Región Científica

e-ISSN: 2954-6168
Región Científica. 2024. 3(1), 2024226
doi: 10.58763/rc2024226

Revisión sistemática sobre los desafíos que enfrenta el desarrollo e integración de las tecnologías digitales en el contexto escolar chileno, desde la docencia

Systematic review of the challenges facing the development and integration of digital technologies in the Chilean school context, from the teaching perspective

Leonardo Alberto Velásquez Castro[1], José Adrián Paredes Águila[1]

ABSTRACT

This article is the result of research in which an analysis was made on the challenges faced by the development of teaching with digital technologies in the Chilean school context, given that it is a constantly changing scenario. From the examination of the scientific evidence collected, some elements were established to explain the scope of teaching with digital technologies in Chilean schools, factors that influence the effective integration of technologies, and how the integration of digital technologies in Initial Teacher Education has been developed. For this purpose, a systematic literature review study was designed, with a sample of 23 articles whose content was analyzed through a categorized classification based on the criteria suggested by the Prisma protocol. The results obtained allow the conclusion, among other aspects, that the integration of digital technologies in Chilean education is a relevant and dynamic issue and that several approaches and models have emerged in its implementation, highlighting the importance of educational policies in the promotion and monitoring of this process in the classroom.

Keywords: teacher training, educational innovation, educational policy, information technology.

JEL classification: H52; I21; O33

RESUMEN

El presente artículo es el resultado de una investigación en la que se realizó un análisis sobre los desafíos que enfrenta el desarrollo de la docencia con tecnologías digitales en el contexto escolar chileno, dado que es un escenario en constante cambio. A partir del examen de las evidencias científicas recogidas, se establecieron algunos elementos que permiten explicar los alcances de la docencia con tecnologías digitales en las escuelas chilenas, factores que influyen en la integración efectiva de las tecnologías y cómo se ha desarrollado la integración de las tecnologías digitales en la Formación Inicial Docente. Para tal propósito se diseñó un estudio de revisión sistemática de literatura, con una muestra de 23 artículos, cuyo contenido se analizó a través de una clasificación categorizada, a partir de los criterios sugeridos por el protocolo de Prisma. Los resultados obtenidos permiten concluir, entre otros aspectos, que la integración de las tecnologías digitales en la educación chilena es una cuestión relevante y dinámica, que en su implementación han surgido varios enfoques y modelos, al igual que se destaca la importancia que tienen las políticas educativas en la promoción y acompañamiento respecto a dicho proceso en el aula.

Palabras clave: formación de docentes, innovación educativa, política educativa, tecnología de la información.

Clasificación JEL: H52; I21; O33

Received: 19-10-2023 **Revised:** 07-12-2023 **Accepted:** 20-12-2023 **Published:** 15-01-2024

Editor: Carlos Alberto Gómez Cano

[1] Universidad de Magallanes. Punta Arenas, Chile.

Cite as: Velasquez, L. y Paredes, J. (2024). Revisión sistemática sobre los desafíos que enfrenta el desarrollo e integración de las tecnologías digitales en el contexto escolar chileno, desde la docencia. Región Científica, 3(1), 2024226. https://doi.org/10.58763/rc2024226

INTRODUCTION

The use of digital technologies (DTs) has significantly changed the educational landscape (Abel et al., 2022; Aşık et al., 2020; Backfisch et al., 2021). Numerous investigations conclude that integrating DTs in classrooms can enrich teaching and learning processes (Bereczki & Kárpáti, 2021; Tondeur et al., 2019). Among other benefits, the incorporation of TDs in education can encourage student participation and promote meaningful learning; therefore, equitable access to TDs is fundamental to reducing educational-technological gaps and preparing them for today's world (Lawrence et al., 2020; Taimalu & Luik, 2019; Uslu & Usluel, 2019; Wilson et al., 2020).

In the particular case of Chile, a policy aimed at educational quality and innovation has been promoted with the support of DTs through the Enlaces program, which initially offered pedagogical advisory services, technical support, continuous training, and teacher certification in digital competencies. From this perspective, the development of TD teaching has been a long-standing and highly relevant process since it has always sought to meet the constant demands imposed by accelerated social and technological changes. Thus, TD teaching in Chile faces challenges, but also has opportunities.

