Innovation in maths class: examples and counter-examples of effectiveness of the teaching initiative in times of pandemic*

La innovación en clase de matemáticas: ejemplos y contraejemplos de eficacia de la iniciativa docente en tiempos de pandemia*

Inovação na sala de aula de matemática: exemplos e contra-exemplos de eficácia da iniciativa de ensino em tempos de pandemia.

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Abstract

Introduction: the technological culture of this century makes it necessary to analyze the technological skills developed by teachers, since currently Information and Communication Technologies (ICT) are present throughout the environment, including education, where they play the role of mediators to improve teaching and learning, so teacher innovation in the classroom and teacher effectiveness in times of pandemic are important. **Objective:** to examine the pedagogical use that mathematics teachers give to ICT in their professional practice and their effectiveness in remote teaching. **Methodology:** it was developed in phases, information was collected through interviews, non-participant observation, focus group and didactic analysis, with a sample of 17 basic and secondary mathematics teachers from different schools in the department of Atlántico. **Results:** Efficacy is evident in some teachers in remote classes, but the same does not happen in face-to-face classes, where it was found that ICT skills were underdeveloped. **Conclusions:** teachers make partial pedagogical and didactic use of ICT in their professional practice.

Key words: Technology; Self-efficacy; Professional Practice; Teacher Competencies; Remote Teaching.

Resumen

Introducción: la cultura tecnológica de esta época hace necesario analizar las competencias tecnológicas desarrolladas por los docentes, puesto que actualmente las Tecnologías de la Información y la Comunicación (TIC), se encuentran presentes en todo el entorno, incluyendo la educación, donde cumplen el papel de mediadoras para mejorar la enseñanza y aprendizaje, por lo que es importante la innovación del profesor en la clase y la eficacia de este en tiempos de pandemia. **Objetivo:** examinar el uso pedagógico que dan los docentes de matemáticas a las TIC en su práctica profesional y la eficacia de estos ante la enseñanza remota. **Metodología:** se desarrolló por fases, se recolectó información con entrevistas, observación no participante, grupo focal y análisis didáctico, con una muestra de 17 profesores de matemática de básica y media de distintos colegios del departamento del Atlántico. **Resultados:** se evidencia eficacia en algunos profesores en clases remotas, pero no sucede lo mismo en presencialidad donde se encontró bajo desarrollo de las competencias TIC. **Conclusiones:** los profesores dan parcial uso pedagógico y didáctico a las TIC en su práctica profesional.

Palabras Clave: Tecnología; Autoeficacia; Práctica profesional; Competencias del docente; Enseñanza remota.

Resumo

Introdução: a cultura tecnológica de nosso tempo torna necessária a análise das competências tecnológicas desenvolvidas pelos professores, uma vez que hoje em dia competências, dado que da Informação e Comunicação (TIC) estão presentes em todo o ambiente, incluindo a educação, onde desempenham o papel de mediadores para melhorar o ensino e a aprendizagem, Portanto, é importante que os professores inovem na sala de aula e sejam eficazes em tempos de pandemia. **Objetivo:** examinar o uso pedagógico das TIC pelos professores de matemática em sua prática profissional e a eficácia no ensino e na aprendizagem. **Metodologia:** foi desenvolvido em fases, as informações foram coletadas através de entrevistas, observação de não-participantes, grupo de foco e análise didática, grupo de foco e análise didática, com uma amostra de 17 professores de matemática primária e secundária de diferentes escolas do departamento de Atlántico. **Resultados:** a eficácia de alguns professores em aulas remotas é evidente, mas este não é o caso nas aulas presenciais, onde foi encontrado um baixo desenvolvimento de competências TIC. Conclusão: os professores fazem parte e o uso didático das TIC em sua prática profissional.

Palavras-chave: Tecnologia; Auto-eficácia; Prática profissional; Competências do professor; Ensino à distância

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Introduction

The development of Information and Communication Technologies (ICT) has allowed them to be strongly used as a strategy for innovation in education (Calle, 2019; Hernández, 2017; Valbuena-Duarte, Rodríguez and Tavera, 2021; Valbuena-Duarte, Tamara-Gutiérrez, and Berrio-Valbuena, 2021), opening new spaces in the academic environment and becoming a central engine of opportunities to achieve an innovative and productive education (MEN, 2014). This highlights the need for educational resources that help strengthen teacher training and curricular adaptation supported by the use of ICT resources so that both teachers and students can develop digital competencies, and in the latter, in addition, the knowledge of each disciplinary area with the use of these resources.

