RESEARCH ARTICLE

ICT Skills Profiles in Educational Practice to Meet the Challenge of Remote Teaching

Perfiles de competencias TIC en la práctica educativa ante el reto de la enseñanza remota

Perfis de competências em TIC na prática educacional que enfrentam o desafio do ensino à distância

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OPEN ACCESS

DOI: http://dx.doi.org/10.18634/sophiaj.17v.1i.1052

Article information

Received: October 08, 2020
Revised: February 12, 2021
Accepted: April 16, 2021
Published: May 4, 2021

Keywords: ICT, teacher competencies, professional practice, class plan, remote teaching.

Palabras clave: TIC, competencias del docente, práctica profesional, plan de clase, enseñanza remota.

Palavras-chave: TIC, competências do docente, prática profissional, plano de aula, ensino à distância.

How to cite:

Valbuena,S.; Rodriguez, D. & Tavera, A.V. (2021) ICT Skills Profiles in Educational Practice to Meet the Challenge of Remote Teaching. *Sophia* 17 (1) e1052

Sophia-Education, volume 17, number 2. January/June 2021. English version

ABSTRACT

Knowledge and skills in the use of technologies in the didactic and pedagogical sense in relation to the impacts on the teaching and learning processes have been a trend of study. This research focused its attention on describing and examining profiles and levels of appropriation of Information and Communication Technologies (ICT) in the professional practice of the mathematics teacher based on the uses that from the didactic and pedagogical are present in the microcurriculum of this discipline, the relevance of this study is due to the characteristics of the current student population and additionally because at these crucial moments in human history where the use of ICT is no longer optional because it must attend a remote teaching. This research worked with mathematics teachers from 17 elementary and middle schools in the Colombian Caribbean region collecting information through interviews, focus group, non-participant observation, documentary review, and didactic analysis. From the analysis of the results, it is evident the low use that teachers give to technologies from the pedagogical and didactic point of view in an integrated way in the microcurriculum and their professional practice, and mostly a purely instrumental use of technology in the microcurriculum is identified. From the study it is possible to conclude the little development of ICT skills in the mathematics teacher and emerging aspects that would make it possible to optimize school learning, complementary to previous ones described in the literature.

ISSN (electronic): 2346-0806 ISSN (printed): 1794-8932

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Conflict of interest:

The authors have no conflict of interests to declare.

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Resumen

Los conocimientos y competencias en el uso de las tecnologías en el sentido didáctico y pedagógico en relación con los impactos en los procesos de enseñanza y aprendizaje han sido tendencia de estudio. Esta investigación centró su atención en describir y examinar perfiles y niveles de apropiación de las Tecnologías de la Información y la Comunicación (TIC) en la práctica profesional del profesor de matemática en función de los usos que desde lo didáctico y pedagógico están presentes en el microcurrículo de este saber disciplinar, la relevancia temática se tiene por las características de la población estudiantil actual y que de manera adicional se devela en estos momentos cruciales de la historia de la humanidad donde el uso de las TIC dejó de ser optativo puesto que debe atender una enseñanza remota. Para tal fin, se recolectó información de profesores de matemáticas de 17 colegios de educación básica y media de la región caribe colombiana a través de entrevistas, grupo focal, observación no participante, revisión documental y análisis didáctico. Del análisis de los resultados se infiere el bajo uso de las tecnologías desde lo pedagógico y didáctico por parte de los profesores integradas en el microcurrículo y a su práctica profesional, evidenciando en su mayoría un uso puramente instrumental de la tecnología en el microcurrículo. Del estudio se logra concluir el poco desarrollo de las competencias TIC en el profesor de matemáticas y aspectos emergentes que posibilitarían optimizar el aprendizaje escolar, complementarios a otros previamente descritos en la literatura.

