

Received: 29/09/2022 - Accepted: 24/10/2022 - Published: 02/01/2023

KNOWLEDGE AND APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGY BY EARLY CHILDHOOD EDUCATION TEACHERS IN A SELECTION OF PRIVATE SCHOOLS IN MIRANDA STATE – VENEZUELA

CONOCIMIENTO Y APLICACIÓN DE LAS TECNOLOGÍAS DE LA INFORMACIÓN Y LAS COMUNICACIONES DE LOS DOCENTES DE EDUCACIÓN INICIAL DE UNA SELECCIÓN DE COLEGIOS PRIVADOS DEL ESTADO MIRANDA, VENEZUELA

Elizabeth Michailoff Calvo: Universidad Metropolitana. Caracas - Venezuela
emichailoff@correo.unimet.edu.ve

Ana Grossmann Zamora: Universidad Metropolitana. Caracas - Venezuela
ana.grossmann@correo.unimet.edu.ve

Milagros Briceño Marcano: Universidad Metropolitana. Caracas - Venezuela
mbriceno@unimet.edu.ve

How to cite the article:

Michailoff Calvo, E., Grossmann Zamora, A., & Briceño Marcano, M. (2023). Knowledge and application of Information and Communication Technology by early childhood education teachers in a selection of private schools in Miranda state – Venezuela. *Revista de Comunicación de la SECCI*, 56, 49-66.
<http://doi.org/10.15198/seeci.2023.56.e815>

ABSTRACT

The main purpose of this work was to analyze the level of knowledge, application, and disposition towards Information and Communication Technologies (hereinafter ICT) by early childhood teachers in a selection of private schools. Three specific goals were suggested: to research the knowledge that teachers have about the use of ICT, to know the technological tools that teachers apply to children, and to describe the teaching strategies used in connection with technology. On the other hand, the methodology used was a mixed approach of non-experimental design. The data collection was carried out through three instruments: a questionnaire aimed at all the teachers of early childhood education, an interview directed at a selection of the teachers of the initial level, and an interview directed at the principals or coordinators of the 7 private schools of Miranda State. The data collected through each of the instruments were categorized and graphed, to subsequently be analyzed through a triangulation process. The main results were linked to how technology is perceived as an ally that benefits and supports the teaching process; most teachers have a medium level of technological knowledge, and wish to continue training in this area. Last of all,

both educational centers and their teaching teams see ICTs as an opportunity for change and development.

Keywords: Educational technology, ICT, early childhood education, preschool teachers, teacher education, teacher qualifications, educational strategies, distance education, educational development.

RESUMEN

El presente trabajo tuvo como objetivo principal analizar el nivel de conocimiento, aplicación y disposición ante las Tecnologías de la Información y las Comunicaciones (en adelante TIC) en los docentes del nivel de Educación Inicial de una selección de colegios privados. Se plantearon tres objetivos específicos referidos a indagar el conocimiento que tienen los docentes acerca del uso de las TIC, conocer las herramientas tecnológicas que aplican los docentes con los niños y describir las estrategias didácticas utilizadas vinculadas con la tecnología. Por otro lado, la metodología empleada fue de enfoque mixto de diseño no experimental. La recolección de datos se realizó por medio de tres instrumentos: un cuestionario dirigido a todos los docentes de educación inicial, una entrevista dirigida a una selección de los docentes del nivel inicial y una entrevista dirigida a los directivos o coordinadores de los 7 colegios privados del estado Miranda. Los datos recolectados mediante cada uno de los instrumentos fueron categorizados y graficados, para posteriormente ser analizados a través de un proceso de triangulación. Los principales resultados estuvieron vinculados en cómo se percibe la tecnología como un aliado que beneficia y apoya al proceso de enseñanza, en su mayoría los docentes tienen un nivel medio en conocimientos tecnológicos, desean continuar formándose en esta materia y por último tanto los centros educativos como sus equipos docentes ven las TIC como una oportunidad de cambio y desarrollo.

Palabras clave: Tecnología educacional, TIC, educación de la primera infancia, docente de preescolar, formación de docentes, competencias del docente, estrategias educativas, educación a distancia, desarrollo de la educación.

CONHECIMENTO E APLICAÇÃO DE TECNOLOGIAS DE INFORMAÇÃO E COMUNICAÇÃO DOS PROFESSORES DE EDUCAÇÃO INICIAL DE UMA SELEÇÃO DE ESCOLAS PRIVADAS DO ESTADO DE MIRANDA, VENEZUELA

