

# Pedagogical Uses of Digital Technologies by Pre and In-Service Teachers: Literature Review from a Global Perspective to the Chilean Context <sup>†</sup>

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**Abstract:** The broad integration of information and communication technologies (ICT) in students' and teachers' lives requires education professionals to think of new ways to provide teaching and learning opportunities. Public and institutional policies, non-governmental organizations and technological innovation companies demonstrate a clear intention to incorporate ICT in schools. This situation leads to new demands on teachers who need to reflect on how to offer teaching and learning provisions with ICT to maximise student-learning gains. This paper focuses on the implications of the new educational landscape to the training and support of Chilean pre-service and in-service teachers. Our work discusses the research literature that deals with the rise of “new” ICT pedagogies, the relationship between them and the notion of active student participation. We suggest that it is important to prepare teachers earlier in their teacher-training programme and during their professional development in the pedagogical use of technology. In particular, pre-service and in-service teachers should be provided with learning opportunities that help them to understand and practice the skills of pedagogic planning and the evaluation of the educative possibilities of ICT.

**Keywords:** ICT; digital literacies; new pedagogies; teacher professional development; teacher training

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## 1. Introduction

This paper focuses on the research literature that deals with the rise of “new” ICT pedagogies and the training and support offered to pre-service and in-service teachers in Chile [1]. We suggest that it is important to prepare teachers earlier in their teacher-training programme and during their professional development in the pedagogical use of technology. In this respect, pre-service and in-service teachers should be provided with learning opportunities that help them to understand and practice the skills of pedagogic planning and the evaluation of the educative possibilities of ICT [2,3]. In this article we refer to the challenges of teaching in the digital age, discussing the literacy changes of pupils and teachers, as well as the pedagogical divide between ‘conventional’ and ‘new’ uses of ICT in teaching. We will then offer an overview of the research-based evidence concerning teachers’ ICT uses in Chile. In the conclusion we discuss the challenges faced in the training and support of teachers at universities or during their professional development programmes at schools.

## 2. The Challenges of Teaching in the Digital Age

### 2.1. New Literacies among Students and Teachers

In the past “literacy” has been understood as individual skills related to read and write [4]. The conventional notion of “literacy” involves certain abilities such as decoding, oral reading fluency, reading comprehension, writing and spelling [5]. The appearance of new notions of the term “literacy” is mainly due to changes in the educational landscape, more specifically to the increased evolution and use of new technologies among students and teachers (e.g., portable technologies in which users can interact through different applications, such as social networks and media technologies, among other resources) [5,6]. As a consequence, the notion of “literacy” has evolved to take on multimodal terminologies that speak to the disappearance of communicational boundaries as well as to the search, assembly and expansion of multiple texts such as words, still and moving images, instant messages, among other modes [7–10]. Ng highlights that the fast evolving landscape of ICT during the last decades offers a wide range of definitions of literacy such as media and ICT literacies [8], online literacy and new literacies [9], among other notions. For instance, the term “new literacies” seems to be linked in some extent to the meanings of the term “digital literacy”, as it encompasses social networks activities that take place predominantly through the screens of mobile devices [10,11].

Within the broad range of contemporary literacies, “digital literacy” plays a significant role in understanding how student teachers and schoolteachers use ICT in practice [6,8,12]. Their ICT qualifications have become an influential aspect sharing implicit links with the rise of new literacies in the digital age. In this respect, the consideration of child and adolescents’ digital literacies has been extensively documented, which can help education professionals to understand how students learn [4,10]. Still, there seems to be slight exploration of the digital literacies of teachers in school-based contexts and how such literacies inform their choices and uses of ICT [12].

Different scholars have suggested that the term “digital literacy” comprises technical and cognitive dimensions of learning with ICT [6,8–10]. For example, Lankshear & Knobel link digital literacy to technical or operational competencies of users with computers and the Internet. They also claim that the term is often defined as the ability to evaluate the information offered in online environments in order to judge its value and credibility [6]. We suggest here that an examination of the potential effects provided by the digital literacies of teachers on their ICT uses in the classroom has become crucial. Considering that both teachers and students have become ICT users [13], the acknowledgement of the literacy changes of pupils as well as their own digital literacies can offer lights of the ways in which they use ICT in teaching. This is relevant because the recognition of the digital literacies of either pre-service or in-service teachers can provide opportunities to decide suitable teacher training and professional support according to their needs in this matter.

### 2.2. Different Uses of Technology in Teaching: The Pedagogical Divide

Concerning the recognition of different technology uses by teachers, Webb claims that integrating ICT requires us to consider different interrelated facets, such as the teaching methods and pupils’ organization, the content and the context of instruction, among other factors [3]. Therefore, understanding the different pedagogical practices of teachers with ICT involves an exploration of their ideas, values, beliefs and the thinking that leads them to such practices. We may find several theoretical frameworks and models supporting the uses of digital technologies in teaching, such as Koehler & Mishra’s technological, pedagogical, content knowledge (TPACK) [14]. Within the wide repertoire of perspectives underlying teachers’ uses of ICT there are two broader views: the conventional (or traditional) and the innovative pedagogical frameworks [1,2,15,16]. The former is mainly characterized by the uses of ICT for delivering content, the preservation of a passive role and commitment of pupils in their learning processes, and the focus placed on the teacher. The latter involves active student participation in order to assure deep understanding and application of learning in real world contexts to maximize student-learning achievement [2,16]. Following this viewpoint, Hadjerrouit sustains that the multiple perspectives underpinning the uses

