L2 Teachers' ICT Competencies: Needs Analysis in Teacher Professional Development

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ABTRACT

The incorporation of technology has generated important challenges in relation to the strategies that teachers have implemented, created or adapted to respond to the demands of the new reality that the declaration of a pandemic brought in 2020. Thus, it is necessary to inquire about the ICT skills of foreign language teachers in order to identify their training needs in this regard. This study, which falls within the paradigm of mixed methods, was carried out through the application of a self-perception survey in relation to the ICT skills based on the Competency Framework by UNESCO in the quantitative phase. 186 foreign language teachers who were alumni of the Master's Degree in Teaching Spanish as a Foreign and Second Language and continuing education courses offered by this master at Caro y Cuervo Institute were surveyed. The quantitative results showed that teachers' development needs mainly relate to the Level of Creation, which implies the ability to build knowledge, innovate, work on projects and transcend the classroom. Thus, L2 Teachers' required training must emphasize the ICT competencies that foster their leadership and innovation to assure their teaching quality and position their institutions at the forefront of language education.

*Keywords***:** *language instructino; perception; teaching skills; teacher education; technology education.*

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Competencias TIC de Docentes de Lenguas: Análisis de Necesidades en Formación Docente

RESUMEN

La incorporación de la tecnología ha generado importantes desafíos en las estrategias que los docentes han tenido que implementar, crear o adaptar para responder a las demandas que trajo consigo la declaración de pandemia en 2020. Por ende, es necesario indagar acerca de las competencias TIC de los docentes de lenguas extranjeras para identificar sus necesidades de formación. En la fase cuantitativa de este estudio mixto se realizó una encuesta de autopercepción en relación con las competencias TIC con base en el Marco de Competencias de la UNESCO. Se encuestaron 186 docentes egresados de la Maestría en Enseñanza del Español como Lengua Extranjera y Segunda Lengua del Instituto Caro y Cuervo y profesores que hicieron cursos de educación continua ofertados por este posgrado. Los resultados cuantitativos mostraron que las necesidades de los docentes se relacionan con el Nivel de Creación, que implica la capacidad de generar conocimiento, innovar, trabajar en proyectos y trascender el aula. De esta manera, los docentes de L2 requieren una formación que enfatice las competencias en TIC para fomentar su liderazgo e innovación y así asegurar la calidad de su enseñanza y el posicionamiento de sus instituciones en la formación de lenguas extranjeras.

Palabras clave: *competencias del docente; enseñanza de idiomas; formación de docentes; percepción; tecnología educacional.*

INTRODUCTION

Information and communication technologies (ICT) have suffered several changes during the last decades, which have potentiated their implementation within different fields such as education. For years, ICT has served as educational technology due to its impact on classrooms and the changes it has promoted in the knowledge society (Román-Mendoza, 2018). Moreover, different student-centered methodologies have emerged under their influence, which has encouraged quality education (Parra, 2012).

Nevertheless, during the last three years, ICT have played a major role since the lockdown caused by the Covid-19 pandemic. The sudden change toward synchronous and asynchronous learning in virtual settings at all levels of education triggered a transformation that has made teachers rethink their own practices. Some educators have opted for applying their basic knowledge on technology and others have demonstrated a higher interest in professional training and teaching skills development to boost both teaching and learning processes mediated by ICT.

However, only a few studies have focused on the needs analysis of teachers' ICT competencies after the pandemic lockdown. Some studies have evidenced the resilience and interest teachers of different fields have demonstrated to adapt themselves to the educational context, and some others have focused on the analysis of drawbacks teachers have faced in relation to the design and implementation of learning environments mediated by ICT. Yet, there is a lack of knowledge regarding the skills teachers have developed and the ones that they need to consolidate about the use of ICT to favor student-centered L2 teaching and learning processes. Hence the main goal of this project was to establish the needs of L2 teachers' training concerning their ICT competencies as alumni of the Master's Degree in Teaching Spanish as a Foreign and Second Language and teachers who took continuing education courses offered by this program at the Caro y Cuervo Institute.

This study is justified in the need for exploring the reality of the L2 teachers' practices and their use of ICT for educational purposes. This allowed us to identify the level of methodological and technical skills they have reached after the pandemic lockdown based on a self-perception survey of their ICT competencies. The results of this research could be used as a meaningful source of information to promote teachers' professional development programs at different educational levels.