The importance of teachers trained in technology in a pedagogical and didactic way presupposes being prepared not only for the development of classes where ICT resources are part of the planning, but also for contingencies where the use of ICT resources goes from being optional to mandatory, as is the case currently being experienced worldwide due to the COVID-19 coronavirus pandemic, which has caused Colombia, like many other nations (MinSalud, 2020), to adopt social isolation as a precaution and means of protection, suspending academic attendance and initiating remote teaching in response to the emergency (MEN, 2020).

In this way, the pandemic has changed education from a model that focuses on the transmission of information between teacher and student to a model centered on the use of technology, in this way, reflections focus on the need to achieve quality education in emergency remote teaching and for this to be achieved it is necessary for the teacher to be competent in the use of technology, in such a way that it is essential to discuss, according to Cabero-Almenara (2020) and Jiménez-Sánchez (2020) the professional practice of the teacher and the merely instrumental use of different ICT resources. With the emergence of these digital resources (Montero, 2018; Martínez, 2019) it has always been expected the birth of new methodologies that can strengthen relationships between members of an educational environment, enabling communication between teachers and students and developing great potentialities in studying with these technological mediators, even in times of remote teaching (Valbuena-Duarte, De la Hoz and Berrio-Valbuena, 2021).

Similarly, it should be noted that teachers at the time of moving to this remote education had to adapt quickly, making changes in all their professional practice, now focused on technology. However, by not having sufficient training in the use of these resources, students were filled with concerns and stress when receiving information from the teacher in a different way (González-Calvo et al., 2020), which, according to Sullivan et al. (2020), leads teachers to focus on rethinking the way in which they carry out planning based on the pedagogical use of different ICT tools in order to significantly enhance student learning.

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This implies that the teacher now has the additional need to self-manage and develop the ability to organize and execute actions that allow him/her to be effective when using different ICT resources. And in this aspect, positive beliefs in the use of ICT as an element to support teaching processes play a relevant role (Carmona-Mesa et al., 2020), together with the teacher's efforts, persistence and commitment to pedagogical planning that gives greater meaning to the teaching process (Carmona-Mesa et al., 2020).

and meaning to their professional practice (Pedraza et al., 2019).

Thus, it is necessary for teachers to be prepared in the use of ICT resources to contribute to educational quality and innovation, so the purpose of this paper is to examine the pedagogical and didactic use that mathematics teachers make of ICT in their practice and their effectiveness in remote teaching.

II. THEORETICAL FRAMEWORK

Technology is raised by the MEN (2008), in its guide number 30 Ser competente en tecnología (Being competent in technology):
a necessity for development! as: "human activity that seeks to solve problems and satisfy needs by transforming the environment through the rational and creative use of resources and knowledge" (p.5). Likewise, the appropriation and use of technology is the creative and pertinent use of diverse technological resources that facilitates the accomplishment of tasks and enhances learning.

With reference to the teacher's practice, Gavilán et al. (2007), state that this is not only what the teacher does but also the understanding of his/her instruments and the purpose of their use, complementing that on the basis of the MEN (2014), the teacher's practice is defined from the competencies: Teaching, Training and Evaluating, which are described as follows:

To teach: To refer to the understanding and adequate use of didactics in order to favor student learning and to be able to develop their competencies (...) To train: It refers to the use of pedagogical knowledge to create educational environments to achieve a joint development among students, teachers and the community (...) To evaluate: Refers to the reflection, monitoring and decision making that the teacher must have in the training processes to seek to favor self-regulation and to be able to propose the necessary actions for an improvement of teaching both in learning and in the curriculum (...) (MEN, 2014, p. 8).

