Infusing ICT practices in Teacher Education Programs

A thesis presented by

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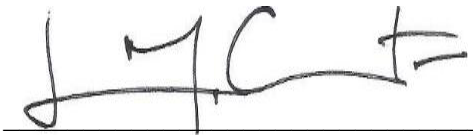

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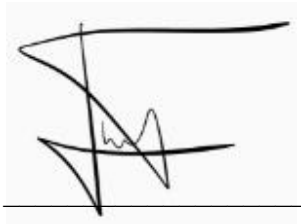

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DEDICATION

To my family, my friends, and all the professors in the program, who always supported me through this formative process.

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I would like to thank my family for being by my side, supporting me, and giving me the strength to continue in challenging times. Furthermore, I am thankful to my Thesis Director, Dr. Liliana Cuesta Medina, for these two years of guidance and unconditional support to accomplish and complete this challenge. Moreover, I want to thank all the professors in the program who allowed me to enhance my professional development. All the classes helped me expand my knowledge and improve my personal and professional life.

ABSTRACT

INFUSING ICT PRACTICES IN TEACHER EDUCATION PROGRAMS

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This study has a twofold purpose. On the one hand, it aimed to voice pre-service foreign language teachers' needs regarding digital skills. These needs come from various actors in teacher education programs, including coordinators, teachers and students, and national and international experts in the field of ICT and foreign language teaching and learning. On the other hand, the study also intended to determine how the digital competencies of pre-service language teachers can be fostered with the inclusion of an ICT component in the programs' curriculum offer to effectively prepare them to teach and/or learn English through the use of technologies. The study arose from the finding which evinced that not all the Licenciatura programs in Colombia included a solid plan that fused ICT and language teacher education, so that teachers and students could be supported to be better able to develop their language trajectory, either in their role of teachers or learners, while meeting the demands of the contemporary society of knowledge and their field of action. This study was conducted on fifteen teacher education programs in Colombia involving eight coordinators, twenty-nine teachers, forty-five students, and ten national and international experts in ICT and EFL. A qualitative inquiry was carried out

by the administration of questionnaires and semi-structured interviews. Responses were analyzed using Grounded Theory and coding procedures.

The study displayed the benefits and challenges of the inclusion of an ICT component in the teacher education curricula. The study illustrated how through an ICT component, pre-service language teachers can develop their digital skills in an informed, effective, and critical way. The study also showed that although teachers shall assume responsibility for their professional development, they have to be supported along their professional trajectories to continue either acquiring or strengthening their digital competencies, especially after the COVID-19 pandemic, time in which they were exposed abruptly to remote and online education.

Lastly, findings suggest that a merely practical ICT component is not sufficient, it requires the fusion of a robust theoretical component that enables a solid foundation in theory and research, with a practical approach that highlights the role of pedagogy supported by technological devices. In the practical component, pre-service teachers can design and apply various tools and strategies, based on a thorough analysis of the educational context for which the ICT component is planned. Such analysis shall encompass specific contexts' needs, benefits, affordances, and constraints of the use of technology in the classroom. All in all, this study findings aim at contributing to the field as a starting point for new tendencies for creating, adjusting, modifying, and implementing ICT components in curriculums offered by teacher education programs in Colombia (and perhaps overseas).

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Introduction

The exponentially growing use of technology in our contemporary and everchanging society embodies different challenges, especially in educational sectors. Substantial investments are needed in terms of resources, comprising human and infrastructure matters, without leaving aside issues such as teacher development, digital skills acquisition, and lifelong learning skills development.

Hence, education in various levels and domains, including public and private schools, language centers, and institutes worldwide, are considering new possibilities to include Information Communications Technologies (ICT, hereafter) into their course offerings, materialized in apps, platforms, and/or different strategies, to tackle the challenges of the new normalness, to train users, and to innovate their practices. Furthermore, taking into consideration that students and teachers have learned to adapt and endorse the challenges of remote, blended and online environments, it is of the utmost importance to keep fostering the accomplishment of personal and professional objectives to ensure that efficient learning takes place.

Surprisingly, at the local context, most of the teacher education programs (Licenciatura in Foreign Languages for the case of Colombia) do not include ICT components in their study plan, perhaps due to a vague, and/or somehow erroneous notion in which young learners are known as digital natives with innate ability to use technology. The reality is entirely different as was evinced during the current pandemic (COVID-19) that emerged in early March 2020. Everyone abruptly switched to online and remote learning, unveiling many students' difficulties and unfamiliarity in using platforms and academic support learning technologies, despite their knowledge of social media usage services. Educational systems around the globe have had to

make several changes, which include classes, exams, methodologies, and communication and interaction strategies. In just a week, the Colombian government and its educational institutions, were forced to move aside the traditional methodologies to consider new ways to teach, learn, and evaluate.

Unexpectedly, education made a fast migration to online systems that unveiled that despite most of the learners use technology in their social life, they do not have the necessary digital skills to succeed in online academic environments, and, thus, not ready to face the dynamics of the new learning environment. Similarly, teachers and pre-service teachers seem to be ill-prepared to integrate technology into their educational practices; therefore, they need more preparation to use technology in an innovative, responsible, and critical way. As a result, the need to train pre-service teachers to acquire ICT skills is undisputable.

In agreement with the aforementioned panorama, Chigona (2015) argued that pre-service teachers are finishing their teacher education programs unqualified to teach with ICT. This fact is concerning because it neglects the importance of ICT training in the construction of lifelong learning skills and assumes that learners are innately and digitally literate. Therefore, it is paramount to advocate for solid training in tertiary education, so that professors in teacher education programs become aware of the importance of ICT skills into the curriculum. However, even today, ICT have not yet been considered as something to integrate in the official study plan of many teacher education programs. It seems to be an implicit aspect in the subjects offered in their curricular proposals. As a result, pre-service teachers lack both knowledge and expertise to integrate ICT into their pedagogical practices.

The inquiry arises, while also being cognizant of a thorough analysis of cases in local and international contexts that picture the reality of teachers and students who need to be skillfully trained in ICT to be able to comply successfully with the demands of their education targets. Thus said, the account of studies described below portrays the ways in which different countries have tried to implement numerous methods and resources supported by ICT in teaching and learning practices.

In Jordan, Abuhmaid (2011) accompanied by the Ministry of Education performed different ICT training sessions during four years with one hundred twenty teachers from diverse regions to train them to include ICT in the national curriculum of this country. The study aimed to verify the effectiveness of ICT inclusion through an ICT course. The author applied interviews, classroom observation, questionnaires, teachers' experiences note to collect the required data. In the end, they came up with positive results in terms of ICT, digital skills, and knowledge improvement in general. “Teacher training courses, both pre and in-service, can help teachers to adopt technology solidly, foster enthusiasm and new ways to implement ICT into their profession” (Abuhmaid, 2011, p. 195). Nevertheless, it is important to consider that some problematic aspects such as timing, teachers´ views, school culture, assignments and motivation seem to impact the effectiveness of this type of courses.

In The Netherlands, Tran, Van Den Berg, Ellermeijer and Beishuizen (2015) aimed to include technology in teaching, considering how to turn software manipulation into molding ideas connecting with meaning-making. During this process, pre-service teachers understood and applied different tools as they learned how to design, teach, and assess through ICT resources. All the data collected came up from the teachers' experience during this learning process from observation, questionnaires, interviews, and different teachers' perspectives and personal

perceptions. This study displayed positive results in terms of the ICT proficiency level that preservice teachers acquired thanks to the permanent support, materials, and lesson plans delivered. However, it noted some particular needs in terms of the importance of individual feedback.

In the Colombian context, some educational institutions have also tried to integrate ICT into their curriculum. At the moment of collecting data (2021-1) through an exhaustive revision, thirty-one teacher education programs in foreign language teaching and learning in Colombia were reviewed. This review followed a documentary analysis methodology, and consisted of accessing the information related to the study plan exposed in the University web pages. We found that most of the programs have not explicitly included any ICT formation in their curriculum, as a particular course or component. It is important to clarify that even though it is not visible in the study plan, it can be conducted mainstreamed through other available courses in the program. This study focuses on those programs that have not a course or component explicitly displayed in the study plan as depicted in Table 2.

Table 1.

Teacher education programs with ICT an explicit ICT component in their study plan.

University	Name of Program	Modality	City	Sem	ICT course
Universidad de Antioquia	Pregrado en Lenguas Extranjeras.	On-site	Medellín Antioquia	10	Las TIC en la enseñanza y aprendizaje de Lenguas Extranjeras L2/L3 Elective course
Fundación Universitaria Compensar	Teacher education programs en Inglés y Bilingüismo	On-site	Bogotá	9	ICT in language teaching. 6th semester
Universidad Tecnológica del choco	Licenciatura en lenguas modernas con énfasis en inglés	On-site	Quibdó Chocó	10	Informática y Nuevas Tecnologías. 1st semester
Universidad de la Amazonia	Licenciatura en Inglés	On-site	Florencia Caquetá	9	TIC herramientas virtuales de la disciplina. 4th semester
Universidad Pedagógica y Tecnológica de Colombia	Licenciatura en Idiomas Modernos Español e Inglés	On-site	Tunja, Boyacá	10	TIC´s y Ambientes de Aprendizaje 1st semester.
Universidad Pontificia Bolivariana	Licenciatura en Inglés	On-site and Virtual	Medellín, Antioquia	10	Enseñanza y aprendizaje con mediación tecnológica. 8th semester.
Universidad Católica Luis Amigó	Licenciatura en Inglés	On-site	Medellín Antioquia	8	Competencias Fundamentales en TIC.1st semester.
Universidad de Córdoba	Licenciatura en Inglés	On-site	MonteríaCórdoba	10	Mediaciones tecnológicas 1st semester.
Corporación Universitaria Minuto de Dios Uniminuto	Licenciatura en lenguas extranjeras con énfasis en inglés	On-site	Bogotá	10	Virtual environments for teaching foreign languages (elective course).
Universidad Antonio Nariño	Licenciatura en Español e Inglés	On-site	Bogotá.	9	TIC y educación 2nd semester.

Table 2.

Teacher education programs which do not have an explicit ICT component in their Study Plan.

University	Name of Program	Modality	City	Sem	ICT course
Universidad Católica de Oriente	Licenciatura en Lenguas Extranjeras	On-site	Rionegro, Antioquia	10	Not included
Universidad de Nariño	Licenciatura en Inglés Francés	On-site	Pasto, Nariño	10	Not included
Universidad de Pamplona	Licenciatura en Lenguas Extranjeras	On-site	Pamplona, Norte de Santander	10	Not included
Universidad de San Buenaventura	Licenciatura en Lengua Inglesa	Virtual	Bogotá	8	Not included
Universidad de Sucre	Licenciatura en Lenguas Extranjeras	On-site	Sincelejo, Sucre	9	Not included
Universidad del Atlántico	Licenciatura en Idiomas Extranjeros	On-site	Barranquilla, Atlántico	10	Not included
Universidad del Tolima	Licenciatura en Inglés	On-site	Ibagué, Tolima	10	Not included
Universidad La Gran Colombia	Licenciatura en Inglés	On-site	Bogotá	8	Not included
Universidad Nacional Abierta y a Distancia	Licenciatura en Inglés como Lengua Extranjera	Virtual	Bogotá	10	Not included. (practicum)
Universidad Pedagógica Nacional	Licenciatura en Español e Inglés	On-site	Bogotá	10	Not included
Universidad Pedagógica Nacional	Licenciatura en Español y Lenguas Extranjeras.	On-site	Bogotá	10	Not included
Universidad Pedagógica y Tecnológica de Colombia	Licenciatura en Lenguas Extranjeras	On-site	Tunja, Boyacá	10	Not Included
Universidad Santiago de Cali	Licenciatura en Lenguas Extranjeras Inglés Francés	On-site	Cali, Valle del Cauca	10	Not included
Universidad Popular del Cesar	Licenciatura en Lengua Castellana e Inglesa	On-site	Valledupar, Cesar	10	Not included

Universidad Santo Tomás	Licenciatura en Lengua Extranjera Inglés	Virtual.	Bogotá	10	Not included
Corporación Universitaria del Caribe	Licenciatura en inglés	Virtual.	Sincelejo, Sucre	8	Not included
Institución Universitaria Colombo Americana	Licenciatura en Educación Bilingüe Español – Inglés	On-site	Bogotá	10	Not included
Universidad del Valle	Licenciatura en Lenguas Extranjeras	On-site	Cali, Valle del Cauca	10	Not included
Universidad del Cauca	Licenciatura en Lenguas Modernas Inglés-Francés	On-site	Popayán, Cauca	10	Not included
Universidad Industrial de Santander	Licenciatura en Lenguas Extranjeras con énfasis en Inglés	On-site	Bucaramanga, Santander	10	Not included
Universidad de Manizales	Licenciatura en educación básica con énfasis en inglés	Virtual	Manizales	10	Not included

Although ten programs have included ICT in their study plan, most of them are presented as elective courses and/or seminars. This reality clearly demonstrates that ICT formation is still not seen as crucial as we have faced it during this new reality. A reality that invites us to reflect about important facts such as: “Only 19 percent of their 42,000 students assessed in 14 countries and educational systems could work independently with computers as information-gathering and management tools due to a lack of ICT formation” (Strauss, 2019).

This study aimed to voice pre-service foreign language teachers’ needs regarding digital skills. These needs come from various actors in teacher education programs, including coordinators, teachers and students, and national and international experts in the field of ICT and foreign language teaching and learning, to determine how the digital competencies of pre-service

language teachers can be fostered through the inclusion of an ICT component that prepares them to learn and teach English supported by the use of technologies.

Based on the above-mentioned facts, this research poses the following research question:

How might the digital competencies of pre-service language teachers be fostered in teacher education programs?

Subsequently, this study aims to accomplish two specific objectives:

1. To voice different perspectives from coordinators, teachers and students from various teacher education programs about pre-service teachers' needs in terms of digital competencies.

2. To determine how the digital competencies of pre-service language teachers can be fostered with the inclusion of an ICT component in the teacher education programs that prepares them to learn and teach English supported by the use of technologies.

Theoretical framework

ICT skill development in pre-service teachers has been a long-lasting concern in different educational contexts around the world. It does not seem to be a local problem, since digitalization in education is widening through time and the need for action is immediate, especially in the present times in which classes have had to migrate to emergency remote teaching and learning conditions as Hodges, Moore, Lockee, Trust and Bond (2020) established. If institutions had been better prepared to tackle the COVID-19 pandemic, and there had been action plans in the use of ICT and the training of learners and teachers, the reality would have been more bearable. Thus said, a higher number of local and international institutions would

have managed this pandemic without inconvenience, tackling and optimizing their limited resources, generating less improvised study plans and out of context evaluation systems, understanding the barriers and challenges from blended and online environments.

CALL and ICT in the language classroom: Evolution and current conditions

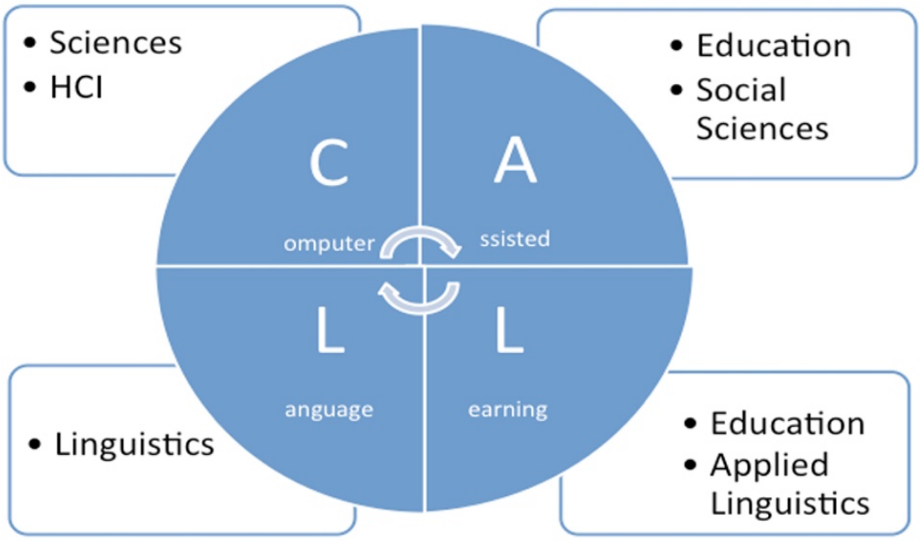
Computer-assisted language learning (CALL) was the term agreed upon at the 1983 TESOL convention. “CALL is a term widely used to refer to the area of technology and second language teaching and learning despite the fact that revisions for the term are suggested regularly” (Chapelle, 2003, p. 3). In addition, (Davis, 2013.p261) proposed a limited definition, where “(CALL) is perceived as an approach to language teaching and learning in which the computer is used as an aid to the presentation, reinforcement and assessment of material to be learned”. A more accurate definition was proposed by Levy (1997, p.1). He defined “CALL as the search for and study of applications of the computer in language teaching and learning”.

The majority of contemporary CALL practitioners agreed with Levy´s definition because computers cannot be assumed as an aid, the concept of CALL has been shaped by language and pedagogy principles but also it has been connected in a linear way by computer and technology with educational purposes. Indeed, this concept endorses four different components (sciences-education and social sciences- linguistics- education and applied linguistics) those components are correlated and belong together (Stickler & Hampel, 2015).

Through the next figure, it is easy to understand and analyze the intersection through different disciplines CALL has, and the ways in which CALL moves and interacts with science, social science, and education with technology.