THEORETICAL FRAMEWORK

ICT in the educational context

ICT is conceived as educational technology (Román-Mendoza, 2018) since its transformative impact has reached the classroom and has changed the knowledge society (Parra, 2012). Furthermore, the influence of ICT has motivated the generation of student-centered methodologies that have made it possible to improve the quality of education. According to Díaz-Barriga (2013), the implementation of ICT allows generating and strengthening meaningful learning, so they become instruments that favor an innovative use of information to improve both teaching and learning experiences.

ICT Competency Framework for Teachers

UNESCO (2019) sets out a framework of ICT skills related to education at three levels and each one of them is made up of six educational aspects. As teachers level up, the ICT competencies are more advanced, but they are less focused on technology since it is perceived as a means to an end; thus, technology becomes an enabling mechanism.

In the first level or level of Knowledge Acquisition, teachers have basic knowledge of digital literacy skills and digital citizenship, so they include technology in their curricular contexts to support individual, group and whole-class activities through traditional teaching methods. The second level or Deepening level of Knowledge unlocks the true potential of technology as they use it to enable students to learn through problem-based and project-based learning in order to solve real-life problems collaboratively. In the third level or level of Knowledge Creation, both students and teachers create knowledge, innovate and work on projects that have an impact outside the classroom (UNESCO, 2019). Furthermore, this framework includes six aspects that characterize the functions that teachers perform through ICT and each of these can be described according to the three levels mentioned, depending on the stage of technology adoption in which teachers are located. (see Table 1).

Table 1. UNESCO ICT Competency Framework for Teachers

Aspect	First Level: Knowledge Acquisition	Second Level: Knowledge Deepening	Third level of Knowledge: Creation
Educators can…			
Understanding ICT in Education Policy	Determine how and to what extent their teaching practices follow institutional and/or national policies.	Design, modify and apply teaching practices that follow national and institutional policies, and meet social needs and interests.	Critically reflect upon national and international education policies, suggest changes and improvements and envision their further effects.
Curriculum and Assessment	Analyze the curricular standards and determine the possible pedagogical use of ICT to meet them.	Integrate ICT in the disciplinary contents, teaching, assessment and courses transversely to fulfill curricular standards.	Establish assertive ways to implement collaborative learning to achieve the curriculum standards of the different disciplinary fields.
Pedagogy	Properly select ICTs according to specific teaching and learning methodologies.	Design project-based activities supported by ICT to help students develop project plans and solve complex problems.	Enhance students' autonomy within a collaborative and student-centered environment by specifying learning criteria.
Application of Digital Skills	Identify and use the functions of common hardware components and productivity software.	Create digital learning environments that combine varied digital resources and tools to help students develop problem-solving and higher-order thinking skills.	Build communities of knowledge and make use of ICT to promote lifelong learning.
Organization and Administration	Arrange the physical environment in such a way that technology is at the service of varied learning methodologies and favoring inclusion.	Implement digital tools in a flexible manner in order to foster collaborative learning.	Lead the design of a technology strategy in order to turn the school into a learning organization.
Teacher Professional Learning	Use ICT to achieve professional development goals.	Implement technology to network with other teachers and promote their professional development.	Consistently evolve, inquire, innovate and share meaningful practices so as to ascertain ways for technology to best serve the school.

Note. Adapted from UNESCO ICT Framework of Competency for Teachers by UNESCO, 2019. CC BY-SA.

METHODOLOGY

The present research is a mixed-method study due to the advantages it offers (Creswell & Plano, 2007; Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 2003). It combines and enhances the strengths of the two approaches, mitigates their weaknesses, and offers the possibility to achieve a better understanding of the problem (Díaz, 2014). Likewise, an explanatory design was adopted since it allows a first approach to the problem through the application of a survey; results would be then explained more deeply with the application of interviews with some of the participants. This article reports the first stage of the study, which focuses on the quantitative analysis of the self-perception survey.

An online GoogleForms questionnaire composed of three sections was designed to collect information. The first section includes the respondents' characterization which involves information such as age, sex, education level, years of teaching experiences, languages taught, country of residence, students' country of residence, type of workplace, modality in which they teach their classes and type of ICT professional training. The second block proposes a Likert scale (18 items), with ratings from 1 to 5, according to the teachers' perceptions of their use of ICT in various areas. Finally, one open question was proposed to inquire about teacher training needs (Annex 1). To guarantee the validity of the instrument, Cronbach's alpha test in SPSS Statistics was run on a sample size of 42 respondents. The perception scale revealed a degree of reliability of $\alpha=0.93$ according to the interpretation indicator of Pestana and Gageiro (2003). The participants who answered the survey were a group of 186 L2 teachers who did the Master's Degree in Teaching Spanish as a Foreign and Second Language or took continuing education courses offered by this master at Caro y Cuervo Institute. Convenience sampling was carried out (Stratton, 2021); a group of 400 teachers were sent an invitation through their emails to inform them about the purpose of the study and invite them to make part of it. Then 186 teachers answered positively, signed the consent form and responded to the survey.

