Level of self-perceived performance by future nursery educators on the pedagogical use of ITC

SELF-PERCEIVED LEVEL OF PERFORMANCE BY FUTURE PRESCHOOLER TEACHERS REGARDING THE USE OF ICT[1]

Nivel de desempeño autopercibido por futuras educadoras de párvulos sobre el uso pedagógico de TIC

Competências do século xxi: como desenvolvê-las através do uso de videogames em um contexto multigrau?

RECIBIDO: 12 DE OCTUBRE DE 2017 EVALUADO: 20 DICIEMBRE 2017 APROBADO: 10 ENERO 2018

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en

ABSTRACT

This work presents the preliminary results of a study conducted by a Chilean higher education institution which was aimed at establishing the self-perception of second and third year students of the Preschool Education Teaching program regarding their level of achievement on digital profi-ciency from a pedagogical dimension of usage of ICT. The methodology applied was quantitative with descriptive design. A total of 69 students of second and third year of training participated in the study taking the Digital Proficiency Self-evaluation Scale for Teaching Students, in their pedago-gical dimension. Results show that overall, students have a good perception regarding their performance in the pedagogical usage of ICT, except in the evaluative practice

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RESUMEN

En este trabajo se presentan los resultados preliminares de un estudio llevado a cabo en una institución de educación superior chilena, cuyo propósito estuvo orientado a establecer la autovaloración que poseen las estudiantes de 2º y 3º año de la carrera de Pedagogía en Educación Parvularia sobre el nivel de logro de su competencia digital, desde una dimensión pedagógica del uso de TIC. La metodología utilizada fue cuantitativa, con un diseño descriptivo. Participaron un total de 69 estudiantes de segundo y tercer año de formación, a quienes se les aplicó la Escala de autoevaluación de competencias digitales para estudiantes de Pedagogía, en su dimensión pedagógica. Los resultados evidencian que las estudiantes en general poseen una buena valoración sobre su desempeño en el uso

por

RESUMO

Este artigo apresenta os resultados preliminares de um estudo realizado em uma instituição de ensino superior chilena, cujo objetivo foi estabelecer a auto-avaliação dos alunos do 2º e 3º ano da carreira de Pedagogia na Educação Infantil sobre o nível de realização de sua competência digital, a partir de uma dimensão pedagógica do uso das TIC. A metodologia utilizada foi quan-titativa, com desenho descritivo. Participaram 69 alunos do segundo e terceiro anos de formação, aos quais foi aplicada a escala de autoavaliação de competências digitais para alunos de Pedagogia, na sua dimensão pedagógica. Os resultados mostram que os estudantes em geral têm uma boa avaliação do seu desempenho no uso pedagógico das TIC, exceto para a prática avaliativa apoiada em

[1] This work is part of Universidad del Bio-Bio's (Chile) 2016 Research and Innovation Project, entitled: "In-Depth Strategies in the Use of ICT From a Pedagogic Perspective for Students of Preschool Education Pedagogy and its Effect on Digital Competence", (Code: 160723/DdoC). Contact: cflores@ubiobio.cl

supported by ICT, yet, said perception is framed within a traditional teaching model.

pedagógico de TIC, salvo en lo que respecta a la práctica evaluativa apoyada por TIC, pero dicha valoración se enmarca en un modelo tradicional de enseñanza.

TIC, mas esta avaliação é enquadrada dentro de um modelo de ensino tradicional.

Keywords: Teachers' digital proficiency, pedagogical usage of ITC, teachers' training, preschool education

Palabras clave: Competencia digital docente, uso pedagógico de TIC, formación del profesorado, educación parvularia

Palavras chave*:* Competência pedagógica digital, uso pedagógico das TIC, formação de professores, educação infantil

PARA CITAR ESTE ARTÍCULO / TO CITE THIS ARTICLE / PARA CITAR ESTE ARTIGO:

Flores-Lueg, C., Mena-Bastías, C., Arteaga-González, P., Navarrete-Troncoso, L., & Gajardo-Rodríguez, A. (2018). Nivel de desempeño autopercibido por futuras educadoras de párvulos sobre el uso pedagógico de TIC. Revista Panorama, 12(22), 19 - 30.

