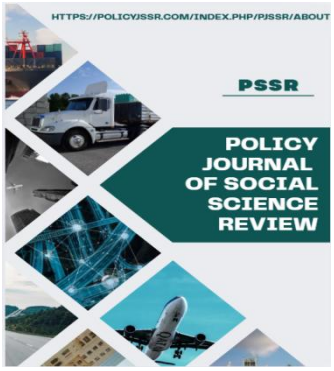

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V	*Professional Development*				
1	Yes	191	95.5	1.04	.20
2	No	9	4.5		
VI	*Knowledge of ICT Policies or Research*				
1	I don't know	2	1.0		
2	Not well-informed	39	19.5	2.82	.49
3	Informed	151	75.5		
4	Very informed	8	4.0		
	Total	*200*	*100*		
VII	*Technical Skills*				
1	None	22	11.0		
2	New	32	16.0	2.70	.77
3	Emerging	130	65.0		
4	Proficient	16	8.0		
	Total	*200*	*100*		
VIII	*Use of ICT Resources in the Classroom*				
1	Never	3	1.5		
2	Sometime	65	32.5	2.73	.63
3	Often	114	57.0		
4	Always	18	9.0		
	Total	*200*	*100*		
IX	*Children's Age*				
1	Under 3	71	*35.5*		
2	3-4	87			
3	5	42	*43.5*	*2.85*	*0.73*
4	6	*0*			
5	7-8		*21*		
		0	*0*		
	Total	200	100		
X	*Pre School Description*				
1	Public	20	10.0		
2	Private	180	90.0	1.90	.30

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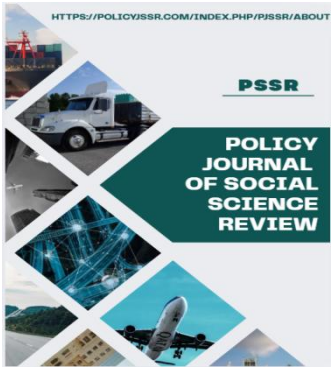

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Total	*200*	*100*

The table shows that the majority of respondents were female (80%) and male (20%), with a mean score of 1.20 (S.D = 0.40), indicating a predominantly female sample. In terms of age, most respondents (61%) were between 20–29 years, followed by 30–39 years (23.5%), with a mean of 2.24 (S.D = 0.70), reflecting a relatively young group.

Regarding qualification, the highest proportion (63.5%) held Master's/M.Phil degrees, with a mean score of 4.46 (S.D = 0.86), indicating a highly educated sample. For experience, most respondents (81%) had 5–10 years of experience, with a mean of 2.71 (S.D = 0.94), suggesting moderate teaching experience.

The table further shows that 95.5% of respondents had received professional development training, with a mean of 1.04 (S.D = 0.20). In terms of knowledge of ICT policies, most respondents (75.5%) were "informed," with a mean of 2.82 (S.D = 0.49), indicating a good level of awareness.

For technical skills, the majority (65%) rated themselves at the "emerging" level, with a mean of 2.70 (S.D = 0.77), reflecting developing competence. Similarly, ICT usage was frequent, with most respondents reporting "often" (57%), and a mean score of 2.73 (S.D = 0.63).

The table also shows that most children taught were aged 3-4 years (43.5%), with a mean of 2.85 (S.D = 0.73). Finally, most respondents (90%) were associated with private pre-schools, with a mean score of 1.90 (S.D = 0.30).

Overall, the table indicates a predominantly female, young, well-qualified, and moderately experienced sample with developed ICT skills and high engagement in professional training, mainly working in private pre-schools.

Table 1.1

Following table presents the frequency distribution of Availability of ICT Resources in ECE classrooms in the form of graphic representation:

Availability of ICT Resources in ECE Classrooms

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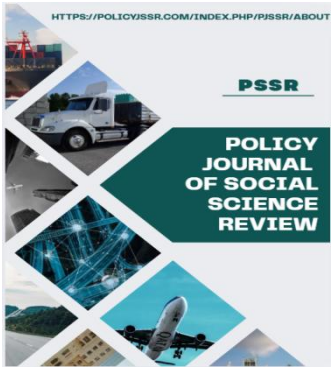