Next, the teacher's reflection in practice is what allows him/her to face the teaching process in his/her exercise (Llinares, 2014; Valbuena-Duarte, Porras and Barrios, 2021), in addition, he/she should not simply summarize his/her profession to the study of pedagogy and its disciplines each one apart, since it is through the joint work of pedagogy and didactics that he/she can achieve learning in students. This requires the teacher to possess a series of competencies, which according to Llinares (2012; 2014) can be summarized in that the teacher knows how and when to use specific knowledge for the solution of professional difficulties; similarly, Pochulu et al. (2016), address competencies as the combination of knowledge, attitudes and skills that favor the efficient professional performance of the teacher.

In turn, the MEN defines competencies as: "the set of knowledge, skills, attitudes, understandings and cognitive, socio-affective and psychomotor dispositions appropriately related to each other to facilitate the flexible, effective and meaningful performance of an activity in relatively new and challenging contexts" MEN (2006) (cited by MEN, 2014, p. 31). It is of interest in this work the definition of ICT competencies that teachers within technological innovation, so it assumes the conceptualizations in this sense of the Ministry of Education in Colombia:

Technological competence: the ability to select and use in a relevant way a variety of technologies

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of technological tools, understanding the principles that govern them, the ways to combine them and the licenses that protect them (...) *Communicative Competence:* is the ability to express oneself, establish contact and relationships in virtual and audiovisual spaces through various resources in a synchronous and asynchronous manner (...) *Pedagogical Competence:* is the ability to use ICT for the teaching and learning process, recognizing the scope and limitations of the incorporation of these technologies in the comprehensive training of students and their professional development (...) Management Competence: is the ability to use ICT in the planning, organization, administration and effective evaluation of the educational processes.(...) *Management Competence:* is the ability to use ICT in the effective planning, organization, administration and evaluation of educational processes. *Research Competence: t h e* ability to use ICT for the transformation of knowledge and the generation of new knowledge (MEN, 2014, p. 31-33).

These ICT competencies for teacher professional development are developed and expressed in three degrees or levels of complexity, which are:

Exploration: The moment of exploration is the first approach to an unknown world in which it is very appropriate to imagine, or bring to mind things that are not present to our senses (...) *Integration:* It is in this second moment, where the abilities to use ICT autonomously are developed, teachers are ready to develop ideas that have value through the deepening and creative integration of ICT in educational processes (...) *Innova- tion:* The moment of innovation is characterized by putting new ideas into practice, using ICT to create, to express their ideas, to collectively build new knowledge and to build novel strategies that allow them to reconfigure their educational practice (MEN, 2014, p.24).

Likewise, it is important that the teaching and learning process involves competencies, knowledge, motivation and self-efficacy (Shaughnessy, 2004), among other aspects that aim to enhance processes, highlighting that self-efficacy is defined by Bandura (1977) as "the beliefs in one's own ability to organize and execute the actions required to manage future situations" (p. 2).

III. OBJECTIVES

The purpose of this scientific article is to socialize the work carried out with the purpose of examining the pedagogical use that mathematics teachers make of ICT in their professional practice and the effectiveness of these resources in remote teaching.

IV. METHODOLOGY

The research is developed with a qualitative approach (Mejía et al., 2014), and makes use of a descriptive design (Arias, 2012). For the collection of information, non-participant observation was carried out by recording a field diary and a checklist in face-to-face classes of mathematics teachers, as well as structured interviews applied to mathematics teachers with face-to-face and virtual questionnaires, and finally, a didactic analysis adapting the guidelines of Rico (2013), using the cycles; content, cognitive, instructional and evaluation analysis, in order to analyze the technology in mathematics texts Mathematics 10º of the Santillana publishing house 2013 edition (identified as text 1) and Mathematics 10º issued by the MEN in the 2017 edition (identified as text 2).

Participants

The research was carried out with a population of mathematics teachers of elementary and middle school in the city of Barranquilla and its metropolitan area, with a sample of 17 mathematics teachers of elementary and middle school from different schools in the Department of Atlántico, selected based on the criterion of voluntary participation, and who were working in public or private institutions belonging to the north-central-historic, southeast and southwest localities, which makes the sample non-probabilistic and intentional (Arias, 2012).

Characteristics of the participants: There are 8 teachers from public institutions in Barran- quilla of strata 1 and 3 from the southeastern, southwestern and metropolitan localities, 5 teachers from public institutions of strata 1 in the municipality of Soledad from the southeastern locality, 1 from a public institution in Galapa from the southwestern locality, 2 from private institutions in Barranquilla from the historical north-central locality and 1 teacher from a private institution in the municipality of Soledad from the southeastern locality, totaling a total of 17 teachers of basic and middle school Mathematics.