Considering the above, the following systematic review is proposed, which is justified by the importance of collecting, grouping, and categorizing the abundant information on the object of study. From there, we sought to understand the current situation in Chile in relation to the challenges linked to and integration of TD in the Chilean school context from the perspective of teaching. Rapid technological development has introduced opportunities and obstacles in education; therefore, exploring the Chilean situation can provide a clear vision of how these technologies are being integrated into educational processes and how they impact learning and teaching processes.

In order to go even deeper into the aspects described above, this research work is approached from the following question: What challenges face the development of digital technologies in the Chilean school context, given a constantly changing scenario?

Integration of digital technologies in education

Incorporating TD in educational processes is a relevant, dynamic, and constantly evolving issue. Several approaches and models have emerged to address this issue, such as the TPACK Model, the Area Decalogue, the pending innovation of Cobo (2016), and the proposals of Castañeda and Adell (2013). The TPACK Model (Technological Pedagogical Content Knowledge) suggests that teachers should combine their pedagogical knowledge, their specific content knowledge, and their knowledge of digital technologies to achieve effective teaching. This model emphasizes the importance of integration occurring in a meaningful way and impacting the components of the teaching-learning process.

Another contribution in this direction is the Area Decalogue, which includes principles such as the personalization of the learning process, the promotion of creativity and collaboration, and the continuous training of teachers in the use of technologies (Cobo, 2016). The same author raises the idea of "pending innovation", referring to unresolved challenges and opportunities in technological integration, something that implies maximizing technologies to improve teaching and adapt educational methods, ensuring relevance in the modern world.

In a similar vein, Castañeda and Adell (2013) focused on the need to facilitate the development of digital competencies in teachers; foster the design of spaces that encourage creativity and the development of critical thinking in students; as well as promote collaborative and participatory learning environments. These approaches and models provide us with new perspectives on the integration of digital technologies in the field of education.

METHODOLOGY

Approach and design

The research was based on the qualitative route and was framed in the interpretative paradigm. Its realization required the identification and analysis of scientific articles on the challenges of teaching regarding the use of digital technologies in the Chilean school context. Therefore, the instrument selected to organize the methodological procedures was the thematic analysis, which allowed combining theoretical sampling, axial coding, and constant comparison (Strauss & Corbin, 2016) with the foundations of systematic reviews.

Systematic reviews consist of research identifying relevant publications on a specific topic (Cooper et al., 2018); once identified and obtained, the data are processed and synthesized using a pre-established and replicable protocol. To correctly elaborate this procedure, the guidelines set forth in the PRISMA statement (Urrútia & Bonfill, 2010) were adapted to the specific purposes of this research.

Sample and search strategies

For the collection of information, search strategies were employed in the WOS, SCOPUS, and SCIELO databases, identifying those studies comprised between the years 2018 and 2022. The search was limited by language to articles in English and Spanish while also filtering for scientific articles corresponding to the areas of educational and social research.

To identify the studies, a series of combinations were executed in the search engines of the SCOPUS, WOS, and SCIELO databases, based on the terms: ICT, digital technology, digital competencies, technology, digital, virtual; together with other key terms for the research, such as: school, primary education, secondary education, education, teaching, teacher, training. In addition, the words Chile, chilena, chileno, estado de Chile, gobierno de Chile; and the terms Chile, chileno, Estado de Chile, Gobierno de Chile; were incorporated, followed by the Boolean operator AND. It was further specified that the words be found in the title, abstract, or keywords of the identified studies.

Selection process

For the first filter, 216 articles were identified from the WOS, SCOPUS, and SCIELO databases. The next phase corresponded to the screening of records, in this process we eliminated: first, those articles that were duplicates (n=31); and also those that, according to the abstract, were not related to the object of study (n=115), obtaining a total of 70 screened articles.