of ICT in teaching complicate teachers' choices and applications of such technologies with pupils [15]. This situation leads teachers to choose a mix of learning theories, which sometimes are not "adequately" transferred into the classroom. In this line, there seems to be an assumption that if teachers know how to operate technologies, they will use it pedagogically almost by instinct [17]. This idea leads to conclude that teachers need to master not only the operational skills to manipulate ICT but also their critical thinking abilities that enable them to choose and decide how a specific technology should be used with teaching intentions [15,17,18]. As we have mentioned earlier, the incorporation of technology in teaching is complex and involves multiple considerations. Therefore, the provision of opportunities to train and support teachers is significant to develop substantial changes in this matter.

### **3. The Situation in Chile: The Need of an Effective Use of Technology**

The Chilean educative landscape seems to be inclined to the conventional edge of the pedagogical divide addressed previously. The results of a study conducted by Hinostroza, Ibieta, Claro, & Labbe showed that teachers are mainly using digital technologies for replacing the traditional blackboards with conventional presentation software, such as PowerPoint, and that the predominant pedagogical purpose is linked to content delivery. Other ICT uses in teaching are devoted to gain students' attention through the incorporation of videos inside the classroom [19].

Brun & Hinostroza explored the uses of ICT in the initial teaching training (ITT) programmes in Chile. These scholars found that teacher educators used technology mostly for administrative work (e.g., preparing lessons, communicating with students or searching information and resources on the Internet) [1]. Similarly, student teachers used ICT to search information, make presentations as part of their class assessments and creating learning materials, such as lesson plans and PowerPoint presentations. The research also revealed that teacher educators usually trained pre-service teachers to use computers and projection systems for conventional or traditional pedagogical purposes. Other kinds of technologies such as portable devices or video-conferencing tools were infrequently incorporated as part of their training.

Garrido-Miranda, Hass & Rodríguez explored primary student teachers' abilities to purposefully incorporate innovative teaching practices with digital technologies [20]. A multiple case study including eight participants revealed that the main purposes of ICT integration were related to content-delivery instead of more complex or sophisticated application of technologies. Although the participants were keen to develop high-order skills, such as critical thinking and creativity, these abilities were often seen as non-compulsory tasks.

Considering that most of the research-based evidence exposed in the previous passages claims a need for further exploration, it could be hypothesized, then, that there is a potential domain of pedagogical expansion that can include 'new' educative uses of technology inside the classroom. This interpretation would also suggest that both pre-service and in-service teachers might need more systematic training and support to acknowledge the possible learning benefits of ICT, such as flexibility, collaborative learning, motivation, creativity and critical thinking skills, among other learning gains [15,16,21].

Education is inherently difficult and involves multiple considerations. Such complexities play a key role in offering adequate teacher training and professional support that allow teachers to understand the links, factors, elements and levels intertwined in the processes of teaching and learning. Using technology with pupils becomes an additional challenge that turns the practice even more demanding. The changing nature of ICT appears to shape the provision of an almost obsolete preparation of teachers in their technology use. These circumstances are particularly important when teachers complete their training programmes and during their professional development, as education professionals need to elaborate creative ways of addressing the intricacies mentioned here, in order to comprehend the potential pedagogical value of ICT and accommodate their practices to such affordances [14].

Given the challenges described above, the research-based evidence in Chile alongside indications of foreign studies seems to suggest that teachers need to make different connections. For

example, when designing and implementing teaching practices with ICT they need to link their content knowledge with the kind of pupils and the context of instruction, among other factors [14,22].

#### 4. Conclusions: Challenges to the Training and Support of Teachers in Chile

We have discussed in this article the challenges faced by both teacher education institutions and schools in regards to the pedagogical uses of ICT. Since teaching encompasses different interrelated areas [3], we recognise the importance of the development of diverse skills related to technology uses inside the classroom. Particularly, the abilities of teachers to operate ICT are important. However, teachers' cognitive, pedagogical and evaluation skills are even more significant, as they enable education professionals to teach accordingly to the technological changes experienced in the last decades. In this sense, we highlight the significance of teachers' digital literacies in light of the need to stimulate a more systematic comprehension of how digital technologies can work in education and how teachers can promote more thoughtful ways of using such resources in different learning contexts [23].

Although there is a relatively small body of research-based evidence on the training and support of teachers in Chile, the existing evidence seems to show a lack of preparation of teachers concerning innovate uses of ICT in the classroom [1]. The fact that teachers tend to replicate old practices with ICT reveal new demands to refocus the training and professional development programmes that actually take place at universities and schools [1]. This situation appears to be mainly due to an assumption that if teachers can manipulate ICT they will be instinctively prepared to use it pedagogically [17,24]. It is interesting to note that technology integration in teaching is often viewed from an operational or technical perspective [15,25]. Hence, teacher training programmes, as well as teacher educators and consultants, face the challenge to rethink and orient their preparation towards the awareness of the links between pedagogy, literacy changes among pupils and teachers, and how technology can be used in practice to improve student learning gains. The educational landscape in Chile appears to face important challenges, which require priority recognition. We aim here to contribute to the academic discussion in the field.

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