The methodology followed is adapted from Castro-Inostroza et al. (2020), which is executed in the following phases:

Phase I: First approach to the object of study: In this first phase, we meet with each mathematics teacher in the sample to become familiar with them, discuss the objectives of the research and request permission for data collection.

Phase II: Elaboration of a data collection instrument: Instruments for data collection are constructed through literature review, thus designing the questionnaires applied to the teachers, recording in a field diary of non-participant observations of each teacher's pedagogical act, in addition to the elaboration of a checklist of observation of each teacher's pedagogical act.

Phase III: First data collection and application of the interview: A first field work is carried out by applying a questionnaire by means of a structured interview to the mathematics teachers who are part of the on-site sample, also carrying out the non-participant observations, this record is made in times of on-site teaching and making a record in a checklist applied in times of remote teaching.

Phase IV: Second data collection: A second field work is carried out with the purpose of collecting information from mathematics teachers on the pedagogical and didactic use of technology in remote teaching times, applying face-to-face and virtual interviews using the Google meet platform.

Phase V: Data analysis: A triangulation of the information collected from the actors of the study is made with the instruments represented in questionnaires, checklist and field diary and the theoretical references base of this study. Likewise, the didactic analysis is carried out by adapting 4 cycles of analysis of Rico (2013), in order to analyze the integration of ICT resources in a pedagogical way in the textbooks used by the teachers of the sample.

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V. RESULTS AND DISCUSSIONS

Results

This section contains the data obtained from the application of the different techniques and instruments.

Analysis of questionnaires

This instrument was validated by 4 experts in the use of ICT applied to mathematics education. A triangulation of the instruments applied to the sample was carried out in order to determine the effectiveness of the teachers, the ICT competencies identified and the pedagogical and didactic use they make of ICT resources. From the explorer level, most of the teachers declared to know and manage diverse ICT resources and showed self-efficacy, especially in times of pandemic.

Likewise, the classroom teachers mentioned knowing several ICT resources but most of them do not make explicit the pedagogical intentionality of use, which places 8 teachers at this level in relation to the communicative competence because although they surf the Internet and communicate with their students and the academic community using ICT resources, however, the other ICT competencies are not identified at this level due to the few ICT resources used as methodological and didactic strategies for the monitoring of teaching practice, as shown in Table 1.

Table 1
Criteria in relation to the Explorer level

Recognition of the epistemic and didactic value of the use of the digital media it uses
7 teachers in remote teaching state that ICT resources in the teaching of mathematics encourage collaborative and self-taught learning, which are important for the student to have interactive learning, however, they state that they have difficulty in the lack of equipment, connectivity and training in these subjects.
10 classroom teachers mention the importance of the current use of ICT, stating that ICT resources motivate students in the classroom; however, they do not mention giving a didactic or pedagogical meaning to the ICT resources they use.
Mastery of educational technological tools in the design and delivery of classes (Palos et al., 2017).
7 teachers in remote teaching state that they use various ICT resources, such as social networks and virtual platforms, Google tools, among others, to carry out different activities with students and to communicate. They show mastery of these, although two teachers do not mention didactic and pedagogical intentionality.
Most of the 10 on-site teachers say that they are familiar with various ICT resources, such as social networks, office tools, web pages, among others, to send information; even so, those who say they use these resources do not explain the intentionality of their use from a pedagogical and didactic point of view.

Source: Own elaboration.

Similarly, from the integrative level, as shown in Table 2, teachers in both presential and remote teaching have positive perceptions regarding ICTs; some integrate them into their lesson plans, and many even have a command of these tools and have received training for their use; however, it is evident that, in presential, most of the teachers do not make pedagogical and didactic use of ICTs, as well as a teacher in remote teaching.