Accordingly, there were 134 female and 52 male participants. Their ages ranged from 20 to more than 50 years old, being 31 to 40 years old the highest percentage (36%, n=67). Besides, their levels of education varied from Bachelor's degree to Ph.D.; among them, 50% hold a master's degree. Likewise, the group of respondents extended from novice teachers to educators with more than 20 years of experience who taught in different modalities such as face-to-face, online and blended.

RESULTS AND DISCUSSION

This article focuses on the quantitative results of the self-perception questions that asked educators to select the option that best described their teaching practice in their teaching context. The responses about the Understanding of the Role of ICT in the Education Policy aspect displayed that most of the participants either totally agreed (37.6%, n=70) or agreed (36%, n=67) their practices corresponded to the ICT institutional policies in the first level (Knowledge Acquisition). For the second level (Knowledge Deepening), both the strong agreement (39.2%, n=145) and agreement (38.7%, n=72) responses slightly increased in regard to analyzing the challenges of applying the institutional ICT policies to their teaching practice. As to the third level (Knowledge Creation), the agreement and strong agreement percentage decreased; however, most of the participants either totally agreed (34.9%, n=65) or agreed (30.1%, n=56) that they suggested actions to enrich the institutional ICT guidelines. These agreement results that decreased in the Creation level unveiled a fewer number of respondents who questioned or made proposals to improve ICT policies at the workplace. Thus, it is essential to acknowledge that teachers' voices, despite being ignored in some contexts, are imperative to formulate policies so they portray what they actually experience in the classroom (Vandeyar, 2021). Furthermore, the neutral answers drew attention since they were higher than the negative responses in the first (18.3%, n=34), second 14% (n=26), and third level (20.4%, n=38).

Figure 1.
Percentages of Understanding the ICT in Education Policy responses
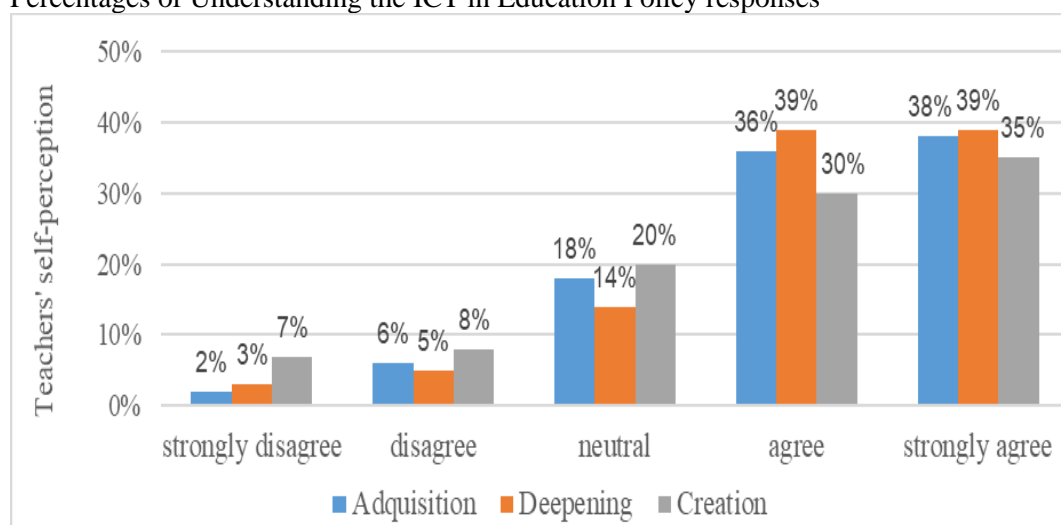
Note: Own elaboration from data of research.