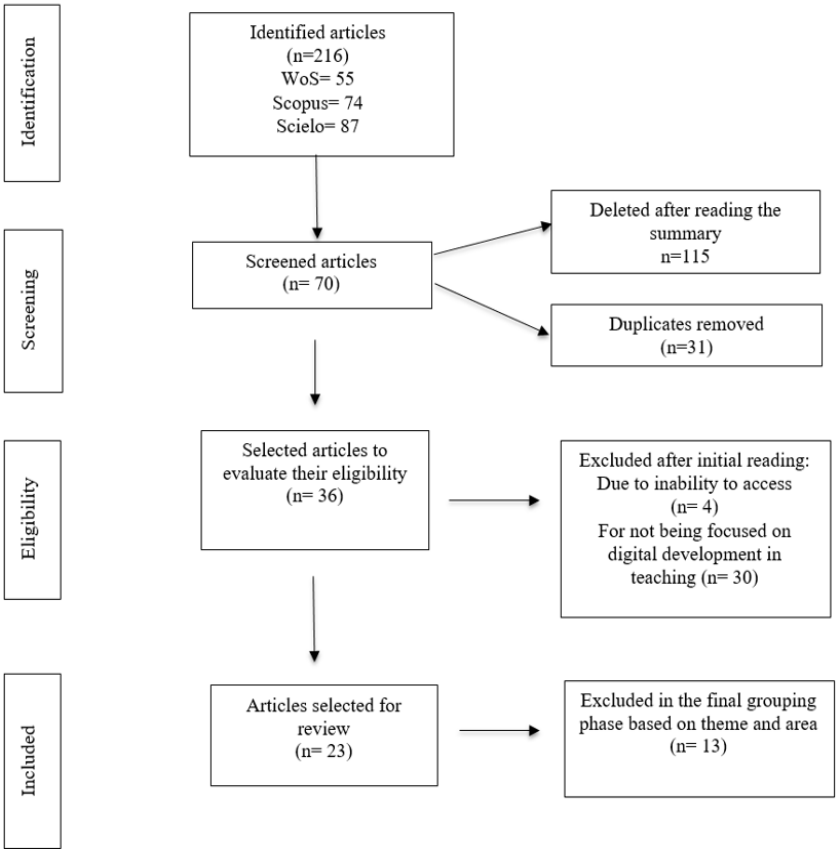
Subsequently, in the eligibility phase, articles were eliminated after an attempt to read them. This filter was applied based on two criteria: due to the impossibility of access or that access required payment (n=4), or, that the focus was not related to the main topic of the research (n=30). By implementing this filter, 36 papers were obtained. It is worth mentioning that in this phase, those articles regarding the development of the fid in the context of Chilean higher education were established as inclusion criteria, given their relevance to the study's objective.

Finally, an in-depth reading of the articles was carried out to group them according to subject matter and scope, establishing a total sample of 23 articles, which were included in the systematic literature review. In summary, the final research sample was 23 scientific articles published between 2018 and 2022.

For the purpose of evidencing and making transparent the search and selection exercise of the articles that were subsequently included in the systematic literature review, the flowchart of the process is presented below (Figure 1). It is based on the Prism 2020 Statement (Page et al., 2021):

Figure 1.

Flowchart based on the PRISMA statement



Source: own elaboration.

Information analysis

Subsequently, a content analysis was carried out on the challenges of teaching in the Chilean school context regarding the use of digital technologies. Based on an open coding, the following axial categories were defined (Strauss & Corbin, 2016), in which the various codes identified were grouped and related. To carry out the coding process, the ATLAS.ti software was used, this favored the consolidation and raising of the three definitive categories of analysis, these are: the scopes of teaching with digital technologies in Chilean schools; the factors that influence the effective integration of digital technologies in the classroom; and the integration of DT in IDF.

The descriptive summary of the selected articles can be seen in table 1. The articles in the table are ordered chronologically and then in alphabetical order of the first author.

