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*Scientific articles*

**Percepción de los docentes sobre la usabilidad de las tecnologías en el aprendizaje de los alumnos de preescolar**

*Teachers' perceptions of the usability of technologies in preschool students' learning*

*Percepções dos professores sobre a usabilidade das tecnologias na aprendizagem de alunos da pré-escola*

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## Resumen

El uso de las tecnologías de la información y la comunicación (TIC) en el ámbito educativo ha crecido de manera considerable. La vinculación de las TIC con la educación ha generado debate en cuanto a su aplicación, principalmente en la educación inicial. Existe escasa evidencia sobre la utilización de las TIC por parte de los docentes de preescolar. El estudio examinó la percepción de los docentes de preescolar hacia la usabilidad de las TIC y su relación con las variables sociodemográficas de edad, experiencia docente y nivel educativo del profesor. El diseño del estudio fue cuantitativo y participaron 100 docentes de preescolar del municipio de Cajeme, Sonora; seleccionados mediante un muestreo por conveniencia. Las respuestas al instrumento de 20 ítems fueron procesadas utilizando tablas de frecuencia y pruebas no paramétricas de hipótesis y análisis de correlación. Se definieron los grados de percepción de la utilidad y facilidad de uso de las tecnologías por los docentes. El 44 % de los docentes presenta una alta percepción de utilidad de las TIC y el 66 % un nivel alto de facilidad de uso de las TIC. No se obtuvieron relaciones significativas entre la edad y la facilidad de uso y utilidad de las TIC; así como con la experiencia docente y el nivel educativo de los docentes.

**Palabras clave:** docentes de preescolar, práctica docente, TIC

## Abstract

The use of information and communication technologies (ICT) in education has grown considerably. The connection between ICT and education has sparked growing debate regarding their contribution to development, particularly in early childhood education. There is a significant lack of evidence regarding the use of ICT by preschool teachers. This study examined preschool teachers' perceptions of ICT usability and its relationship with the variables of age, teaching experience, and teacher level. The study design was quantitative and included 100 preschool teachers from the municipality of Cajeme, Sonora, selected using convenience sampling. Responses to the 20-item instrument were processed using frequency tables and nonparametric hypothesis and correlation tests. The objective was to define teachers' perceptions of the usefulness and ease of use of the technologies. 44 % of teachers perceived the usefulness of ICT as high, and 66 % perceived ease of use as high. No significant relationships were found between age and ease of use or usefulness of ICT, nor

were relationships observed between these variables and teaching experience or the school level at which teachers taught.

**Keywords:** preschool teachers, teaching practice, ICT.

## Resumo

O uso das tecnologias de informação e comunicação (TICs) na educação cresceu consideravelmente. A integração das TICs na educação gerou debates sobre sua aplicação, particularmente na educação infantil. Há poucas evidências sobre o uso das TICs por professores da educação infantil. Este estudo examinou as percepções dos professores da educação infantil sobre a usabilidade das TICs e sua relação com variáveis sociodemográficas como idade, experiência docente e nível de escolaridade. O estudo empregou uma abordagem quantitativa e incluiu 100 professores da educação infantil do município de Cajeme, Sonora, selecionados por amostragem de conveniência. As respostas ao instrumento de 20 itens foram processadas utilizando tabelas de frequência, testes de hipóteses não paramétricos e análise de correlação. Os níveis de utilidade e facilidade de uso das tecnologias percebidos pelos professores foram definidos. Quarenta e quatro por cento dos professores relataram uma alta percepção de utilidade das TICs e 66 % relataram um alto nível de facilidade de uso. Não foram encontradas relações significativas entre idade e facilidade de uso e utilidade das TICs, nem com a experiência docente ou o nível de escolaridade dos professores.

**Palavras-chave:** professores da educação infantil, prática docente, TICs.

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## Introduction

The use of information and communication technologies (ICTs) in education has increased significantly in recent years. This advancement has modified teaching practices, fostering the development of new areas of learning. This has positively transformed the teaching process, improving its quality by adapting it to the individual needs and characteristics of students (Cabero & Martínez, 2019; Martínez et al., 2018).

Currently, the potential of technological tools to optimize the teaching and learning process has increased exponentially. However, in Mexico, obstacles persist that restrict the impact of these technological tools on the quality of education (Arellano, 2020). Furthermore, there is limited access to technological equipment in schools and insufficient teacher training to implement these resources in their educational practice (Sosa & Valverde, 2022). Teachers must modify their beliefs about ICT so that these tools can give new meaning to their educational practices (Padilla, 2018).