In the first level of the Curriculum and Assessment aspect, most of those surveyed either totally agreed (49.5%, n=92) or agreed (37.6 %, n=70) when asked if they analyzed which uses of ICT would contribute to teaching, learning, and assessment in their classes. About the second level, the majority of respondents agreed (41.9%, n=78) and totally agreed (40.9%, n=76) that they contemplated ICT in the teaching and evaluation processes of curricular contents and generated learning environments enhanced by ICT. Nevertheless, the strong agreement (35.5%, n=66) and agreement (31.2%, n=58) responses decreased in the third level when teachers were asked if they implemented ICT-mediated collaborative and student-centered learning methodologies in their syllabi. This lower result calls attention to how challenging the Creation level is since it implies reinterpreting the curriculum that works in a knowledge society and coming up with an authentic assessment (UNESCO, 2019). Moreover, this competency level is a reminder of the need to integrate ICT in the curriculum to prepare students to live in a society that transforms and uses information for building knowledge focused on human development (Ghavifekr & Rosdy, 2015). The neutral response percentages also drew attention as they were higher than the strong disagreement and disagreement responses in the first (8.6%, n=16), second (13.4%, n=25) and third levels (20.4%, n=38).

Figure 2.
Percentages of Curriculum and Assessment Responses
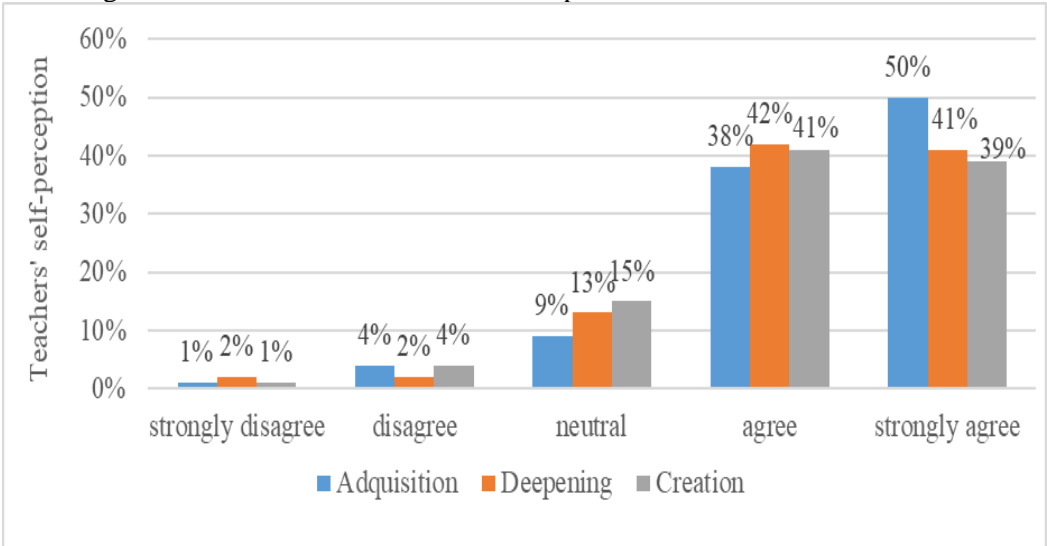
Note: Own elaboration from data of research.

Regarding the first level of the Pedagogy aspect, most of the educators either agreed (41.4%, n=77) and strongly agreed (38.7%,n=72) when asked if they properly selected ICT to support specific teaching and

learning methodologies. The agreement percentage decreased in the second level. However, still many respondents agreed (34.4%, n=64) and strongly agreed (29.6%, n=55) when they were asked about the project-based and ICT-supported learning activities designed to help students create, apply and develop projects and solve complex problems. Notably, the highest percentage of positive answers correspond to the third level, as most of those surveyed reported agreement (43%, n=80) and strong agreement (29.6%, n=55) regarding the fostering of self-management in student-centered and collaborative learning supported by ICT. This result is noteworthy since this level implies helping students in their knowledge creation, so they develop their learning skills and their peers' and it mirrors how ICT integration is gaining importance as it develops collaborative learning, self-reliance and responsibility (Ghavifekr & Rosdy, 2015). Moreover, the results brought attention to the neutral answers since they obtained a higher number of responses than the disagreement and strong disagreement answers in the Acquisition (14.5%, n=27), Deepening (14.5%, n=27) and Creation levels (24.3%, n=45).