RESUMO

O principal objetivo deste trabalho foi analisar o nível de conhecimento, aplicação e disposição para as Tecnologias de Informação e Comunicação (doravante TIC) em professores do nível de Educação Inicial em uma seleção de escolas privadas. Foram propostos três objetivos específicos, referentes a pesquisar o conhecimento que os professores têm sobre o uso das TIC, conhecer as ferramentas tecnológicas que os professores aplicam com as crianças e descrever as estratégias de ensino utilizadas em relação à tecnologia. Por outro lado, a metodologia utilizada foi uma abordagem mista de design não experimental. A coleta de dados foi realizada por meio de três

instrumentos: um questionário direcionado a todos os professores da educação inicial, uma entrevista direcionada a uma seleção dos professores do nível inicial e uma entrevista direcionada aos diretores ou coordenadores das 7 escolas particulares do Estado de Miranda. Os dados coletados por meio de cada um dos instrumentos foram categorizados e colocados em gráficos, para posteriormente serem analisados por meio de um processo de triangulação. Os principais resultados estiveram ligados à forma como a tecnologia é percebida como uma aliada que beneficia e apoia o processo de ensino, a maioria dos professores tem um nível médio de conhecimento tecnológico, deseja continuar a formação nesta matéria e por fim tanto os centros educativos como as suas equipas docentes veem as TIC como uma oportunidade de mudança e desenvolvimento.

Palavras chave: Tecnologia educacional, TIC, educação infantil, professor de educação infantil, formação de professores, competências docentes, estratégias educacionais, educação a distância, desenvolvimento educacional.

Translation by **Paula González** (Universidad Católica Andrés Bello, Venezuela)

1. INTRODUCTION

Today we live in a society updated through technology, which has been evolving rapidly and occupying an important space that has led to changes and transformations of a cultural, social, and economic nature. Technology, in turn, has been introduced in the work and educational environments; especially the latter has faced and continues to face certain obstacles regarding the integration of technologies in teaching-learning, finding the gap between digital natives and teachers, digital literacy, poor training for teachers for the implementation of ICT, among others.

According to Prendes and Cerdán (2021), technological diversity is a great challenge, which implies technological training in each of the areas of education. Technology is advancing at a dizzying pace, which leads to new models and teaching-learning strategies for the assimilation of technological changes, besides promoting training for a labor market with new demands. As expressed by Prendes and Cerdán (2021), advances in the area of Science and Technology have led to a constant evolution in the various fields of knowledge, including education. The production of information implies the design of a set of networks and channels to process, store and disseminate knowledge; this makes possible the massification to different users, at different educational levels.

Therefore, the incorporation of any ICT tool in the educational context begins with the teachers, by providing adequate training for their integration into the professional practice of teaching and research. Understanding that to properly take advantage of the benefits that these tools can bring to the sector, it is necessary to train teachers both in their management and the use they can make of them. For ICT to be incorporated into the educational field, two main pillars are needed: effective communication between the members of the educational community and, on the other hand, the continuous training of teachers in the field of cutting-edge technologies, the latter being key to the success of their inclusion and integration. Cabero et al. (2015) emphasize the importance of having technical knowledge about how ICTs work and

the development of competencies to know how and in what to employ them; "they must also possess pedagogical knowledge, regarding how to teach effectively and, finally, knowledge about the content or discipline regarding the subject they must teach" (p. 2). According to Cabero et al. (2015) knowledge about subject content, pedagogical knowledge, and technological knowledge, are fundamental areas in the teacher training process.

The constant updates in these times of pandemic where teachers have had to perform their work remotely through the Internet to continue advancing in their roles as teachers have allowed many to be obliged to use them; although not everyone has the simultaneous knowledge to understand it. However, it could be said that the problem in the digital field that arises between educators and ICT is shown when the formal education system is paralyzed or has an impassive evolution compared to the changes that occur in society. ICTs have been progressively permeating education, in many cases satisfactorily; in others, with difficulties inherent to the environment.

In recent times, it has been seen how young people at an early age know how to handle technologies better than adults, this is due to the constant growth of this area, without staying static and go along with innovations and technological advances. Many educational institutions take this advantage for a more effective incorporation of technology in the classroom, for a more meaningful and contextualized education.

Currently, technology has become a valuable ally for the comprehensive formation of citizens that any country needs to achieve full social, cultural, and economic development. In Venezuela, it can be considered that there are many limitations regarding this issue, but there are institutions where the multiple advantages offered by ICT are evidenced, integrating them into the existing educational plans. These advantages of ICTs allow us to see the incorporation of technological apps as a valuable contribution to teaching and learning, significantly impacting the learning of children and young people, transforming the curriculum, and being a part of the teaching process.

ICTs in the knowledge society are the axis for information access, implying new challenges and a change for the teaching activity that requires new skills and the development of technological competencies (Solano et al., 2018). This is why it is necessary that teacher training includes the management and knowledge of ICT so that it originates learning that will include new challenges and change the way teachers educate. But technology advances and teachers must be prepared and updated to take full advantage of it.

That is why teacher training must be supported by the digital competencies necessary for the use of ICT in their work environment. This means that teachers must learn to use technology from a pedagogical point of view, taking into account the goals, objectives, pedagogy, and didactics to fulfill their mission in the 21st century (Cabero and Martínez, 2019). From this, it is inferred, that besides being trained in the technological part, it is also important that they expand their instrumental training through the use of didactic tools for the performance of their work, and the development of the teaching-learning process that facilitates achieving significant

knowledge.