Figure 1.

Research fields that intersect with CALL. (Stickler & Hampel, 2015, p.382).



The "computer" component connects with science and human-computer interaction, suggesting interaction linkages between people, computers and digital tools. The "assisted" element refers to education and social sciences, highlighting the pedagogical component, and the importance of learning through technology. The third component is "learning", which establishes a relationship with linguistics, pedagogy, and languages. The last section is "language", and its study of linguistics, together with the process of teaching and learning languages.

Through time CALL has been presented as "Computer-assisted instruction (CAI) and computer-assisted learning (CAL) predate CALL as generic terms, and CALI (computer-assisted language instruction) was incorporated into the name of the professional association CALICO (Computer-Assisted Language Instructed Consortium), which was founded in the United States in 1982" (Davies, Otto and Rüschoff , 2013, p.20). The concepts have experienced considerable changes due to the influence on the current principles and paradigms in foreign language

teaching and learning. Current pedagogy promotes collaborative knowledge construction rather than learning processes focusing on the teacher. New trends and tendencies aim to promote authenticity, collaboration, students' role environment, task orientation, and adjustments according to the local context. Likewise, the increasing availability and flexibility of digital media, as well as the greater ease, have extended the possibilities to use all the potential not only for entertainment purposes but also for academic ones. There is no question that digital media are now having a significant impact on the way foreign languages are being taught and learned. "It can now be argued that computer-assisted language learning has come of age, and that we are now entering a fully integrated and naturalized phase of CALL" (Davies et al., 2013, p.34). Indeed, According to Mahdi (2013) CALL will arrive at this point when computers are utilized every day as an essential or usual element of every instruction like a pen or a book. Although the technological resources will not be the focus of all lesson, they will be used in almost all of them. They will be fully integrated into the classroom to normalize their use and make them part of the lesson. "As long as CALL is treated as something 'abnormal' it will not be fully effective". (Chambers & Bax, 2006, p. 474)

The concept of CALL has had a significant evolution in the last years. It has embraced from the language teaching and learning in which the computer is used as an aid to a more integral concept where the technological tools have a critical impact and a fundamental role in learning due to the flexibility, availability, and great access. These tendencies are not necessarily associated with studying foreign languages, but there are trends and adjustments according to context-specific needs. These tendencies include the concept of Blended Learning and Emergency Remote Teaching and Learning.

Blended Learning

"The rapid emergence of technological innovations over the past half-century (particularly digital technologies) has had a huge impact on the possibilities for learning in the distributed environment" (Graham, 2009, p. 6). One of these innovations is blended learning first called e-learning'. "The concept was redefined as 'Blended Learning' as it became clear that Web-based activities in a traditional self-study mode could not 'replace' classroom practice and social interaction on language learning but would support and extend it" (Davies et al., 2013, p. 32).

Blending at the activity level occurs when the blend comprises a learning activity that combines both face-to-face and computer-mediated elements (Medina, 2018). This concept, often refers specifically to the establishment or use of resources which combine e-learning with other type of instructive resources as Rosdale (2006) mentioned. Blended learning is a concept that has emerged some years ago. "It has also been coined as "hybrid learning" and "multi-method learning" (Elva, 2006, p. 1), but now is gaining momentum in all educational scenarios as it has been proved that this modality increases learners' engagement, productivity, and learning through technology, while taking advantage of resources, both human and infrastructure as Medina (2018) declared. There are some models proposed by Graham (2009) that remark that Blended Learning can be developed at four levels: the activity level, the course level, the program level, or the institutional level.

Graham and Osguthorpe (2003) suggested that with the blended learning approach, teachers can harness the benefits of both face-to-face interaction and online technology to create a pedagogic balance that promotes student learning and facilitates activity-based learning. In

addition, Graham and Osguthorpe (2003) presented six reasons why one might choose to design or use a blended learning system: (1) pedagogical richness, (2) access to knowledge, (3) social interaction, (4) personal agency, (5) cost effectiveness, and (6) ease of revision.

Blended learning aims to integrate new approaches by mixing face-to-face with online interaction. It pretends to evidence these types of mixed interactions support the improvement of different digital skills when students feel involved, enthusiastic, and focused to study in a variety of learning situations. “Blend offers the combination of varied social interaction patterns in a synchronous/asynchronous scenario that meets different needs and learning styles”, Medina (2018, p. 42).

Although, some higher education programs institutions have integrated and expanded learning centers, accommodations, campuses and classrooms to facilitate e-learning and distance learning (Zawacki-Richter, Müskens, Krause, Alturki, & Aldraiweesh, 2015). This does not seem to be enough and efficient. The success of blended learning could be affected by numerous aspects such as: the internet connection, the available resources, the unpreparedness institutions have, the lack of sequence, but the most visible relates to the lack of teacher training. Teachers and educational institutions at varied educational levels are not always prepared to respond to such specific circumstances and characteristics related to the specific settings. This lack is associated to the scarce knowledge and expertise in blended learning, which according to Medina (2018), poses difficulties at the instructional design level.

Despite Blended Learning is a new trend in education, a considerable amount of institutions are applying blended learning especially in higher education programs to encourage students, learn in a multi-modality way, keeping in mind that “Blended learning does not mean

bolting technology onto a traditional course and/or using technology as an add-on to teach a difficult concept or deliver supplemental information" (Medina, 2018, p. 43).

Emergency remote teaching and learning context in Pandemic times

As a result of the COVID-19 pandemic, schools, institutions, universities, colleges and language centers from public and private sectors are facing numerous challenges in continuing teaching and learning while the health emergency is forcing a rethink in different domains in life and education is no exception. Emergency remote teaching (ERT) has emerged as an alternative used by online education researchers and professional to draw a high-quality online education as a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances (Hodges, Moore, St Lockee, Trust, & Bond 2020). It is different than "Online learning, that can be defined as instruction delivered on a digital device that is intended to support learning" (Ferri, Grifoni, & Guzzo 2020, p .2). Indeed, numerous concepts are related to online learning such as: distance learning, distributed learning, blended learning, online learning, mobile learning among others. Each concept contains different characteristics and specific principles.

All the institutions around the globe were forced to cancel all types of face-to-face activities including classes and events in order to prevent possible infections and keep social distancing to prevent the rapid spread of the virus. This situation has been demanding for administrative staff, teachers, students and faculties due to the lack of preparedness and the anguish a pandemic produces. The adoption of different models implies the participation of government, experts, citizens, policy makers, institutions, administrative staff, teachers and students. Students and teachers mainly, have confronted diverse difficulties in remote teaching

due to the present limitations related to technological, educational and social challenges (Ferri et al., 2020).

In order to promote the implementation of an ICT component in teacher education practices (UNESCO, 2018, p. 8) advised that the "ICT component should be integrated into the three phases of teacher professional development: pre-service, in-service, and on-going formal and informal pedagogical and technical support in order to encourage and foster digital competencies in all educational levels". This pandemic would not be as tragic if teachers had adequate ICT literacy, which would make integrating technology into their teaching approaches more fun and comfortable. Although online learning carries a stigma of being lower quality than face-to-face learning, despite research showing otherwise (Hodges et al., 2020). And face-to-face learning environments inclined to place primacy on the human-human interaction (Graham, 2009). The pandemic and the shutdown clearly stated the importance of and ICT component in all educational programs, the importance of government support, pertinent policies, and continuous teacher training. Although this situation is stressful, when it is over, institutions will emerge with an opportunity to evaluate how well they were able to implement ERT to maintain continuity of instruction (Hodges et al., 2020).

In addition, Maru (2021, p. 63) recommended some vital efforts such as "Providing necessary ICT components in schools, preparing teachers for more digital literacy, and saving more time for learners' feedback and interaction are worth to implement the inclusion of an ICT component at different educational levels".

ICT Skills

The concept of digital competencies has been defined with different terms such as "Digital literacies, digital skills, ICT literacies, ICT competencies".(CT Literacy Panel 2002, p. 2) defines ICT literacy as the capability to practice digital technology, communication tools, and/or networks to access, integrate, manage, evaluate, and create information to function in a knowledge society. "Digital literacy is the ability to use digital technology, communication tools or networks to locate, evaluate, use and create information" (UNESCO, 2018, p. 64).

ICT skills refer to the technical use of ICT. Hence, ICT competencies are conceptualized as the integrated and functional use of digital expertise, abilities, and attitudes. Regarding the concept and including it with teaching practices teacher technology literacy means that students can use ICT tools to help their learning, so they can learn more successfully. ICT information and communications technology which means computers, mobile phones, digital cameras, satellite navigation systems, electronic instruments and data recorders, radio, television, computer networks, satellite systems or almost anything that handles and communicates information electronically. "ICT includes both the hardware (the equipment) and the software (the computer programmes in the equipment)" (UNESCO, 2018, p. 65).

According to these concepts, it is essential to recognize the importance of ICT inclusion in educative contexts. Indeed, The 2030 Agenda for Sustainable Development recognizes that "The prevalence of Information and Communications Technologies have a significant potential to accelerate progress, to bridge the digital divide and support the development of inclusive Knowledge Societies based on human rights, the achievement of gender equality and empowerment" (UNESCO, 2018, p. 1).According to UNESCO (2018) Teachers' capacity to

arrange learning in new ways, integrate technology effectively with pedagogy, create socially engaged classrooms, and encourage cooperative engagement, collaborative learning, and group work will be key to this inclusion. Indeed, "There is a significant correlation among teachers' ICT literacy levels with their training experiences, internet frequency usage, and ICTs integration in language teaching" (Hafifah & Sulistyo, 2020, p. 186). This ability is not intrinsic, it includes training, content, pedagogical and specific knowledge, as this ability is not innate, in the development of ICT skills is important to incorporate formal education where students can obtain the basic concepts while they learn how to use and adapt digital tools through the experiential use of technology.

Throughout the COVID-19 pandemic, teachers from everywhere in the world have faced this necessity, and due to this situation, in-service teachers have realized they do not have the basic skills to adapt their teaching into technology, evincing that their young and formerly-believed "digital" students do not know how to work online for academic purposes. Thus, UNESCO (2018) suggests that the training of pre-service teachers, should focus on "Initial preparation on pedagogy, subject matter knowledge, management skills and use of various teaching tools including digital tools and resources" (UNESCO, 2018, p. 8). In order to guarantee an efficient ICT integration during teacher professional careers UNESCO also establishes that "The teaching skills of the future will include the ability to develop innovative ways of using technology to enhance the learning environment and to encourage knowledge acquisition, knowledge deepening and knowledge creation" UNESCO (2018, p. 21).

According to Kennedy, Judd, Dalgarno and Waycott (2010), it is also essential to consider that not all students are equally competent with technologies. Their patterns of use can vary considerably when they move beyond basic and entrenched technologies to newer,

emerging, or recently introduced ones. With this in mind, two of the most important objectives teachers should put into practice in ICT skills are to develop and prepare students who have been considered as digital citizens to use those resources more professionally, allowing them to appropriate, explore those resources and reflect on how they use them, ensuring a natural endorsement of technologies for their current and lifelong learning experience.

Frameworks as a possible starting point

In order to promote ICT formation, different institutions and experts have worked on the development of different frameworks that aim to help, guide and promote ICT inclusion in different educational levels. These frameworks aim to guide the incorporation of an ICT component at different educational levels, help policy makers to create new policies to adapt and include ICT in diverse practices, promote teachers´ professional development and continue to ensure that education responds to the current tendencies, requirements and skills in this 21st century, now, we live in a world where technical innovation is accelerating at rapid pace, and digital technologies are becoming an increasingly important aspect of our daily lives.

For starters, we believe that teachers have to be theoretically informed so they can make informed decisions based on what the literature and previous studies and explorations of this kind suggest. Although it is not our intention to advocate for a specific framework, it is of the utmost importance that any option chosen is rooted and fundamentally in agreement with the needs, objectives and context of the academic institution, and per se their student and teacher body. Such consideration will enable a smooth adaptation, transition and normalization along the usage and endorsement of ICT in the curriculum.

At the beginning of 2001, Educational Testing Service (ETS) convened an important international panel to examine the expanding importance of Communication Technologies (ICT) as well as the connection to literacy. In this panel numerous experts from public and private sector contributed. The objective of this framework is to offer a basis for the design and the instrumentalization of material including assessment envisioned to inform public policy and diagnostic procedures in order to check particular skills related to information and communication technology.

The ICT literacy panel (2002) established three core recommendations:

a. Large-scale assessments and public policy research: Government should start including international assessment in terms of ICT literacy. According to the results obtained government, educators, researchers and experts should conduct new policies in order to extend access, confidence and have improved practices with new technologies.

b. Diagnostic assessment: Diagnostic assessments converging on the extent of ICT literacy, or on the ability of students to develop it.

c. An integrated ICT curriculum: The acquisition of ICT is mainly learned through cognitive and practical practices. In this sense, ICT literacy skills need to be integrated appropriately into curricula addressing cognitive skills as well as those addressing IT and technical skills in order to ensure improved ICT literacy.

The development of this framework has numerous benefits such us: The framework as a vehicle for debating the domain's definition and statements, the development of common assumptions and the capacity to establish shared goals, the link to evidence collected through the process arises a deeper understanding of what is being measured, and

this awareness and the critical link between public policy, assessment, and research, enhancing the usability of the data produced.

This organizational scheme, shown below, illustrates the foundational set of skills and knowledge that underlies ICT literacy: “cognitive and technical proficiency” (ICT Literacy Panel, 2002, p. 18):

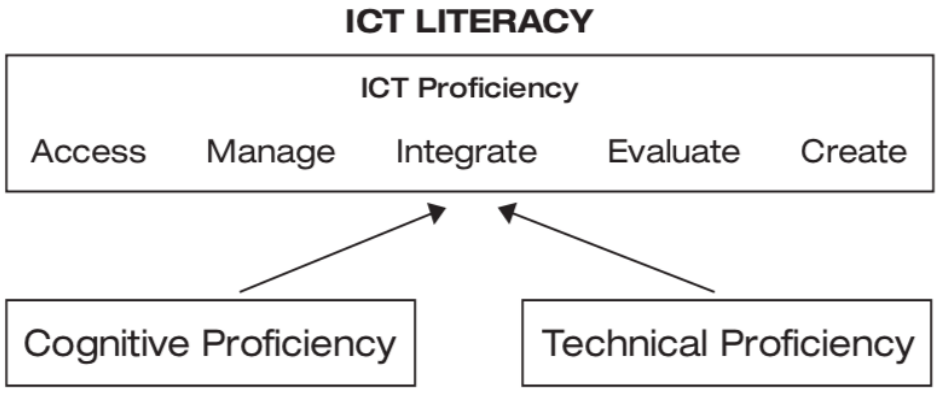
- Cognitive Proficiency: the required core skills of everyday life at school, at home, and at work. These abilities are demonstrated through literacy, numeracy, problem solving, and spatial/visual literacy.

- Technical Proficiency: the fundamentals of digital literacy. A core understanding of hardware, software applications, networks, and digital technology elements.

- ICT proficiency: The integration and application of cognitive and technological skills. ICT skills are considered as enablers, allowing people to take full advantage of technology's possibilities. ICT skills lead to creativity, personal transformation, and societal change at the greatest level.

Figure 2.

ICT literacy, foundational set of skills cognitive and technical proficiency (ICT Literacy Panel, 2002,p.18)



According to this framework, ICT literacy should include a cognitive and a technical competence. As a result of this ICT literacy panel (2002) five components are considered as essential: accessing, managing, integrating, evaluating, and creating information in a technological context.

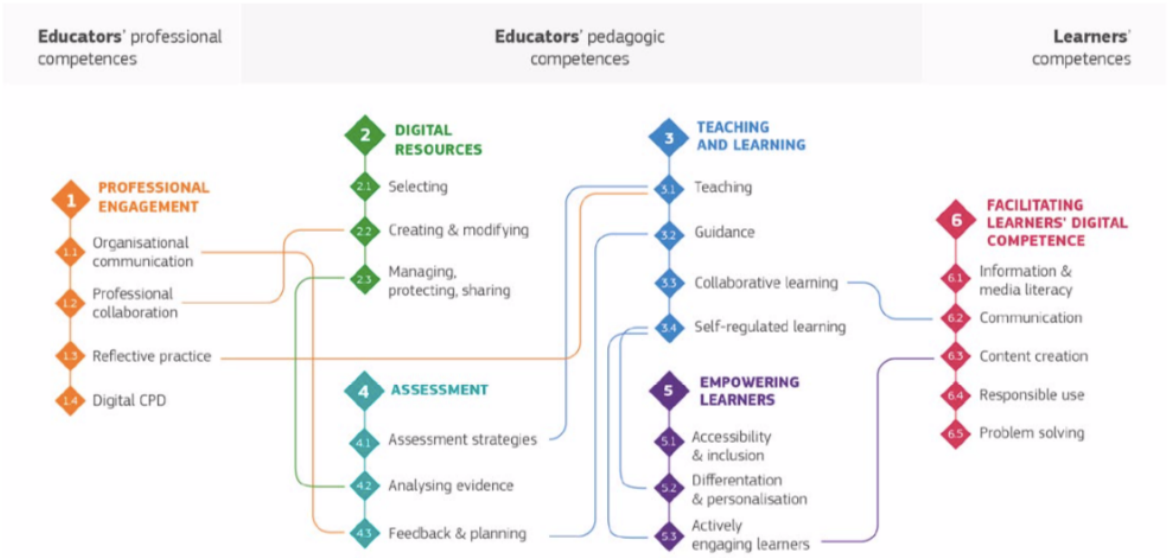
In (2017) The European framework for the digital competence of educators was published by Christine Redecker. This framework aims to help in the guidance of policy and can be adapted and implemented in different training programs. It provides a usual language and approach that can be helpful in the exchange of best practices around the world. This framework is directed to educators at all educational levels, public, private, vocational, special needs, children, teenagers, adults including non-formal contexts. By providing a frame of reference, a common terminology, the framework is designed to help national, regional, and local efforts to enhance educators' digital competence. It can be seen as a point of reference for Member States and other actors to check the accuracy and approach of their own present and future tools and

frameworks. In addition, it can serve as a guide policy considering specific needs in context, and it is intended to stimulate discussion about the increasing demands on educators' digital competency.