DOI: http://dx.doi.org/10.15765/pnrm.v12i22.1070

INTRODUCTION

Currently, Information and Communications Technology (ICT) is part of every social sphere, and the abundant information in the existing literature accounts for it. However, this fact has affected different processes that take place in said area, particularly the people, since in order to actively participate on the emerging scenarios – working, social and personal – new competences must be developed nowadays, including, e.g., a critical and responsible use of mass media, especially the Internet, and the digital competence in all of its dimensions must be developed as well. This competence has become key knowledge for a graduate of any level or professional discipline and it must be acquired throughout the training process, because current society demands them to be able to actively and responsively participate in all of society's spheres by being efficient and creative in their tasks, providing answers to productive needs to technological innovation and by interacting in more and more globalized environments. All of these require future professionals to graduate being "competent in the mastery of specific codes, symbolic systems and interaction with information in digital format and through communication networks" (Arras, Torres y García-Valcarcel, 2011).

Concerning digital competence, it is important to highlight that it is a complex concept, given its polysemic nature, diverse definitions exist (European Commission, 2005; Gisbert *et al.*, 2011; Larrazt, 2012; Gutierrez, 2014). An analysis of said definitions led to the finding that all of them combine certain elements of informational alphabetization and technical mastery of technological and digital tools. Likewise, these definitions show a cognitive dimension, a communicative dimension and some even integrate ethical and legal aspects, assigning a sense to acquiring this competence (Flores-Lueg, 2014). Therefore, it can be concluded that digital competence encompasses a set of other competences or sub-competences which provide its multidimensional nature (Adell, 2010; Ferrari, 2013; Larrazt, 2012).

Considering the aforementioned, referring to digital competence requires knowing that it entails more than just using ICT, a capacity to critically identify and assess available information, mainly in digital format and accessed multimodally must also be developed; all the while, there is a challenge to learn how to decode and understand information circulating in the sociocultural-digital context to transform it into knowledge. From this perspective digital competence is understood as

> the mobilization of those skills and dexterities that allow seeking, critically selecting, obtaining and processing relevant information by using ICT to transform it into knowledge, while being able to communicate it using different technological and digital supports, acting responsibly, respecting pre-existing social norms and taking advantage of these tools to acquire information, learn, solve problems and communicate in different interaction scenarios (Flores, 2015, p. 27).

On the other hand, ICT is gaining more and more relevance in the education sphere, ICT's challenge is to provide answers to the requirements that are currently demanded by contemporary society, while education is in charge of contributing to the training of citizens of the 21st century. In that sense, it cannot be denied that the school (particularly the

Panorama | pp. 19-30| Volumen 12 | Número 22 | Enero-Junio | 2018 | ISSN Impreso 1909-7433 | E-ISSN en linea 2145-308X |

teachers) must be liable for this purpose. Thus, teachers are expected to own these tools and incorporate them in the teaching-learning process, in order to offer a more constructive and innovative way of teaching, tapping all of the educational possibilities offered by ICT-enabled environments, in so far as they encourage "learning mainly based on participative models, supported by collaborative learning and group work, with access to different activities and educational resources on the Internet, promoting active learning and strengthening communication and interaction among people" (Llorente *et al.*, 2015, p. 45). This demand to the teacher does not come without difficulties, teachers have the obligation to develop digital competence in all of its dimensions, and they must acquire other type of skills, dexterities and attitudes that enable an articulation of pedagogical and disciplinary knowledge with ICT, which is to say, to incorporate ICT from a pedagogical dimension, a challenge that needs to be considered early on in teacher training (Esteve *et al.,* 2016); in the words of Vaillant (2013) "initial teacher training may contribute to a reproductive system that perpetuates multiple inequities or, on the contrary, drive reforms justified on every student's right to learn" (p. 45).

Therefore, it is important to mention that incorporating ICT from a pedagogical dimension is a complex matter, certain barriers exist that, one way or another, have interfered in the educational use of these tools in the classroom, as mentioned by Diaz- Barriga (2010):

> Abundant literature manifests that the uses given to ICT in education are not oriented to quality improvement in its broader sense, but simply to make traditional classroom activity more efficient (p.132).