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Table 2
Criteria in relation to the integrating level

| ICT training and perception (Said-Hung et al., 2017). |
|---|
| 7 teachers in remote teaching state that having to use technological resources has changed the way they teach, they have developed more autonomy and innovation of ICT resources for teaching and learning assessment. In addition, some have been trained in the use of ICT. |
| Of the 10 on-site teachers, 4 of them plan to be trained from different courses and trainings of the MEN for the use of ICT, even so, 3 of these teachers do not make use of ICT resources in the classroom, although they have a positive perception about technology, but at the time of making use of these they do not show intentionality. |
| Classroom planning with the use of ICT (Teliz, 2015). |
| The majority of remote teaching teachers state that they use ICT resources for lesson planning, through virtual platforms, using various strategies, some use virtual and face-to-face learning guides for students who do not have connectivity, use various resources for interaction with students, and communicate with them. |
| 10 on-site teachers make lesson plans, taking into account the institutional curriculum, basic learning rights, basic competency standards, curricular frameworks and thematic axes. In addition, some of them make use of different ICT tools, such as office automation, web pages, among others, but most of them do not mention the pedagogical intentionality. |

Source: Own elaboration.

The results in Table 2 place 6 teachers at the integrative level in relation to technological competence, since they combine and implement technological resources to improve their planning and teaching practice. In addition, 6 teachers are located in the management competency because they enter relevant training and appropriation programs for professional development. Regarding the pedagogical, research and communicative competence, this level was not evidenced in the teachers because they do not propose, develop or lead learning strategies and projects with the use of ICT in the school environment.

With reference to the innovative level, teachers in remote teaching claim to know, manage and use technological resources for pedagogical and didactic purposes, evidencing a self-efficacy in the teachers on the adequate use of these resources in pandemic, in addition, in presentiality, although some teachers claim to have management and pedagogical use of these resources, as shown in Figure 1, most of them do not integrate and do not make adequate use of these resources, as shown in Table 3.

Figure 1
A mathematics teacher's response on activities using ICT.
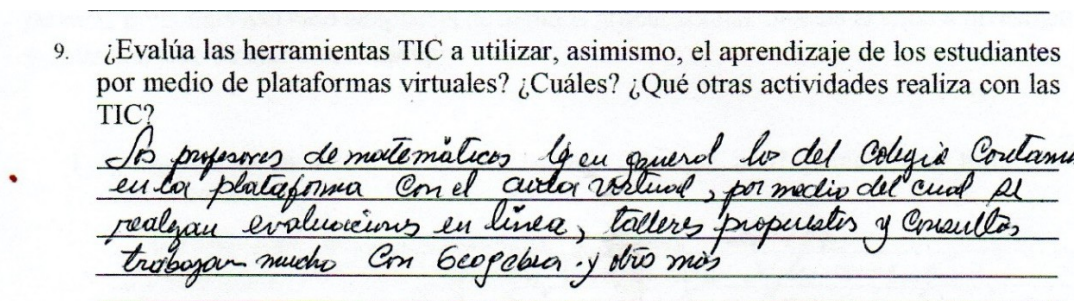
Note. Figure taken from a questionnaire applied to a mathematics teacher at a public institution in the southeastern locality. - *Source:* From the researchers

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Table 3
Criteria in relation to the level of innovation

Uses or creates specific digital media to give meaning to mathematical content (Carvajal et al., 2019).
In remote teaching, most of the teachers mentioned using resources such as virtual platforms, social networks, m a t h e m a t i c a l software, YouTube videos, web pages, to communicate with students, guide them, carry out evaluations, resolve concerns, initiate a new topic, share information, although one teacher did not explain the pedagogical and didactic intentionality of their use.
Of the 10 on-site teachers, some mentioned using ICT resources such as mathematical platforms and software when they are in the classroom, mostly to deepen a given topic, verify students' knowledge, send workshops, send information, carry out evaluations, where few actually use these resources for didactic purposes.

Source: Own elaboration.

In relation to the above, it is analyzed that 10 teachers are at the innovative level of technological competence since they use ICT resources to build significant learning in their students; in addition, only 8 teachers are at the innovative level of pedagogical competence since they create learning environments mediated by technology and evaluate the results obtained with the implementation of different strategies mediated by ICT. It should be clarified that the research, management and communicative competencies were not evidenced in this case.

It should be added, that it was possible to evidence that most teachers are in the third generation (ICT-based education) according to Yong et al. (2017); Arboleda and Rama (2013), because they integrate some ICT resources, although often in an instrumental way, and others are in the fourth generation four (web-based education), because they integrate social networks and online platforms.