**Figure 3**.
Percentages of Pedagogy Responses
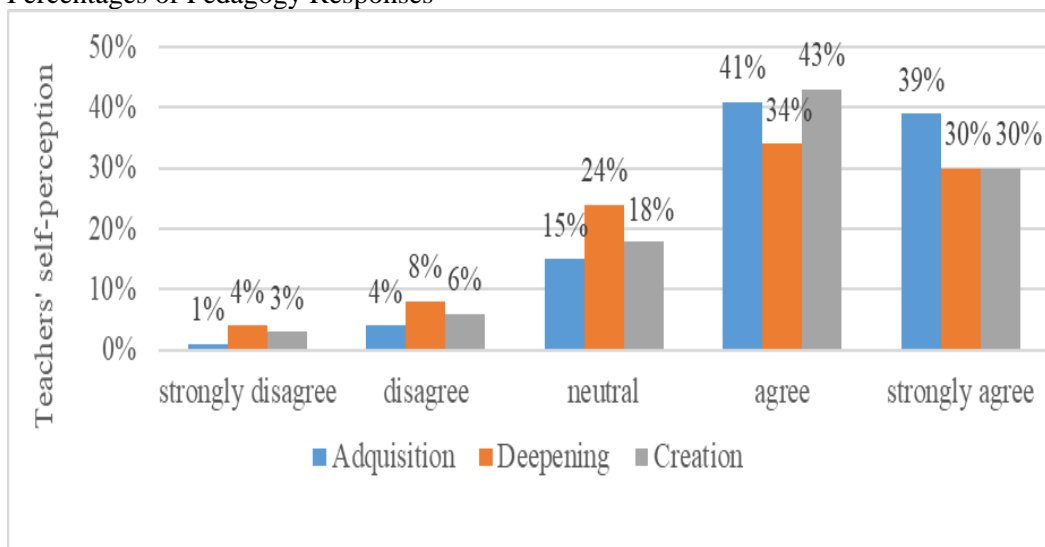
Note: Own elaboration from data of research.

The Application of Digital Skills aspect shows different results. The most frequent answers indicated educators either strongly agreed (52.7%, n=98) or agreed (30.6%, n=57) in the first level when asked if they knew the functions and could use the most common computer equipment and programs. In the second level, the strong agreement answers decreased (32.8%, n=61) in regard to the combination of digital resources and tools to help students develop problem-solving and higher-level thinking skills. In the third level, when participants were asked if they built knowledge communities and used digital tools

to promote lifelong learning, the strong agreement responses decreased, too. The strong agreement drop along the three levels shows fewer educators who firmly identify the functions of digital tools to improve and strengthen learning as expected in this competency (UNESCO, 2019). The neutral responses also called attention since they were slightly higher than the disagreement and strong disagreement responses in the first (9.1%, n=17), second (14%, n=17) and third (23.1%, n=43) levels.

Figure 4.
Percentages of Application of Digital Skills Responses
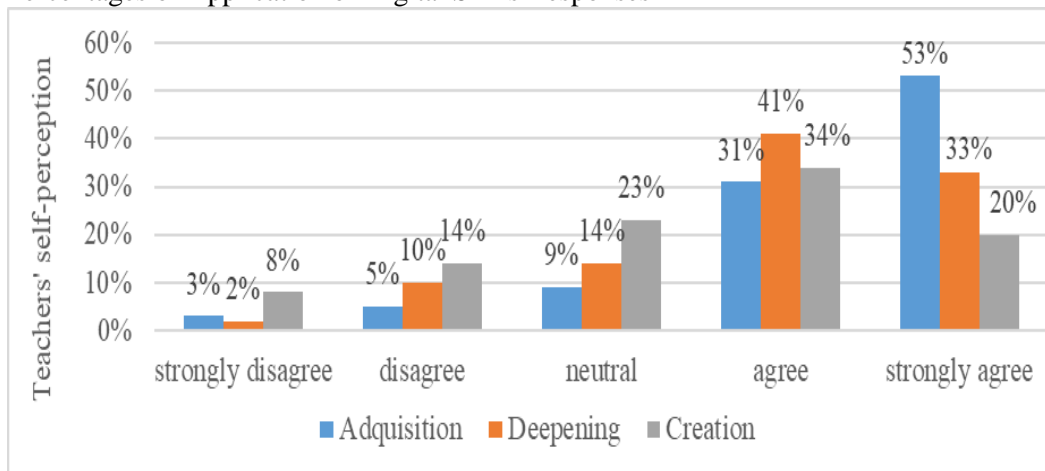
Note: Own elaboration from data of research.