RESUMO

Conhecimento e habilidade no uso de tecnologias no sentido didático e pedagógico em relação aos impactos nos processos de ensino e aprendizagem têm sido uma tendência de estudo. Esta pesquisa centrou sua atenção em descrever e examinar perfis e níveis de apropriação das Tecnologias de Informação e Comunicação (TIC) na prática profissional do professor de matemática a partir dos usos que do didático e pedagógico estão presentes no microcurriculum. desta disciplina, a relevância deste estudo deve-se às características da população estudantil atual e, adicionalmente, porque nestes momentos cruciais da história da humanidade onde o uso das TIC já não é opcional porque deve assistir a um ensino à distância. Esta pesquisa trabalhou com professores de matemática de 17 escolas de ensino fundamental e médio da região do Caribe colombiano, coletando informações por meio de entrevistas, grupos focais, observação não participante, revisão documental e análise didática. A partir da análise dos resultados, evidencia-se a baixa utilização que os professores dão às tecnologias do ponto de vista pedagógico e didático de forma integrada no microcurricular e na sua prática profissional, sendo sobretudo identificada uma utilização puramente instrumental da tecnologia no microcurricular. A partir do estudo é possível concluir o pouco desenvolvimento de competências em TIC no professor de matemática e aspectos emergentes que possibilitariam otimizar a aprendizagem escolar, complementares às anteriores descritas na literatura.

Introduction

The transformation of society mediated by Information and Communication Technologies (ICT) demands the need to use them reflexively to promote teaching and learning and achieve quality education. Its impact has generated that they are conceived and focused as an important resource for pedagogical development within the classroom, as an important factor in teaching and learning (Valencia et al., 2016; Laitón et al., 2017; Valenzuela & Varela, 2020). The emergence of these resources requires the teacher to develop skills, abilities and knowledge to properly use technologies (Grisales, 2018; Valenzuela & Varela, 2020).

One of the elements that gains increasing importance in teacher training for the planning of their own work in the classroom is the modeling of sequences of activities to achieve set objectives and favor students' learning by including their reality with an educational intent (López & Villanueva, 2019). This state implies the challenge for the teacher to make use of ICT in their plans for students who are native in technology; however, there is evidence that the teacher does not feel confident with the use of ICT in the classroom due to their lack of skills (Ángel et al., 2016; Ángel & Patiño, 2018; Valenzuela & Varela, 2020). Also, there is still a lack of greater reflection, socialization, and participation in the academic field so that an impact of ICT is generated in the microcurriculum (Cantú & Morado, 2016; Carvajal et al., 2019).

In the field of education, the orientations have traditionally been adjusted to perspectives that imply that the teacher in practice as in training learns to manage, connect and transform their knowledge into reasonable actions within the classroom. In the same way, their ICT training should be oriented with information that enables and facilitates the use of these resources for the improvement of student learning. In general, the scientific commitment of the education sciences has implied the criticism that teachers do not use ICT in a didactic way, thus evidencing an effective lack in the management of technological resources (Caviedes, Gamboa & Badillo, 2019; Fernández, Fernández & Rodríguez, 2018).

Particularly, in this topic, Colombian education through the Ministry of Information and Communication Technologies has created different programs for basic and middle school teachers to make use of ICTs seeking to expand access and use of ICTs for quality education; as an example, there are Computers for Education (CPE) (2001), ICT Plans (2009), Vive Digital (2010), and ETIC@ (2017). The effectiveness of these programs seems not to have impacted as expected. An example of this is reported in the report of the final measurement and evaluation study of CPE (2018) that presented an appropriation in terms of ICT skills by managers and teachers and under use of digital content by teachers. Another similar case is evidenced in the impact assessment of the Vive Digital plan carried out by the National Planning Department (DNP, 2016) which identified that, there were no positive effects in terms of access to formal and non-formal education activities with the use of ICT.

The relevance of the use of technological resources from the didactic and pedagogical point of view has been revealed in events such as the one currently experienced in the world at the educational level, in which the use of technology goes from being optional to being mandatory, due to the emergence of the coronavirus (COVID-19), declared by the World Health Organization (WHO) as a pandemic. The WHO is a promoter that many countries, among those Colombia through the Ministry of Health and Social Protection (MinSalud), adopted social isolation as a preventive measure. Therefore, the Colombina Ministry of Education (MEN, 2020) postponed face-to-face classes to cover them virtually or remotely.