After the global advent of COVID-19 and the new biosafety and social isolation measures, the way was opened to communication and interaction through new technologies (Ramirez, 2020). The consequence is that face-to-face classes in schools have been suspended to give way temporarily to distance education. According to UNESCO reports, by March 2020, 138 countries worldwide had closed their schools and universities, affecting 80 percent of the student population, i.e., 1.37 billion students. Furthermore, worldwide, about 60.2 million teachers stopped working in the classroom (UNESCO, 2020). Given this situation, to address distance education, many countries have used social networks as a tool to bring teachers and students closer together, as well as public television to offer courses for students of all ages, and to train teachers, taking into consideration that the Internet is not available to everyone.

Regarding this particular, but at a national level, according to the article "In times of pandemic, Venezuela's digital gap brings new inequalities to education", the most important deficiency in Internet connections in Latin America is in Venezuela due to the minimal funding in this sector by the national government; in 2019, Venezuela ranked 175th out of 176 countries in the ranking (Ramirez, 2020).

Now, regarding distance education in schools in Venezuela, according to a report by CECODAP (2020), 72% of respondents rated distance education with children and adolescents as deficient. On the other hand, according to Alzuru (2020), the Venezuelan Federation of Teachers conducted between July and August 2020 a study with researchers from different institutions in the country, called "Venezuelans amid the coronavirus pandemic"; they interviewed 602 people, 60% teachers and 40% between students and parents. The figures that resulted are really significant, 93% of those interviewed consider that most of the students and their parents do not have the digital training in programs and apps to face the plan "Cada Familia una Escuela" (**Every family a school**), proposed by the Ministry of Education until face-to-face classes are resumed.

Similarly, there is also the issue of teacher training, which, according to the aforementioned research, 90% of teachers do not have digital training either. That is, they are not prepared to assume this modality. To achieve continuity in virtual education, teacher training in multimodal teaching and evaluation strategies is necessary, as expressed by Aguilar (2020).

On the other hand, the president of the National Association of Private Educational Institutes (ANDIEP) said in an interview that not all teachers are trained for distance education, there is a lack of preparation. However, private education is the one that has been the best able to support it, but this sector only represents 18% of the national education system (Romero, 2020).

From the perspective of the subject of this research, it could be said that the pandemic has generated a change in the educational system since it has been forced to integrate ICT tools as a didactic strategy in the educational process. Thus, the importance and need for training educators in the proper management of apps and their use in the classroom to be able to respond to the demand of students and themselves as

educators are evident.

At present, training is proposed around two areas: the competencies that a teacher should achieve from the conceptual, procedural, and attitudinal points of view; and how this training should be managed to achieve optimal results and learning opportunities that have an impact on the classroom (Hernández, 2017). This implies that teacher training in early childhood education should not be limited to the acquisition of technical skills in the use of technological equipment but should offer pedagogical knowledge and experiences of what it means to integrate ICT in the classroom, plan learning experiences that positively impact students and represent a challenge in the face of new technologies. It should be taken into account that the role that teachers play is the result of their own paradigm in which their beliefs about reality, education, students, learning, and their values are the starting point from which they will conceive and develop competencies. Technology is the means or instrument used by the teacher to educate, but it will depend on the pedagogy used, the results, and the achievement of the objectives set (Prensky, 2011).

Undoubtedly, nowadays initial education teachers face a great challenge in the face of technologies and distance education since their use implies the implementation of new didactic skills and ways to approach educational action; however, the challenge goes beyond incorporating technology, it is to reflect on educational practices and how ICTs impact what is done in the classroom.

Hence the need to conduct this research, to analyze the level of knowledge and application of Information and Communication Technologies of teachers at the Early Education level of a selection of private schools in the Miranda state - Venezuela. This research work will allow us to research the knowledge that teachers have about the use of information and communication technologies, to know the technological tools that teachers apply with children at the Early Education level, and describe the didactic strategies used by teachers in which information and communication technologies are incorporated, which will provide information for other researches to promote the creation of strategies that allow adequate management of ICT in the classroom.

2. OBJECTIVES

General Objective: To analyze the level of knowledge and application of Information and Communication Technologies of teachers at the Early Childhood Education level.

Specific Objectives

1. To research the knowledge that teachers have about the use of Information and Communication Technologies.
2. To know the technological tools that teachers use with children at the Early Childhood Education level.
3. To describe the didactic strategies used by teachers in which information and communication technologies are incorporated.

3. METHODOLOGY

This is mixed research because it contemplates a quantitative and qualitative approach, as well as a set of systematic, empirical, and critical processes. On the other hand, the design is cross-sectional since the data collection was carried out in a single period. It is also experimental because the variables were not manipulated deliberately and, finally, it is of concurrent triangulation because besides simultaneously collecting quantitative and qualitative data, they were analyzed by cross-validation between them, to establish patterns of comparison and reach conclusions (Hernández et al., 2010).