Table 1.
Summary of selected articles

No.	Authors	Year	Journal	Article name
1	Arancibia, M., Cosimo, D. & Casanova, R.	2018	Ensayo	Teachers' perception about ICT integration in teaching practices in relation to the normative frameworks for the teaching profession in Chile [Percepción de los profesores sobre integración de TIC en las prácticas de enseñanza en relación a los marcos normativos para la profesión docente en Chile]
2	Cerda, C., Saiz, J., Villegas, L. & León, M.	2018	Estudios Pedagógicos	Access, time and purposes of use of digital technologies in Chilean teacher-training students [Acceso, tiempo y propósito de uso de tecnologías digitales en estudiantes de pedagogía chilenos]
3	Cerda, C. & Saiz, J.	2018	Perfiles Educativos	Self-directed learning of pedagogical knowledge with digital technologies. Generation of a theoretic model form Chilean student teachers [Aprendizaje autodirigido del saber pedagógico con tecnologías digitales: Generación de un modelo teórico en estudiantes de pedagogía chilenos]
4	Flores Lueg, C, Mena Bastías, C, Navarrete Troncoso, L, Arteaga González, P, Gajardo Rodríguez, A	2018	Actualidades Investigativas en Educación	Significances given by future nursery school teachers to the ICT incorporated in their training process [Significaciones atribuidas por futuras educadoras de párvulos a las TIC incorporadas en su proceso formativo]
5	Leiva, J., Cabero, J. & Ugalde, L.	2018	Revista Latinoamericana de Tecnología Educativa RELATEC	Personal Learning Environments (PLE) in College Students of Pedagogy
6	Matamala, C.	2018	Perfiles Educativos	Development of digital literacy. What strategies do professors use to teach information skills? [Desarrollo de alfabetización digital: ¿Cuáles son las estrategias de los profesores para enseñar habilidades de información?]
7	Arancibia Gutiérrez, B. & Bustamante Molina, M.	2019	Magis	Reader's learning supported by the interactive digital Board: An empirical study [Aprendizaje lector con apoyo de la pizarra digital interactiva: Estudio empírico]

8	Flores Lueg, C. & Roig Vila, R.	2019	Revista iberoamericana de educación superior	Personal factors influencing future teachers' self-assessment about the pedagogical dimension of ICT use [Factores personales que inciden en la autovaloración de futuros maestros sobre la dimensión pedagógica del uso de las TIC]
9	Silva, J., Usart, M. & Lázaro Cantabrana, J.	2019	Comunicar	Teacher's digital competence among final year Pedagogy students in Chile and Uruguay
10	Cabello, P., Ochoa, J., & Felmer, P.	2020	Pensamiento Educativo	Digital technologies as a pedagogical resource and their integration into pre-service teacher training in Chile [Tecnologías digitales como recurso pedagógico y su integración curricular en la formación inicial docente en Chile]
11	Silva, J. & Miranda, P.	2020	Revista de estudios y experiencias en educación	Presence of digital teaching competence in initial training programs in Chilean public universities [Presencia de la competencia digital docente en los programas de formación inicial en universidades públicas chilenas]
12	Tapia, H., Campaña, K. & Castillo, R.	2020	Perspectiva Educacional	Comparative analysis of ict subjects in initial teacher training in Chile between 2012 and 2018 [Análisis comparativo de las asignaturas tic en la formación inicial de profesores en Chile entre 2012 y 2018]
13	Thibaut, P.	2020	Revista Electrónica de Investigación Educativa	The Nexus between Literacy and Digital Culture: A Teachers' Perspective in Chile [El nexo entre literacidad y cultura digital: una mirada docente en Chile]
14	Godoy, M., Zúñiga, E. & Tomljenovic, M.	2021	Revista de estudios y experiencias en educación	Challenges encountered by science teachers when dealing with millennials and post-millennial students [Desafíos del profesor de ciencias frente a estudiantes Millennials y Post-Millennials]
15	Halpern, D., Piña, M. & OrtegaGunckel, C.	2021	Educación XX1	Parent and school mediation: Use of technology to enhance school performance [Mediación parental y escolar: Uso de tecnologías para potenciar el rendimiento escolar]
16	Ibaceta, C. & Villanueva, C.	2021	Perspectiva Educacional	Virtual learning environments: variables that affect the pedagogical practices of elementary school teachers in the Chilean context
17	Mateus, J. & Andrada, P.	2021	Magis	Teachers Facing Covid-19: Perceived Changes in Chile and Peru [Docentes frente al covid-19: cambios percibidos en Chile y Perú]
18	Tapia, H.	2021	Revista de estudios y experiencias en educación	Profiles of knowledge and use of ICT in Chilean teachers [Perfiles de conocimiento y uso de las TIC en profesores chilenos]
19	Berríos, L., Mendoza, A. & Prats, M.	2022	Educacao e Pesquisa	Reading fity of novice teachers and digital literary mediation: crossroads between trajectories and competences [Identidad lectora de profesores noveles y mediación literaria digital: entrecruces entre trayectorias y competencias]