The reviewed literature highlights the advantages of using ICT at the preschool level. Pinto and Osorio (2019) report the achievements of incorporating ICT into the school curriculum; they show that children are more active in different areas of development and improve their learning. The use of these tools produces cognitive improvements in learning mathematical logic, communication, and social studies. Furthermore, it allows for the development of their social skills (Vértiz-Osores et al., 2019).

It is worth noting that the reviewed studies are primarily from Latin America and Europe. Some authors (Bustamante and De Lima, 2020; Ching-Ting et al., 2014) indicate that the use of technology significantly enriches personal interactions in early childhood, particularly in children's conversational skills. Technology is employed as a mediator in the educational process, facilitating children's holistic development.

Early childhood education is a crucial period in human development; it is the stage where initial learning takes place, cognitive, emotional, and language development is activated, and the foundations are laid for developing physical and psychological skills that will serve as a lifelong resource. Children learn, improve, and practice cognitive, socio-affective, and motor skills; therefore, it is important that the various activities carried out in the classroom support their developmental process (Gutiérrez-Duarte & Ruíz-León, 2018).

The integration of digital media into education has sparked increasing debate regarding its contribution to child development, particularly in early childhood education. Aspects surrounding pedagogical practices in technology-influenced environments reveal diverse perspectives on their positive or negative impact at the preschool level (Miulescu, 2020).

The use of ICT in the early childhood classroom helps improve independent learning, self-esteem, and fine motor skills. Incorporating technology into the teaching and learning process allows children to learn through content exploration and participate in experiences that promote play and observation using technological tools (Campana et al., 2019).

According to Gjelaj et al. (2020), the incorporation of digital technologies in the preschool classroom can help children express themselves in ways that were previously impossible. According to Ulco and Baldeón (2020), the integration of ICT in schools strengthens the skills necessary for language development and cognitive processes; furthermore, it fosters cooperation among peers.

Studies have been conducted in countries such as Uruguay, Spain, Finland, Switzerland, and Mexico on the pedagogical competencies of preschool teachers (Navarro-Zamora & Flores-Aguilar, 2018). These studies explored teachers' aptitude and attitude in acquiring skills for curriculum development. This represents a shift in the perspective of learning, where the main objective is for teachers to move beyond using technological resources solely for information transfer and become facilitators of learning, thus transforming information into knowledge.

Regarding teachers' perceptions of technology use, Muñoz et al. (2019) indicate that preschool teachers struggle to implement modern and innovative pedagogical approaches due to their own fears and inherent beliefs. Medina (2019) and Peterson et al. (2018) argue that teachers must identify and select technological tools that enhance student learning, given that teacher mediation is a determining factor in demonstrating the use of ICT. Similarly, Ghitis and Alba (2019) point out that the integration of technology into teaching and learning processes is influenced by teachers' perceptions, as their acceptance conditions its incorporation in the classroom. Consequently, the use of ICT fosters learning development based on student curiosity, while simultaneously connecting their potential with the educational needs of the learning context.

On the other hand, perception is defined as the inherent relationship of the individual with initial sensory processes; it constitutes the result of psychological processes that range from the organization to the interpretation of information. This phenomenon occurs at two levels: the first occurs in the sense organs; that is, outside the brain. Meanwhile, the other is cerebral in nature, where the nervous system processes information according to the category of the stimulus received (Sánchez-Márquez, 2019).

In the educational field, factors have been identified that influence the effectiveness of ICT usability as a teaching support tool. Scientific evidence highlights that the perceived use and usefulness of these technologies are related to the technological integration by teachers (Ifinedo et al., 2020). In this regard, Ifinedo and Kankaanranta (2021) demonstrate that promoting the incorporation of ICT in classrooms transforms the learning environment and improves teaching practices, which in turn influences teachers' attitudes and skills.

According to Beltrán et al. (2015) and Ferrer et al. (2011), usability is defined as the teacher's perception of the ease of use of ICTs to enhance the teaching and learning process. This construct refers to the teacher's ability to use technology effectively and satisfactorily to achieve pre-established educational goals (Ferrer et al., 2011). In this sense, the likelihood of technological integration increases when the teacher perceives the use of ICTs in their educational practice as convenient and simple (Colorado, 2014; Turpo, 2012).