Didactic analysis: An analysis of the textbooks: Caminos del saber Matemáticas 10 (text 1) of the Santillana publishing house, and the MEN book, Matemáticas 10 (text 2), is carried out in order to analyze how they integrate technology in a didactic and pedagogical manner, adapting from Rico (2013) 4 cycles of analysis with their respective categories, presented in this section below:

Content analysis: for the Formal and structural categories, it was evident that in text 1, it is indicated that to find broader definitions, web pages can be reviewed, while in text 2 only the concepts presented by the text are present, for the representational category, mention is made of con- tentions where they indicate the use of software such as GeoGebra, Graph, and Excel, graphing calculator for graphing, and making diagrams, solving exercises, among others. For the phenomenological category, text 2 presents in 4 units a section called MATEMATICS, but only makes use of Geogebra and the scientific calculator, and text 1 presents technological resources such as software. This can be seen in Figure 2.

Figure 2
*Concepts in text 1 mentioning application in multimedia*

Source: Figure taken from text 1.

Cognitive analysis: in the learning expectation category, in some units, text 1 expresses its objectives through ICT resources as: constructing and graphing functions, solving problems, activities, and reinforcing specific issues of the topics covered in the units, and in text 2, the objectives presented with the use of some ICT resources are: constructing and graphing functions, and the use of the scientific calculator to solve different operations. For the category learning difficulties, none of the texts make use of ICT resources in a didactic way. For the category cognitive demands in the two texts, it is evident that a series of activities are developed to consolidate competencies, I propose, argue, interpret, exercise and solve problems, but they do not involve ICT resources to support, solve and develop these.
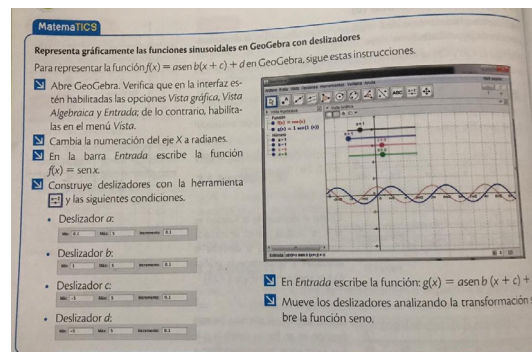
Instructional analysis: for the category of materials and resources, in the case of text 1 at the end of some units, it proposes some activities with digital applications (Microsoft Mathematic, WolframAlpha, Graph, GeoGebra and Excel). While in text 2 in fewer units it shows the GeoGebra software, in others it presents the scientific calculator to solve operations. This can be seen in Figures 3 and 4 as an example of this result.

Figure 3
Software integrated in the text 1
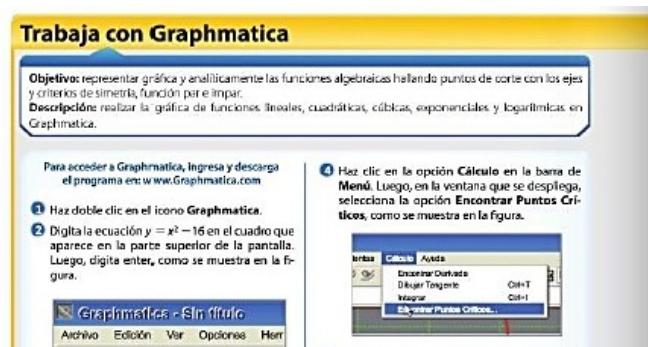
Source: Figure taken as evidence of the use of technological resources in text 1.

Figure 4
Software integrated in the text 2

Source: Figure taken as evidence of ICT use in text 2.

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Evaluation Analysis: for the category of interpretation of the results achieved, it is possible to note that, although the books make use of some technological resources in different units, they do not have a pedagogical or didactic objective, since only certain activities are presented at the end of some of the units.