20	Fernandez Sanchez, MR. & Silva Quiroz, J.	2022	RIED-Revista Iberoamericana de educación a distancia	Assessment of the Digital Competence of Future Teachers from a Gender Perspective
21	Paidican, M. & Arredondo, P.	2022	Mendive. Revista de Educación	Techno-pedagogical and disciplinary knowledge of primary school teachers and demographic factors [Conocimientos tecnopedagógicos y disciplinares en los docentes de primaria y los factores demográficos]
22	Silva J., Cerda C., Fernández Sánchez, M. & León, M.	2022	Revista Interuniversitari a de Formacion del Profesorado	Teacher digital competence of teachers in initial training of chilean public universities [Competencia digital docente del profesorado en formación inicial de universidades públicas chilenas]
23	Trigo, E., Jarpa, M. & Maraver, R.	2022	Educacao e Pesquisa	Chilean and Spanish teachers' beliefs and disposition when teaching writing in the pandemic: a contrastive study [Creencias y actitudes de docentes chilenos y españoles al enseñar escritura en la pandemia: un estudio contrastivo]

Source: own elaboration.

RESULTS

The key findings, organized by the main themes identified in the analysis, are shown below.

Scope of teaching with digital technologies in Chilean schools

The exploration of the reality of teaching through the integration of digital technologies in Chilean schools reveals an interconnection of themes that highlight the advances and challenges of the use of these tools in teaching and learning. From that, this category addresses the effects of digital teaching in Chilean schools.

The perception, beliefs, knowledge, and experiences of teachers are key elements in this scenario (Arancibia et al., 2018; Berríos et al., 2022; Halpern et al.,2021; Ibaceta & Villanueva, 2021; Ifinedo et al., 2020; Kjellsdotter, 2020; Matamala, 2018; Thibaut, 2020). In general, educational practices have been marked by an instrumental use of TDs, lacking pedagogical sense (Arancibia Gutiérrez & Bustamante Molina, 2019; Flores Lueg et al., 2018; Matamala, 2018; Thibaut, 2020).

Without going any further, the emergency remote education carried out by school communities during the Covid-19 pandemic revealed the poor preparation that teachers had for the implementation of educational methodologies in virtual learning environments (Burbaitė et al., 2018; Christopoulos & Sprangers, 2021; Ibaceta & Villanueva, 2021; Mateus & Andrada, 2021; Trigo et al., 2022). In this regard, the scientific literature is clear in sustaining that a change of approach is required in the search for one that points towards methodologies more focused on student learning than on the mere delivery of content (Halpern et al., 2021; Matamala, 2018; Mateus & Andrada, 2021; Trigo et al., 2022).

In this regard, according to the literature investigated, teachers positively value the application of TDs in their educational practices (Cheng et al., 2020; Farjon et al., 2019; Gomez Jr et al., 2022; Huang et al., 2021). According to the educators studied in the sources, these tools allow them to enrich learning and motivate their students (Arancibia Gutiérrez & Bustamante Molina, 2019; Berríos et al., 2022; Cerda & Saiz, 2018; Godoy et al., 2021; Thibaut, 2020) as well as to approach the digital culture that is close to the students (Thibaut, 2020). In this sense, Godoy et al. (2021) argue that educational policy has suggested this through ICT competency standards, but this has not permeated the school system (Matamala, 2018). Based on this scenario, it becomes relevant that the policy and the schools persist in digital inclusion from a more comprehensive view, focused on education and not only dedicated to the delivery of devices (Godoy et al., 2021; Matamala, 2018; Mateus & Andrada, 2021).

It can even be affirmed that it is necessary to gradually break down certain beliefs in teachers that impede the digital development of students. For example, that students are digitally skilled only because they have used

TDs throughout their school career (Matamala, 2018; Mateus & Andrada, 2021), or that they attribute veracity to printed text over digital media (Berríos et al., 2022; Matamala, 2018). This shows that teachers do not visualize, among other aspects, the potential of multi-modality for the treatment of disciplinary content (Berríos et al., 2022). Indeed, and according to the results of a study by Thibaut (2020), it is shown that students themselves do not understand the potentialities offered by TDs for their educational development.