Concerning the first level of the Organization and Administration aspect, around one-third of the respondents (35.5%, n=66) agreed and about a quarter of those surveyed was neutral (26.9%, n=50) when asked if they organized the physical environment so that technology was in the service of different learning methodologies inclusively. As for the second level, the most frequent answers were agreement (40.3%, n=75) followed by total agreement responses (28.5%, n=53) in regard to the use of digital tools flexibly and inclusively to facilitate collaborative, project-based and student-centered learning. In the third level, educators' neutral responses increased and were the most recurrent answers (26.9%, n=49) followed by the agreement responses (23.6%, n=49) when asked if they led the development of technology strategies at their workplaces to turn them into learning organizations. Additionally. the disagreement responses increased (17.7%, n= 33) in comparison to the previous levels.

The neutral responses brought attention as they were more frequent than the disagreement and strong disagreement answers in the Acquisition and Deepening levels and this neutral response was the highest in the Creation level. The Organization and Administration aspect raises more questions in terms of the neutral answers and why about a quarter of the educators neither agree with the statement about ICT

plans to update the school's technology strategy. It would be worthy to unveil the reasons behind these neutral answers since this competency affects how technology can boost educational change (Sipilä, 2013).

Figure 5
Percentages of Organization and Administration Responses
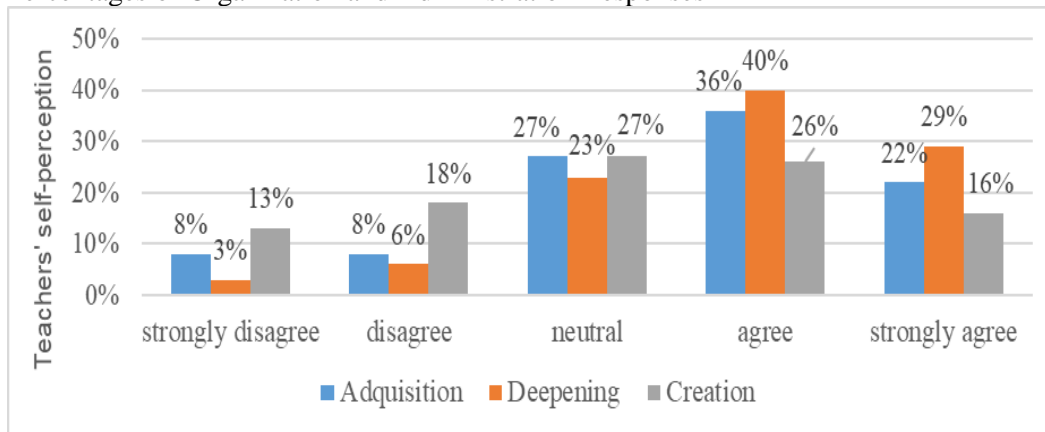
Note: Own elaboration from data of research.

Regarding the Teacher Professional Learning competence, most of those surveyed either totally agreed (57%, n=106) or agreed when asked if they used ICT for their professional development in the first level. In the second level, the agreement responses (41.4%, n=77) increased and the total agreement answers decreased (33.9%, n=63); nevertheless, these responses were the most frequent in regard to participating in networks of educators to enhance their professional development. In the third level, the agreement response decreased; however, it was the highest response rate (34.9%, n=65) on the subject of continuous development, experimentation, innovation, and sharing of best practices to determine how technology can best serve at the workplace. Both the total agreement and the neutral responses reported the same exact percentage rate (31.1, n=43).

The neutral response drew attention since it progressively increased along the levels, so the more advanced the level was, the higher the neutral response percentage was. Additionally, the strong agreement response decrease in the Creation level portrayed less educators who innovated and modeled better ICT practices and had mentor roles in their institutions. As Díaz-Maroto and Cascales (2015) stated, teachers tend to prioritize students' needs and interests when implementing ICT in their lessons rather than innovating.

Figure 6.
Percentages of Teacher Professional Learning Responses
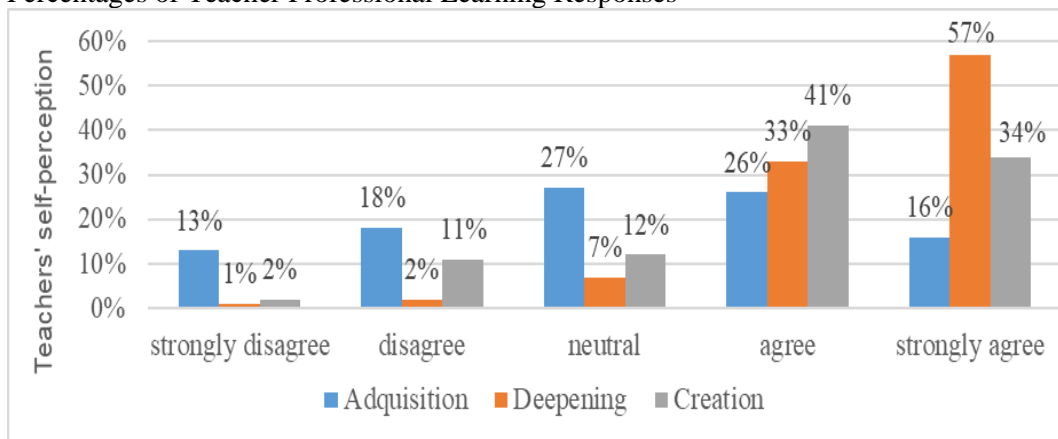
Note: Own elaboration from data of research.