This framework focuses on various aspects of educators´ professional activities: Professional engagement (technology for interaction, teamwork and professional development), digital resources (creating and sharing), teaching and learning (the use of technology in teaching and learning), assessment (technology to enhance assessment), empowering learners (promote inclusion, personalization and engagement), and facilitating learners' digital competence (enhance creativity and responsibility, problem solving). Some of the aspects have a special correlation and are aligned to foster the development of digital skills based on the improvement of basic skills through the awarenes of the needs, and the specificities in determined contexts.

Figure 3.

European framework for the digital competencies. (Redecker, 2017, p. 8)

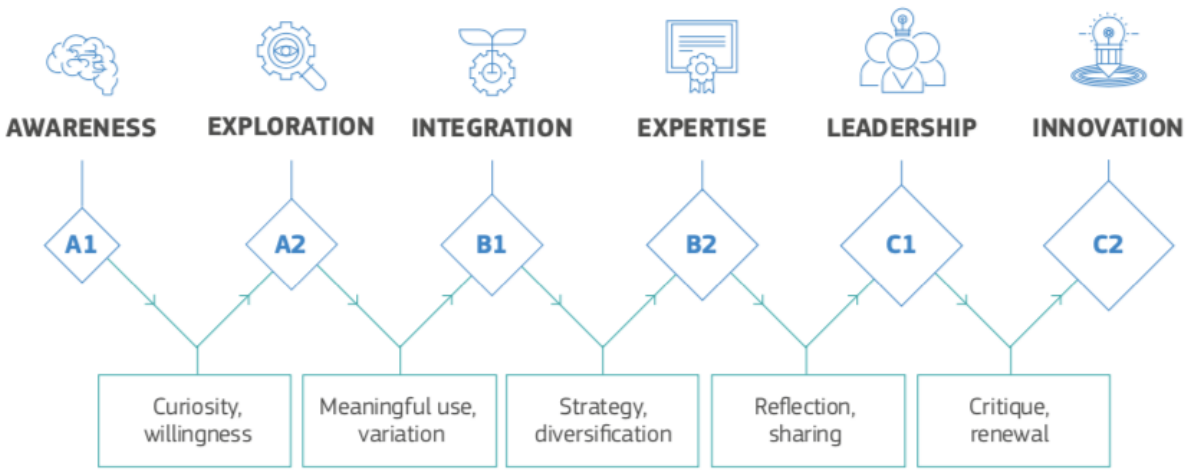


"The main objective of the proposed model is to support continuous professional development. It is not intended as a normative framework or as a tool for performance appraisal" (Redecker, 2017 p. 28).

In addition, this framework offers a progression model that pretends to help educators comprehend personal weaknesses and strengths in order to take action and improve in their own process and acquire a more advanced level of digital competencies supporting UNESCO´s idea: "Training and on-going support must enable teachers to develop the necessary ICT competencies so they can, in turn, ensure their students develop the relevant skills, including digital competencies for life and work" (UNESCO, 2018, p. 1).

Figure 4.

Progression model ICT literacy proposed by European framework (Redecker, 2017, p. 29).



These stages and the logic of their progression are inspired by Bloom's revised taxonomy. It explains the stages in a learning progress from "Remembering" and

"Understanding", to "Applying" and "Analyzing", and finally to "Evaluating" and "Creating". (Redecker, 2017). At the beginning, Newcomer (A1) and Explorer (A2), educators embrace new information and try to acquire basic digital skills. In Integrator (B1) and Expert (B2), educators increase and reflect on the digital skills they have acquired. Leader (C1) and Pioneer (C2), educators transmit the knowledge acquired, get a critical component and start developing new practices.

In 2018, UNESCO also offered and published an ICT competency framework for teachers (ICT-CFT) in this last edition it addresses 6 aspects of teachers´ professional practice: Understanding ICT in education policy, curriculum and assessment, pedagogy, application of digital skills, organization and administration, and teacher professional learning

Figure 5.

Framework proposed by UNESCO.(UNESCO, 2018, p. 10)

Through these aspects, UNESCO aims to support teachers who have achieved ICT competences in their professional teaching, to encourage them to have an influence on the educational system, and to steer the evolution of students' ICT proficiency during the teaching-learning process.

The UNESCO ICT competency framework for teachers (ICT-CFT) presents three different moments of a teacher´s development in terms of the pedagogical practice of ICT. The

first moment is knowledge acquisition, at this moment teachers acquire primary ICT competencies like how to adapt ICT into the standards, curriculum, and national policies, differentiate the various ICT tools to support learning and teaching practices, as well as the identification of aspects in terms of hardware and software. The second moment is knowledge deepening, where teachers learn how to create a student-centered environment through the application of digital tools to promote collaborative learning and interaction, how to design ICT projects, blend digital devices into the classroom, and integrate ICT with the content in syllabus proposed by the national policies and institution. The third and last moment is knowledge creation, where teachers feel encouraged to change their habits over multidisciplinary projects, encourage students to learn through collaborative processes with ICT inclusion, create knowledge communities, train other teachers, innovate, and share the knowledge with the community to grow together as an ICT team.

Pre-service teachers' attitudes, barriers, competencies in terms of ICT inclusion

Several anticipated problems may arise when an institution, or a group of individuals integrate technology in the classroom. This section attempts to delve into some roadblocks, with the ultimate intention to give priority to these aspects when initiating and developing curriculum implementations. Several studies have examined the importance of fostering ICT in teacher education programs. For example, A study carried out by Sauro (2011) aimed to present the role of synchronous mediated communication (SMCM) for second language acquisition.

For this study, Sauro (2011) included a digital exploration that focused on identifying relevant publications on synchronous computer-mediated communication (SMCM) from 1990 to 2010. She exposed the inclusion and exclusion criteria for the study, 302 studies were analyzed.

The study presented assertive results in terms of grammatical competence, accuracy, lexical output, self-correction, self-regulation, lexical richness, improvement in vocabulary and grammar use, growth in sociolinguistic competence, as well as discourse functions, assertion, pragmatic appropriation, language socialization, coherence and cohesion, verbal and non-verbal competencies, the negotiation communication breakdown, showing that technology as a multimodal strategy is useful and it provides more opportunities to produce output in the second language for several years.

Henderson et al. (2013) aimed to present various procedures to assist pre-service teacher´s integration of ICT in their classroom practice. The author included modeling, assessment of ICT in a pedagogical integration, and the implementation of a shared examination during Practicum classes. The author carried out this study in thirty-nine universities in Australia, intervened sixty-two participants using different tools like focus groups, and interviews. During the process, the students took a critical, collaborative, and reflective role of the ICT in their curriculum. Findings showed that pre-service teachers could integrate ICT into their lessons and teaching practices as well as the opportunities to investigate, select, picture, teach, and consider their choice to include ICT into their professional process.

In the South African context, another study examined pre-service teacher attitudes. In their project, Sabiescu et al. (2013) showed how training could help pre-service teachers to articulate technology in their pedagogical practices in a significant way. This research project aimed to assess the association between the digital skills teachers have, the self-efficacy and the attitudes in terms of ICT intention and integration in their practices. This study was carried out with eleven pre-service teachers, and it had two phases. The first was a training module component about the use of interactive whiteboards to engage different exercises. In the second

phase, students learn how to use digital storytelling (DTS) in their contexts. Findings were categorized in three different aspects, namely:

a) Cognitive attitudes, that gauged innovation, caused impact on undeveloped contexts, fostered new social and educational opportunities.

b) Affective attitudes, which addressed findings related to passion, the fear to be left behind, and the enthusiasm the pre-service teachers felt during the process.

c) Technology integration scenarios, in which students- centered activities based on contextualized needs were addressed.

Also in 2013 in Belgium, Tondeur (2018) conducted a study to examine how three institutions prepared pre-service teachers in the integration of ICT courses in their practices through the development of a multiple case study. In this project, the authors pretended to promote a technological, pedagogical content knowledge model (TPACK), involving the cooperation between Technological knowledge (TK), pedagogical knowledge (PK), content knowledge (CK) in the curriculum. Through instruments like semi-structured interviews with ICT supervisors, focus groups, collection, and triangulation methodology the authors examined and obtained some findings based on three approaches to analyze the TPACK model during the process.

Later, Chigona (2015) pretended to expose that pre-service teachers should graduate appropriately qualified to teach with ICT. The study aimed to understand why pre-service teachers continue underprepared to include ICT in their teaching practices, and why they still use traditional methodologies. Participants were fourteen (14) pre-service teachers and sixty (60) students, the author applied interviews, written reflections, focus groups, and, the technological

pedagogical and content knowledge (TPACK) model. Through the application of these methods, the author understood that everything depends on how to use technology to learn and how ICT promotes learning.

An important finding was related to ICT formation, how to develop digital skills, the affordances, and the limitations in the curriculum, as well as the influences pre-service teachers have when they want to include it. The study also showed that pre-service teachers teach in the way they have learned, for this reason, it could be difficult to implement strategies they had not experienced during their formation, the outcomes finally showed information related to the self-efficacy and how the concept of students as digital natives affect their self-confidence.

During the same year Mirzajani, Mahmud, Fauzi and Ayub (2015) presented a literature review where they aimed to show that pre-service teachers' ICT use is not still as prognosticated. The study exposed the barriers that pre-service teachers have in terms of ICT utilization in the classroom. Findings categorized the barriers in different sections, the first and second categories were related to resources. In these categories, the authors revealed the lack of equipment, the difficulties pre-service teachers have related to ICT usage and application, the appropriation of hardware and software, and the limited access to the tools. The subsequent category was related to training, unveiling the deficient training, including the difficulties of access to different contexts, the lack of experience, and the hypothesis of digital natives. The remaining categories showed the lack of knowledge of ICT and the absence of leadership, as well as the institutional obstacles showing the absence of incentives. In addition to this, issues concerning scarcity of time, absence of motivation, low-commitment, anxiety, low self-confidence, the resistance to change, and inclusion of new methodologies into class were evinced. Despite the previous

obstacles presented, the authors revealed that most pre-service teachers are aware of the importance of technology and the usefulness it has in class.

Other study conducted in Turkey by Aslan et al. (2016) presented some of the influential factors pre-service teachers have in ICT inclusion. This study expressed that pre-service teachers need to be skilled in ICT integration to promote efficacy in teaching and learning processes. The study took two hundred pre-service teachers, they used a T-test to collect the data, and the multiple regression methodology to analyze it. The purpose of this study was to examine some variables like the ICT competence pre-service teachers have, the perceptions about ICT inclusion, the attitudes, the obstacles, the pedagogical knowledge, and the concerns in order to investigate how they integrate ICT into their teaching and learning practices. Some of the results showed high computer anxiety, low self-confidence pre-service teachers have with ICT, low pedagogical competence, and basic ICT skills.

Subsequently, the research by Boholano (2017) underpinned the importance that the school and the system must provide the required resources to ensure learning. Likewise, the curriculum must promote collaborative learning strategies in students-centered environments. Literature review, surveys, focus groups, interviews, and questionnaires were applied and the author interpreted the findings. One of the most remarkable findings was that the internet is an excellent tool for pre-service teachers to share their likes, preferences, points of view with others, as well as the opportunities to learn based on their personal and individual preferences. Social networking sites are sources to interact, communicate opinions, socialize, and obtain information. Thus, networking sites like Facebook and YouTube are the most popular networking sites, but their use is not academic. This echoes our former claim of conceiving learners as digital natives in terms of networking or entertainment sites.

In the same year, McLeod (2017) presented a chapter in the book *Tomorrow's Learning*. In this chapter, it was revealed that In Australia pre-service teachers were not relinquishing the levels of ICT skills conceived to be addressed in the Australian Curriculum, as their skills were not the ones expected by the government and as a result, pre-service teachers were not appropriately prepared for the complexity of ICT integration.

Through different focus groups and written reflections, the author compared two different cohorts in a university program, the first and the last one, using a unit of TPACK (pedagogical, technological, and content learning) model. The data analysis revealed the results in four different categories:

Firstly, evidence of improved confidence with ICT. In this category, pre-service teachers, acquired a better understanding of technologies, reflected on the possibility to include ICT in their future practices, as some of them tended to overestimate their skills.

Secondly, evidence of increased understanding of the pedagogical implication of using ICT. In this category, pre-service teachers showed little enthusiasm, they did not appreciate the academic excellence, and they also felt much stressed even though they worked at their pace. Thirdly, the evidence of an increased understanding of the ICT requirements for teachers. In this category, pre-service teachers felt shocked at the number of digital tools to use in education, occasionally they felt worried and concerned but, the standards helped them to increase their knowledge. Finally, the evidence of increased likelihood of using digital technology in the future. In this category, pre-service teachers felt positively prepared to use digital tools in their practicum, they also had a more prominent appreciation of the pedagogical, technological and content learning knowledge during the process.

In 2018 Wu and Wu (2018) aimed to investigate the pre-service teacher's autonomy, their ICT literacy level, and their ability to combine technology with education considered as a prerequisite for adequate appropriation after their graduation as teachers. One hundred seven pre-service teachers from the University of Beijing participated in this research study. The authors used a standard model of curriculum autonomy, the teacher autonomy scale (TAS), the knowledge deepening, and knowledge creation ICT- competency framework for teachers (CFT) model. To examine the autonomy the authors applied a questionnaire to the participants regarding some variables like gender, motivation, and individual internship characteristics. Data analysis displayed two important findings, the curriculum autonomy is related to teacher's technology literacy and teacher's knowledge and the teacher's autonomy and ICT competency do not differ throughout internship and motivation.

All of the aforementioned studies reinforce the importance to conduct the present study, as it serves as a twofold road. On the one hand, it broadens the scope of studies that infuse ICT practices in teacher education programs, and on the other, it can depict a scenario that assists learners, teachers, and educational institutions to design and implement cross-curricular ICT components that ease the transition to blended and online environments, and support users to be more literate in the use of technology.

Method

Research design

Research question: How might the digital competencies of pre-service language teachers be fostered in teacher education programs?

Table 3.

Research design

Objectives	To voice different perspectives from coordinators, teachers and students from various teacher education programs about pre-service teachers' needs in terms of digital competencies. To determine how the digital competencies of pre-service language teachers can be fostered with the inclusion of an ICT component in the teacher education programs that prepares them to learn and teach English supported by the use of technologies.
Type of Study	Qualitative, exploratory research.
Context	Thirty-one (31) foreign language teaching programs in Colombia. Fifteen (15) decided to take part in the study.
Participants	Fifteen (15) Teacher education programs in Colombia: Eight (8) coordinators from eight (8) programs. Twenty-nine (29) teachers from nine (9) programs. Forty-five (45) students from nine (9) programs. Ten (10) national and international experts in ICT and language teaching and learning.
Data Collection Instruments	Questionnaires to students, teachers and coordinators. Interviews to 10 experts in ICT and foreign language teaching learning.

Context

Several higher educational institutions offer foreign language teaching and learning programs in Colombia. The majority of them with an emphasis on the English language. In this study, thirty-one programs were explored regarding their study plan and the courses offered in order to determine the inclusion of an ICT component or course. Programs were found and selected based on an exhaustive web analysis search of educational institutions in Colombia. The initial database was the one available at the Ministry of Education. Then, a follow-up search was made in each of the websites available.

Although some programs have included a component or a determined course in information communication technology in their study plan, others probably do not explicitly include this. Still, it can appear implicit and transversal in other courses. In other institutions, the course is explicitly included, but in most cases, it is offered as an elective course or seminar.

Type of study

This is an exploratory qualitative study. The main goal of exploratory research is the production of generalizations about the group, process, activity, or situation under study. “Exploratory research is couched in a more assertive language of "to analyze," "to validate," "to verify," "to show," "to specify conditions.” (Glaser & Strauss, 1967. p.128). According to Stebbings (2014, p. 5) “Researchers explore when they have little or no scientific knowledge about the group, process, activity, or situation they want to examine but nevertheless have reason to believe it contains elements worth discovering”.

Moreover, Merriam (2009, p. 29) establishes, “The researcher intervenes consciously in the problematic as the primary instrument of data collection and analysis assumes an inductive stance, and strives to derive meaning from the data to voice different perspectives”. In this case, from students, teachers, and coordinators and experts in ICT and foreign language teaching and learning at the university level about the perceived needs of students from different teacher education programs in foreign language teaching and learning in their digital skill area training, with the aim to determine how might the digital competencies of pre-service language teachers be fostered in the context of an implementation of an ICT component that prepares them to both, learn and teach English being supported by the use of technologies.

In this sense, this type of qualitative research aims to analyze and understand a phenomenon in a certain context, this type of studies does not entail a specific intervention since the main goal is to be conscious of a necessity in order to propose a possible solution or improvement. “To explore effectively a given phenomenon, researchers must approach it with two special orientations: flexibility in looking for data and open-mindedness about where to find them” (Stebbins, 2014, p. 5).