This research is descriptive because it seeks to detail the implication of ICT in the current educational system, emphasizing the knowledge that teachers have about the use and management of these technologies.

Regarding the variables, dimensions, and indicators 3 variables were defined, which are: Level of ICT Knowledge, Technological Tools, and Didactic Strategies, each with two dimensions and their respective indicators.

As for the scenario and key informants, 7 private schools selected in municipalities of the Miranda state of Venezuela, such as: Baruta, Chacao, Hatillo, and Sucre, where the people who will answer the questions posed are located, are presented as the scenario of the research. These schools were selected because they were easily accessible to the researchers. The principals/coordinators were the key informants, being the link with the participating preschool teachers, and the potential informants were 94 preschool teachers from the 7 schools.

On the other hand, the type of sampling used was intentional non-probabilistic because their selection was determined based on the researchers' judgment, in which they defined as criteria:

For quantitative and qualitative informants:

1st. Coordinator of the initial level stage (nursery and preschool) with availability and accessibility.

2nd. Teachers of the initial level stage (nursery and preschool) with availability and accessibility.

3rd and last, preferably belonging to different age groups.

For the selection of scenarios, it was taken into consideration that the group of schools selected did not have the same technological level. Of the 94 potential informants, 51 teachers answered the quantitative instrument, and the qualitative information was obtained from 2 groups, one of 21 early education teachers and the other of 7 coordinators.

Regarding the data collection techniques and instruments, for the quantitative data, the questionnaire technique was used and applied to a large group of early childhood teachers, who were previously identified as potential informants, distributed among

the 7 selected schools. This technique was used to research the level of knowledge that teachers have about the use and application of different technological tools, as well as the availability of ICT resources in their educational center. The questionnaire was carried out through Google Forms, its questions were simple, multiple, linear, and selection, as well as others. For its application, the link to the questionnaire was sent to the coordinator of the educational center, who was in charge of its distribution via email to the teachers.

Then, for the collection of qualitative data, a semi-structured interview was applied in a non-face-to-face manner to a group of teachers and coordinators of the initial stage, with open-ended questions. These interviews were conducted through Zoom, video calls through Whatsapp, and phone calls.

The objective of the interviews with the group of 21 teachers was to know their opinion about the management of ICT in their teaching process, their interest, and their need for training on the subject. And in the case of the interview with the 7 coordinators, the purpose was to know their opinion about ICT knowledge and integration in their educational center, as well as to know what their teacher training plan on technologies has been.

For the expert validation process, 3 data collection instruments were developed, taking into account the variables, dimensions, and indicators mentioned above. After this, a group of 12 experts, 8 of them from the technology area and 4 from the methodology area were sent a letter of presentation and an evaluation instrument. They made a series of recommendations and suggestions for improvement and subsequent application.

Three data analysis techniques were used. The first technique used was graphical to represent the information in an organized and visual way through numerical data. The second technique was that of categorization, for which, first, the information collected in the interviews was transcribed and then grouped in a matrix through keywords and categories. At the end of this process, the quantitative and qualitative data were compared and analyzed using the triangulation technique, to contrast the views of the 3 groups of informants (Hernández et al., 2010).

4. RESULTS

The following is a summary of the analysis of the results organized by each of the dimensions of the instruments:

DIMENSION 1: Teacher

The purpose of the teaching dimension was to measure knowledge about ICT, willingness to use ICT in the classroom, and integration of ICT in the classroom. The following information was found through this dimension:

Concerning ICT knowledge, all the surveyed teachers showed interest in knowing about them because they are a resource that contributes to improving and facilitating

teaching. It could be evidenced that the educators' interest in knowing about the topic is 100% for the total of the studied scenario.

According to teachers' knowledge of ICTs, 48% stated that ICTs are a tool that enriches students' education and fosters creativity and self-learning; while 31%, 16/51, teachers indicated that it is a resource to improve teaching, and 22%, 11/51, stated that it is a support instrument for classroom teaching.

For their part, the principals interviewed agreed that the teachers at their schools have a medium-high level of ICT knowledge. In turn, the teachers interviewed stated that they had a medium-high level of knowledge, which corroborates the perception that the principals/coordinators have of their work teams. As for the level of willingness, all the teachers interviewed indicated that they were well disposed to the use of ICT in the classroom, while the principals also noted a high willingness of the teachers to use ICT. Therefore, it is confirmed that the group of teachers surveyed has a high willingness to use ICTs.

Regarding the integration of ICT in teaching, there are different but not antagonistic views among the teachers consulted and the principals/coordinators interviewed, the former visualize the integration through the educational program, indicating that the integration of ICT has had a favorable change in the teaching activity and the latter consider that they should be linked to the curriculum. On the other hand, the consultation with the group of teachers interviewed had a specific ICT integration approach, related to classroom activities. According to the following question, what has the integration of ICTs into the educational model meant to you? The following results were obtained; 88%, 45/51, indicated that ICT integration had a favorable change; 76%, 39/51, stated that it was an opportunity for growth; 75%, 38/51, supported digital updating; 65%, 33/51, indicated having connectivity problems; 41%, 21/51, expressed that it was difficult to use, and 39%, 20/51, stated that there is a lack of teacher preparation for the use of ICT.