Added to this, the literature is conclusive in stating that schoolchildren do not possess the necessary digital competencies that allow them to function in an increasingly digital world (Arancibia et al., 2018; Cerda & Saiz, 2018; Godoy et al., 2021; Matamala, 2018). Worrying, moreover, is the low level of development of higher skills such as analyzing, evaluating or creating (Godoy et al., 2021), which accounts for the preponderance in the application of traditional methodologies or focused on the lower levels of the taxonomy.

The pedagogical dimension of the use of TDs is also an aspect that stands out in the studies analyzed. On the one hand, Fernández Sánchez and Silva Quiroz (2022) explore the reading identity of novice teachers and how digital literary mediation can enrich it. On the other hand, Mateus and Andrada (2021) focus on the challenges that science teachers face when teaching millennial and post-millennial students, evidencing how TDs can be a tool to adapt to the characteristics of these generations.

However, teachers tend to regulate and delimit the activities that students have to do, giving little space for the generation of their own products or content (Matamala, 2018; Tapia, 2021). The emphasis of educational practices has also not been on processing, adequate analysis of information sources and their impact on research or inquiry; practices that are developed mainly in private schools or in some public humanist schools in urban areas (Matamala, 2018; Paidican and Arredondo, 2022).

Factors influencing the effective integration of digital technologies in the classroom.

The following are the results that show the factors that, according to the specialized literature on the subject, are relevant to point toward an effective and inclusive integration of TD in Chilean schools. The scientific literature argues that it is necessary for teachers to adopt a strategic role in order to move towards educational transformation through the use of TDs (Arancibia et al., 2018; Berríos et al., 2022; Halpern et al., 2021; Ibaceta & Villanueva, 2021; Mateus & Andrada, 2021; Trigo et al., 2022). In this way, it is possible to promote, among other aspects, the empowerment of students regarding their own and their peers' learning processes (Arancibia et al., 2018; Godoy et al., 2021; Halpern et al., 2021). From that, it is highlighted that teachers attribute importance to the development of their own digital skills (Arancibia et al., 2018), and in turn, they are in favor of change (Mateus & Andrada, 2021).

However, there is a negative perception of their own TD skills (Berríos et al., 2022; Trigo et al., 2022). Moreover, teachers have little clarity about TDs' impact on learning (Arancibia et al., 2018; Ibaceta & Villanueva, 2021). This phenomenon especially impacts teachers who work in disadvantaged contexts, those teachers with less academic preparation, and those who have no previous approach to TDs (Ibaceta & Villanueva, 2021; Leiva et al., 2018). A similar situation occurs with early childhood educators, where there is evidence of deficiencies in their training processes with TD (Flores-Lueg et al., 2018; Mateus & Andrada, 2021).

This is in addition to the fact that teachers perceive scarce support and structural conditions (Arancibia Gutiérrez & Bustamante Molina, 2019; Berríos et al., 2022; Ibaceta & Villanueva, 2021; Matamala, 2018; Trigo et al., 2022), time and knowledge needed for planning with TD (Arancibia et al., 2018; Ibaceta & Villanueva, 2021; Mateus & Andrada, 2021; Trigo et al., 2022), likewise, a deficient training trajectory in TD (Arancibia et al., 2018; Berríos, 2022) which, incidentally, is mainly based on autonomous learning (Arancibia et al., 2018; Ibaceta & Villanueva, 2021; Mateus & Andrada, 2021; Trigo et al.,2022).

It is precisely the training for the development of digital teacher competence (TDC) that is presented as one of the cornerstones for the effective integration of TDs in the classroom (Arancibia et al., 2018; FloresLueg et al., 2018; Godoy et al., 2021; Halpern et al., 2021; Ibaceta & Villanueva, 2021; Mateus & Andrada, 2021; Tapia, 2021; Trigo et al., 2022). In this regard, teachers' self-perception of their digital skills is much higher than their actual competencies (Silva et al., 2022). It is worth mentioning that in kindergarten education, this perception is lower compared to higher levels, which can be attributed to the difficulty of adapting to the inclusion of TD in younger students (Mateus & Andrada, 2021).