In terms of existing barriers, it is possible to highlight some teacher-related external and internal (personal) factors. As to the external factors, some authors (Fainholc *et al.,* 2013; UNESCO, 2004; Vaillant, 2013; Valverde *et al.*, 2010) advise that, historically, teacher ICT training process has been structured following a technical and instrumental rationale, which has caused teachers to have certain limitations in mastering the use of technology, along with a noticeable lack of trust in it (Suarez-Rodríguez *et al.*, 2011); a situation that is also evident in initial teacher training and that was warned over a decade ago by UNESCO (2004): "study plans for future teachers usually lack pedagogy and strategies to present content" (p. 65); likewise, often these plans fail to explain how to integrate technological tools to support said learning. Additionally, another external factor – of the utmost importance to us – is the discrepancy between school's training and society's demands (De Saint Pierre, 2008; Marin-Barbero, 2009; Silva, 2012). In that sense, there is an agreement with Vasquez-Cuperio and Lopez-Penedo (2016) when they explain that "educational systems are trying to face the 21st century's episteme" (p. 251). Consequently, one of the first challenges to incorporate ICT in the teaching-learning process implies understanding the educational process from a different perspective, one that navigates traditional teaching practices and student-centered educational practices that focus on students learning based on using these tools, taking into consideration the characteristics of the technological and digital context that surrounds them, as well as the new ways of learning that are being developed.

In terms of the internal or personal factors, several studies consider the teacher's attitude towards ICT (specifically a computer and the Internet) to be one of the variables with the largest incidence over the incorporation of these tools with educational purposes in the classroom (Kale and Goh, 2014; Gargallo *et al.,* 2006, 2010; Silva and Astudillo, 2012; Suarez-Rodriguez *et al*., 2012; Tejedor *et al*., 2009; Trujillo *et al*., 2011).

Similarly, "gender" and "educational level in training" are considered variables with incidence in the pedagogical use of these tools in the classroom (Flores, 2015; Suarez-Rodriguez *et al*., 2012; Almerich *et al*., 2011; Barrantes *et al*., 2014; Sainz, 2013); these results are very worrying considering the predominant presence of females in the teaching career in preschool and basic levels (Sainz, 2013), if children are mostly exposed to a female teacher, it could be concluded that they are clearly disadvantaged in terms of interaction with technologies in the classroom, in contrast with the higher education levels, in which male teachers are predominant.

In addition to the aforementioned, it is necessary to explain that there is concern at national and international level by different government and non-government institutions to establish the performance of ICT use to be achieved by each teacher, which has consequently materialized in the definition of standards. These proposals are an attempt to characterize desirable performance by future or practicing teachers in terms of what they must know, do and be when they integrate technologies to their teaching practices, but based on valid and quality criteria for a determined context. Particularly in Chile, the Ministry of Education defined the ICT Standards for Initial Teacher Training in 2008. To Silva (2011), this proposal represents a framework that acts as an itinerary between teachers' initial training and their first years as practitioners, conceived as an integrating and cross-sectional scheme of operating and curricular elements, aimed at developing cognitive skills and dexterities of teaching decision-making. This proposal applies five dimensions, namely: Pedagogical Aspects; Technical Aspects; Social Aspects; Ethical and Legal; School Management and Professional Development. Likewise, these dimensions articulate with the two basic teacher training spheres: pedagogical training and disciplinary training. It contains 16 competences grouped per aspect, and it has a total of 76 indicators, this helps illustrate the fact that the dimension of Pedagogical Aspects has the most weight (since it encompasses seven competences, accounting for approximately 44% of the total defined competences (Flores, 2015).

Despite our country's efforts to implement an ICT policy in the school system, the presence of these tools at curricular level is still uncommon (Peirano and Dominguez, 2008), and the results of this policy in the Chilean educational system do not show significant progress from the learning levels' point of view, as well as in the methodological appropriation by teachers to integrate them in a didactically accurate way" (Ponce *et al*., 2012, p. 399). As mentioned before, the reasons for these results may be diverse, some are associated to epistemological ideas connected with training models and to others related with teachers' personal factors, but the problem may also lie in the fact that the proposals of the ICT Standards take into account homogeneous groups for all Chilean teachers, regardless of their educational level in training or practice, a highly relevant aspect

considering the biopsychosocial characteristics of children and teens in each educational level within formal education, adaptation of teaching methodologies supported by ICT for each development stage of students, as well as diverse sociocultural and geographic contexts of the country.