This specific study aims to offer significant contributions in the analysis of the state of the use of ICT in a pedagogical and didactic way in the microcurriculum and therefore in the professional practice of the mathematics teacher, particularly in relation to the objective of analyzing the profiles and levels of appropriation (Explorer, Innovator and Integrator) of ICT skills (Technological, Pedagogical, Management, Communicative and Research) that the teachers of Mathematics have from the microcurricular planning and their professional practice. All this from the review of written production and field work carried out with teachers of basic and secondary education in 17 schools of the city of Barranquilla and some municipalities of its surroundings.

ISSN (electronic): 2346-0806 ISSN (printed): 1794-8932

Conceptual Framework

Technology in the microcurriculum of the math teacher

Technology seen as "human activity, which seeks to solve problems and meet needs through the rational and creative use of resources and knowledge" (MEN, 2008: 5), places it as an essential part in curriculum planning (Álvarez & Blanquicett, 2015), understood here as the curriculum based on the MEN, of Decree 230[1] of 2002 in its article 2 of chapter I, as "the set of criteria, curricula, methodologies and processes that contribute to comprehensive training and the construction of national, regional and local cultural identity, incorporating different resources" (MEN, 2002: 1). In this order of ideas, teaching plans organize the curriculum into three levels: macrocurriculum (curricula), mesocurriculum (area plan) and microcurriculum (classroom plan) (Mayora & Gutiérrez, 2019; MEN, 2017).

At the first level is the curriculum, defined in Law 115 of 1994 or the General Education Law in its article 79 as the "structured outline of the mandatory and fundamental areas and optional areas with their respective subjects, which are part of the curriculum of educational establishments" (1994: 17). In a second level, the planning of each area that makes up the curriculum is "annual planning" (MEN, 2017: 21), that is, the execution of the objectives of this plan is organized in classroom plans through sequences of activities "planned for a limited period of time" (MEN, 2017: 23), in favor of the quality of the teaching and learning process, five moments are proposed from the MEN. These are:

> Moment of exploration: Students are motivated towards a new learning, recognizing their previous knowledge regarding the topic to be addressed and/or the activity to be carried out, the importance and need of said learning. Structuring moment: The teacher performs the conceptualization, introduction of vocabulary and new processes, making explicit teaching and modeling in relation to the learning objective. Practice-execution time: The teacher proposes learning actions that allow the use of didactic resources such as educational materials, in order to achieve learning goals. Transfer time: The teacher plans how the students will socialize and transfer what is understood during the activity in order to verify if the learning goal was achieved. Moment of appreciation: The teacher closes the learning process that he developed by generating reflections and actions that allow students to answer the questions: what was achieved? Did we achieve the learning goal? What difficulties did we have? What should we improve? (MEN, 2017: 25-26).

Seen in this way, the integration of ICT into the educational process is a key function that every teacher must develop in their work (reflected in their microcurricular planning). From the pedagogical dimension, it is understood as a task and skill to support a teaching that entails a meaningful learning (Valencia et al., 2016), in terms of the management of technological resources implies doing it in an innovative and creative way for an effective and assertive teaching.

Technology and its implementation by the teacher

Regarding the teacher, in 2014 the MEN documented the ICT skills that must be developed: The technological competence (related to selection and relevant use of technological tools); the Communicative competence (it is the ability to express, establish contact and relationships in virtual and audiovisual spaces through various resources in a synchronous and asynchronous way); the Pedagogical competence(use ICT for the teaching and learning process in order to fully train students); the Management competence *of* (use of ICT in an adequate and effective way in planning, organization, administration and evaluation in the academic field); and, finally, the Research competence (use ICT for the production of new knowledge and the transformation of knowledge).

These ICT skills are ranked in three levels of development and complexity (MEN, 2014), with the basic level being *Exploration,* in which teachers begin to introduce themselves, become familiar with and reflect on these resources in the teaching and learning process. The next level is of *Integration;* in which teachers develop the ability to use technology autonomously and creatively, with ideas that have value through deepening the educational process, and, finally, that of *Innovation,* when putting new ideas into practice, collectively builds new knowledge and innovative strategies with the use of ICT, in such a way as to allow reconfiguring their practice.