DIMENSION 2: Educational Center

The principals consulted regarding the infrastructure of their educational centers in terms of technological resources, which is one of the pillars to be taken into account in the integration of ICTs, stated that they have different resources, among which computers, tablets, televisions, DVDs, projectors, among others, stand out. On the other hand, some principals stated that they have computer rooms; they also stated that the school plans to create a Teknikids classroom, and another expressed that they would like to incorporate interactive whiteboards in the future. This information can be traced back to the theoretical framework of this research, where mention is made of the resources most used in the classrooms, as well as the availability of space for computers. Regarding the consultation, a principal oriented their response towards what they are doing in their school to support their teachers in the pandemic situation, where the educational process was carried out at a distance, for this purpose, they provided technological equipment to their teachers to give continuity to the classes.

According to the questionnaire applied to the teachers; 63%, 32/51, consider that the disposition that the educational centers have toward the use of ICT is at a medium level, 35%, 18/51, at a high level, and 2%, 1/51, at a low level.

Concerning the presence and availability of technological resources in the educational centers, the group of teachers interviewed in general expressed in a very varied manner that their schools do indeed have some of the options addressed in the interview; coinciding with the presentation of the principals regarding this point.

Concerning the information gathered from the teachers' questionnaire related to this aspect, it is found that, although the question asked was not the same as the one asked to the smaller selection of teachers and directors, it can be inferred from the answer they gave about the frequency of use of ICT by their students, that most of their schools have ICT in their schools, thus complementing the three answers of the informants.

At least half of this last group of teachers consulted, denied that their schools have a defined schedule for students to make use of ICT in the classroom, while the other half of the group stated that they have pre-established schedules within the daily schedule for students to make use of these resources. Additionally, a majority of the group responded that their students use ICTs one to two days a week; the percentage of teachers who indicated that their students never interact with ICTs in the classroom was very low.

DIMENSION 3: Technological Resources

In the interview with the teachers, they expressed that to use ICT, it was necessary to seek support to learn how to use and implement the different resources associated with these technologies for the teaching-learning processes; most of them did it in a self-taught way and by self-exploration; also, a group chose to seek help in their environment; finally, almost all of them agreed that it is relevant to continue using ICT resources and/or apps when resuming face-to-face classes.

The least used technological resources in the classroom before the pandemic are in the low category with 54%, among the least used are: Peripheral Resources (printer); some Audiovisual Resources (digital camera, video camera, and projector), and Digital Resources (digital whiteboard and tablets). At the medium level, 33% of the most used resources are from the Audiovisual group (audio players, video players, television), at the high level 12% of the most used are from mixed groups, among them: the audio player, the digital whiteboard, the smartphone, and the computer.

The mastery of technological resources by the teachers consulted through the questionnaire, evidences that the level of mastery is concentrated in the high range for most of the audiovisual and digital resources, with 41%; followed by the medium level with 31% among audiovisual, digital, and peripheral resources; the low level with 19% groups the following classification of resources: audiovisual, digital, and peripheral; and none with 8%, among resources of digital and audiovisual nature.

The least used technological resource in distance modality classes during the pandemic reached a low level of 43%; among them are: Audiovisual resources (Television, Video player, Projector, and Video camera), some digital resources (Digital whiteboard and Tablet) and the printer as a peripheral resource; the medium level reached 29%, among the most used resources at this level are the digital and process resources (Smartphone and Computer) and among the Audiovisual resources, the audio player, among others. Finally, the high level obtained 27%, among the most used resources are the computer, smartphones, digital whiteboards, and tablets; belonging to the digital and process resources.

The majority of teachers, 48%, indicated that they did not know the wide range of apps consulted. Among those with the least knowledge are: Socrative, Kahoot, and Educaplay corresponding to the interactive game group; Pooplet, Goconqr, Icuaderno by Rubio, and Edmodo among the group of creating work environments and collaborating/discussing/communicating. However, the high level is 19%, followed by the medium level at 17% and the low level at 16%. Among the apps that stand out for having greater knowledge are: Whatsapp, Zoom, Google Drive, Google Presentations, Google Docs, Google Calendar, Classroom, and Google Meet.

For their part, the principals rate the mastery of the apps and programs by their teachers as quite good, indicating that more than half, even from before the pandemic knew them, among those that stand out, are: Whatsapp, Zoom, Google Drive, Google Presentations, Google Docs, Google Calendar, Classroom, Google Meet; in this particular, they agree with what was reported by the teachers consulted, but these also reported that from the drop-down of apps presented to know how wide and varied their knowledge was in this matter, it was discovered that for a significant group of informants, there are many apps about which they do not know and that they had not used before, limiting their knowledge to those mentioned above.