Correlation between Self-perception Vs. Gender

Prior studies have not reported consistent results in terms of gender and ICT competencies (Díaz-Maroto & Cascales, 2015; Fernández-Cruz & Fernández-Díaz, 2016; Yuen & Ma, 2002); however, the gender-based analysis revealed some data of interest regarding the participants' self-perception of their practices. In the third level of the Understanding ICT in Education Policy aspect, female teachers presented a higher percentage of neutral answers and a lower percentage of agreement and strong agreement answers compared to male teachers. It implies a considerable number of women who may have fewer possibilities to actively propose changes that could help improve ICT educational policies in their context.

Likewise, at the first level of Organization and Administration, male teachers evidenced a considerable percentage of neutral answers and a lower percentage of agreement compared to the female teachers, implying more female educators who fully make the most of their physical environment and devices to promote inclusive learning methodologies. Additionally, at the third level of the same aspect, female teachers demonstrated a lower percentage of agreement and strong agreement, which makes notice there is a lower number of women who demonstrate their leadership to design a technological strategy and guide its implementation and make their institutions become a learning organization. Finally, at the third level of Teacher Professional Learning aspect, female teachers presented more neutral answers, implying an important number of women who neither confirm nor deny their possibilities to consistently

evolve, inquire, innovate and share meaningful practices so as to ascertain ways for technology to best serve the school.

Correlation between Self-perception Vs. Age

In order to analyze the correlation between perception and age, four generational groups were established; the first one with teachers between 20 and 30 years old, the second one with 31 to 40-year-old teachers, the third with 41 to 50-year-old teachers, and the fourth one with teachers older than 50; accordingly, some results are worthy to highlight. In the Understanding ICT in the Education Policy aspect, the most frequent disagreement and total disagreement responses were provided by the teachers between 20 and 30 years old in the three levels which implies the youngest respondents are the ones who less understand and apply policy directives and question national education reform policies. Accordingly, older teachers understand policy as a social practice that counts on teachers to succeed (Sutton & Levinson, 2021).

In the Organization and Administration aspect, the younger population reported the most frequent answers in strong disagreement in the first and third levels unveiling less percentage of participants who organize the physical environment to support the ICT use for learning and who boost the development of ICT plans to accomplish the institutions' technology strategy.

Correlation between Self-perception Vs. Level of Education

A third correlation established is between perception and level of education. Four levels of education have been considered: Undergraduate, Specialisation, Master's and Ph.D. degrees. In the Application of Digital Skills competency, graduate and doctorate educators reported the most frequent disagreement responses in the second level regarding integrating digital tools to support learners' higher-order thinking and problem-solving skills. These results mirror previous research that states collaborative tools are the least used by teachers (Díaz-Maroto and Cascales, 2015).

Likewise, in the first level of the Organization and Administration aspect, the high percentage of neutral responses by Ph.D. educators drew attention; accordingly, it is needed to inquire more deeply to understand to what extent these teachers use technology to favor inclusion by means of active methodologies. Additionally, in the third level of the same aspect, a quarter of graduate teachers reported disagreement responses, implying an important number of educators who do not perceive their

leadership towards technological strategies to promote the transformation of their institutions into learning organizations.

Finally, in the second level of the Teacher Professional Learning aspect, more than one- fifth of Ph.D. teachers, despite their academic level, do not use technology to connect to academic communities, and so, other teachers would not make the most of their contributions.

Correlation between Self-perception Vs. Years of Experience

Almost a fifth of the respondents who fell into the ranges of experience between 16 and 20 years and more than 20 years reported the most frequent disagreement responses in the third level of the Application of Digital Skills. This result corresponding to the Creation Level denotes an important number of the most experienced teachers present more difficulties when building communities of knowledge and using web tools to foster pervasive learning, thus, they find approaching technology to transform learning environments more challenging.