Also positioned as challenges are overcoming gender bias (Flores Lueg et al., 2018; Mateus & Andrada, 2021), the access gap between public and rural schools, compared to privately managed and large urban areas (Arancibia

et al., 2018; Godoy et al., 2021; Paidican & Arredondo, 2022; Trigo et al., 2022); the significant difference between teachers according to their academic background (Cerda et al., 2018; Paidican & Arredondo, 2022); and the generation gap in TD integration (Halpern et al., 2021; Mateus & Andrada, 2021). From the above, Silva et al. (2019) argue that the greater the experience in the use of TD in the classroom, the greater the confidence and attitude oriented to the use of TD in the classroom, especially in female teachers.

On the other hand, the pressure of the educational system to cover the curriculum is manifested; this causes the pedagogical practice to focus mainly on addressing content instead of fostering skills with a focus on the integral; therefore, this is where TDs can adopt an important role (Arancibia et al., 2018; Matamala, 2018; Thibaut, 2020). Added to this is the difficulty of accompanying these processes from the students' home, where parental mediation is established as an essential component to accompany digital inclusion processes; a situation that, moreover and in the Chilean case, has not occurred (Arancibia Gutiérrez & Bustamante Molina, 2019; Flores Lueg et al., 2018; Halpern et al., 2021; Ibaceta & Villanueva, 2021; Trigo et al., 2022).

Integration of TDs in Initial Teacher Education (ITE)

This category emerges as an imperative need to contextualize and optimize the incorporation of TD in the preparation of future teachers in order to empower their pedagogical skills and promote more effective learning in tune with the demands of a digital society.

In the current educational landscape, the effective integration of TDs in IDF in Chile emerges as a transcendental challenge to prepare future teachers on the pedagogical use of these tools and thus enrich teaching in the country's schools (Cabello et al., 2020; Cerda & Saiz, 2018; Fernández-Sánchez & Silva Quiroz, 2022; Godoy et al., 2021; Silva & Miranda, 2020; Tapia et al., 2020). In this line, Flores Lueg and Roig Vila (2019) reinforce the idea that initial teacher training is cardinal to achieve effective integration of TD in teaching, also considering factors such as gender, educational level, and ICT skills in order to adapt teaching appropriately and equitably.

The reality of IDF with TD is a theme that emerges strongly in this study, in articles such as that of Arancibia Gutiérrez and Bustamante Molina (2019), the importance of future teachers being qualified to integrate TD in a coherent manner with the legal frameworks that regulate the teaching profession in Chile is highlighted. On the other hand, Cabello et al. (2020) question the effectiveness of educational policy and advocate for a review of institutional training and management. In turn, schools of education must intentionally plan these processes and provide the necessary technological infrastructure to foster the good development of future teachers (Cerda & Saiz, 2018).

In line with the above, the analysis by Cerda et al. (2018) reveals that access to digital technologies and the time dedicated to their use are determining factors in IDF. For their part, Leiva et al. (2018) analyze how students use technologies in their learning processes and how these practices can influence pedagogical strategies and teaching design, highlighting the need to consider how technological tools can facilitate different levels of thinking and cognitive skills (Cerda et al., 2018).

Aligned with these results, the study by Silva et al. (2019) suggests that CDD should be a central objective in initial teacher training when considering the constant evolution of TDs and their impact on the educational environment. Likewise, Tapia et al. (2020) emphasize the need for a homogeneous integration of TD subjects in teacher training so that future educators are properly prepared to address technological demands in their future classrooms, a fact endorsed in other similar research (Cerda et al., 2018).

A fundamental aspect of educator training is the perception of competence and confidence in the use of TDs (Cerda & Saiz, 2018; Leiva et al., 2018). Flores Lueg and Roig Vila (2019) elaborate on this issue, pointing out that the self-assessment of future teachers about their pedagogical competence in the use of TDs may be influenced by personal factors such as age, gender, and previous experience with TDs. These aspects underline the need to address not only technical skills but also perceptions and attitudes towards TDs in teacher training from the approach of the CDDs (Arancibia et al., 2018; Arancibia Gutiérrez & Bustamante Molina, 2019; Cerda & Saiz, 2018; Flores Lueg et al., 2018; Godoy et al., 2021; Halpern et al., 2021; Ibaceta & Villanueva, 2021; Leiva et al., 2018; Mateus & Andrada, 2021; Tapia, 2021; Trigo et al., 2022; Silva et al., 2022).