DIMENSION 4: Updating

The purpose of the updating dimension was to determine the interest in ICT training, the modality of the updating programs, and the topics of interest. The following information was found through this dimension:

The training received with the use of ICT in the teaching career according to the respondents indicates that 35%, 18/51, had optimal training, 25% corresponds to the sufficient level, 13/51 consulted; followed by 24%, 12/51 who did not respond to the question, and 16%, 8/51 for which the training was insufficient.

100% of the informants agreed to continue receiving training since it is of utmost importance to have the necessary knowledge to use technology as a complement to school activities.

The school principals/coordinators interviewed were interested in having their teachers trained in ICT, recognizing that teachers need to make the most of these resources, so much so that most educators received induction on the subject under study, coordinating courses, workshops, and talks to reinforce knowledge on the use of apps and equipment; another group received talks and webinars on notions to learn how to

use the set of ICTs to be used in their classes, among other initiatives to support the teaching team. When the responses of the teachers interviewed were compared with those of the principals, it was found that they complement each other. In this order of ideas, it can be noted that even when teachers are not tacitly asked about the type of training they received, they are asked about how they would qualify the training received in the use of ICTs, obtaining a high level of satisfaction, thus reinforcing the results obtained by the principals and the teachers interviewed. Regarding the teachers interviewed, they agreed to continue receiving training to keep themselves updated on issues related to technology.

It seems to the groups of informants that a suitable option to continue training is through the mixed modality; that is, face-to-face and virtual.

Concerning the topics of interest for training, despite having different proposals, both principals and teachers agree with the management and importance that Information and Communication Technologies should have in the classroom and that their contents should be based on the creation of didactic materials for the use of these tools, where teachers can become familiar with ICTs to manage classes effectively with their students. The teachers interviewed indicated some areas of interest to continue receiving training from the educational center, with the most relevant areas being those related to training in the use of ICT; development of didactic material; implementation and training in apps; evaluation of online didactic games, and creation of interactive spaces.

Specifically, some of the contents that teachers prefer to be addressed in their training in the use of ICTs are:

- 90.2%, 46/51 Elaboration of didactic material.
- 82.4%, 42/51 Evaluation of didactic games on the Internet.
- 86.3%, 44/51 Implementation of and training in APPS
- 74.5%, 38/51 Creation of interactive spaces with presentations and Google Slides
- 62.7%, 32/51 Gamification
- 62.7%, 32/51 Use of apps for Task Management

DIMENSION 5: Methodology and types

The purpose of the methodologies and types dimension was to learn about the methodologies used and types of strategies that integrate ICTs. The following information was found through this dimension:

According to what was raised by the teachers consulted, it could be evidenced that the type of methodology that had the greatest predominance over the others was Projects with 90%, 46/51; followed by the methodology Didactic game with 63%, 32/51, Thinking-based learning was also present with 47%, 24/51; Problem-solving and Cooperative work 35%, 18/51; finally, Flipped Classroom and Design Thinking with 33% each, 17/51.

The didactic strategies employed for the use of ICTs in the teaching process, are found to be the most important and with the highest percentage:

- 88% Didactic game
- 65% Creation and projection of videos
- 57% Experimentation
- 45% Interactive Reading
- 24% Reading and Writing Corners
- 22% Creation of the computer corner within the classroom.
- Among others.

In the theoretical framework of this research, the topic of the impact of ICT in education was addressed, as well as the need to use new methodologies and strategies that enhance the teaching and learning process, making use of these, so, obtaining such a positive response from the informants leads the researchers to think that the educational centers are receptive, as well as on the part of the teachers in this regard. In the interviews conducted, the principals/coordinators talked about how ICTs have impacted their schools and agreed that their teachers have positively accepted all the changes made in methodologies, didactic strategies, adaptations in planning, and content, among others. For their part, the teachers interviewed stated that there is a great difference in the teaching methodology before and after the pandemic; clearly because they have had to adapt to a greater presence of ICT in teaching; these teachers stated that among the most important pedagogical methodologies for them currently are: songs, interactive presentations, meaningful and playful activities, didactic games, videos, and creativity and innovation. However, before the pandemic the most used methodology for classes as provided by teachers are: projects, didactic games, and thinking-based learning.

All the principals interviewed agree that the incorporation of ICT into the educational system is not transitory, but rather it came to be included in current education, and the teachers interviewed consider that it is a complementary activity; other teachers see ICT as a support tool to be integrated into didactic strategies in the classroom because they are beneficial for the teacher's teaching and the student's learning. Among the most important strategies with the greatest presence, they highlighted didactic games, the creation and projection of videos, experimentation, and interactive reading.

DIMENSION 6: Application

The purpose of the application dimension was to learn about didactic strategies used in the classroom. The following information was found through this dimension:

Michailoff Calvo, E., Grossmann Zamora, A., & Briceño Marcano, M.
Knowledge and application of Information and Communication Technology by early
childhood education teachers in a selection of private schools in Miranda state – Venezuela.