Discussions

From the instruments applied, it could be evidenced that teachers have a positive perception about the use of ICT as mediating resources in pedagogy and didactics, but despite this, most of them do not make use of these resources and those who use them, often do not take into account the pedagogical and didactic intentionality, however it is clear that they perceive techno-logical resources as an important mediator in teaching, which is consistent with other works such as Angel and Patiño (2018), Arancibia et al. (2016), Báez and García (2016); Valenzuela and Varela (2020) where teachers have a positive perception of ICT resources for teaching. And there are works using various resources such as social networks, virtual centers (Calle, 2019), educational platforms, software (Valbuena-Duarte, Tamara-Gutiérrez & Berrio-Valbuena, 2021) and others, but some do not make explicit the didactic intentionality of the use of these resources (Valbuena-Duarte, Ro- dríguez & Tavera, 2021).

The findings of this work show and reaffirm the need for teachers of millennial students to be trained in ICT competencies (Cabero-Almenara, 2020; Valbuena-Duarte, Porras & Ba- rrios, 2021), to empower themselves with these resources as part of the competencies that need to be developed in their teaching (Valbuena-Duarte, Medina & Teherán, 2021), and to reverse the evidence found of a remarkably low level of competencies in these developments, for which it is necessary that teachers in their practice make use of different ICT resources in a didactic way. Teherán, 2021) that reverses the evidence found of a remarkably low level of competencies in these developments, for which it is necessary that teachers in their practice make use of different ICT resources in a didactic and pedagogical way (Jiménez-Sánchez, 2020), in order to generate meaningful learning in students. In addition, as evidenced in the results where most of the teachers, especially in pre-service, do not have a preparation and a pedagogical use of ICT (González-Calvo et al., 2020, Valbuena-Duarte, Rodríguez & Tavera, 2021), where teachers are not sufficiently prepared in the correct use of technological resources for remote teaching, so that a basic use of these resources is found.

Thus, the results found show a similar aspect to that evidenced in studies such as those of Fernández et al. (2018); Valenzuela and Varela (2020), where teachers include very little technology as didactic tools in their teaching practice. In turn, it does not differ from that mentioned by Teliz (2015), since there is little guidance from teachers towards the generation of pedagogical work in the classroom supported with ICT, as well as the absence of effective mathematics teaching practices supported with these resources. However, teachers perceive ICT resources as great allies for teaching students of the current generations, which allows them to see these teachers with an important ingredient of motivation for training and working with resources of this nature, and with this they have managed to develop their classes in remote teaching. This can be understood as Carmona-Mesa et al. (2020) points out that "self-efficacy is a strong predictor of the actions that subjects plan to perform to achieve a specific purpose" (p. 583).

Finally, the majority of teachers have not yet fully developed their competencies.

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ICT, which differs from what is mentioned and expected in the policies of the MEN (2014), which states that, in the context of innovation in education, all teachers must have ICT skills during their teaching practice and according to what was analyzed in the research, most teachers have not yet managed to acquire these skills to be able to maintain a technological innovation that allows them to improve their educational practice.

VI. CONCLUSIONS

Differences are identified between the discourse of most of the teachers with respect to ICT and what is evidenced in their practice through the observations made both in classroom and remote teaching, teachers make a basic use of ICT resources, and it is very common to find the absence of a pedagogical and didactic purpose of ICT in their practice and in their planning.

Although some of the teachers have ICT training obtained from various courses, there is no evidence of the appropriation and didactic and pedagogical use of these resources by most of the teachers during the development of classroom classes, which suggests that improvements in teaching are still far from being achieved.

However, the evidence of the few developments in ICT competencies of teachers is clearly compensated by the great effort, commitment and persistence that these teachers have shown in the teaching processes. And they make their best efforts to use them in a pedagogical and didactic way in educational activities such as planning, practices and evaluations, which contrasts with what was found in the classroom in these same teachers where only in some aspects of self-efficacy are identified for their teaching action taking advantage of their skills and competencies in the use of these resources.

Thus, one aspect to highlight is that it is possible to conclude that remote teaching teachers have a self-efficacy regarding the use of ICT resources with positive attitudes that have allowed them to plan their teaching actions in these times of pandemic.

Finally, it is concluded that even in times of remote teaching it is very important for teachers to support their pedagogical planning instead of designing resources; however, few teachers make this use. In the same way, it is concluded that the text guides of the teachers in the sample include few ICT resources such as free computer programs, which can generate difficulties for the teacher when using them, and even in the cases in which they include various tools, it is evident that the teachers use them very little or do not use them in their practice.

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