As a result, the most effective strategy to comprehend and analyze the data is to look for this understanding wherever it can be found, through the flexibility and the degree of openness using any ethical means available.

“It is more accurate to qualify exploration as primarily inductive and confirmation as primarily deductive” (Stebbins, 2014, p. 6). By way of explanation, in exploratory research, the exploration itself in primary inductive considering it goes from the observation of certain phenomenon to build hypothesis and more probable conclusions. Then, in the confirmation a deductive approach goes from theory and conclusions based on diverse generalizations. When the causes of a phenomenon cannot be observable, this approach is useful. This deductive approach does not aim to contribute to the production of knowledge.

The grounded theory that emerges from the sequence of exploratory investigations evolves in detail, breadth, and validity as the data accumulates. Indeed, a growing substantive grounded theory may have broad enough applicability to warrant further development into a formal grounded theory. (Glaser & Strauss, 1967, Chapter 4).

Instruments of data collection

Instruments to be used include questionnaires, and semi-structured interviews. "Questionnaires are defined as any text-based instrument that give survey participants a series of questions to answer or statements to respond to either by indicating a response" (Young, 2015, p. 4) In this study, questionnaires will be spread to coordinators, teachers and students in different teacher education programs in foreign language in Colombia. Questionnaires present numerous benefits, one of the most remarkable ones is that the data can be processed and analyzed more easily than spoken data. Additionally, questionnaires are considered as flexible instrument that can be administered online which is convenient regarding the current COVID-19 pandemic.

"Interviews aim to search opinions, perceptions, and attitudes toward some topic" (Glesne, 2011, p. 104). In this study, interviews will be applied to different experts in ICT and foreign language teaching and learning. "The questions will be created by the researcher before interviews begin and can be changed or modified throughout the interview". This is known as semi-structured interview (Glesne, 2011. p. 102), as the questions may appear in the course of interviewing and may add or replace pre-established ones.

Interviews are a suitable source of information by cause of the responses given from individual perceptions, values, concerns, and needs. "They can provide information based on examples that would be career trajectories, biographical details, and views of their work" (Richards, 2003, p. 52).

Before data collection consent forms were distributed to participants, ensuring anonymity and confidentiality processes. Data management procedures include validation and triangulation procedures. The data collection took place during Semester (2021-1) as described in the timeline,

indicating specific times for data gathering, including the delivery of consent forms, authorizations, the application of questionnaires, interviews, as well as data analysis procedures, including data categorization, and detailed explanation of findings.

Participants

"As researcher the primary responsibilities to participants are clear: obtain consent, protect from harmed, and ensure privacy" (Drew et al., 2008, p. 57). Starting out from this premise, the invitation to participate in this research was sent through e-mail to thirty-one teacher education programs in Colombia where the aim of the study was established as well as the objectives, clarifying the importance of participants' voices and the significance of their insights in this study. From this invitation, fifteen universities replied and decided to participate in the study. In this part of the process eight coordinators, forty-five students, and twenty-nine teachers answered a short questionnaire. This questionnaire was sent through google forms due to the COVID-19 pandemic. This included some demographic questions, questions related to their curriculum in the program, the formation they have had in terms of ICT as well as their needs in this field.

In the second part of the data collection process, ten national and international ICT experts were contacted through e-mail in order to have a short interview taking into account what they consider essential in teacher education programs related to ICTs, the digital skills pre-service teachers should foster, some recommendations they had for pre-service teachers to develop their digital skills, and how to include ICTs into the classroom and educational practices.

It is essential to mention that the participation on this research was voluntary, and participants could withdraw at any time by informing the researcher as Drew et al (2008) suggested.

Table 4.

Time line

2021	**Months**											
	1	2	3	4	5	6	7	8	9	10	11	12
Consent forms	x											
Authorizations	x											
Questionnaires	x	x	x	x								
Conducting Interviews					x	x						
Data Categorization							x	x				
Documentary Analysis									x	x		
Report Writing											x	x

2022	**Months**											
	1	2	3	4	5	6	7	8	9	10	11	12
Report Writing	x	x	x									

Results

This chapter, displays the outcomes and analysis of the qualitative data gathered from eighty-two questionnaires answered by students and teachers from different teacher education programs in Colombia, and ten interviews piloted with ICT and foreign languages teaching and learning experts in field. The findings were organized into codes, categories and subcategories,

and emerging concepts gathered from instruments were organized and classified according to the level of importance and significance in the study.

The qualitative analysis was carried out following the principles of grounded theory proposed by Corbin and Strauss (2008). The grounded theory is considered as a specific methodology developed by Glaser and Strauss (1967) for the purpose of building theory from data. The researcher applied different instruments to collect data, the data reflected codes, the categories emerged from codes allowing the researcher to validate the answer to the research question. “The process of coding involves interacting with data (analysis) using techniques such as asking questions about the data, making comparisons about the data, deriving and developing concepts in terms of their properties and dimensions” (Corbin & Strauss, 2008, p. 66).

Data Analysis

Overall category mapping

The data was organized according to the number of entries and some commonalities in the responses. From this process seventeen codes emerged.

Figure 6.

Coding process

Analysis involves what is commonly termed as coding. The process consists of taking raw data and raising it to a more theoretical level. Coding is the name, and codes are the names given to the concepts derived through coding.(Corbin & Strauss, 2008, p. 66). At the first stage, 17 codes emerged from the pre-analysis of questionnaires from teachers and students, and the interviews from experts in ICTs field.

The analysis started with the exploration of codes making connections and comparisons among them from the questionnaires and interviews identifying significant concepts that

operated as a guide to answer the research question. All the codes emerged from the collected data, and as Flick (2013, p. 11) established, the data analysis is oriented to decrease big sets of data or its complexity grouping numerous elements in order to reduce the diversity in the data by recognizing a core category. Based on the statement, codes were categorized according to the number of entries and repetitions in responses.

Table 5.

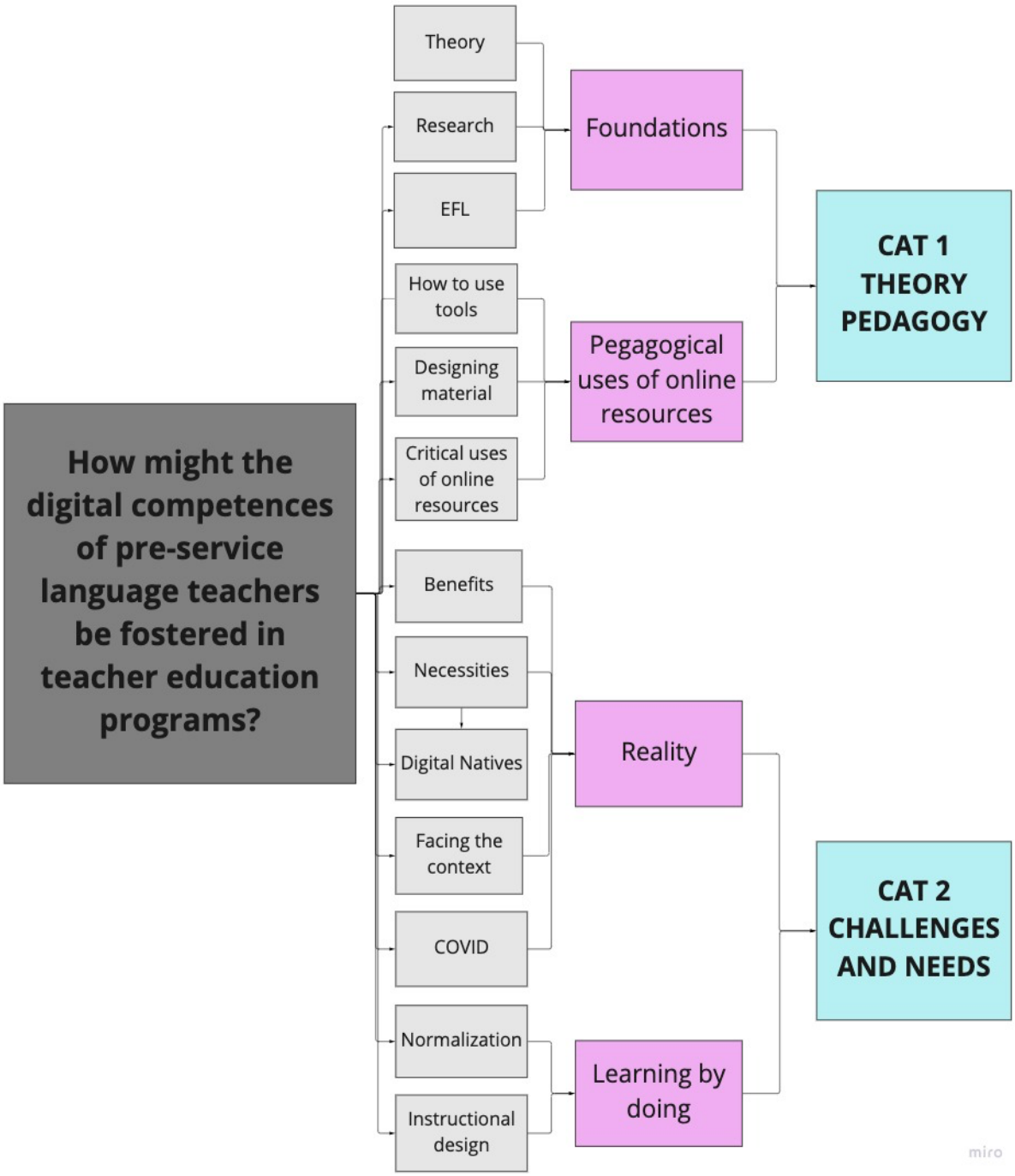
Coding process

1	**How to use tools**
2	Pedagogy/Theory
3	Benefits
4	EFL
5	Designing materials
6	Critical uses of online resources
7	Necessities
8	Creativity
9	Facing the reality
10	Research
11	Instructional design
12	COVID
13	Digital natives
14	Autonomy
15	Trouble shooting
16	Cultural aspects
17	Normalization concept

Based on the initial process of coding and taking a closer look at the emerging codes from qualitative instruments (Questionnaires and interviews), some commonalities and differences appeared, giving rise to two core categories: *theory/pedagogy, and Challenges and needs.*

Figure 7.

Mapping process



Categories

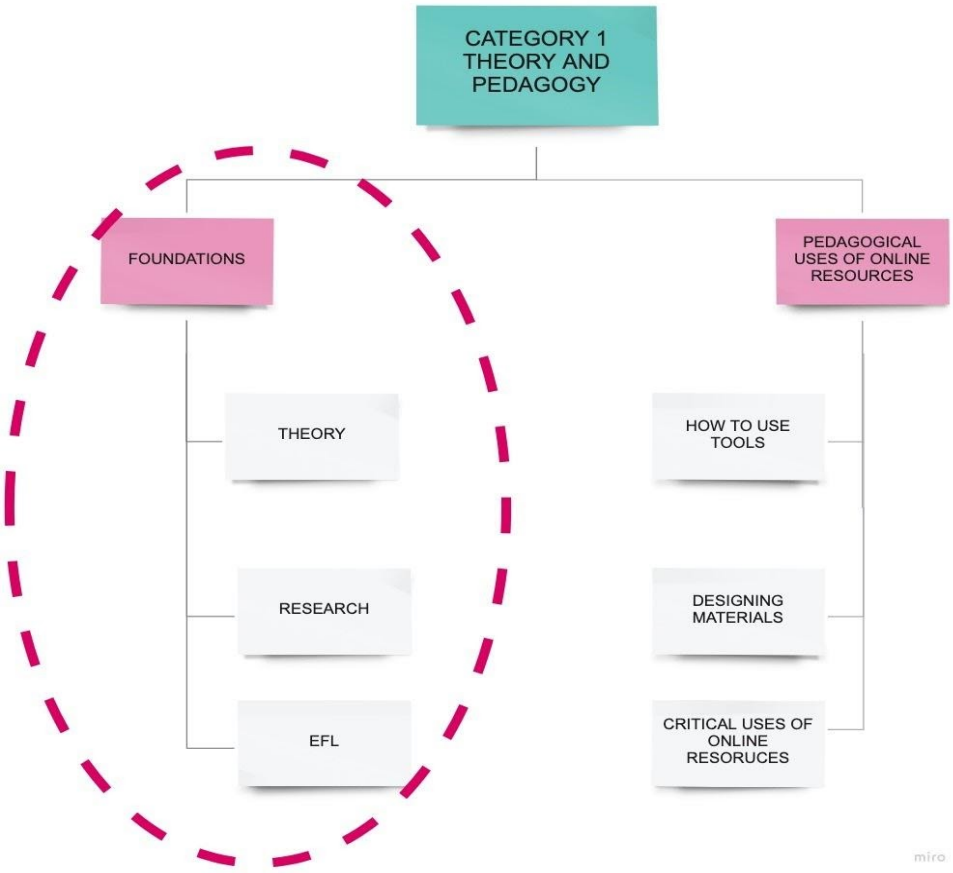
Category 1: Theory/pedagogy

As a first stage, seventeen codes were analyzed, and six of those codes were classified in the first category called *theory/pedagogy*. This category emerged based on most of the codes and information related to relevant concepts that appeared retrievable. From this process, two subcategories arose called *foundations* and *pedagogical uses of online resources*.

The subcategory *foundations* contains three core notions: *Theory, research, and English as a foreign language.*

Figure 8.

Category 1: Theory pedagogy - foundations



The first notion*, theory,* comprises all the concepts and principles in terms of language teaching through ICTs. This category revealed the importance of theory, how the theory relates directly to how students can learn through technology, and why those concepts are relevant for pre-service teachers to know what theory is behind the tools, the basis, the authors, and why they need a solid foundation to teach and learn through technology.

In the data, most of the questionnaires from students, teachers, coordinators, and experts in the interviews reflected the importance of theory. They considered theory as the first component to foster and develop pre-service teachers' digital skills.

Some of the relevant concepts that appeared through the questionnaires were: computer-assisted language learning CALL, digital literacies, gamification, assessment, programming,

CLIL, Online teaching - LMS (Learning Management System) knowledge, flipped learning, blended learning, and teaching, among others. Most of the students, teachers, and coordinators also expressed the relevance of including a theoretical foundation component, as the basis for an ICT curriculum:

> "A theoretical module is essential¨, ¨We need theoretical perspectives¨, ¨First students need to understand the concepts related to ICTs, the advantages and disadvantages" (Teacher 6).
>
> "When I start with the conceptualization in a course, I empathize with how to differentiate face-to-face learning with technology integration, blended learning and virtual learning, and mobile learning. Students can better understand their principles, constraints, processes, advantages, and disadvantages" […] Anyways students need to get a wide knowledge in theories, tools, principles, methods, approaches using technology, in that way they can move from the conceptual part to the operational part (Expert 6).

Data analysis indicated that after the implementation, students, teachers, coordinators, and experts considered theory the first and most important component regarding the perceived needs of students from diverse teacher education programs regarding their digital skills. In addition, the category *theory* seems to be a determinant of how the digital competencies of pre-service language teachers can be fostered in the context of an ICT component in the curriculum.

The second notion, *research,* encompasses all the components related to previous and different studies in the field, the systematic work undertaken to increase the stock of the knowledge, authors, concepts, and some reasons to consider research essential in fostering ICT

skills in pre-service teachers. Most of the participants viewed research as part of the required basis in incorporating an ICT component in teacher education programs. Through the questionnaires and interviews some comments as bellow:

> "I think that one of the required components should be research" (Teacher 2).
>
> "A second component I would make from the research perspective, right?... to the extent that it allows students to understand how in different contexts the... how... you are working on certain types of models of... of... let's see how I put it... let's say that in the... there are different ways of integrating technology into the classroom, right? to get the strategies and methodologies from research, according to what we have in the classroom […] The components related to the research, and you start to validate those theoretical references. You begin to see new academic references, and you begin to see that there is a... let's say a different idea, and that's where you start to generate an exercise as I told you just now, a little bit more critical about what I already read" (Expert 8).
>
> "It is important to show students just that part of everything that is related to research and academic production" (Expert 3).

Data revealed that *research* should be a core component in integrating an ICT component in teacher education programs in Colombia since most of the participants considered that previous studies in the field are essential to understand what type of studies have been applied in different contexts, what experts have done, the results, the concepts that have emerged through research, and the expansion in the disciplinary field of science.

The third notion, *EFL (English as a foreign language)*, which means learning English in a non-English speaking country, reflected the necessity to include ICTs in teacher education programs in Colombia. This subcategory embraces the development of language skills like reading, listening, writing, and speaking through the use of technology using online language learning materials, apps, software tools, programs, web pages, and online courses that allow students to obtain a more meaningful learning process.

The data from questionnaires and interviews showed that students, teachers and coordinators in different teacher education programs in Colombia are aware of the necessity to implement an ICT component, in this case, to learn English. In addition, data from interviews indicated that experts in the field considered that the link between EFL and ICT is imminent, and the necessity to integrate them is evident.

> "We employ to use technology as a beneficial tool for foreign languages learning" (Student 44).
>
> "How can I use technological resources to learn languages"? (Student 26).
>
> "How to use essential Apps to learn languages New Software tools. ICT in learning English" (Student 37).

> "The main objective of the undergraduate programs is... language, right? and the other main objective is teaching, language teaching. What we have to do is to insert the

technological component in both of them. So that it becomes an instrument to reach those other two... those other two objectives". (Expert 6).

"The connection between the methodological part of language teaching and the alternatives offered by technology" (Expert 1).