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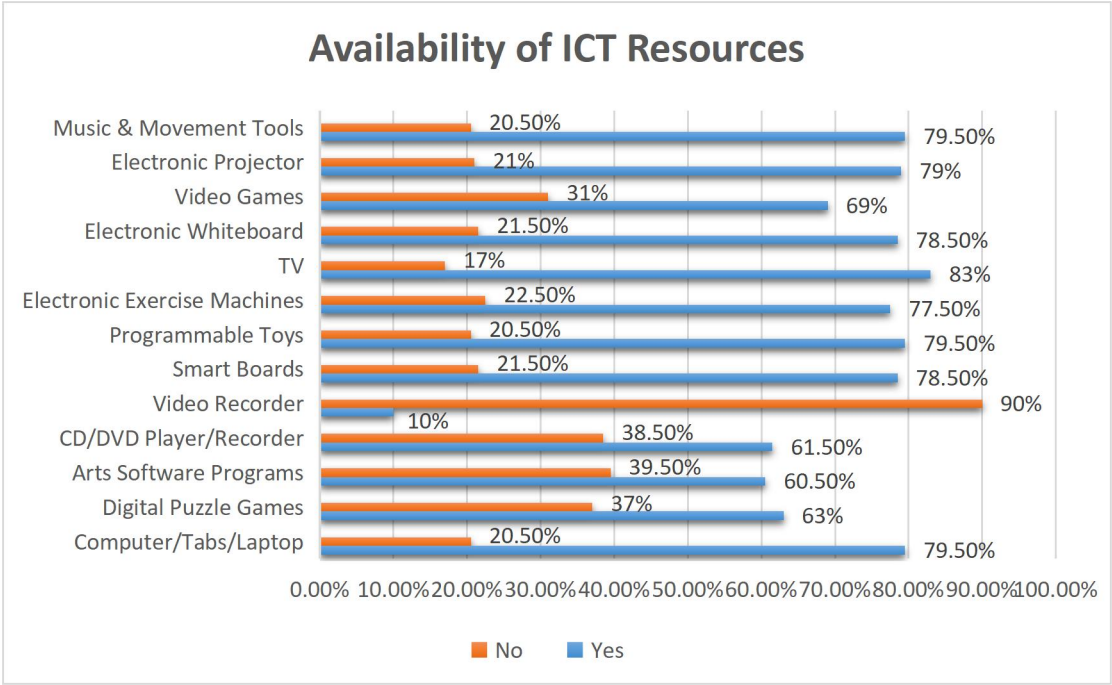

This graph shows the availability of ICT resources in ECE classroom. Results indicate the availability of computer/tabs/laptop (79.5%), digital puzzle games (63%), arts software programs (60.5%), CD/DVD player/recorder (61.5%), video recorder (10%), smart boards (78.5%), programmable toys (79.5%), electronic exercise machines (77.5%), TV (83%), electronic whiteboard (78.5%), video games (69%), electronic projector (79%), music & movement tools (79.5%).

Overall results indicate that the highest available ICT resource is TV (83%), and the lowest available is video recorder (10%).