The application of didactic strategies with the use of ICT in the classroom to favor student learning occupied the medium level with 55%, 28/51; high level with 45%, 23/51, and low level with 2%, 1/51.

Practically all the principals interviewed indicated that they are committed to supporting the application of different didactic strategies mediated by ICT in the classroom. On the other hand, the teachers interviewed indicated that the didactic strategies they use most frequently are visual, followed by auditory, playful, cognitive, kinesthetic, and all those in which the child can manipulate and experiment with their environment. As for the level of application of the didactic strategies, practically all the teachers expressed a good level of application of these strategies, because they favor the learning of their students.

5. CONCLUSIONS AND DISCUSSION

The conclusions in scientific research are constructs that allow exposure of the final data of the research; it is the expression of the results obtained to carry out the approximations for future steps.

The main conclusions of this research are presented below:

For specific objective 1: To research the knowledge that teachers have about the use of Information and Communication Technologies.

It was possible to conclude that the teachers and principals belonging to the scenarios and informants, had a degree of knowledge in some technological tools and resources so it can be said that this tool did not have a great affectation because they knew how to use them, in some cases the lack of knowledge was little since they always maintained a good disposition to learn and somehow integrate these tools in their daily activities, without remaining static to the changes that have been presented through distance education.

The disposition that schools have maintained before, during, and after the pandemic has been to keep their teachers informed in all aspects related to ICT, they have been concerned about keeping them at the forefront through induction (courses, and workshops, among others); as they have always been open to the idea and the integration of information and communication technologies, as it becomes a support for teaching in the classroom. Furthermore, they are tools that enrich students' education and encourage creativity and self-learning.

For specific objective 2: To know the technological tools used by teachers with children at the Early Education level.

The technological tools used or implemented for the teaching and learning processes by the teachers were learned in a self-taught way and by self-exploration and others seeking help from their environment. The apps and programs that most of the schools use are Zoom, PowerPoint, Google Meet, and Google Drive since they are more effective to perform tasks and evaluations, and staying integrated with the students without the need for face-to-face classes. The results highlight the importance of

teacher training in ICT so that they can guide students in the learning process and encourage them to use technological tools during their learning. In early education, these are pedagogical tools of great value, because they allow children to be more dynamic and innovative in their learning process, contributing to their comprehensive development. Knowing the technological tools that can be used in early education allows the design of plans using ICTs that enhance cognitive development in an affective environment that stimulates imagination, the search for solutions, and children's creative thinking.

Regarding specific objective 3: To describe the didactic strategies used by teachers in which information and communication technologies are incorporated.

The teachers who were part of the study expressed, that some of the didactic strategies currently used in which ICT are incorporated are audiovisual, and interactive, and include the participation of students; however, it is considered necessary that school authorities initiate a training process on information technologies aimed at teachers, to transform the teaching activities and incorporate them in the classroom, to allow the emergence of new didactic strategies or at the same time develop those already proposed with the knowledge acquired through courses and workshops.

It should be noted that didactic strategies should be adapted to the student and the teacher, allowing the development of new didactic materials, which allow an alternative communication to favor the teaching-learning process, since this allows the teacher the possibility of rethinking activities, conceived as traditional teaching to expand and complement them with didactic planning that links ICT. Thus trying to close the digital gap in the access and use of technology, building a dynamic process of participation and student-teacher exchange.

Through the scope of these specific objectives, it can be determined that the general objective of the research referred to analyze, the level of knowledge and application of Information and Communication Technologies of teachers at the Early Education level, has been achieved; through a questionnaire addressed to 51 teachers, a semi-structured interview addressed to 21 teachers and 7 principals/coordinators, the research team fulfilled the stated objective, gathering precise information that would give total and percentage results and, thus, determine the level of knowledge that teachers have about the use of information and communication technologies.

6. REFERENCES

- Aguilar, N. (2020). *Desafíos de la Educación en Pandemia*. PRODAVINCI.
<https://bit.ly/3uOqhDZ>
- Alzuru, O. (2020). *Desafíos de la Educación en Pandemia*. PRODAVINCI.
<https://bit.ly/3pgO1PS>
- Cabero Almenara, J. Marín-Díaz, V. y Castaño Garrido, C. (2015). *Validación de la aplicación del modelo TPACK para la formación del profesorado en TIC*. Universidad De Córdoba. <https://helvia.uco.es/xmlui/handle/10396/17286>

Michailoff Calvo, E., Grossmann Zamora, A., & Briceño Marcano, M.
Knowledge and application of Information and Communication Technology by early
childhood education teachers in a selection of private schools in Miranda state – Venezuela.