To conclude, the reality of initial teacher education with TD highlights the urgent need for comprehensive and contextualized preparation for future educators (Silva et al., 2022). FID in TD should not be limited only to technical aspects but should focus on the development of solid digital competencies and the ability to use TD effectively in teaching and student learning (Cerda et al., 2018; Leiva et al., 2018; Silva & Miranda, 2020).

DISCUSSION

There is a broad consensus in the literature analyzed according to which the Chilean school system has made progress but also faces some challenges regarding the effective integration of TD. Several authors argue that one of the most important challenges is the perception and beliefs of teachers, something that coincides with the educational research (Claro et al., 2022).

In general, teachers in Chile express a positive perception of TDs; however, there are some limiting beliefs that may hinder their effective use. These limiting beliefs may be influenced by age, experience and training; therefore, teacher training processes are key to overcoming these tensions between limiting beliefs and promoting the effective use of TDs in the classroom.

Another challenge that manifests itself in the studies is the digital divide between public and private schools, urban and rural areas, and different academic levels (Martínez Mancilla et al.,2021). This challenge requires comprehensive educational policies that seek to promote digital inclusion from an equitable perspective.

Similarly, it is significant to consider the relationship between FID and reality in the classroom. Research shows that future teachers may have a higher self-perception of competence than their actual skills. Therefore, it is necessary to align training, both initial and in development, with the demands of the classroom and with the constantly evolving digital society, which is in line with what the literature supports.

From the scientific literature analyzed, it is argued that the process of integration of TD in Chilean education requires a much more comprehensive view that considers both technological and pedagogical elements. This effort requires the work and participation of all the actors involved in the educational processes.

CONCLUSIONS

Taking the guiding question of the study as a starting point, it can be concluded that DTs have the potential to enrich the teaching and learning processes in Chilean schools but, at the same time, challenges must be addressed to guarantee their effective use. In this framework, one of these challenges is teacher training in digital competencies. It is possible to state that current training is insufficient and is not always in tune with the needs of teachers. This may be because IDF in Chile has permanently focused on the development of disciplinary competencies, leaving aside digital competencies.

On the other hand, there is an emerging need to install a pedagogical approach focused on learning. Therefore, using TDs in the classroom should be mainly oriented toward student learning. This means that the deployment of educational activities should be designed from an approach that promotes the development of skills and competencies. On the contrary, the traditional approach to teaching, focused on the transmission of content, is not necessarily compatible with the adequate and effective use of TDs. Likewise, the promotion of actions aimed at collaboration among teachers becomes relevant; this process even becomes strategic when we think of developing actions for the integration of TD in the classroom since it is the teachers who learn from each other and share experiences and resources.

Finally, it is worth highlighting the importance of Chilean educational policies in promoting and accompanying the integration of TD in schools. In this sense, public action could persevere more in the generation of concrete mechanisms to promote the necessary and relevant resources for teacher training, the acquisition of digital resources, and support for research in digital education.

From the study, it is possible to advance some lines of future research, namely, to investigate the most effective ways of integrating TD in the classroom and to evaluate the impact of TD on student learning. The former involves considering different educational contexts, students' needs, and the characteristics of TDs. The second, on the other hand, will help to identify the most effective practices and, from there, to improve the integration of TD in Chilean schools.

Among the limitations of this research, we can mention the dispersion of the research that addresses the object of study, which could leave out of consideration research of eventual relevance for the analysis and deepening of some relevant aspects for the development of our work.

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FINANCING
None.

DECLARATION OF CONFLICT OF INTEREST
None.

AUTHORSHIP CONTRIBUTION
Conceptualization: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Data curation: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Formal analysis: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Acquisition of funds: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Research: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Methodology: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Project administration: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Resources: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Software: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Supervision: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Validation: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Visualization: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Writing - original draft: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.
Writing - revision and editing: Leonardo Alberto Velásquez Castro and José Adrián Paredes Águila.