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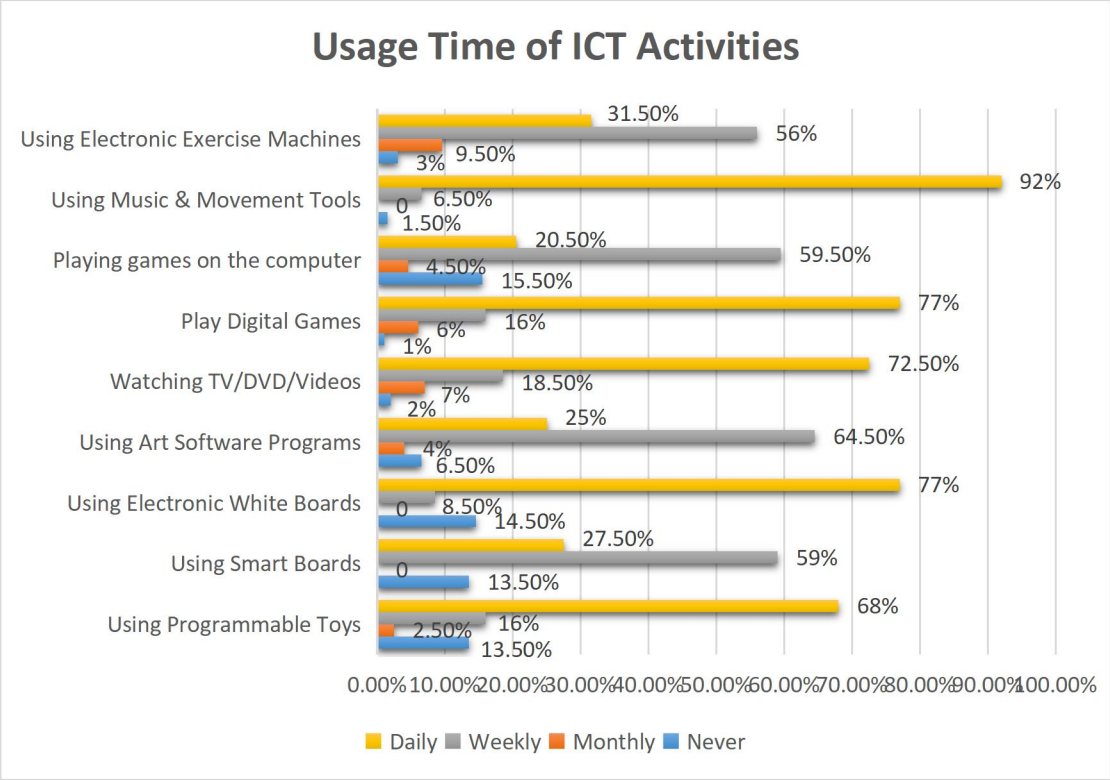
Table 1.2

Following table presents the frequency distribution of Young Learners' Usage time of ICT Activities in ECE Classrooms in the form of graphic representation:

Young Learners' Usage Time of ICT Activities in ECE Classrooms



The data in this graph shows how frequently a group of ECE children using different ICT activities. The scale was: ("Never," "Monthly," "Weekly," and "Daily"). The percentage in the graph shows the frequency category for each particular ICT activity. Results indicate using programmable toys (never=13.5%, monthly=2.5%, weekly=16%, daily=68%), using smart boards (never=13.5%, monthly=0, weekly=59%, daily=27.5%), using electronic white boards (never=14.5%, monthly=0, weekly=8.5%, daily=77%), using arts and software programs (never=6.5%, monthly=4%, weekly=64.5%, daily=25%), watching TV/DVD videos (never=2%, monthly=7%, weekly=18.5%, daily=72.5%), play digital games (never=1%, monthly=6%, weekly=16%, daily=77%), playing games on the computer (never=15.5%, monthly=4.5%, weekly=59.5%, daily=20.5%), using music & movement tools (never=1.5%, monthly=0, weekly=6.5%, daily=92%), using electronic exercise machines (never=3%,

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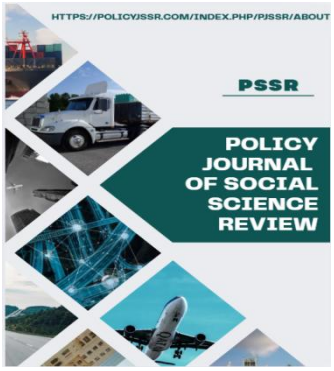

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monthly=9.5%, weekly=56%, daily=31.5%).

Findings of the Study

The findings indicate that the majority of respondents were female (80%) and predominantly aged 20–29 years (61%). Most participants held a Master's/M.Phil degree (63.5%) and had 5–10 years of teaching experience (81%). A large proportion (95.5%) had received ICT-related professional training, and most reported being informed about ICT policies (75.5%). In terms of technical skills, the majority were at an emerging level (65%), and over half (57%) reported often using ICT resources in the classroom. The children taught were mainly aged 3–4 years (43.5%) and under 3 years (35.5%). Additionally, most respondents were from private preschools (90%). Most ICT resources are widely available in ECE classrooms, particularly TVs (83%), computers/tablets/laptops (79.5%), programmable toys (79.5%), music and movement tools (79.5%), electronic projectors (79%), and smart boards and electronic whiteboards (78.5% each). Moderate availability was observed for video games (69%), digital puzzle games (63%), CD/DVD players/recorders (61.5%), and arts software programs (60.5%). In contrast, video recorders were notably scarce, with only 10% availability, indicating a gap in access to this specific resource.