- Cabero Almenara, J. y Martínez Gimeno, A. (2019). Las Tecnologías de la Información y Comunicación y la Formación Inicial de los Docentes. Modelos y Competencias Digitales. *Revista Profesorado*, 23(3), 247-257. <https://bit.ly/3uToayQ>
- CECODAP. (2020). *72% de los venezolanos califica la educación a distancia con niños y adolescentes como mala o deficiente*. CECODAP. <https://bit.ly/3fOzW9n>
- Hernández Cruz, G. (2017). *La formación permanente del docente en competencias interculturales*. Red de estudios sobre educación (REED). <https://bit.ly/2RgNu3O>
- Hernández Sampieri, R., Fernández Collado, C. y Baptista Lucio, P. (2010). Metodología de la investigación. McGraw-Hill. <https://bit.ly/3gaMPJT>
- Prendes Espinosa, M. y Cerdán Cartagena, F. (2021). Tecnologías avanzadas para afrontar el reto de la innovación educativa. *RIED Revista Iberoamericana de Educación a Distancia*, 24(1), 32-46. <https://bit.ly/3uQyFmu>
- Prensky, M. (2011). *Enseñar a nativos digitales*. SM.
- Ramírez, T. (2020). *En tiempos de pandemia, la brecha digital de Venezuela trae nuevas desigualdades a la enseñanza*. The Conversation. <https://bit.ly/3x7NUJI>
- Romero, F. (2020). Desafíos de la Educación en Pandemia. *PRODAVINCI*. <https://bit.ly/3piDQdN>
- Solano Hernández, E., Marín Juarros, V. y Rocha Vásquez, A. (2018). Competencias TIC en los docentes de las unidades tecnológicas de Santander. *Revista Interuniversitaria de Investigación en Tecnología Educativa*, 5, 67-83 <https://bit.ly/3fn7kx8>
- UNESCO (2020). *1.370 millones de estudiantes ya están en casa con el cierre de las escuelas de COVID-19, los ministros amplían los enfoques multimedia para asegurar la continuidad del aprendizaje*. UNESCO. <https://bit.ly/3vS7adA>

AUTHORS' CONTRIBUTIONS, FUNDING, AND ACKNOWLEDGMENTS

Authors' contributions:

Conceptualization: Michailoff Calvo, Elizabeth, Grossmann Zamora, Ana, and Briceño Marcano, Milagros. **Methodology:** Michailoff Calvo, Elizabeth, Grossmann Zamora, Ana, and Briceño Marcano, Milagros. **Software:** Not applicable. **Validation:** Michailoff Calvo, Elizabeth, Grossmann Zamora, Ana, and Briceño Marcano, Milagros. **Formal analysis:** Michailoff Calvo, Elizabeth, Grossmann Zamora, Ana, and Briceño Marcano, Milagros. **Data Curation:** Michailoff Calvo, Elizabeth, Grossmann Zamora, Ana, and Briceño Marcano, Milagros. **Writing-Preparation of the original draft:** Michailoff Calvo, Elizabeth, Grossmann Zamora, Ana, and Briceño Marcano, Milagros. **Writing-Revision and Editing:** Michailoff Calvo, Elizabeth Grossmann Zamora, Ana, and Briceño Marcano, Milagros. **Visualization:** Michailoff Calvo, Elizabeth. **Supervision:** Briceño Marcano, Milagros. **Project management:** Not

Michailoff Calvo, E., Grossmann Zamora, A., & Briceño Marcano, M.
Knowledge and application of Information and Communication Technology by early
childhood education teachers in a selection of private schools in Miranda state – Venezuela.

applicable. **All authors have read and accepted the published version of the manuscript:** Michailoff Calvo, Elizabeth Grossmann Zamora, Ana, and Briceño Marcano, Milagros.

AUTHOR/S:

Elizabeth Michailoff Calvo

Bachelor's Degree in Early Childhood Education. Graduated from Universidad Metropolitana. Substitute Assistant in Primary Education at Colegio Teresiano la Castellana. Volunteer at FUNDANA. Certification of different Masterclasses. UNIMET, about "Education in Pandemic Times", "Current Challenges for Education", "Educational Management and Innovation", and "Educational Experiences". Intermediate English Level B1, EC School - Bristol, England. Currently starting a Master's Degree in "Teaching Methodologies" at Universidad Nebrija, Madrid.

Orcid ID: <https://orcid.org/0000-0003-1080-9877>

Ana Teresa Grossmann Zamora

Undergraduate student of Early Childhood Education, Universidad Metropolitana. Classroom Assistant, Taller Infantil Burbujitas, High School Graduate of Science, Colegio San Ignacio de Loyola.

Orcid ID: <https://orcid.org/0000-0003-3853-9231>

Milagros Briceño Marcano

Post-doctorate in Philosophy and Educational Sciences. Ph.D. in Didactics of Educational Organizations, Universidad de Sevilla. Specialization in Technology, Learning, and Knowledge, Universidad Metropolitana. Professor of Preschool Education, Universidad Metropolitana. Ordinary Member of the Department of Educational Sciences, Universidad Metropolitana. University of affiliation: Universidad Metropolitana, Caracas, Venezuela.

Orcid ID: <https://orcid.org/0000-0002-2824-9890>

Google Scholar: <https://scholar.google.es/citations?user=UCV0eeIAAAJ&hl=es>