1. With Decree 230 of 2002, rules are issued on curriculum, evaluation and promotion of students and institutional evaluation. This is repealed by Article 19 Decree 1290 of 2009, in relation to regulating the evaluation of the learning and promotion of students of basic and secondary education and then is completed in the Single Regulatory Decree of Education 1075 of 2015, which is then replaced in the part of Chapter 2 and the deletion of Chapter 7 of Title 3 of Part 5 of Book 2, through Decree 1330 of 2019.

Materials and Methods

With a qualitative approach and descriptive design (Arias, 2012), the information is obtained from structured interviews with stakeholders, documentary review of mathematics microcurricula, and didactic analysis (Rico, 2013) applied to mathematics textbooks, one from a commercial publisher and another issued by the MEN (2017 edition). Non-participant observation was performed and the focus group technique was also applied, making a record in the checklist and in the field diary.

The study population are basic and middle school teachers and a sample of them is taken from an intentional non-probabilistic study (Arias, 2012) consisting of mathematics teachers linked to two institutions of different socioeconomic strata (1,2 and 3), 13 from public sector institutions and 4 of a private nature, located in various localities of the municipalities of Barranquilla (south-east, south-west, metropolitan area and central-historic north), Soledad (south-east and south-west) and Galapa (south-west). Most of the teachers have a degree in mathematics, with the exception of one who is a chemical engineer; except for three, the others report continuing education, six have ICT training through courses and diplomas, and four say they have no training in ICT.

Methodology for data analysis

The methodology is executed in four phases: 1) *Documentary exploration* , 2) *Field work*, 3) *Organization and classification of the information*, using the design of tables in Word, the information is organized and classified according to the levels of ICT competencies, dimensions, categories and indicators, and phase 4) *Analysis of the information,* carried out through a triangulation between data that involves the considerations collected and what is provided by the theoretical references. The adapted didactic analysis of Rico (2013) is also used, taking into account 4 of the 5 cycles. The analysis is carried out on three fronts:

The first part analyzes the microcurriculum of the mathematics teachers who are part of the sample in pedagogical and didactic aspects of the use of technology, the moments that make up their classroom plan and the levels of ICT skills identified in which the teacher is found.

The second front of analysis is based on indicators that account for knowledge of ICT, use in classroom planning and creation of digital content by the teacher, associating these with the levels of development of ICT skills and is identified from their developments in which generation it is possible to locate them.

Finally, the third front of analysis using Rico's Adapted Didactic Analysis (2013) in 4 cycles, *Content Analysis, Cognitive Analysis, Instructional Analysis* and *Evaluation Analysis* looking for information of support for the teacher in the development and improvement of ICT skills through bibliographic resources; represented in the textbooks used.

Results

Analysis of the microcurriculum of Mathematics

The microcurricula of the mathematics teachers who are part of the sample are analyzed from the pedagogical and didactic use that they give to technology, the moments that make up the planning of the teachers, and the levels of ICT skills in which the teacher is, it being clear that different levels of development may occur for each skill.

The environmental analysis *to the pedagogical and didactic dimensions* is adapted from Valencia et al. (2016) and from Ángel y Patiño (2018) using criteria such as interactive teaching resources, use of instruments and concertation of online evaluation criteria, use of information sources, citation and referencing standards*,* knowledge of platforms *e-learning* and Web resources and the preparation of teaching materials with ICT*.*

Thus, it is evident that 7 of the 17 teachers in the sample communicate, browse and use information sources with the use of ICT and include technological resources such as YouTube, computer programs and web pages in their professional and personal spaces and recognize the educational value that they can offer. However, when analyzing the microcurricula designed for the year 2019 and part of 2020, it is possible to divide the teachers into two groups: the first, with a considerable amount that do not include resources of this nature in their plans, and a second group made up of only three teachers who make