Data reported that the link between EFL and ICTs stands in need taking into account the results from questionnaires and interviews. Within the interchange between ICT and EFL, pre-service teachers will be able to foster their digital skills by introducing ICTs strategies and tools as online language learning materials, apps, software, programs, web pages, and online courses to EFL.

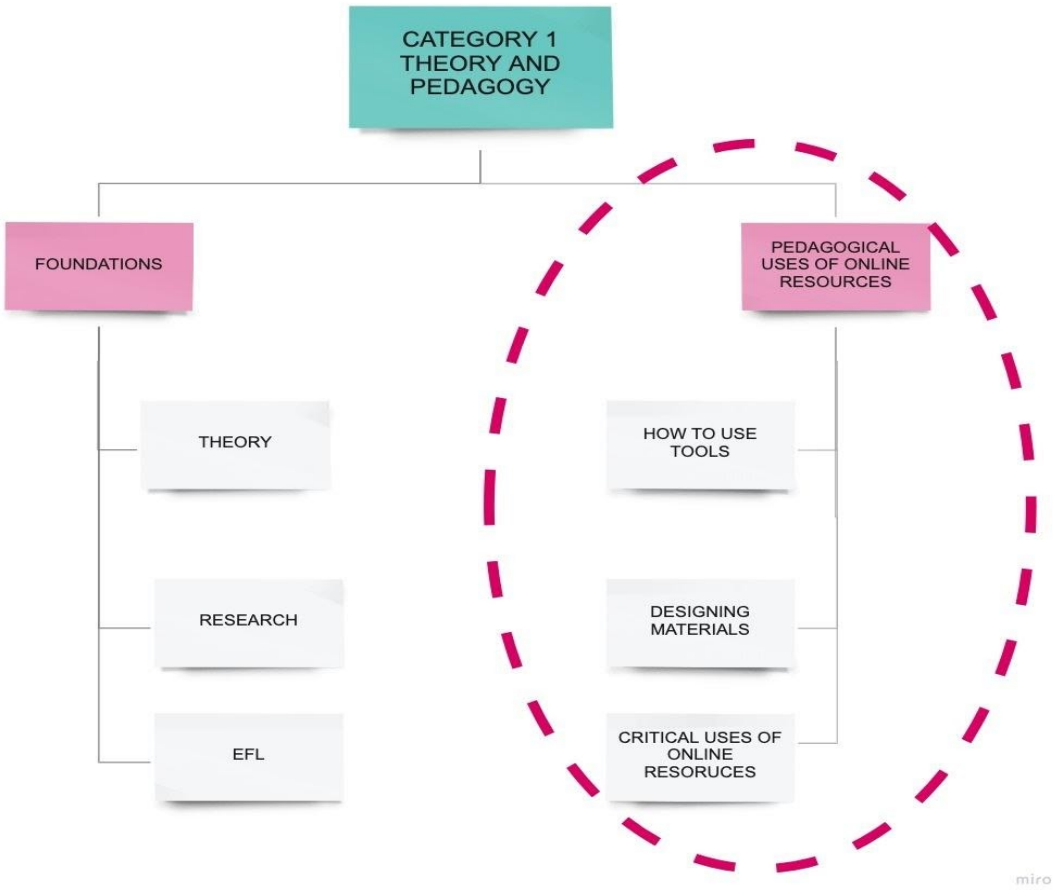
This first subcategory, *Foundations,* with its notions theory, research, and English as a foreign language, are crucial in fostering pre-service teachers' digital skills.

The majority of the students, teachers, and coordinators in questionnaires and experts in interviews were clear and determined when exposing the needs, the improvements, and the opportunities offered by theory, research, to improve foreign language teaching and learning.

The second subcategory, *pedagogical uses of online resources* displays four notions: *How to use tools, designing materials, and critical uses of online resources*.

Figure 9.

Category 1: Theory pedagogy – Pedagogical uses of online resources.



The first notion, *how to use tools*, emerged from questionnaires and interviews. They considered that a practical component is also essential in fostering pre-service teachers' digital skills. In the questionnaires, students, teachers, and coordinators additionally proposed different topics they believe are fundamental as the development of programming skills like: Excel-Word-PowerPoint-Photoshop-Camtasia, communication into digital literacy, friendly tool resources search like: Pictures, Charts, Quiz Pages, Listening Stories, videos, podcast, short films, writing stories, dramatic representations, video editing skills, audio edition skills, and adaptability to get

used to some platforms like YouTube, web tools, programming, software development, visual designs, editing, virtual LMS, dynamic presentations (Prezi-genially-Kahoot). Regarding the interviews with experts, they agreed on the importance of a practical component where pre-service teachers receive training on using the various tools they have available to learn and teach English through technology. For example:

> "I would like to receive training to use technological resources as a way to improve skills as a student" (Student 21).
>
> "I think the most important thing is to know how to manage tools on the internet, and also the platform used to teach" (Student 20).
>
> "Technology management skills that a foreign language teacher needs and therefore in which a future teacher should receive training are: skills to acquire the standard technical management of the use of platforms for teaching, such as Meet, Teams, Blackboard (although they may be different, there are basic elements to learn how to manage them from the teacher's role) […]Technology management skills that a foreign language teacher needs and therefore in which a future teacher should receive training are: skills to acquire the standard technical management of the use of platforms for teaching, such as Meet, Teams, Blackboard (although they may be different, there are basic elements to learn how to manage them from the teacher's role) "(Expert 2).
>
> "Let's say technological, they would also have to learn how to use technologies, so also in that curriculum. I would have, we do not have to think that all students know how to use all technologies, if I want to use a Padlet now and my students do not know how to use the Padlet

first we have to teach them how to use that Padlet, then today in that first skill that I said at the beginning, technological skill, that is, they know how to use not only the computer, but the tools inside the computer in this case, well that, for example, any if I want to use Eh. . well, uh, virtual environments, then I have to teach students to use virtual environments or to create, uh... 3D pictures to present to my students" (Expert 3).

The second notion in this subcategory, *designing materials*, appeared from the questionnaires' responses and interviews. From the responses from questionnaires and interviews, students, teachers, coordinators, and experts considered that pre-service teachers should receive training in creating virtual spaces, content to promote learning, web pages, youtube channels, apps, programming, interactive tools, and online games in order to foster pre-service teachers' digital skills.

"Creating digital authentic material" (Teacher 8).

"Whoever is interested in technology MUST create content, which should encourage users to use and apply it. Based on my experience, only are few students and teachers curious and ready to design material with high quality (not all what we find in the web deserves to be used in class)" (Teacher 13).

"Design of material and both summative and formative/alternative forms of assessment, for both the digital and face-to-face worlds, that account for students' achievement of the learning objectives". (Expert 2).

> "Students must be able to create virtual objects ehhh...multimodal not only be able to read them, but also be able to be able to create them. The second thing is that the student must be able to develop virtual objects, he has to be able to develop tasks, applications with pedagogical and didactic purposes ... because he is going to be a teacher" (Expert 4).
>
> "Okay, because the truth is that for me… the learning of technologies always has to be an experiential learning" (Expert 9).

The last notion in this subcategory is called *critical uses of online resources.* This notion exhibited a key feature. Although implementing an ICT component seems indispensable in teacher education programs in Colombia, a critical perspective should support this inclusion. Students, teachers, coordinators, and experts were aware that technology in the classroom is not enough. This ICT component should reflect a clear intention, the impact, and the realities according to certain conditions in Colombian contexts.

> "Search and select the appropriate sources of information according to the context" (Student 21).
>
> "Be critical when choosing resources and reading information, be connected to the global academic world" (Teacher 26).
>
> "How I as a teacher take a position on technology as mediation and from that position I develop critical thinking, that is, how I evaluate online tools, how I understand the impact that these types of activities have in the school environment and how I am able to see critically that

the issue is not even about the budget we have for the equipment or the speed of the network connection" (Expert 1).

"Critical digital competence, that is to know when one is online to know, eh? That not only how to get to the information, but what information is real, what information is not real, to know when we read something from the internet, especially or from any social network, What things are credible, What things are not credible, How do we know if a source, if the person who has written it is a source that we can trust or we cannot trust. So that would be a critical digital competency" (Expert 9).

"It is like looking for the student to have an integral formation, to know what ICTs are for, how they can be effective in the foreign language formation process, to motivate them to use them, to motivate them to water them as a seed that is an absolutely functional and practical tool to work" (Expert 5).

To conclude, this first category*, theory/pedagogy,* displayed significant information concerning the research question: How might the digital competencies of pre-service language teachers be fostered in teacher education programs?

From this first category, two subcategories emerged. The first subcategory foundations arose from three notions: theory, research, and EFL. Theory includes the importance of theory, how it relates directly to how students can learn through technology, and why concepts are pertinent for pre-service teachers to know what theory is behind the tools, the authors, and why they need a solid foundation to teach and learn through technology. The following notion,

research, conveys with the importance of previous studies in the field, the essential authors, the different types of studies that have been applied through time. In the end, the third notion, EFL, displayed information regarding the importance of developing language skills through apps, software tools, programs, web pages, and online courses to obtain a more meaningful learning process.

The second subcategory, pedagogical uses of online resources, presented three core notions: using tools, designing material, and critical uses of online resources. Using tools referred to the importance of a practical component where pre-service teachers could develop their digital skills by managing different devices for academic purposes as well as the ability to design material and implement various strategies to become digitally literate. The last notion, critical uses of online resources, stated the impact of different technological resources.

These components are part some of the elements Pre-service teachers, teachers, coordinators, and experts considered essential in implementing an ICT component in teacher education programs.

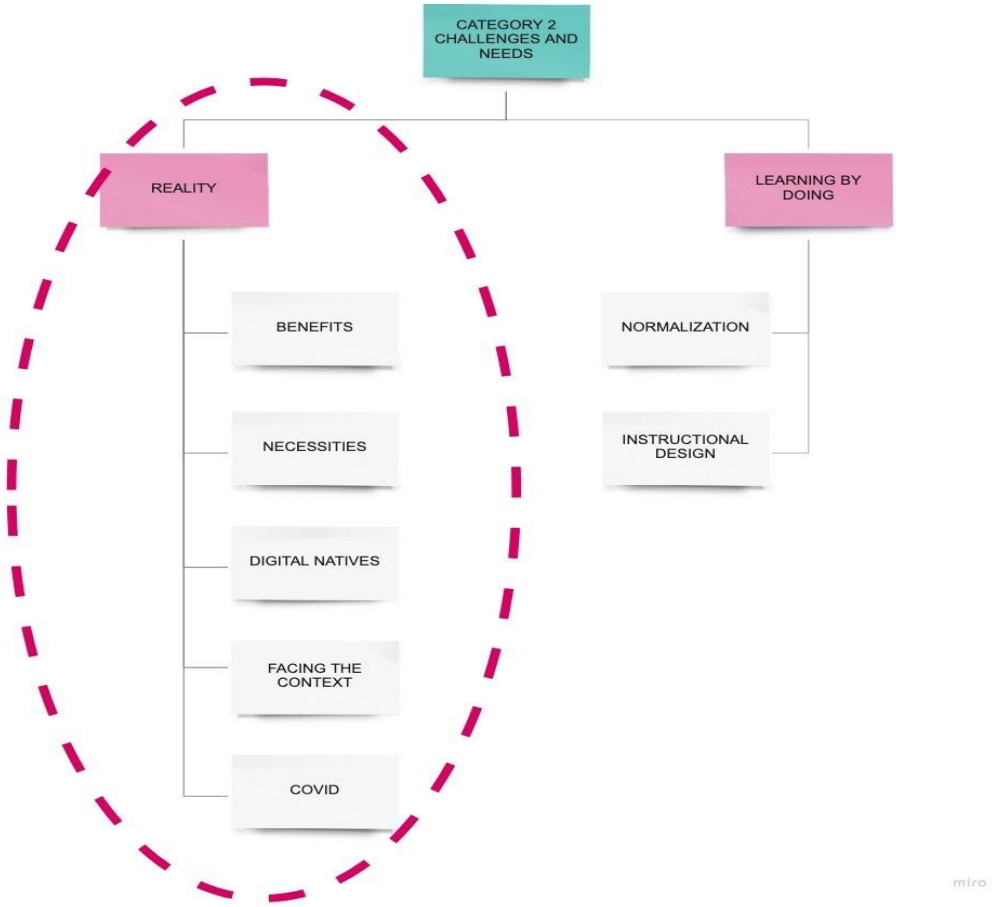
Category 2: Challenges and needs

Challenges and needs were established as the second category in this study. This category arose two subcategories called: *Reality* and *Learning by doing.*

Reality's first subcategory contains five notions: benefits, necessities, students as digital natives, facing the context, and COVID impact.

Figure 10.

Category 2: Challenges and needs - Reality



The first notion, *benefits,* displayed information regarding what pre-service teachers, students, coordinators, and experts in the field consider benefits when an ICT component is included in classes, lessons, and activities.

Most of the participants have a clear idea about what ICT offers in terms of education, how it can help increase motivation and self-autonomy in students, the advantages of various available and free materials, the attractiveness, and the efficacy in terms of learning.

Based on this, information from questionnaires and interviews revealed some benefits as: motivation, autonomy, collaborative learning, socialization, among others.

> "ICT contributes to enhancing students´ motivation and autonomy. Helps students and future teachers to use technology appropriately and be able to teach in an innovative way. It will expand learning experiences and learning materials they will be able to use also in their future teaching profession" (Coordinator 7).
>
> "I consider that technology is a tool that today contributes to essential issues in the teaching-learning relationship, such as collaborative learning, socialization through virtuality, among others" (Student 35).
>
> "Use technology and its applications with all affordances, as we say in English, all its potential and possibilities for whatever you want to teach mathematics, English, Spanish... whatever is true. We have to be open to change, we have to be open to the fact that we don't teach or learn in the same way anymore, so I think that's what we have to be open to" (Expert 5).

As interviewed number 5 mentioned, the affordances of ICT are explicitly visible with a variety of possibilities, benefits, and potentials. Including an ICT component in the curriculum could offer and increase motivation, self-efficacy, self-regulation, and autonomy in foreign language teaching and learning. Although the use of ICTs in education contains some limitations according to different contexts, this inclusion can help expand different learning experiences and materials to contribute to the field and research.

Based on the variety of benefits previously mentioned, the second notion, *necessities,* unveiled a reality that pre-service teachers, teachers, coordinators, and experts face in their daily practices. Lack of professional and academic training, the reduced availability of resources in different institutions, and the limited training pre-service teachers receive in their teacher education courses.

> "This process needs to be carefully prepared. In addition, teachers and students need to be provided with all the necessary training and equipment" (Coordinator 8).
>
> "Professional or academic training because these tools are essential for teaching and learning, increase motivation, interest in students and promote interactivity between them" (Student 16).
>
> "Teachers must be ready to implement technological resources in their teaching practices and the only way to know how to do it is by being trained on that issue!" (Teacher 19).
>
> "We must first help the student to make technology part of the curriculum, part of the curriculum, and it is through technology that the student can achieve learning" (Expert 5).
>
> "The student must be able to develop virtual objects, he must be able to develop tasks, applications with pedagogical and didactic purposes eh... because he is going to be a teacher Yes? So... a bachelor's degree must provide him with these tools" (Expert 4).

Even though technology offers considerable benefits through its inclusion in educational processes, it conveys a lot of needs, especially in terms of academic and professional training. Most teachers do not tend to use technology in the classroom because they were not taught that way. The inclusion of ICTs into the school depends on the type of formation and training they have received in their individual process and the kind of courses they completed in the teacher education program.

The third notion in this subcategory *reality* is *students as digital natives*. This notion emerged as a concept or idea from multiple participants. This vague idea appeared over the last 21 years, where it is believed that kids born in those years have grown up around technology. For this reason, they can be viewed as digital natives. From this perspective, participants expressed their points of view based on the reality they face in different contexts.

> "I feel hopeless for the virtual process, I constantly feel sad about having to learn online for my attention skills" (Student 22).
>
> "I would like to receive training on how to optimize the time we spend on the devices and also how to streamline the process" (Student 30).
>
> "New students are digital natives in the sense that they were born and have grown up with technologies, but the use they make of technologies is not the same. All students do not have the same digital skills, right? depending on the exposure they have had, there are those who are very skilled in many skills such as in many language registers and there are those who only know how to use Instagram and chat with friends and that's it, they do not know other technologies, no?" (Expert 9).

> "Well, it's the students, let's say that most of them bring some kind of competence, right? of skill, of digital skill, right? of them, Well, anyway in their world they have been using technology for... for their purposes that are not necessarily academic, right? sometimes to that point when they get to the undergraduate level they surely have not used technology much for academic purposes, but they have used it for recreational purposes, right? Entertainment, ehh I don't know, with the purpose of meeting people, with the purpose of acquiring information and some kind of training in a very informal way, right?" (Expert 6).

Most of the participants, including pre-service teachers, teachers, coordinators, and experts, agreed that pre-service teachers could be assumed as digital natives because they have grown up surrounded by technology. They can perfectly use technology in several modes. Indeed, they present particular competencies, especially for those involved with pleasure, socialization, entertainment, gaming, and many others different from academic purposes.

In this subcategory *reality*, the fourth notion is *Facing the context*. This notion displayed details concerning a cruel reality, especially in our Colombian context. Most of the participants expressed different concerns related to the limited access to technological tools students have.

Not all the students in Colombian schools have access to the internet connection, and a representative number of students do not have access to different tools such as laptops, tablets, etc. Information from questionnaires and interviews showed that students and teachers are concerned about this situation.