From Nielsen's (1994) perspective, technological utility is a determining factor in a user's interaction with technology, as it can be easy to use but not useful, or vice versa. This author points out that in digital environments there must be a balance between usability and utility, considering the latter useful as long as it satisfies the user's needs. Barat (2016) and Tarhini et al. (2016) maintain that when teachers perceive the benefits of incorporating technology into educational practices, their performance improves. Davis (1989) adds that perceived ease of use acts as a causal antecedent of discovered utility, conditioning both current use and the intention of future adoption.

In summary, usability in education is conceptualized as the interaction between perceived ease of use and perceived usefulness regarding the successful integration of technological tools into the teaching and learning process (Romeo et al., 2023). Furthermore, usefulness is closely linked to teachers' perceptions of their intention to use the tools (Sherer et al., 2015), and is closely related to the perceived support in the development of teaching practices (Teo, 2011).

On the other hand, preschool education is a critical stage in children's lives, as it is during this time that they acquire the cognitive foundations necessary for their later development and constitutes their first formal contact with the education system. The integration of ICTs at this level offers teaching strategies that stimulate different sensory channels (auditory, visual, tactile), which fosters meaningful learning processes and increases student motivation (Miulescu, 2020). However, in the current context, although new generations of "digital natives" interact naturally with technological media (Barbosa & Amariles, 2019), Mexican institutions face structural and pedagogical barriers. These include obsolescence or a lack of infrastructure, a lack of training programs, technophobic attitudes or distrust, high maintenance costs, and deficient administrative management (García et al., 2013).

The United Nations Educational, Scientific and Cultural Organization [UNESCO] (2019) and the Mexican Ministry of Public Education [SEP] (2019) have established guidelines and criteria for evaluating the digital competencies of preschool teachers. These criteria require that teachers not only possess instrumental skills but also be able to pedagogically integrate technologies, communicate effectively in digital environments, and

maintain ongoing professional development that responds to the demands of the contemporary world.

Studies in rural areas of Sonora indicate that preschool teachers recognize the benefits and advantages of ICTs for enriching their teaching practice; however, they express concerns that their inappropriate use may interfere with student learning (Ramos et al., 2019). Meanwhile, Mortis et al. (2018) observed that private primary schools in the municipality of Cajeme have sufficient and adequate technological infrastructure; however, there is no evidence that teachers possess the digital skills necessary to facilitate the curricular integration of technological tools in the teaching-learning process. This highlights a gap between teachers' pedagogical training in the use of digital resources and technological availability.

On the other hand, Mortis et al. (2021) analyzed 120 studies conducted in Sonora between 2010 and 2019; of these, 82 focused on the use of technological tools in basic education (primary and secondary), revealing a notable lack of research in preschool. This knowledge gap underscores the need to develop and implement teacher training and professional development programs, based on accurate assessments and support models. In this regard, Alpízar-Domínguez (2019) argues that the integration of technology in preschool should be approached as a strategic opportunity to optimize teaching in the face of the growing impact of digital culture in the classroom.

Therefore, based on the scientific evidence analyzed, the objective of this study is to determine the perception of preschool teachers towards the usability of ICT and its relationship with the variables: age, experience as a preschool teacher, level of studies, level of training, type of school and preschool grade in which they work.

## Method

A quantitative study with a non-experimental design was conducted, as the variables were measured without any manipulation (Gall et al., 2007; Hernández et al., 2014). It was cross-sectional and correlational in scope.

The study population consisted of 563 preschool teachers from public and private schools in the municipality of Cajeme. A non-probability convenience sample of 100 participants was taken, all of whom were women. Participants were distributed as follows: 38 % were between 21 and 30 years old; 40 % between 31 and 40; 15 % between 41 and 50; and 7 % between 51 and 60. Fifty-two percent had between one and nine years of experience; 28 % had between 10 and 19 years; and 20 % had between 20 and 30 years of experience. Sixty-eight percent held a Bachelor's degree, 25 % a Master's degree, 5 % a Doctorate, and 2 % other qualifications. Forty-nine percent worked in private schools, and 51 % worked in public institutions.

To measure the usefulness and ease of use of ICTs, an instrument was designed based on the scales proposed by Davis (1989) and Arreola (2020); however, these were adapted to the context of preschool teachers. Responses were on a five-point Likert scale (0 = Strongly disagree, 4 = Strongly agree). The usefulness scale consisted of ten items, with a Cronbach's alpha of  $\alpha = 0.88$ . The perceived ease of use scale also had ten items and obtained an  $\alpha = 0.91$ .

was sent to the principals of the selected schools to inform them about the research objectives and to request the participation of preschool teachers in data collection. The schools included in the research were those whose principals gave their consent to allow teachers access.