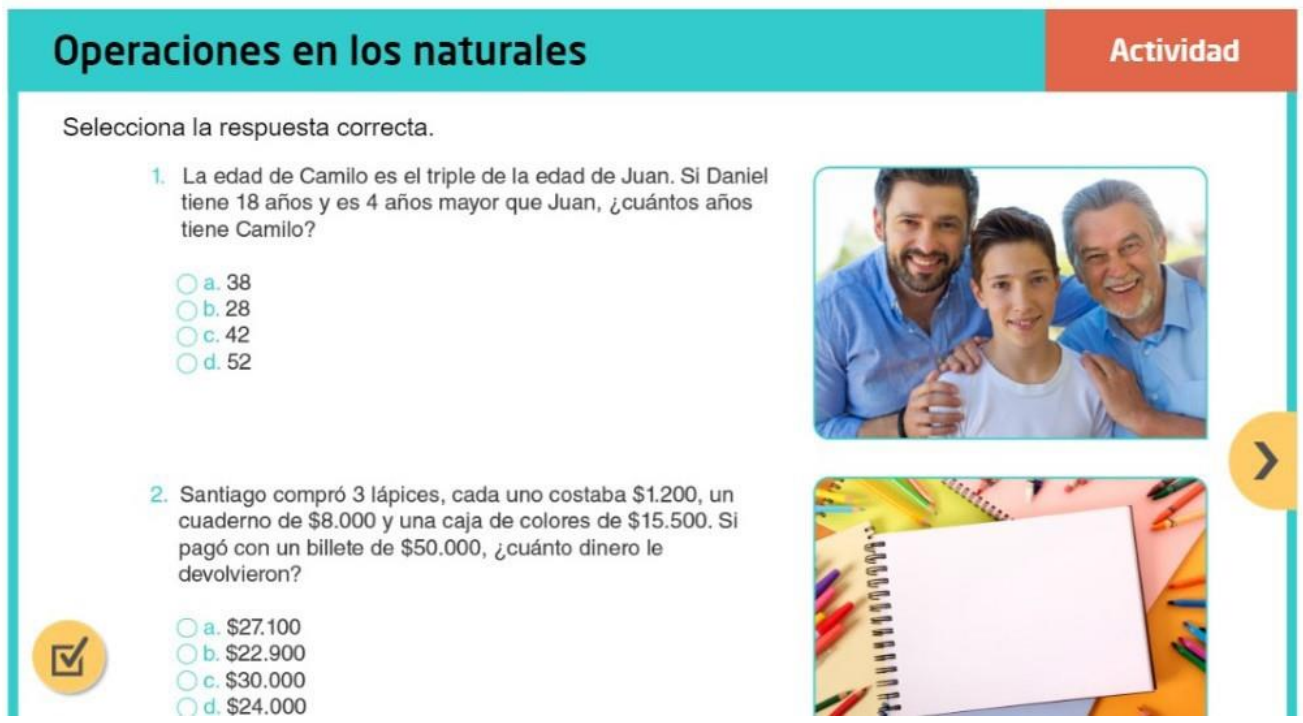
ISSN (electronic): 2346-0806 ISSN (printed): 1794-8932

some use of this type of resources and, within this group, in two of them there is no specific evidence of pedagogical and didactic intentionality of use, showing a merely instrumental use of the resource.

The previous presentation leads to identify the first group of teachers with an exploratory profile in relation to technological, pedagogical, management and communication skills, because they recognize various technological tools and some ways of integrating them, observing a preponderant use as a means of communication with their students through social networks and emails and the use of the Internet to search for information. In the second group of teachers, they are able to locate a profile with an integrative level with respect to technological and pedagogical skills since they use various ICT resources in different educational contexts and present some pedagogical strategies to enhance the student's learning. No teacher is placed in these competencies with a profile at the innovative level, since there is no evidence that they design learning environments or institutional management with the use of specialized ICT tools, and do not adapt new models and ideas from various sources. In addition, some teachers of public institutions in the south-eastern town and north-historical center do not integrate any ICT resources so it is not possible to locate them with any profile or level of appropriation in technology.

It should be noted, however, that in the classroom plans (of April and May 2020), in time after the declaration of the realization of classes from a remote access, it was found that the teachers of the private institutions in the north-historical center, south-east and south-west, include technological resources such as educational platforms, social networks, Zoom and YouTube to provide feedback and develop exercise skills in students. Only teachers in the north-central historical and southeastern locality design activities with the use of ICT resources to assess, guide and enhance learning (an example is shown in Figure 1).