"Knowing the tools I have access to" (Student 44).

"How to manage the lack of technology access of any student". (Teacher 8).

"Mmm during these times it is just that ... There is very little... little access to technology and educational institutions even ehhh the internet that is available in many institutions mmm is of very poor quality... so it does not allow students to have that democratic access to information, right? Ehhh first I say to be aware of where we are; and what we need as, as a country or as a school, what is needed so that all these training processes or connection between learning and technologies can bear good fruits mmmmm and there are many things to, to change and to think about and I believe that our ehhhh future teachers... the people we are training, if they are aware of that and that they see these difficulties as challenges, right?"(Expert 3).

"What happens is that I believe that undergraduate students must be taught... they must be taught how to function in the world they are in. In other words, when I say the world that touches them, I mean in the context... in the context in which, in the one that touches them... because one does not necessarily end up working in paradise, right? Many... many do, right? many end up working in a place where they have resources, in a place where the children are not hungry, in a place where there is no violence, many do, or those problems are not so big that they do not arise there in the classrooms, but others do not... others do not... others end up working in other contexts, right? in less favored contexts, right? More... with more complications." (Expert 6).

Based on this, pre-service teachers, teachers, coordinators, and experts consider that implementing an ICT component in Colombian language teaching education programs is essential. Still, pre-service teachers must be aware of their contexts in their teaching practices with their affordances and limitations.

The last notion in this subcategory is called *COVID-19.* This notion is part of the subcategory *reality as* COVID-19 appeared unexpectedly and changed reality in terms of interaction, socialization, occupation, and education. In this last one, many changes were applied in institutions worldwide. Unexpectedly teachers and students had to move to an online environment where they were probably not prepared to. As it is part of our current reality, many challenges and needs appeared. Based on this situation, some institutions realized the importance of implementing an ICT component in their teaching education programs in Colombia.

> "The current situation (the covid pandemic) demands urgent curricular adjustments of this kind" (Student 23).
>
> "The pandemic has brought new challenges and teaching and learning strategies are different now" (Teacher 5).
>
> "That is what happened to many teachers with this pandemic. And it's that from one moment to the next they went from one context to another. So, they didn't know what to do... they didn't know, they didn't know very well what to do, so that's when those skills became very important. Ah well, I did this here, now I can do this here" (Expert 6).
>
> "The pandemic with all of this has changed a lot and it has really been very difficult for English teachers and in general to adapt to this new way of working. Many teachers with whom I have worked have experience of 15 to 20 years and much more and they are... super good in the classroom, but when it comes to teaching online, it's like... some things don't work because it's very different, no?" (Expert 7).

Based on the foregoing, what we have now today is not virtual education. It is something like face-to-face education assisted remotely. Teachers did not know how to adapt their practices to online environments due to the lack of training not only by programs but also by schools. This pandemic explicitly showed the necessity to implement an ICT component. As student number 23 expressed, this pandemic exposed the urgent adaptation as a need and a challenge.

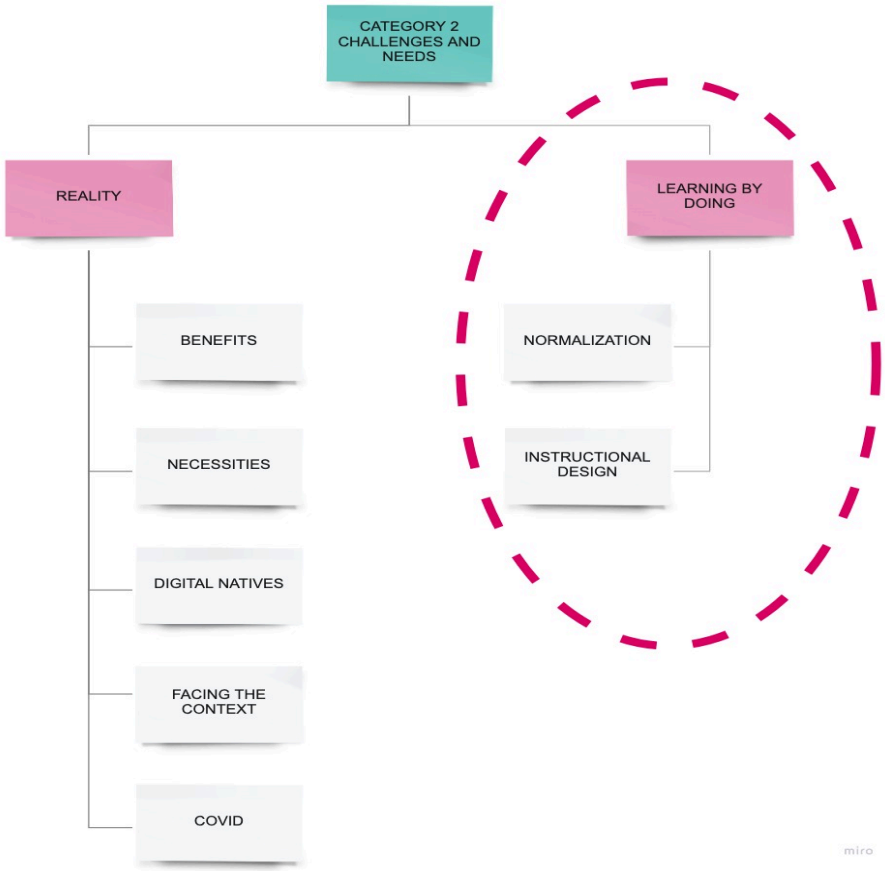
As was previously stated, this second category was called *Challenges and needs*. This category arose two subcategories called: *Reality and Learning by doing.*

In the previous section the subcategory *reality* was explained with its five notions: *benefits, necessities, digital natives, facing the context and COVID*.

The next subcategory was named *Learning by doing*. This contains two specific notions: the *normalization* concept and *instructional design*.

Figure 11.

Category 2: Challenges and needs – Learning by doing



The first notion, *normalization,* repeatedly appeared in data. Most of the participants expressed the importance of this concept in including an ICT component in the curriculum in

teacher education programs in Colombia. The participants argued that the best way to incorporate this component in all the curriculums is through normalization, and the systematic use in all the courses offered by different programs. The normalization concept is viewed as being familiarized with the usage, becoming ordinary, something normal, as part of the curriculum instead of an add-on"

Information gathered from questionnaires and interviews displayed some information, for example:

"Hence having technologies in their language learning processes will make it easier for them to adapt to their future pedagogical practices with ICT" (Coordinator 3).

"More than having a specific set of courses where technology is the main topic, we intend to infuse technology in our everyday practices in the classrooms so that its use becomes natural" (Coordinator 4).

"Backs when he talks about normalization, right? So, when he talks about... when something is standardized when something is standardized you don't realize that he's using it for something right? So, he gives the example of the pencil, right? The pencil. It's a tool for learning and teaching that is so embedded that you don't realize you're using it, right? But you're using it to be able to write, to be able to read, to be able to draw pictures, right? Well... it's normal, it's so normal that you don't realize it exists. It would be to try to get to that same level, that is, designing skills that... that require designing activities, Pardon that require... the use of technology to be able to carry out the activity then a teaching activity" (Expert 6).

> "Normalization has been proposed by several theorists of ICT integration. Because if we continue to think of ICTs as something that we have to look at to see how... It is not to take them as everyday things, it is not to integrate them into the curriculum, it is to make the curriculum so that the curriculum already contains them, yes... that students see ICTs as something that is part of... not as something that is optional from the very beginning" (Expert 5).

According to some excerpts from the data, normalization is one of the ways to implement, adapt and potentialize the ICT component in the curriculum in teacher education programs. By integrating different ICT in activities and courses, students can assume it as part of the curriculum, not as something apart. Normalization implies students´ and teachers´ adaptation, changes in the curriculum in all the courses, training, acceptance, good attitude, and disposition to comprehend and renew teaching and learning strategies.

Based on this, the second notion in this subcategory emerged, being named *Instructional design.* Pre-service teachers, teachers, coordinators, and experts consider instructional design as the basis when including an ICT component in teacher education programs in Colombia.

"But this process needs to be carefully prepared. In addition, teachers and students need to be provided with all the necessary training and equipment" (Coordinator 8).

"Have revealed how important and necessary it is for future teachers to have not only digital skills but knowledge and training in teaching with TICs" (Teacher 21).

"I wouldn't focus too much on...let's say...on teaching digital skills but more a little bit...maybe like practice and theory from instructional design. So let's say, how should technology be used in the classroom, what should you think about first, how do you select a technological resource, what should you take into account... like all those things let's say .... a little bit more abstract let's say, huh? And I wouldn't focus so much on the technology part as such" (Expert 7).

Instructional design tends to be one of the critical points in including an ICT component in teacher education language programs. According to the participants, theory and practice must be linked to instructional design. Following this route, students normalize the use of technology in their practices, and the educational process could flow satisfactorily.

In conclusion, this second category, *challenges and needs*, presented two subcategories, each of them with its notions. The first subcategory, *reality*, displayed information regarding the benefits of ICT in terms of application, motivation, autonomy, the availability of different materials, and the efficacy in teaching education practices. This subcategory also mentioned some core necessities explicitly related to the lack of professional and academic training, the

limited access to resources, the problems related to internet connection and the poor conditions in most of the institutions in the Colombian context.

These necessities are linked to the myth that considers students as digital natives, being this a determinant and a crucial issue to understand that kids who have grown up surrounded by technology are not necessarily digital natives; they have acquired some technological skills related to socializing, gaming, shopping, traveling, but they rarely use technology with academic purposes. Another fundamental notion this subcategory mentioned was the importance of understanding and facing the Colombian context. Not all the institutions in Colombia have access to the internet connection, and they are not well equipped with the required technological resources, additionally, a representative number of students do not have access to different tools. In this sense, this subcategory depicted important notions about covid. This reality changed the teaching practices to online resources exposing the great necessity to implement an ICT component in the curriculum.

The second subcategory, *learning by doing* through its two core notions, normalization, and instructional design, showed two specific strategies that could help implement this ICT component in teacher education programs. Normalization allows students to become familiarized with the use of technology as part of their lives and academic practices. Students could apply it in the same way as part of the curriculum instead of an add-on. This normalization concept could be possible by implementing theory and procedures related to instructional design, so that would help technology to become something normal or invisible as they are in the common life of people around the world.

Discussion

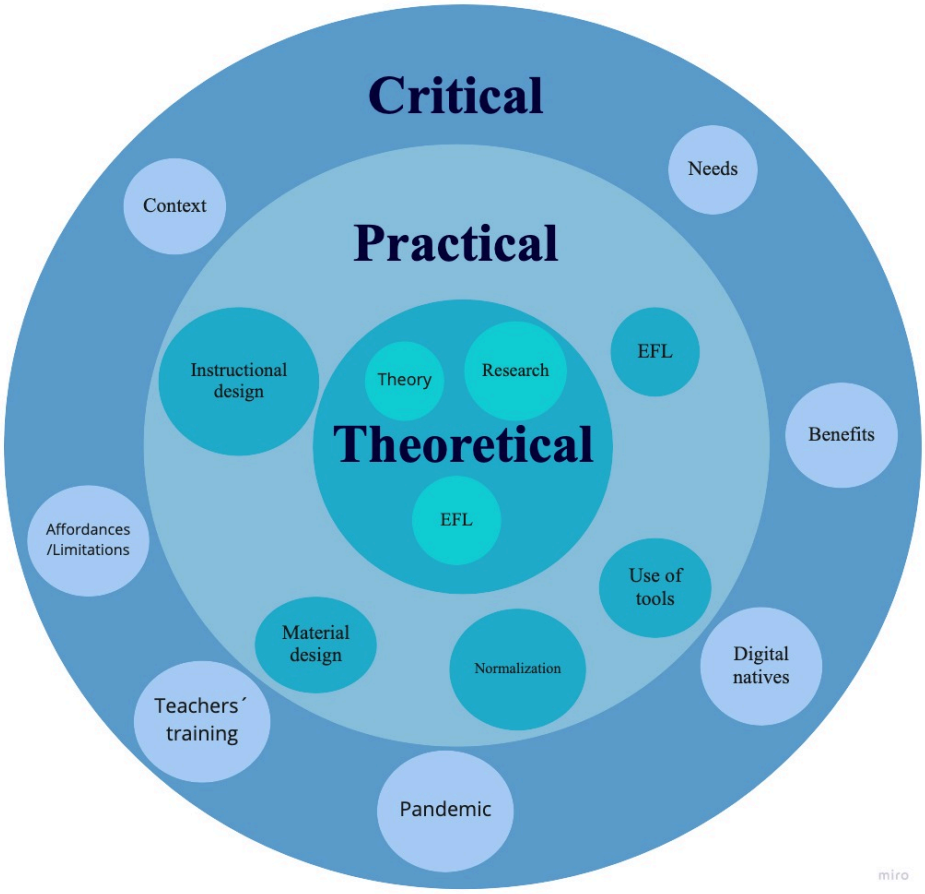
This chapter will tackle the discussion related to the obtained results of the research project. These findings showed the required data to answer the research question: *How might the digital competencies of pre-service teachers be fostered in teacher education programs?* Furthermore, the acquired insights showed how the findings are correlated to the three contemplated objectives in this study.

The results showed that including an ICT component in teacher education programs in Colombia has a crucial role in the education of future teachers, since it responds to the requirements of today's changing and globalized world. Through an ICT component, pre-service language teachers have the opportunity to develop their digital skills in an informed, effective, and critical way. The study also showed that teachers must be responsible for their professional development and be aware of the importance of digital competencies, especially after the COVID-19 pandemic.

Findings suggest that a merely practical ICT component is not sufficient, it requires a robust theoretical component with a solid foundation in theory and research. In the practical component, pre-service teachers can design and apply various tools and strategies, accompanied by a critical component that encompasses specific contexts' needs, benefits, affordances, and constraints.

Figure 12.

An integrative system for the inclusion of ICT in the teacher education curriculum



Theoretical component

In this component, *theory, research, and EFL (English as a foreign language)* appeared. Findings demonstrated that students, teachers, coordinators, and national and international experts regarded *theory as the first and most significant component* in Teacher education programs students' digital skill area training. “As a starting point ICT integration refers to how teachers operate and manage the technology to perform the learning process more engaging by keeping the authenticity of the material” (Maru, Pikirang, Caesar, Donal M, & Ronny, 2021, p. 45). Regarding the importance of this inclusion and implementation, some frameworks have evolved to provide theoretical support, guidelines, instruction, context, goals, and applicability to both pre-service teachers and in-service teachers. This component linked directly to theory with

research. There are available frameworks such as: UNESCO framework established in (2018). It includes the ICT Competency Framework for Teachers (ICT CFT) as a tool to guide pre-service and in-service teacher training on the use of ICTs in the classroom throughout the educational system. Educational Testing Service (ETS) framework was convened an important international panel to examine the expanding importance of Communication Technologies (ICT) as well as the connection to literacy. The European framework for the digital competence of educators also aims to help in the guidance of policy and can be adapted and implemented in different training programs directed to educators at all educational levels, public, private, vocational, special needs, children, teenagers, adults including non-formal contexts.

This type of frameworks operates as a guide or basis to design, develop, and include an ICT component presenting a specific and standardized proposal adapted to particular contexts. Frameworks allow the possibility of creating an own framework that responds to particular needs in each teacher education program in different regions in Colombia.

The majority of the participants perceived research as part of the necessary foundation for introducing ICT into teacher education programs. Indeed, most of the participants agreed that prior research in the field is necessary to understand what types of studies have been used in various contexts, what experts have done, the results obtained, the theory that have emerged through research, and the expansion of the disciplinary field of science. According to the results of all data collection tools, students, teachers, and coordinators in various Colombian teacher education programs, as well as national and international experts are aware of the need to incorporate an ICT component, in this case, to teach and learn English through technology.

Floris (2014) also proposed some of the theoretical foundations an ICT component should have, including theory and research as the pillars of the implementation: The history of CALL • How we learn a language • Teaching and learning using CALL (including how to evaluate available commonly used software for education) (Principles of Digital Material Development, Evaluating some available digital materials. • 21st Century Skills • Online collaboration • Online storage and sharing.

Theory considered as the basis, the first component that should be addressed in the inclusion of an ICT component in teacher education programs. Theory fundamentally refers to all concepts and principles that apply to language instruction using ICTs. The type of theory behind the tools, the authors, the experts in the field, and it establishes some reasons about why pre-service teachers must have a solid theoretical foundation to teach and learn through technology.

Theory and research are the pillars. The first and most crucial component must be part of including an ICT component in teacher education programs. Before pre-service learn how to use different available resources, they must explore, study, and reinforce all the concepts related to ICT in language teaching and learning. They must differentiate concepts such as remote learning, virtual learning, blended learning, CALL, TELL, ICT literacy, digital skills, and others, including the history, principles, and diverse frameworks and models to apply according to the context in order to ensure the development of teacher expertise during the initial teacher education program. The more pre-service teachers acquire and differentiate ICT concepts, the better they would perform in developing the practical and critical components.

Numerous authors such as Glaser and Strauss (1967), Rosdale (2006), Bennett et al 2008), Chigona (2015), Tran et al (2015), Aslan et al (2016), (Redecker, 2017), UNESCO (2018), among others have exposed the necessity of the inclusion of an ICT component in teaching and learning according to their findings in different research studies.