Given the aforementioned background and taking into account that the level of initial teacher training is the key scenario to train future teachers on a pedagogical use of these tools, the purpose of this study was to establish the self-assessment of Preschool Education Pedagogy's second and third-year students in a Chilean public and state university regarding their accomplished level of digital competence of ICT use from a pedagogical dimension.

METHODOLOGY

From a methodological standpoint, this research's quantitative approach was applied through a non-experimental design of descriptive nature, since it only intended to measure variables as they occurred in reality for subsequent description.

The study's context was the Preschool Education Pedagogy program of the Education and Humanities Department in Universidad del Bio-Bio, located in the Bio Bio Region.

The sample included 69 female students (39 in the second year and 30 in the third year), with ages ranging between 18 and 20 years (84.1%), some were daily Internet users (94.2%).

The variables were organized in two groups: personal variables (age, attendance to an ICT-connectivity training) and evaluative variables, which specifically considered the Pedagogical Aspect set forth in the ICT Standards for Initial Teacher Training in Chile (MINEDUC, 2008), a dimension that is defined as follows: "future teachers acquire and show ways of applying ICT in the current school curriculum as a way to support and expand learning and teaching" (ENLACES, 2008, p. 146).

The instrument used to measure the variables was the "Self-Assessment Scale on Digital Competences for Pedagogy Students" (Flores, 2015) because it is a pertinent instrument for the study's context, the training level of the students in the sample and because it offers adequate psychometric qualities, which includes a Cronbach's Alpha of .937, highly significant with p< .001 (Flores-Lueg and Roig-Vila, 2016). The questions in this instrument focus on measuring personal variables and 28 questions that specifically allow assessing students' self-perception regarding digital competence in the pedagogical dimension with Likert scale answer categories, made up by 28 items with 5 answer variables (1: Never/Nothing – 2: Rarely/Seldom – 3: Sometimes/Neither too much nor too little – 4: Frequently/Quite – 5: Always/A lot).

Information analysis was conducted using descriptive statistics, specifically based on central tendency measurements. However, the instrument's internal consistency was determined by an exploratory factor analysis, which indicated the presence of five factors that account for 60.2% of the variance (*KMO*= .754; *Barlett* =780,9; *p*=.000) and a reliability coefficient "Cronbach's Alpha of .924, coming quite close to the original instrument's psychometric measures.

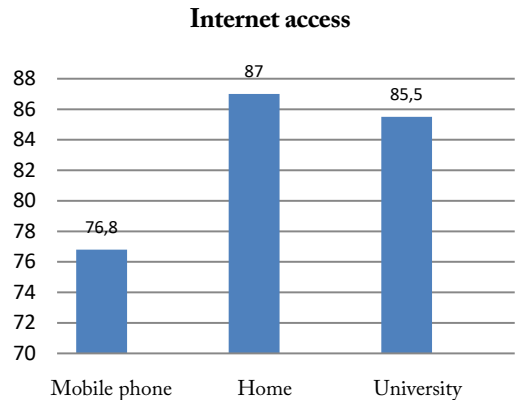
RESULTS

The following are the main results of each variable considered in the Pedagogical Aspects dimension in the "Self-Assessment Scale on Digital Competences for Pedagogy Students" (Flores, 2015). It is worth mentioning that this instrument (as stated before) also considers personal variables that include accessibility and ICT training, the results of which are as follows:

ACCESSIBILITY OF PEDAGOGY STUDENTS AND ICT TRAINING

As observed in Figure 1, most students access the Internet at home or university, it can also be observed that a high percentage (76.8%) does it on their mobile phone.