In subsequent phases, teachers were informed about the purpose of the study, with the importance of their participation emphasized, and they were provided with crucial

information for the proper implementation of the instrument. Emphasis was placed on the confidentiality of the collected data, ensuring its exclusive use for academic purposes, and on the fact that participation in the study was voluntary. An informed consent form was included in the booklet provided to them, where they were asked to indicate whether or not they agreed to participate in the study. The instrument was administered in person.

## Data analysis

The data were analyzed using SPSS version 27 software, and graphs, frequency tables, correlations, and hypothesis tests were employed. Initially, the Kolmogorov-Smirnov test was performed for each scale, revealing the absence of a normal distribution in the data. Consequently, non-parametric tests were chosen. The Mann-Whitney U test was conducted to determine if there were differences in the means of the independent groups.

To classify preschool teachers' perceptions of the usefulness and ease of use of technologies and considering the average responses according to the scale used (0-4), the following levels were defined:

- Very low = 0 to 0.9
- Low = 1.0 to 1.9
- Medium = 2.0 to 2.9
- High = 3.0 to 4.0

This procedure was based on the principles proposed by several authors regarding the construction of scales. These principles include, on the one hand, considering that higher values correspond to greater degrees of the variable being measured; and on the other hand, defining equal intervals in the division of the data (Medrano and Pérez, 2019; Valdés-Cuervo et al., 2019). In this case, it was decided to establish four equivalent levels.

## Results

First, the results were obtained for each of the two scales (perceived usefulness and ease of use), and then the teachers' level of perception was determined for each. Table 1 shows the percentages for each question on the perceived usefulness scale according to the response options.

Considering the sum of response options 3 and 4 as those indicating high agreement, questions 1, 7, and 10 received the highest percentages, while questions 4, 5, and 9 received the lowest. The frequency distribution for the ten questions on the scale is shown in the last row of the table. In this regard, the teachers had an overall average of 68.5 % high agreement regarding the perceived usefulness of ICT.

**Table 1.** Percentages for each question on the perceived utility scale according to the response options

Questions	0	1	2	3	4
1. They promote imagination in students.	2	2	10	66	20
2. They promote communication between students and teachers.	2	3	34	43	18
3. They promote autonomy in students.	0	3	20	51	26
4. They promote student concentration.	6	10	29	41	14
5. They enable cognitive development in students.	3	18	22	45	11
6. They contribute to collaborative learning.	3	11	23	42	20
7. They facilitate students' access to educational resources.	1	1	8	55	35
8. They help to enhance student learning.	0	3	14	54	28
9. They promote the development of psychomotor skills in students.	13	14	20	40	13
10. They promote playful learning in students.	4	12	16	48	20
Global percentages	3.4	7.7	19.6	48.5	20.5

Source: Own elaboration

Table 2 presents the percentages for each question in the instrument regarding perceived ease of use, according to the response scale. Considering the sum of options 3 and 4 as those with high agreement, the questions with the highest percentages are 2, 8, 9, and 10. The frequency distribution of the ten questions appears in the last row of the table. Thus, the teachers had an overall average of 81.5 % high agreement regarding the ease of use of the technology.

**Table 2.** Percentages per response option on the ease of use scale

Questions	0	1	2	3	4
1. I feel comfortable using technological resources to enhance student learning.	0	1	7	46	46
2. Technologies are useful for developing educational activities that improve teaching and learning processes.	0	0	6	55	39
3. It is easy to assess student developmental achievement using digital resources.	0	3	25	45	27
4. The use of technology makes it easier to do my job.	0	1	14	46	38
5. The use of technology allows for optimizing time in the classroom.	0	6	27	41	24
6. I believe that technology makes it easier to carry out my teaching activities.	0	1	22	44	32
7. I believe that the use of technology improves my teaching performance.	0	5	19	45	30
8. I believe it would be easy to increase my skill in using technology.	0	1	16	50	33
9. Technology gives me the flexibility to integrate it into teaching practice.	1	0	10	54	35
10. Technology allows me to better organize my teaching activities.	1	2	13	49	35
Global percentages	0.2	2	16	47.5	34

Source: Own elaboration

Furthermore, perceptions of usefulness and ease of use were classified into four levels: very low, low, medium, and high, distributed equally according to the 0-4 range with five response options. The means of both scales were obtained for this purpose, and are shown in Table 3.