Figure 1. Activity designed by the teacher and displayed on a digital platform



Source: Own observation to institution teacher in north-historical center

In the classroom plans designed for teaching remotely, it is identified only in some teachers of public institutions (north-central historical location) and in all those of private institutions that at the time of exploration they use YouTube videos to expand information on the given theme, map of ideas and virtual platforms.

And at the time of structuring, teachers of public and private institutions in the metropolitan, southeast and southwest, include videos from the YouTube platform to introduce topics and complement concepts and definitions. At the time of practice-execution, seven teachers do not carry out activities using technology as

resources, most of them include activities from the textbook to be carried out manually, with the exception of teachers of private institutions in the north-historical center, and a teacher of public institution in the southeast, who use virtual workshops with the intentionality to value what the student has learned. At the time of Transfer, only teachers from private institutions in the north-historical center relying on social networks and platforms feedback, guide and value students' learning. Finally, at the Assessment Moment, only four teachers ask questions about aspects to improve and difficulties that students had, but no teacher uses technological resources that can support a reflection of the learning process.

Analysis of questionnaires applied to mathematics teachers

From the questionnaires, field diary and checklist applied in remote teaching times to the entire sample, we have analyzed indicators that show knowledge of ICT, their use in classroom planning and creation of digital content, associating these with the levels of development of ICT skills.

In relation to the first indicator of mastery of educational technological tools in the design and delivery of classes, although it is evident that 10 of 17 teachers use various technological resources such as web pages, social networks, educational platforms and computer programs, the didactic intentionality of use is not evident, and seven teachers do not use ICT resources, which does not show a notable recognition of the epistemic and didactic value of their use. The findings in this group of professors under study are consistent with previous work with a similar population (Carvajal et al., 2019; Padilla & Conde, 2019; Palos, Gómez & Alemán, 2017; Teliz, 2015). Although teachers
have a positive perception about the use of ICT in teaching practices, non-integration into the educational process persists, and there is little didactic use of them for significant purposes in the classroom.

Regarding the ICT class planning indicator, related to level *integrator* , six teachers are identified at this level in technological competence and at the same level in management because they combine a variety of technological resources to improve the planning of their educational practices as they have access to training programs that are appropriate for development needs. Regarding pedagogical, research and communicative competences, this level was not evident in teachers since there were no leadership findings, presentations, project developments or learning strategies in the school context using ICT.

Another aspect found regarding class planning with the use of ICT is that a significant number of teachers, when integrating technology, do not make explicit the use from the didactic and pedagogical point of view and give a basic use to technology in the micro-curriculum, lacking greater reflection, understanding and participation so that ICT could have an impact on the micro-curriculum. This differs from what was projected by the MEN (2017) since what is expected is that the teacher in his/her classroom plans intentionally integrates materials (textbooks, audiovisual resources, school library books, among others), involving different learning styles of students, relying on ICT tools and didactic resources developed from the context.

Finally, in the criterion of usage or creation of specific digital media to give meaning to mathematical content, it is related to the innovative level and teachers located at this level are evidenced in relation to the technological competence in terms of the use of resources of this nature to build learning in their students. A little less than half of the sample are at this same level in the pedagogical competence since they design learning environments and evaluate them in both cases by putting into operation different ICT-mediated strategies, such as quizzes, forums and virtual workshops, through educational platforms (Class notebook, Microsoft Teams, Zoom, among others). One teacher statse that she uses resources such as television, and radio, to generate discussions and connections with students. Concerning the competencies of communication, research and management, no teacher was able to be evidenced at this level.

In general, the findings reveal that teachers frequently include ICT as a teaching resource in their teaching practices or in some cases there is an absence of this inclusion, which is a similar aspect to that found in previous studies (Ángel & Patiño, 2018; Fernández, Fernández and Rodríguez, 2018; Gutiérrez, Aristizábal, & Rincón, 2020; Teliz, 2015; Valenzuela & Varela, 2020). Additionally, as a finding to be reported, it is found with high frequency that the teacher does not explicitly state the pedagogical intentionality

ISSN (electronic): 2346-0806 ISSN (printed): 1794-8932

and didactics of the use of these resources, which seems to have meant that teachers in these times of remote teaching only use ICT mainly as a means of communication and not with all the potential that these resources have for the development of thought processes in the student. Thus, an important aspect emerges in this study is the desire of teachers of being able to generate, develop and enhance collaborative learning in the student and other actions that lead to significant learning with critical thinking development and other higher-order thinking skills using ICT.