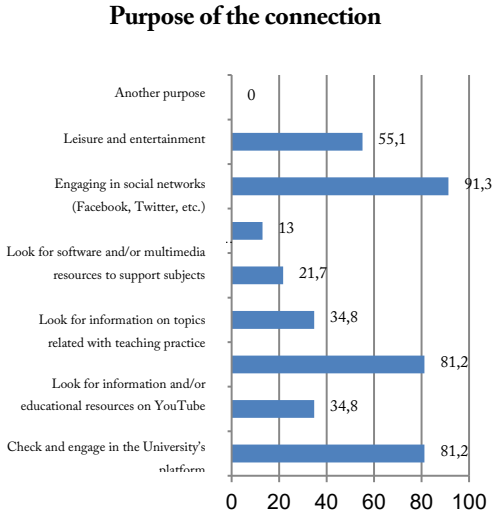
Figure 1. Accessibility of students.



Source: compiled by the authors

As to why students access the Internet, it is mostly to engage in social networks (91.3%), check e-mails (81.2%) and explore the University's platform (subjects). It can be said that seldom do they browse the web for academic information and/or educational resources that may be useful to support the preschoolers' teaching-learning process.

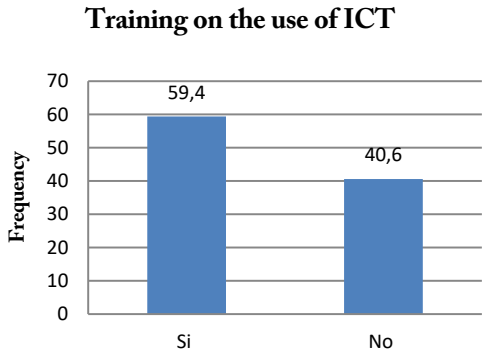
Figure 2. Purpose of student's connection to the web.



Source: compiled by the authors

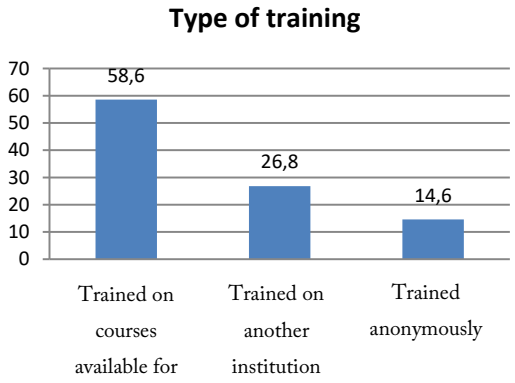
In terms of training on the use of ICT, it is clear that over half of the students (59.4%) has attended some course on the use of these tools, 58.6% of them has taken it in Universidad del Bio-Bio (see Figures 3 and 4); while 14.6% has been autonomously trained.

Figure 3. Training on ICT



Panorama | pp. 19-30| Volumen 12 | Número 22 | Enero-Junio | 2018 | ISSN Impreso 1909-7433 | E-ISSN en linea 2145-308X |

Figure 4. Training form



Source: compiled by the authors

STUDENTS' SELF-ASSESSMENT IN THE DIMENSION OF PEDAGOGICAL ASPECT OF ICT USE

Before we introduce this variable's results, it is important to remember that the exploratory factor analysis determined the presence of five factors. Results show that the students' mean in most of the factors is above 3.0, with homogeneity in the answers, deviations fluctuate between 0.865 and 0.94, indicating that they believe to have favorable performance on the pedagogical use of ICT, with an exception involving Factor 2, which shows results that are somewhat inferior (see Table 1).

Table 1. Descriptive results per factor

	Factor 1	***Factor 2***	***Factor 3***	***Factor 4***	***Factor 5***
Mean	3.12	2.89	3.28	3.54	3.21
Typ. dev.	0.94	0.93	0.919	0.87	0.865
Variance	0.88	0.87	0.829	0.779	0.758
Median	3.1	2.89	3.26	4	3
Minimum	2.91	2.81	3.06	3.41	3.09
Maximum	3.44	2.97	3.85	3.77	3.35

Source: compiled by the authors

In terms of the detail of the variables grouped in Factor 1, called "Design of didactic resources with the use of ICT", it is observed that, overall, students satisfactorily assess their performance, with a noticeable higher assessment in the indicator (I can use some learning strategies that require the use of the Internet", and the lowest being "Acknowledgement of selection criteria for digital resources aimed at preschoolers" (see Table 2).