**Table 3.** Mean and standard deviation of the utility and ease of use scales

	N	Average	Standard deviation
Utility	100	2.75	0.64
Ease of use	100	3.13	0.55

Source: Own elaboration

The usefulness score averaged 2.75, which, according to the previously mentioned criteria, falls between 2.0 and 2.9. This indicates that teachers report a moderate level of usefulness in the classroom. Meanwhile, ease of use averaged 3.13, corresponding to the range of 3.0 to 4.0, indicating that teachers perceive a high level of ease of use for technological tools in their teaching practice.

To determine if there is a difference between public and private schools in terms of preschool teachers' perceptions, the Mann-Whitney U test was used and applied to each of the scales. The *p-value* for the perceived usefulness scale was .39 ( $\alpha = .05$ ), therefore the null hypothesis was accepted, indicating that there are no differences in the perceptions of teachers in public and private schools. Similarly, the test was not significant for the perceived ease of use scale, with a *p-value* of .68 ( $\alpha = .05$ ).

Based on the survey responses, it was observed that teachers were grouped into two school districts. To determine if there were differences between them regarding teachers' perceptions of the usefulness and ease of use of ICT, a hypothesis test was conducted. The Mann-Whitney U test was used for this purpose. The *p-value* for the perceived usefulness scale was .451 and for ease of use, .462. Based on these data, the null hypothesis was accepted in both cases, meaning that there are no differences in the perceptions of teachers in the two school districts regarding the usability of ICT in teaching practice.

Additionally, differences were analyzed based on teachers' educational levels, specifically among those with bachelor's, master's, and doctoral degrees. The non-parametric Kruskal-Wallis test was used for each scale. For the utility scale, the *p-value* was .191, and for the ease-of-use scale, it was .272 (significant at a significance level of  $\alpha = .05$  for both scales). Thus, the null hypothesis was accepted in both cases, indicating that there are no differences among teachers' educational levels for either variable.

Similarly, tests were conducted to determine differences based on the grade level taught by the teachers (first, second, or third). The non-parametric Kruskal-Wallis test was used, with a significance level of  $\alpha = .05$ , for each of the scales (usefulness and ease of use). For usefulness, the *p-value* obtained from the test was .876, and for ease of use, .294. This indicates that the null hypothesis is accepted, meaning that there are no differences in the perception of the usefulness and ease of use of technology across the different grade levels.

To determine if there was a relationship between the perceived usefulness of the software and years of teaching experience, Spearman's rank correlation coefficient was used. The correlation coefficient was 0.12 ( $p = .24$ ). Regarding ease of use, a correlation coefficient of -0.02 was obtained, with a *p-value* of .81; however, these values are not statistically significant, so a relationship between these variables cannot be established.

To determine the relationship between usefulness and ease of use with the age of the teachers, Spearman's rank correlation coefficient was applied. The correlation coefficient for usefulness was 0.07 ( $p-value = 0.44$ ) and for ease of use, -0.12 ( $p-value = 0.23$ ), suggesting that there is no significant relationship between age, usefulness, and ease of use of the technology.

## Discussion

This research has examined in depth how preschool teachers perceive the usability (usefulness and ease of use) of technologies in their educational practice. The results offer a clear view of the factors that influence the adoption and use of ICT in the classroom, considering both ease of use and perceived usefulness. This analysis not only highlights the advantages that these digital tools bring to the teaching and learning process, but also identifies areas for improvement and challenges that teachers face when integrating them into their pedagogical practice. Based on the findings, the hypotheses are partially supported, which could contribute to strengthening preschool education through a more effective use of technologies.

The study results show that teachers have a better perception of ease of use than of usefulness. However, studies by Hong et al. (2021), Kamaruddin et al. (2017), and Brown et al. (2016) highlight the usefulness of technologies in supporting children's learning, although not necessarily their ease of use. On the other hand, Ibrahim and Shiring (2022) and Ismail (2023) indicate that educators generally maintain a positive attitude toward the relationship between ease of use and perceived usefulness, considering both variables equally important for the effective use of technologies in the classroom.

The research reveals that all teachers surveyed use technology for educational purposes. Studies by Mamat et al. (2020), Gillen and Kucirkova (2018), and Sabanci and Omeroglu (2015) support this finding, highlighting that digital resources provide enriching opportunities and are crucial for child development, especially in the area of language. However, Yang (2024) indicates that teachers express concern about the potential adverse impacts of ICT on children's well-being and voice doubts about its advantages and the appropriateness of its application.