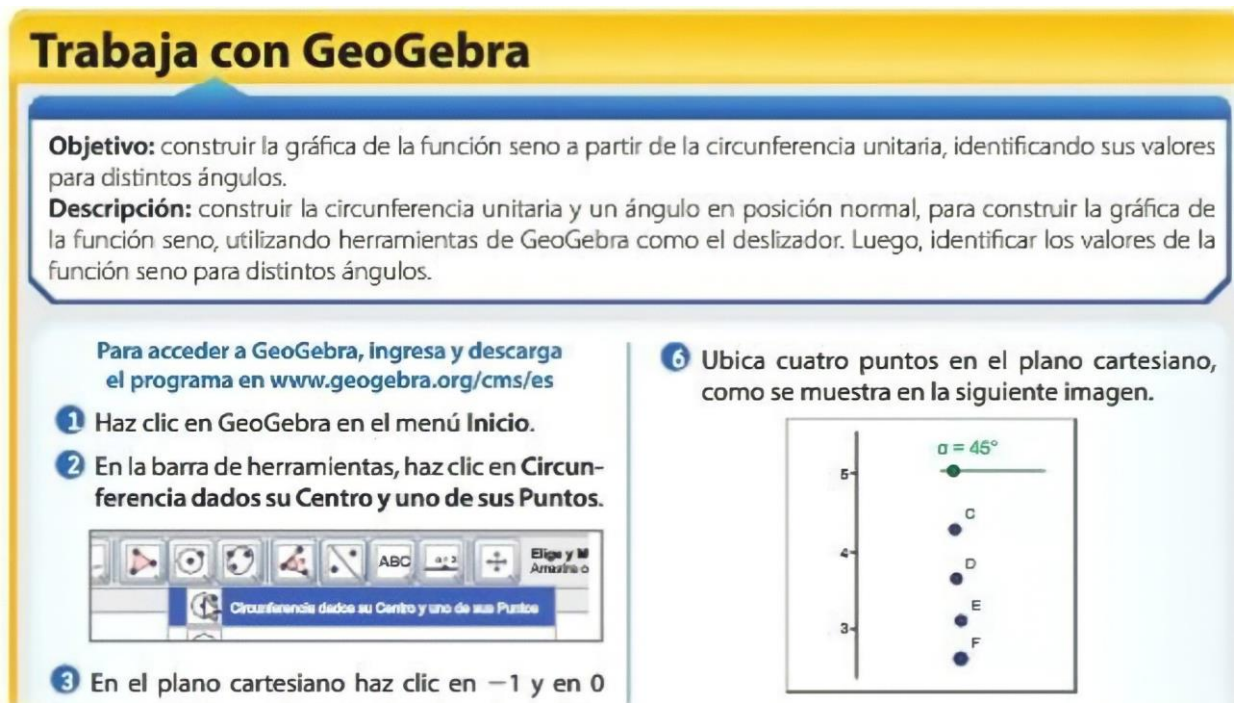
Finally, based on the findings described, it is possible to locate a large number of them in the so-called *ICT-based education* or third generation and a few in the fourth generation called *web-based education,* of the five generations raised by Yong et al. (2017). Being *interactive education* the fifth generation, in which no teacher of the sample is located. Similar aspect studied by Peláez et al. (2018) in Ecuador, Fernández, Fernández and Rodríguez (2018) in Spain, and Palos, Gómez and Alemán (2018) in Mexico which leads to consider that the teachers of the sample are immersed in the fourth generation. In 2016, Gazcón, Larregui and Castro (2016) in Argentina report teachers with a perspective on the use of books using augmented reality and 3D reconstruction to introduce spatial and geometric concepts, thus placing them in generation five. This aspect was not found in the sample under study and that would place the teacher at an innovative level of competence.