In addition, other authors mentioned specific reasons why they consider this inclusion as fundamental and crucial. ICT has become so essential in EFL. Its utilization in education has contributed to the improvement of language learning. “With good access to sources of information, learners are able to enhance their learning and creativity” (Floris, 2014, p. 4). “Considering that technology can play an important role in supporting and enhancing language learning it continues to grow in importance as a tool to assist teachers of foreign languages in facilitating and mediating language learning for their students” (Kranthi, 2017, p. 30). The integration of technology and English practicing skills has a lot of good benefits for them to promote English communication among EFL learners. “It provides a lot more flexibility and caters to more learning styles of the language learners” (Bax, 2003, p. 200).

Data in this study revealed that professionals in the area understand the relationship between EFL and ICT as complementary and cross-directional. It is evident that the inclusion of an ICT component in the curriculum at different teacher education programs is critical to the development of pre-service teachers' digital abilities. This inclusion may also ensure its incorporation through the first component composed by theory, research and the connection with EFL.

Practical component

In order to promote pre-service teachers' digital abilities to incorporate ICT in teacher education programs, participants also believed that a *practical component* is also necessary

where pre-service teachers are able to put into practice the theoretical component, which is composed by theory, research, and the connection with EFL with *a more practical component where pre-service teachers can learn from theory and research and apply it through the pedagogical uses of the numerous digital resources and the design of different technological material with a critical view.*

The practical component basically refers to the use of available tools, the design of materials, the appropriation of normalization concept, and the instructional design as well as the connection with EFL. The participants agreed on the significance of a practical component in which pre-service teachers should be trained on how to use the numerous resources at their disposal to study and teach English using technology. In Fact, Floris (2014) suggested some of the practical components an ICT component should have: Digital Learning and Teaching Materials, Creating digital materials for teaching and learning, Bloom's Digital Taxonomy, 3D tools, Animation and comic strips, Audio editing, Social networking, and Learning management platforms.

Other aspects that students, teachers, and coordinators proposed included the development of program skills, audio, and video edition skills, and the adaptability to incorporate technology into classes. They considered essential the acquisition of knowledge in terms of how to use the variety of tools they have access to and the importance of knowing how to design different instruments to promote the usage through their prior and experimental learning. Hence, in order to foster pre-service teachers' digital skills, participants agreed that pre-service teachers should receive training in some specific skills such as programming and creating virtual spaces with content to promote learning such as web pages, apps, and interactive instruments.

The concept of normalization is relevant to any kind of technological innovation and refers to the stage when the technology becomes invisible, embedded in everyday practice and hence 'normalized'. "Normalization is therefore the stage when a technology is invisible, hardly even recognized as a technology, taken for granted in everyday life" (Bax, 2003, p. 466). Participants agreed that the best method to incorporate this component into all curriculums is to normalize it and apply it consistently across all courses provided by the program. In order to achieve normalization in any educational context numerous factors inevitably need to be considered. "These factors differ from context to context, of course, but might include improvements in the size, design and location of the technology, in other physical aspects of the educational setting, in timetabling and so on" (Chambers & Bax, 2006, p.466).

Through normalization, pre-service teachers can get quickly familiarized with technology usage in the classroom, becoming something usual and invisible. According to data snippets, normalization is one of the approaches to adapt, adjust, and potentialize the ICT component in the curriculum in teacher education programs. It entails student and instructor adaptability, curriculum adjustments across all courses, training, acceptance, and a willingness to understand and update teaching and learning methodologies. Chambers and Bax (2006) discussed eleven topics that must be addressed in order to reach the condition of CALL normalization. They've divided the problems into four categories: logistics, stakeholders' conceptions, knowledge and abilities, syllabus and software integration, training, and development and support. "CALL normalization to be occurred, five major issues should be addressed (i.e., personal, technical, pedagogical, socio-cultural, and institutional)".(Chambers and Bax 2006, p. 475)

Another of the most important aspects of incorporating an ICT component in teacher education language programs is instructional design. According to this study participants, theory

and practice must be linked to instructional design. Bennett et al.,(2008) suggests, for example that a well-designed instructional design for developing teenagers' digital competence is highly recommended and further research about assessing digital competence and improving ICT education and media education school system is urgently needed. Hence, we believe that if receive instructional design training from the earlier semesters in their teacher education programs program, taking into consideration their contextual reality in terms of culture and education, and examining its affordances and limitations; they will get better prepared, become more comfortable using technology in their daily lives, and therefore achieve a normalized practice. "Clearly there is no single technology that 'works best' in low-resource contexts. As in any context, myriad factors" (Hockly, 2013, p. 5).

Angeli and Valanides (2009) proposed five terms that are required of teachers who use ICT in their classrooms: content knowledge, which is the capacity to comprehend a specific subject; pedagogical knowledge, which is the ability to manage teaching methodologies such as classroom instruction, assessment, and lesson planning; knowledge of learners, which is the capacity to recognize the students' needs, skills, and identities; and knowledge of ICT, which is the comprehension of the use of ICT in the classroom. These components were also exhibited from data in this study. Content knowledge is related to the EFL, all the components related to English teaching and learning. Pedagogical knowledge refers to EFL teaching methodologies, models, and frameworks in ICT. Learners' knowledge has seen it as facing reality where pre-service teachers have to be aware of their context, the specific needs students have, and the required improvements.

Critical component

The *critical component* makes reference to the place to delve into a critical reasoning for including an ICT component into teacher education programs in Colombia. We endorse this term as it is necessary that a close examination of the existing needs and traced goals are set before any targeted implementation. In this study, all participants agreed that existing classroom technology is insufficient; this must be accompanied by specific knowledge in the science of the field, practical acquaintance, and a critical perspective to know what, where, when, how, and why to include different approaches and tools.

In this critical component different concepts were addresses such as: *the affordances or benefits, the limitations, the importance of teacher training, and the notion of digital natives as well as the reality of the context especially in COVID-19 pandemic times.*

Participants had a good understanding of what ICT offers in terms of education, how it helps students gain more motivation and autonomy, the advantages of diverse available and accessible material, as well as their attractiveness and efficacy in terms of learning ICT's benefits are plainly evident, with a wide range of options, benefits, and potentials. According to the data, foreign language teaching and learning, including an ICT component in the curriculum, might improve motivation, self-efficacy, self-regulation, and autonomy, given that students from different contexts with a variety of ages, interests, motivations, and personalities can learn and take advantage of those benefits to improve their learning experience. This perspective is echoed by authors around the globe who claim that by providing students with digital or online learning materials, they can increase motivation in learning. In addition to this, “ICT has the potential important role in supporting and enhancing language learning, the use of ICT should never be the goal in and of itself” (Floris, 2014, p. 139). The usage of such materials provides a lot more flexibility and caters to more learning styles of the language learners, as it offers a deep and more

contextualized learning experience, turning the classroom into a student-centered environment, and influencing better attitudes in learning (Boonyopakorn, 2016).

Additionally, "ICTs activities provide flexibility and accommodate students' different learning styles" (Kranthi, 2017, p. 191), influencing their students' English proficiency (Bilgin, 2013). Although in this study, the main phenomenon under investigation was not to determine such influence, it might be a future angle to study in a subsequent research study.

Different authors from distinct nations and contexts have found through research the wide variety of benefits and profitable results when implementing an ICT component in curriculums. "Most of the students showed positive attitudes towards ICT used to study English and expected that ICT should be used more frequently in the classroom" (Hafifah & Sulistyo, 2020, p. 191). "ICT promotes student achievement because this tool allows them to progress at their pace and needs" (Floris, 2014, p. 141). Student interaction and collaboration through technology foster autonomy and learning. Incorporating online tools and authentic materials can foster student learning (Bilgin, 2013, p. 237). "The effective integration of ICT in schools and classrooms can transform pedagogy and empower students" (UNESCO, 2018, p. 1).

As it has been said in this discussion, the inclusion of an ICT component in teacher education programs is fundamental. Although the use of technology carried some constraints and difficulties, the benefits go beyond offering further learning prospects to foster the development of appropriate digital skills as well as students´ self-efficacy, autonomy, motivation and, individual learning pace.

Even though the benefits are already established, there are different variables that can affect the implementation of an ICT component in teacher education programs. Some authors have found through different studies numerous limitations. For example, “lack of teacher training, student motivation, class size, limited class time, educational beliefs, access to resources, culturally appropriate materials, culturally sensitive approaches, and even political realities will determine how to work most effectively with digital technologies” (Hockly, 2013, p. 5).These are some of the ones also found in this study. These are compiled in the necessities section. There were many limitations that were clearly stated in the data obtained. These are: lack of professional and academic training, limited resources in most institutions, Internet connection, Insufficient instruction received by pre-service teachers in their teacher education programs courses, and high cost of implementation.

Incorporating technology into educational processes has many benefits but also numerous requirements, particularly in terms of academic and professional training. Most teachers do not use technology in the classroom because they do not know how to use it. As Floris (2014) stated, most of the teachers have almost no experience integrating ICT into their English Language Teaching. “The responsibility for language instruction should be in the hands of qualified teachers who have the knowledge and expertise to manage and to make the best use of it to accomplish learning objectives” (Floris, 2014, p. 139).

For this reason, this lack of teacher training is one of the constraints and concerns for an effective ICT integration in the curriculums. “Teachers’ knowledge surely influences teachers’ self-efficacy of ICT implementation in higher education settings” (Hafifah & Sulistyo, 2020, p. 189). Hence, numerous institutions are reluctant to include ICT into their educational system. As Bennett, Maton, and Kervin (2008) stated, more measurements are required for improved pre-

service teacher education. All in all, to cope with 21st-century teaching requirements and digital aptitudes, instructors must equip themselves with ICT training and keep up with technological applications.

"The effectiveness of any technological tool depends on the knowledge and expertise of the qualified language teacher who manages and facilitates the language learning environment" (Kranthi, 2017, p. 30). Teachers must be able to integrate ICT into their professional practice in order to ensure fairness and quality of learning, as well as become ICT literate in order to improve the quality of their work (Hafifah & Sulistyo, 2020). Echoing UNESCO principles, teachers need to be able to harness ICT to guide learners in developing knowledge society skills, so the formation pre-service teachers receive is crucial and significant for future generations. The first step in the learning chain is to get the ICT literacy development is to utilize the available resources without inhibition or anxiety. Pre-service teachers must be aware of the importance of their professional development, their ICT literation, their teaching practices, and the use of the available resources emphasizing that technology cannot be the focus or the objective in the lesson. It can be considered as the vehicle to achieve more profitable goals enhanced by autonomy, motivation, self-efficacy, collaboration, and interaction technology offers.

As the reality shows that it is costly to provide ICT training to teachers and administrative staff, teachers play a crucial role as learning facilitators. For this reason, instructors should develop their ICT literacy in order to keep up with the rapid advancement of technology in the classroom by updating their content, and pedagogical knowledge. Thus, pre-service teachers must be ICT literate and apt to teach in this digital era. The training on instructional design pre-service teachers should receive in the Teacher education programs, will

determine their pedagogical knowledge to foster a smooth integration of ICT into their language curricula. In addition to this, “More operational training and stronger policy support of ICT facilities from the institution and government would be advantageous to overcome the problems of ICT and encourage greater ICT integration in education, especially in ELT” (Hafifah & Sulistyo, 2020, p. 195).

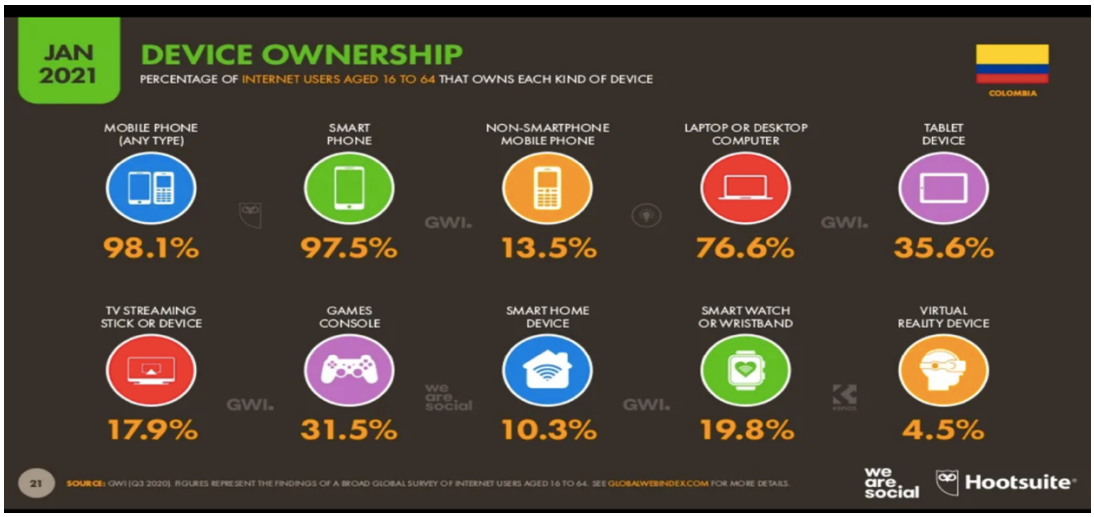
The erroneous visualization of students as digital natives is also an important aspect in this component. As this study depicted it, and Bennett, Maton and Kervin (2008) also established, digital natives are not necessarily knowledgeable about and skillful in digital tools, especially when they are in learning situations. . In fact, as Li and Ranieri (2010) reported that even if access to the Internet is not a concern, students may lack critical thinking and inquiry skills needed to properly analyze and apply online materials and digital technologies. Based on this, although young generations may know how to use technology in a variety of settings demonstrating specific abilities, particularly for those active in enjoyment, socializing, entertainment, gaming; they might not be savvy in using it for academic and professional purposes. This leads us to the conclusion that being in a digital world does not always mean being technologically skilled, and therefore, there shall be routes to make such fusion possible.

The last remarkable aspect is the reality of the context. This concept revealed insights about reality, particularly in our Colombian territory. The majority of the participants raised various concerns about students’ restricted access to technology resources. Not all students in Colombian schools have access to the internet, and a significant proportion of students lack access to various tools such as computers, tablets, and other devices. But, some statistics from (DataReportal, 2021) contradictorily exposed that from 51.07 million of habitants, 98.1% people in Colombia have mobile phones, and 97.5% own a smartphone with internet access. In addition,

the statistics showed that 76.6% of Colombians have a laptop or a desktop computer. As some numerous lacks were previously mentioned, the reality indicates that more than 90% of habitants have access to a smartphone where they can easily access the internet, and more than 70% of habitants own a computer or laptop.

Figure 13.

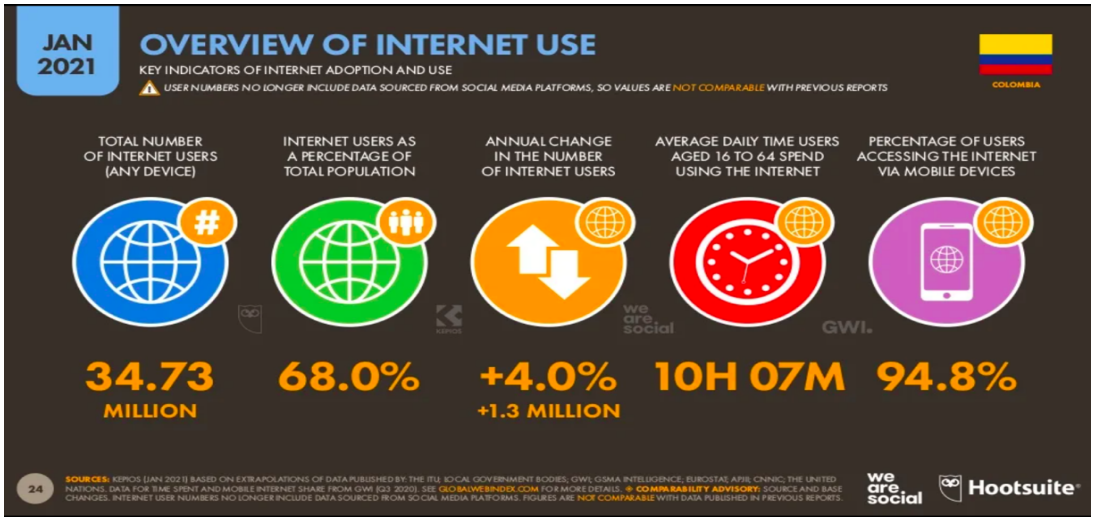
Device ownership in Colombia, Jan 2021 (DataReportal, 2021)



There were 34.73 million internet users in Colombia in January 2021. The number of internet users in Colombia increased by 1.3 million (+4.0) between 2020 and 2021 and Internet penetration in Colombia stood at 68.0 % in January 2021. (DataReportal, 2021)

Figure 14.

Internet use in Colombia, Jan 2021. (DataReportal, 2021)



The above figures are interesting. Even though results in different studies have shown different lacks, especially in terms of resources and internet connection, the reality showed that at least 94.8% of habitants use their cellphones to access to the internet with different type of uses. Contradictorily, findings in this study indicated that not all schools are equipped with appropriate technical resources for conducting online learning. Yet, general data and statistics from (DataReportal, 2021) showed that 97.5 % of students in Colombia have access to a smartphone and that can be perfectly used to teach and learn a foreign language.

Nonetheless, pre-service teachers must be aware of their instructional environments, including their affordances, constraints, so that there is a smooth transition and usage of technology and pedagogy depending on the available infrastructure.