It is important to highlight that no differences were detected between the usefulness and ease of use of ICTs and the teachers' academic level. Nasreen and Chaudhary (2018) support this finding, as they obtained similar results. Meanwhile, Konca et al. (2016) and Johler et al. (2022) state that those with educational backgrounds demonstrate positive attitudes toward technology. This contrast suggests that, although the present study did not find a direct relationship, academic training in education could play a deeper and more complex role in the adoption and use of technology in the classroom.

On the other hand, no differences were found in the perceived usefulness of ICTs according to the type of school (public or private). Kara and Cagiltay (2017) and Ardina et al. (2019) found similar results, with positive findings in both types of institutions regarding the use of technologies in early childhood education. However, Mamat et al. (2020) discovered that preschool teachers in the public sector are better at integrating ICTs to monitor and evaluate student progress compared to those in the private sector.

In turn, no differences were observed between teachers' age and their perception of the usefulness and ease of use of ICTs. Juraković et al. (2020) and Batrakova (2024) reached similar conclusions, suggesting that there is no significant disparity in the favorable perception of ICT use between educators under and over 35 years of age; this demonstrates a positive stance towards the integration of ICTs in early childhood education environments.

No significant differences were found in the perceived usefulness and ease of use of ICTs in relation to years of teaching experience. However, according to the findings of Lee et al. (2016) and Xie et al. (2019), teachers with more experience show a more positive attitude towards the use of applications for early childhood education compared to those with fewer years of experience.

## Conclusions

The majority of participating teachers (73 %) were between 21 and 38 years old. Fifty-two percent had between one and nine years of work experience. A background in education predominated (90 %), indicating a high level of specialization in the field. The teachers were almost equally distributed between public (51 %) and private (49 %) schools, with the majority teaching third grade (54 %). Notably, 100 % of them used technology for educational purposes, reflecting a widespread adoption of technological tools in their teaching practice.

It was found that 69 % of teachers expressed a high level of agreement regarding the perceived usefulness of technology in education, while 31 % expressed some doubts about its effectiveness. Furthermore, the perception of the ease of use of ICT was mostly positive, with 81% of teachers indicating a high level of agreement. This suggests that, in general, participants identify ICT as accessible and manageable for their teaching practice.

The teachers in the study had a moderate perception of the usefulness of technology and a high perception of its ease of use. It is noteworthy that no significant differences were found between these perceptions, the level of education, or the type of school where the teachers work. This suggests that the perception of technology use is consistent among educators, regardless of their educational context or level of academic training.

There was insufficient statistical evidence of an association between age, years of teaching experience and level of education with the usefulness and ease of use of ICT; that is, teachers maintain a congruent and consistent perception regarding the use of digital technologies in the educational context, regardless of these factors.

From a practical perspective, the results of the study indicate that it is crucial to optimize the performance of ICT by teachers, with the purpose of strengthening their perception of the usefulness and ease of use of the technologies, making them aware of their benefits and promoting a more positive attitude towards their integration in the classroom.

Based on the above and considering the findings presented, the following strategies are proposed to improve teaching practice in relation to the use of technology in the classroom (Nazarenko and Andriushchenko, 2019; Ihmeideh and Maadadi, 2018).

- a) Review and update curricula to include the use of ICT in a coherent and effective manner, ensuring that technologies are used as complementary learning tools.
- b) Offer teachers regular workshops focused on how ICT can improve students' concentration, cognitive development, and psychomotor skills.
- c) Integrate technological applications that promote concentration and cognitive development through interactive and playful activities.
- d) Incorporate gamification strategies that develop psychomotor and cognitive skills, such as drawing apps, digital puzzles, and movement games.

Finally, these theoretical and practical contributions not only enrich academic knowledge about the integration of ICT in preschool education, but also suggest the development of future research and lay the foundation for the development of educational policies that promote the effective use of technologies in the classroom.

## Future lines of research

As a possible line of research, it is suggested that the study be expanded to different regions and educational contexts in order to compare the effectiveness and teachers' perceptions of the usefulness and ease of use of ICT in diverse populations. Similarly, the effectiveness of various digital tools in classroom activities should be investigated, as well as how these tools can improve efficiency and the learning environment.

On the other hand, a relevant and necessary aspect to study is the development and implementation of educational policies that promote the use of ICT in preschool education; as well as evaluating their effectiveness in student performance.

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