At the third level of the Organization and Administration, a quarter of the teachers whose experience ranged from 6 to 10 years and a half of the ones with an experience from 11 to 15 years did not play a leadership role in devising a technology strategy for their workplace to turn into a learning organization. Finally, the answers of about one-fifth of the teachers with 16 to 20 years of experience and with more than 20 years reported disagreement about their role as ICT innovators and leaders in their institutions.

Correlation between Self-perception Vs. Modality

The face-to-face educators drew attention to the disagreement and total disagreement responses. One-fifth of these educators reported disagreement answers in the third level of the Curriculum and Assessment aspect; these teachers did not make the most of the technology to implement active methodologies that prepare students for a Knowledge Society. About one-fifth of these on-site class teachers reported the most frequent strong disagreement responses and more than a quarter reported disagreement in the third level of the Organization and Administration level; thus, it portrayed a lower percentage of technology leaders who propose ICT strategies in comparison to educators who teach in other or more than one modality. This is a challenge, as stated by Dexter (2008), since being an e-leader would imply a personal understanding of pedagogy with technologies.

Moreover, about one-fifth of in-person class teachers reported the most frequent disagreement responses in the second level of the Teacher Professional learning competence which implies less respondents who networked with professional development purposes to access and share knowledge. This result mirrors prior research that concluded educators' perception responses decreased when asked if they participated in forums, and discussions and shared their ICT experiences to connect with other colleagues (Díaz-Maroto and Cascales, 2015). Finally, at the third level of the same aspect, one-fifth of the face-to-face educators showed their disagreement when it comes to playing the role of ICT innovators at the service of their institutions.

CONCLUSIONS

The study, as a preliminary report of the self-perception survey, evidenced L2 teachers' development needs based on the UNESCO ICT Competency Framework for Teachers. Initial findings from studies during the pandemic indicated that teachers needed more help in carrying out virtual instruction and handling technology in online settings (Anderson & Hira, 2020); thus, these conclusions unveiled a lack of development of some ICT competencies in this abrupt shift to emergency online education. Thenceforth, in a post-pandemic scenario, most of the teachers surveyed in our research perceived themselves as competent in the levels of acquisition, deepening and creation of knowledge of the six aspects of the UNESCO framework . Nonetheless, the decrease in some agreement and strong agreement percentages allowed us to identify that the main teacher development needs relate to the Creation level in all the aspects, except in the Pedagogy competence which evidences a higher need in the Deepening level.

Accordingly, teachers require training to develop competencies to become active leaders and innovators that propose changes in the ICT institutional policies and new cutting-edge technological strategies that model high-quality teaching practices to position their institutions at the forefront. In addition, they require guidance so as to implement active student-center methodologies, such as project-based and collaborative learning, mediated by ICT to help students develop complex problem-solving skills and high-order thinking, and in turn, support their self-regulation and knowledge construction. Additionally, they could work more on their own lifelong learning and active participation in the building of Knowledge Communities.

On the other hand, the gender, age, level of education, years of experience and work modality correlations allowed us to identify some needs based on the frequency of disagreement and strong disagreement responses. Firstly, female teachers tend to require more guidance when proposing changes in the ICT education policies in their institutions and more participation as leaders in charge of technological strategies; moreover, male teachers could promote more inclusive learning environments by implementing active methodologies.

Likewise, younger teachers (20 to 30 years old) could receive more guidance to reach a better understanding of institutional ICT policies and make the most of the devices and physical settings to potentialize learning processes. Besides, they may develop their leadership skills with the aim of boosting the technology strategies of their institutions.

Regarding the educational level correlations, graduate and Ph.D. educators present some competence necessities. Teachers who hold undergraduate degrees evidence a need for leadership development to impact and transform their education contexts so that all community members are involved in learning. On the other hand, educators who hold a Ph.D. degree may receive training to implement digital tools and active methodologies so as to support their learners' high-order and problem-solving skills development inside an inclusive environment.

The most experienced respondent ranged from sixteen to twenty and more than twenty years of teaching need to work on the building of knowledge communities, their leadership and the use of technology to ensure continuous learning, promote innovation and transform their learning contexts. Besides, educators who ranged from sixteen to ten and from eleven to fifteen years of experience also evidence a need for leading their institutions towards a technological transformation.

Finally, from all learning modalities, on-site class teachers indicate the need for using ICT to implement student-center methodologies, design and lead technological strategies in their institutions, access and share professional knowledge by means of networking and innovate in their teaching practices.

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