Table 2. Design of didactic resources with the use of ICT

Indicators	***N***	***Min***	***Max***	***Mean***	***Typ. Dev.***	***Variance***
9. I use educational tools to design multimedia resources as aid for pedagogical activities (creating websites and/or apps for activity development)	69	1	5	2.91	1.095	1.198
8. I use text processors to produce didactic material as aid for my pedagogical activities	68	2	5	3.44	.968	.937
10. I design the object of learning with multimedia elements that I could incorporate in virtual learning spaces	68	1	5	2.96	.953	.908
7. I feel capable of selecting learning strategies that demand the use of productivity tools (text processors, spreadsheets,	69	1	5	3.25	.930	.865

presentation software or others)						
18. I examine technological innovation applied to education (educational software, websites, etc.) and existing digital resources in the school system and on the Internet to choose those that are pertinent for my educational level	68	1	5	2.93	.852	.726
25. I feel capable of encouraging and moderate virtual learning environments	69	1	5	3.30	.896	.803

Source: compiled by the authors

In Factor 2, called "Evaluation supported by ICT resources", it is observed that the students' perception in all of the indicators is fairly low, since the measurements obtained are below 3.0 and given the homogeneity in the answers (see Table 3).

Table 3. Evaluative practices using ICT.

Indicators	*N*	*Min*	*Max*	*Mean*	*Typ. Dev.*	*Variance*
19. I am capable of designing and using evaluation instruments to monitor children learning in working environments using ICT	69	1	5	2.83	.923	.852
20. I feel trained to apply evaluation instruments that allow me to analyze the result of my teaching practices using ICT	69	1	4	2.81	.879	.773
21. I am capable of reflecting upon results and accomplishments in learning experiences developed using ICT and make new decisions	68	1	5	2.96	1.043	1.088
22. I feel trained to apply evaluation strategies and instruments supported on ICT to value children performance	69	1	5	2.97	.891	.793

Source: compiled by the authors

Table 4 illustrates the descriptive results of each variable grouped in Factor 3, called "Knowledge of ICT's didactic possibilities", which shows that students feel they have knowledge on the opportunities offered by ICT to be used as didactic resources, mainly in the use of learning strategies that require the use of the Internet.

Table 4. Knowledge of ICT's didactic possibilities

Indicators	*N*	*Min*	*Max*	*Mean*	*Typ. Dev.*	*Variance*

4. I identify print and/or digital sources containing information about educational experiences that refer to the use of ICT in my specialty	69	2	5	3.28	.953	.908
2. I identify the characteristics and objective of some didactic digital tools: WebQuest, Wiki, Web Didactica, Blogs and others).	69	1	5	3.26	1.159	1.343
16. I acknowledge the importance of using criteria (usability, interface, accessibility and interactivity) to select prospective software and technological resources to be used with preschoolers	69	1	5	3.06	.906	.820
5. I can use some learning strategies that require using the Internet	67	2	5	3.85	.723	.523
3. I identify technology-based learning experiences for children, acknowledging strengths and challenges	69	1	5	3.36	.874	.764

Source: compiled by the authors

Something similar occurs with Factor 4, called "Use of technology as learning resource", students' measurements in every indicator exceed the value of 3.0, and there is also plenty of homogeneity among answers (see Table 5).

Table 5. Use of ICT as learning resource.

Indicators	*N*	*Min*	*Max*	*Mean*	*Typ. Dev.*	*Variance*
11. I am capable of applying technology to foster preschoolers' creativity and improve their skills	68	2	5	3.63	.879	.773
13. I can use technology to support didactic strategies that provide answers to different needs of preschoolers	69	2	5	3.77	.770	.592
14. I am capable of designing learning experiences that use ICT resources as aid to favor preschoolers' learning	68	2	5	3.41	.652	.425
12. I feel trained to guide preschoolers throughout the development of learning experiences mediated by technology	69	1	5	3.48	.994	.988
6. I can define working environments in which preschoolers need to access the Internet as means to address selected content	68	1	5	3.43	1.055	1.114