Conclusion

It has been concluded that the majority of respondents were female from private preschools, aged 20–29 years, and held a Master's/MPhil degree. Most had 5–10 years of teaching experience, had received ICT-related professional training, and were informed about ICT policies. In terms of technical skills, the majority were at an emerging level and reported often using ICT resources in the classroom. Majority of the children taught were mainly aged 3-4 years.

TV is the most available ICT resource, and video recorder is the least available ICT resource in ECE classrooms. In the context of young learners' usage time of ICT activities, music and movement tools show the highest usage time, while computer games show the lowest in early childhood education classrooms.

Recommendations

1. In-service teachers' training should be conducted targeting integration of ICT resources into ECE instruction.
2. Basic ICT resources including computers and other digital devices should be made available in the ECE schools. Additional funds should be allocated for this purpose.
3. The government may take significant action to ensure that ICT is successfully implemented in ECE schools.
4. Policy makers and curriculum planners should ensure the incorporation of ICT devices into early childhood

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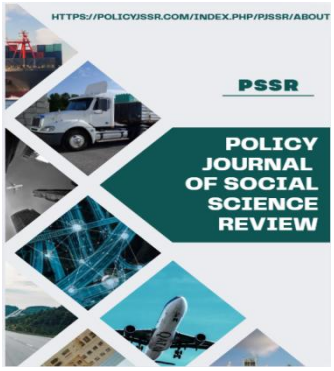

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curricula, specially focusing their cognitive development.

5. The government may enhance its educational programs on ICT training, in particular, for young learners.

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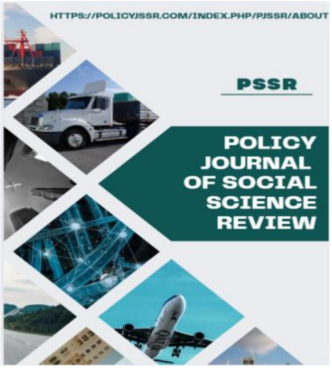

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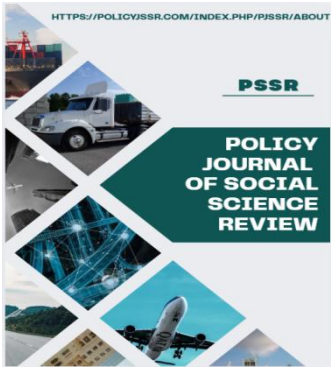

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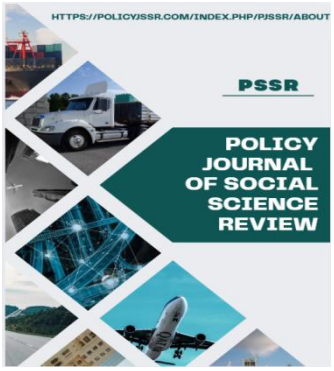

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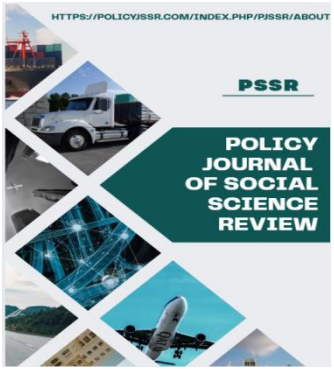

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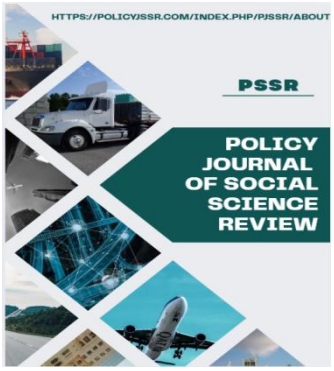

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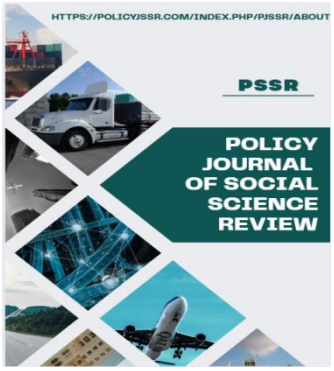

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