COVID-19 is the last aspect in this critical component. It transformed the way people interact with each other, impacting their employment, and education daily practices. Through COVID-19, institutions from everywhere were forced to apply curricular adjustments. Unexpectedly, instructors and students transitioned to an online environment where families were also forced to buy technological equipment and devices to be part of a new educational

methodology that probably could get better results if all teacher education programs were skillfully trained, and prepared to face issues related to learning mediated through technology. The pandemic COVID -19 clearly exposed the lack of training provided by teachers, programs, institutions, and government, a significant number of institutions in the Colombian context have now acknowledged the significance of including the ICT component into their teaching education programs. In agreement with Maru's et al (2021), the use of technology in the learning process has rapidly grown became a priority due to this current pandemic. Indeed, this priority was exhibited through the surprise increase of 1.3 million of internet users between 2020 and 2021 showed by (DataReportal, 2021).

To sum up, this section backed up the necessity to implement an ICT component in teacher education programs in Colombia. The benefits and conditions discussed in this section make a call to better examine the specificities of the Colombian context, the lack of professional and academic expertise, and the restrictions that finances from institutions and government pose. Another aspect to study is directly linked to the myth that students are digital natives, making it a determinant and a critical issue to understand that children who have grown up in a technologically advanced environment are not necessarily digital natives. We claim that when teacher education programs opt by including an ICT component in their curriculums, such curricular adaptation can help to foster a gradual and efficient normalization process, encouraging students to use technology in their daily lives to be digitally literate and act critically in all available domains, including but not restricting to, leisure and academic ones.

Conclusions

Including an ICT component in teacher education programs in Colombia has an essential role at all educational levels. This ICT component principally pretends to promote and ensure pre-service teachers' digital competencies in order to respond to the requirements in today's transforming and globalized education. Through the component in teacher education programs, pre-service teachers have the opportunity to develop their digital skills from the beginning of the program, being more competent and better informed in order to use Information Technology to teach and learn English in an effective, productive, and critical way.

The study exposed a considerable number of benefits of including ICT in teacher practices, such as promoting autonomy, self-efficacy, creativity, empowerment, motivation, self-regulation, and individual learning pace. Although some limitations such as lack of teacher training, limited access to resources, de-contextualized materials also appeared, these limitations are mainly connected to teachers' academic and practical training. As a result, data gathered from students, teachers, and coordinators from fifteen teacher education programs in Colombia and ten national and international experts proposed three fundamental pillars or components*: theoretical, practical, and critical*. Just a practical component would not be enough. As a starting point, including an ICT component in teacher education programs demands a theoretical component with a solid academic and technical base with a strong emphasis on research, previous studies, theory, concepts, and contributors to the field. The practical component enables the use of different tools to teach and learn English as a foreign language which is directly complemented by a critical component that addresses the current reality, the needs, benefits, affordances, and restrictions of specific contexts. This final critical component also establishes the reality of

students as digital natives, as well as the fact that the present COVID-19 pandemic exposed the evident necessity of including an ICT component in their curriculums. The incorporation of this component can contribute in a progressive and effective normalization process, encouraging students to use technology in their everyday life to become digitally literate and engage critically in all possible domains, including but not restricted to recreational and educational ones.

Results of this study have demonstrated previous findings regarding the benefits and necessities in different educational contexts worldwide. Although some conditions are different from Colombia's context and some studies in different countries around the globe have had numerous resources, the lack of teacher training is evident in the majority of the studies. In this study, the results were not different. Participants claimed more support from the government in terms of resources and training. Teachers must also be responsible for their process. They must acquire 21st-century digital skills in order to become digitally literate, promote normalization at different educational levels, and encourage students to use technology critically.

The evidence showed that some institutions in Colombia offering teacher education programs have already started transitioning to include, adapt, adjust, and modify the curriculum, in terms of ICT training, some of them for conviction, the evident current necessity, or due to the COVID-19 pandemic. However, some adjustments are required to comply the ICT component in different teacher education programs in Colombia and possibly overseas.

Limitations of the study

It is essential to consider this study's limitations that probably have affected its results. Although fifteen teacher education programs in Colombia decided to participate in this study, the obtained responses regarding the questionnaires were:

- Eight responses from coordinators of fifteen teacher education programs took part in the study.
- Twenty-nine responses from teachers who belonged to nine different teacher education programs.
- Forty-five students belonged to nine different teacher education programs.

As it is evident, the study did not receive responses from students, teachers, and coordinators from the fifteen programs. The fifteen programs indeed participated. Just in three teacher education programs students, teachers, and coordinators from the same program participated, as it was the expectation from the fifteen programs. In some institutions students and teachers participated, but not the coordinators. In other, coordinators and teachers did, but we did not receive information from students from that specific program.

The previous situation is considered a limitation due to the expectation of receiving information from students, teachers, and coordinators from all fifteen programs. We consider that their information contains different insights, experiences, variables, and perspectives as it is equally important.

Further Research

An extended study including more participants and institutions may be helpful to achieve a more profound understanding of students', teachers', and coordinators' perspectives, concerning ICT. These types of studies are needed in Colombia and probably overseas since the research in this field is still lacking in this context and studies of this kind help all participatory agents in the field not only to be avant-garde but also count on essential notions to include in the teacher education curriculum, which shall be dynamic and evolutionary by nature. Further studies could

be conducted in a specific region of Colombia, for example. Other shall focus in a target institution to accompany it from the design to the evaluation of the ICT component, for example. program All in all, the considerations made in the present study will help tackle the roadblocks that existing (and new) lacks Colombian teacher education programs might be exposed to, in aiming to improve the quality of ICT pre-service curriculum design and development.

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Appendixes

Appendix 1.

Consent Form 01

Ref. Authorization to participate in a research study.

Study: Infusing ICT Practices in Teacher Education Programs.

Researcher: Masters' candidate Daniela Giraldo Sánchez from the School of Languages at Universidad de Antioquia. (5th cohort).

Purpose: It aims to voice different perspectives from teachers, students and coordinators at the university level about the perceived needs of students in different teacher education program (Licenciatura in foreign languages for the case of Colombia) students in their digital skill area training, with the aim to determine how the digital competences of pre-service language teachers can be fostered in the context of an implementation of an ICT component that prepares them to both, learn and teach English being supported by the use of technologies. From 36 Licenciaturas en Lengua extranjeras in Colombia, only 8 of them have included an explicit ICT component in their curriculum. In most cases, it is seen as an elective or an add-on in the study plan.

Process: First stage: Teachers, students and coordinators will fill out a questionnaire sent online (Google Forms).

Second stage: Interview to some experts in ICT and EFL.

Duration: First stage: 25 min Second stage: 15 min.

Benefits: The results will contribute to structuring a solid proposal for the inclusion of an ICT, language learning/teaching component in teacher education programs in Colombia, providing an understanding of stakeholders, teachers' and students' experiences concerning pedagogical implications and expected skills to be developed. The study also aims to broaden the scope of research in this field. Results of the present study will be disseminated with all participants either via scholarly publication(s) or conference presentation(s).

Notes

- ✓ I understand that participation in this research is voluntary, and participants can withdraw at any time by informing the researcher.
- ✓ Only the researchers, collaborators, and supervising professors will have access to the students' identities and to information that can be associated with their identities.

Please check the appropriate box below and sign the form:

I accept to participate in this study, and when requested, I will provide additional information concerning the program.

I understand that I will receive a signed copy of this consent form.

I have read this form and understand it. _____

I do not give permission for my institution to participate in this project. _____

Signature Position Date

Appendix 2.

Questionnaire to students

Dear Student,

Regarding the necessity to train you as teacher educators in information and communication technologies (ICT) to support English teaching and learning, we are kindly encouraging you to provide relevant insights based on your experience. This short questionnaire attempts to collect information about your preferences and suggestions concerning the design of an ICT component for a teacher education programs program in Colombian educational institutions.

All data will be kept anonymous and confidential. The information gathered in the present study will be utilized only for educational and research purposes.

By providing your answers to this questionnaire you grant us access to include you as a participant in our study and analyze all pertaining data. It is expected that you would be able to answer this form in 25 minutes or less.

Cordially,
Daniela Giraldo (Master's candidate)
Dr. Liliana Cuesta Medina (Researcher)

Demographics

1. Select the range of age you belong to

18-22 ___
23-25 ___
26-30 ___
31-35 ___
More than 36 ___

2. What is your gender?

Woman ___
Man___
Prefer not to say _____

In the following questions, please choose (with a circle) the option that applies to you.

3. In what sector do you study at?

a. Public
b. Private

4. What is the name of the institution in which you study at?

_____

5. What is the name of the program?

6. How many semesters does your undergraduate program have? _____

7. In which semester are you currently registered?

_____

ICT

Please, mark with an X the option that applies to you.

On a scale of 1 to 5,

1-Unsatisfied. 2- Poorly satisfied. 3-Somewhat satisfied 4- Satisfied 5. Very satisfied.

1. What is your degree of satisfaction concerning the following statements?

2. The availability of technological resources in your institution: 1__ 2__ 3__ 4__ 5__

3. The training in ICT you receive from the institution: 1__ 2__ 3__ 4__ 5__

4. The digital skills you have: 1__ 2__ 3__ 4__ 5__

5. The availability of internet connection: 1__ 2__ 3__ 4__ 5__

6. The use of technological resources in different classes: 1__ 2__ 3__ 4__ 5__

7. The digital skills teachers have in the undergraduate program 1__ 2__ 3__ 4__ 5__

8. Please, mark with an X the option that applies to you. You can choose more than one option

9. What do you mainly use technology for?

a. To check social network sites like Facebook, twitter or Instagram
b. To chat with friends or family.
c. To read for pleasure.
d. To read for academic purposes.
e. To get informed.
f. To learn something new.
g. Personal Entertainment (video games, podcasts, series, videos. etc).

10. Do you consider that a course of language learning supported by technology is important for you as undergraduate student in your institution? Why?

11. Do you use technology to support your learning process?

___ Yes
___ No

12. If you answered yes to question 4, answer these two next questions, if not, go to question 6.

a. How long have you been using technology to support your learning process?

____Less than a year
____1 to 3 years
____4 to 6 years
____7 to 10 years
____I have not ever used technology

13. How do you use technology to support your learning process? What do you usually do?

14. In your opinion, what are the top 3 skills that undergraduate students should develop in order to use technology to support language learning?

15. What would be the main 5 topics/content areas you would include if you wanted to take an ICT course to learn how to use technology to support language learning?

16. How many hours do you consider a Licenciatura ICT component should have in the area of language learning supported by technology?

17. What kind of training should you receive in regards to the usage of technological resources to support language learning? Explain.

18. Add any other comment you deem necessary.

Thanks for your collaboration.

Appendix 3.

Questionnaires to teachers and coordinators

Dear Professor

Regarding the necessity to train teacher educators in information and communication technologies (ICT)to support English teaching and learning, we are kindly encouraging you to provide relevant insights based on your experience. This short questionnaire attempts to collect information about your preferences and suggestions concerning the design of an ICT component for a Licenciatura program in Colombian educational institutions.

All data will be kept anonymous and confidential. The information gathered in the present study will be utilized only for educational and research purposes.

By providing your answers to this questionnaire you grant us access to include you as a participant in our study and analyze all pertaining data. It is expected that you would be able to answer this form in 25 minutes or less.

Cordially,
Daniela Giraldo (Master's candidate)
Dr. Liliana Cuesta Medina
(Researcher)

Demographics

1. Select the range of age you belong to

20-24 ___
25-29 ___
30-34 ___
35-39 ___
More than 40 ___

2. What is your gender?

Woman ___
Man ___
Prefer not to say _____

In the following questions, please choose (with a circle) the option that applies to you.

3. In what sector do you work at?

a. Public
b. Private

c. Both
d. Other, which one? _____

4. In which educational level do you teach?

a. Licenciatura program
b. Masters' program
c. Both
d. Other

5. What is the name of the institution in which you work at?

_____

6. What role describes you best?

a. Full-time teacher
b. Part-time teacher
c. Language program coordinator
d. Other _____

7. How long have you been working with your institution?
a. Less than a year
b. From 1 to 5 years
c. From 6 to 10 years
d. 11 years or more

8. What courses do you teach? _____

ICT
Please, mark with an X the option that applies to you.
On a scale of 1 to 5,
1-Unsatisfied. 2- Poorly satisfied. 3-Somewhat satisfied 4- Satisfied 5. Very satisfied.

1. What is your degree of satisfaction concerning the following statements?

The availability of technological resources in your institution: 1__ 2__ 3__ 4__ 5__
The training in ICT you receive from the institution: 1__ 2__ 3__ 4__ 5__
The digital skills students have: 1__ 2__ 3__ 4__ 5__
The availability of internet connection: 1__ 2__ 3__ 4__ 5__

2. Do you consider that a course of language learning supported by technology is important for undergraduate students in your institution? Why?
_____

3. Do you use technology to support your language classes?
___ Yes
___ No

4.If you answered yes to question 3, answer this question, if not, go to question 5.
How long have you been using technology to support your language classes?
____Less than a year
____1 to 3 years
____4 to 6 years
____7 to 10 years
____I have not ever used technology

5. In your opinion, what are the top 3 skills that undergraduate students should develop to use technology to support language learning?

6. If you were a curriculum designer of an ICT course for a Licenciatura program, what would be the main 5 topics/content areas you would include?

7. How many hours do you consider a Licenciatura ICT component should have in the area of language learning supported by technology?

8.What kind of training should students of Licenciatura program receive in regards to the usage of technological resources to support language learning? Explain.

9. In your Licenciatura program, do you have any specific course that prepares students to foster English language teaching/learning supported by technology?

10. If you answered YES to the former question, please tell us about the course(s).

Add any other comment you deem necessary.

Thanks for your collaboration.

Appendix 4.

Interview protocol to experts in ICT field and EFL.

Medellín, 15 de julio de 2021

Apreciado(a) Profesor(a)

Reciba un cordial saludo.

Espero se encuentre bien al igual que los suyos.

Nuevamente le agradecemos su participación reciente en el estudio de investigación desde la Maestría en Enseñanza y Aprendizaje de las Lenguas Extranjeras de la Universidad de Antioquia. Tal y como lo expresamos anteriormente, el propósito de este estudio ha partido de una necesidad preliminar, en la que se ha evidenciado que de 36 programas de licenciatura en lenguas extranjeras en Colombia sólo 8 de ellos han incluido en su currículo o plan de estudios un componente relacionado con el uso de las Tecnologías de la Información y la Comunicación como soporte para el aprendizaje y enseñanza del idioma inglés.

La idea del proyecto es obtener diferentes perspectivas de coordinadores, docentes y estudiantes acerca de las diversas necesidades de los estudiantes de licenciaturas en lenguas extranjeras referidas al desarrollo de habilidades del uso las tecnologías de la información y la comunicación (TIC), con la intención de determinar las formas a través de las cuales los estudiantes de licenciatura pueden desarrollar sus competencias por medio de la inclusión de un componente curricular que los prepare para aprender y enseñar Inglés a través del uso pedagógico y racional de las TIC.

Usted amablemente nos colaboró en la primera fase del estudio respondiendo un cuestionario. En esta segunda fase, usted ha sido seleccionado para ser entrevistado, para que, desde su experiencia y liderazgo en el campo pedagógico, nos conteste las siguientes preguntas por el medio que usted a bien tenga:

1. De acuerdo con su experiencia, ¿cuáles habilidades digitales requiere un estudiante de licenciatura en lenguas extranjeras para afrontar este mundo contemporáneo, globalizado y competitivo?

2. Si usted fuera un diseñador de currículo, ¿cuáles serian esas 3 áreas o componentes que usted incluiría en el currículo de un programa de licenciatura en lenguas extranjeras con miras al desarrollo de habilidades digitales?

3. ¿Qué sugiere usted en relación con el aprendizaje y enseñanza de lenguas, mediado por las tecnologías de información (TIC) para que los estudiantes en formación de licenciatura se formen eficientemente para ser capaces de enfrentar las condiciones y retos educativos del mundo actual?

Instrucciones:

Para el desarrollo de esta corta entrevista presentamos tres opciones de acuerdo con su disposición y disponibilidad.

1. Entrevista con duración de máximo 15 minutos que se llevará a cabo vía Teams/ Zoom / Google Meet o la plataforma de su preferencia.
2. Respuesta a las preguntas a través de WhatsApp, las cuales deben ser enviadas al número 3127268189 indicando su lugar de trabajo y su cargo. No es necesario incluir su nombre, tampoco es necesario leer la pregunta con el número de esta es suficiente.

Ejemplos:

- *Hola, soy Profesor de la Universidad de Caldas, Pregunta 1…. (respuesta)*
- *Hola, soy Investigador de la Universidad de Ottawa. Mis respuestas a continuación…*
- *Hola soy Profesor del Colegio Santa Ana y estas son mis respuestas…*

3. Grabación de las preguntas en el medio de su preferencia. Envío al correo: Daniela.giraldo16@udea.edu.co

Consentimiento Informado

√ La participación en esta investigación es voluntaria y los participantes pueden retirarse en el momento que lo considere informando al investigador.

√ El manejo de los audios y la información proveniente de los números de teléfono serán tratados de forma confidencial.

√ Solo los investigadores, colaboradores y supervisores tendrán acceso a la identidad de los participantes. Aseguramos el anonimato y la confidencialidad de los datos.

Nuevamente, gracias por su tiempo y colaboración.

Cordialmente,

Equipo Investigador

Daniela Giraldo Sánchez
Aspirante al título de Maestría en Enseñanza y Aprendizaje de las Lenguas Extranjeras

Escuela de Idiomas Universidad de Antioquia

Dr. Liliana Cuesta Medina (Associate Professor-Researcher)

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