Source: compiled by the authors

Finally, regarding Factor 5, called "Curricular knowledge and ICT", the means in both indicators show that students also believe they have a good level of performance (see Table 6)

Table 6. Curricular knowledge and ICT

Indicators	*N*	*Min*	*Max*	*Mean*	*Typ. Dev.*	*Variance*
1. I identify expected learning that can be developed with the incorporation of ICT into the pedagogical program of my specialty's curricular sector	69	2	3	3.35	.764	.583
23. I use technological resources to collect and analyze data, interpret and communicate results, with the objective of improving preschoolers' learning	69	1	5	3.09	.966	.934

Source: compiled by the authors

DISCUSSION AND CONCLUSIONS

One of the greatest challenges faced by faculty members nowadays is the implementation of Information and Communications Technology in their teaching practice, but from a pedagogical dimension. Although the use of ICT in education (at least in Chile) has been guided by a national policy called ENLACES, promoted since 1992, it is clear that today, the use of these tools has not generated the expected impact in terms of enhancing the quality of learning achieved by students enrolled in formal education (Peirano and Dominguez, 2008; Ponce *et al.*, 2012). The reasons may be diverse, some are external to faculty members, but there are also personal reasons (i.e., attitude towards computers and the Internet, level of knowledge perceived from the use of these tools, gender, training educational level, among others).

Regarding the preliminary results obtained by this study, it can be said that students, overall, perceive they have a good level of performance in the pedagogical use of ICT to support preschoolers' educational process, a result that coincides with other studies that have focused on inquiring on the digital competence of future children students (Cascales *et al.*, 2017; Hervas-Gomez and Silva-Carmona, 2016; Garcia-Ruiz *et al.*, 2014). However, it stands out that the dimension called "Evaluation supported by ICT" was one of the factors with the lowest means, preliminary compared with the other factors that were measured. These results may be explained, in a way, based on an overall perception on the complexity of preschoolers' evaluative process in all of its dimensions, regardless of the use of ICT, due to its imprecise or inexact nature (Diaz, 2010), its fundamental justification of systematic observation of children's performance, in which information analysis, value judgement formulation and decision-making aimed at improving learning become the most challenging processes for a teacher (MINEDUC, 2002); it acquires an even

larger degree of complexity when a technological tool is incorporated to conduct it. On the other hand, it cannot be ignored that the evaluative practice is also an epistemological idea that conditions its understanding and development, and if the action of evaluating is not considered as an integral part of the educational action, it will clearly add to its complexity.

Moreover, it is important to add that future educators mostly use ICT, and the Internet in particular, to engage in social networks or as entertainment, which also agrees with other studies that have focused on university students' digital competences and that have shown that future teachers lack preparation in the use of these resources from a pedagogical standpoint (Badilla-Quintana *et al.*, 2013; Marin and Reche, 2011; Perez and Vilchez, 2013; Romero and Minelli, 2011). Nevertheless, and despite the fact that only 59% of the participants has attended any kind of ICT training course, the assessment they have regarding their performance on the pedagogical use of ICT is rather favorable, especially in Factor 4, which has to do with the use of these tools as learning resources.

All of the above help conclude that although students perceive a good level of performance in the pedagogical use of ICT, it cannot be ignored that currently, it is necessary to offer continued preparation in these tools, following the rationale that Web 2.0, Web 3.0, Web Semantica or other platforms that may arise in the future, will offer multiple alternatives to access required information and will provide a series of alternatives for permanent learning. Thus, the initial training process is suggested to continue promoting a favorable attitude, critical reflection as to the contribution of these resources to support preschoolers' educational process, autonomy in students' processes and to emphasize on teaching methodologies' ludic nature, which is distinctive of preschool education.

Finally, it is important to highlight that the information presented in this work has a series of limitations, since it only corresponds to the first stage of an overarching research, a stage which focused on establishing the self-assessment of Preschool Education Pedagogy's second and third-year students in order to, based on said results, conduct an intervention oriented towards providing answers to actual support needs that were presented by them, a process that is currently being implemented. Moreover, it is also important to emphasize that the results herein are not for generalization, since they only correspond to a reduced sample of students within a particular reality.

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