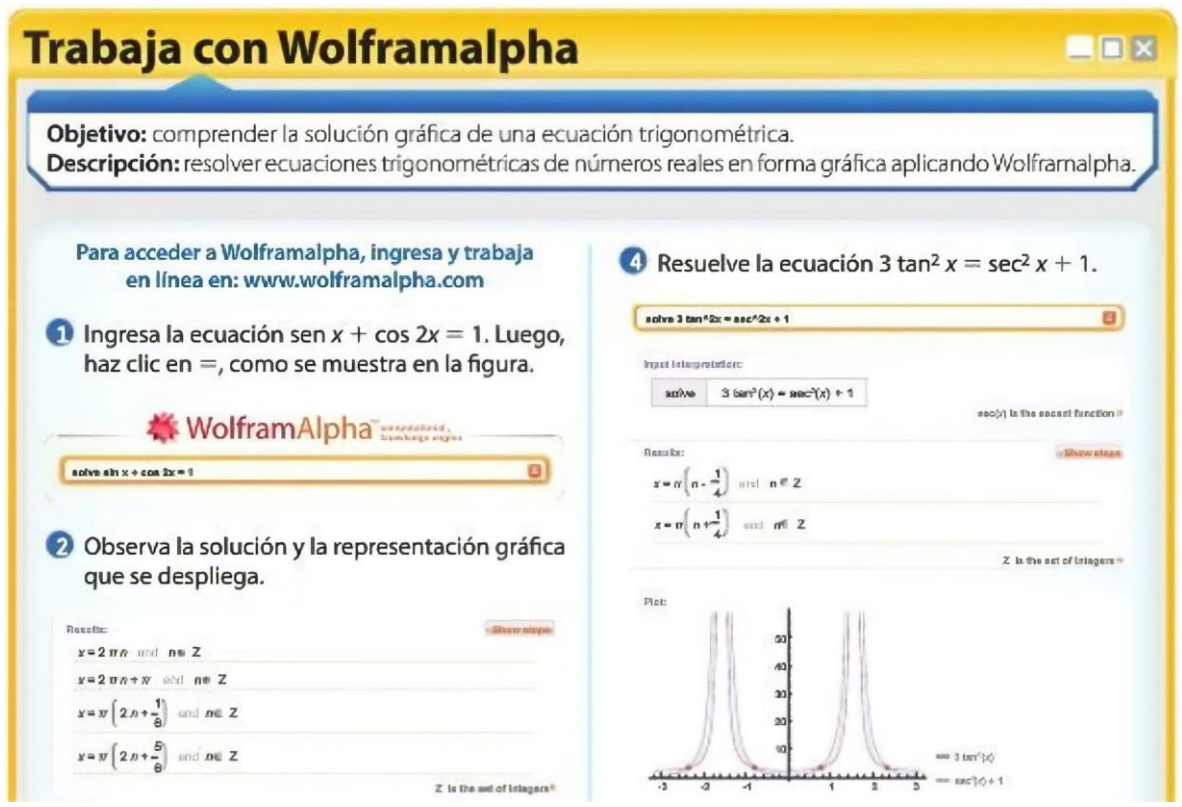
Didactic analysis

With the objective of analyzing the support in bibliographic resources that teachers have in terms of their development and improvement of ICT competencies, didactic analysis is performed in four cycles adapted from Rico (2013)*content analysis, cognitive analysis, instructional analysis and evaluation analysis* to two mathematics texts used by teachers in the institutions under study: *Caminos del saber 10* from Santillana editorial, 2013 edition (text 1) and *Matemáticas 10* from the National Government of Colombia, 2017 edition (text 2).

In *content analysis*, regarding the structural and representational, text 1 uses multimedia formats to present definitions and concepts and only at the end of two units presents a short section where specialized computer programs are integrated (*Microsoft Mathematics, Wolframalpha, Graph, GeoGebra and Excel*) where only one is free use (*GeoGebra*). Figure 2 exemplifies this. In each activity the book presents indications, objectives of uses and activities. Text 2 presents a content titled *MatemaTICS* in three units, using GeoGebra to build graphics, without specifying objectives and didactic intentionality of use.

Figure 2. Embedded computer programs in text 1



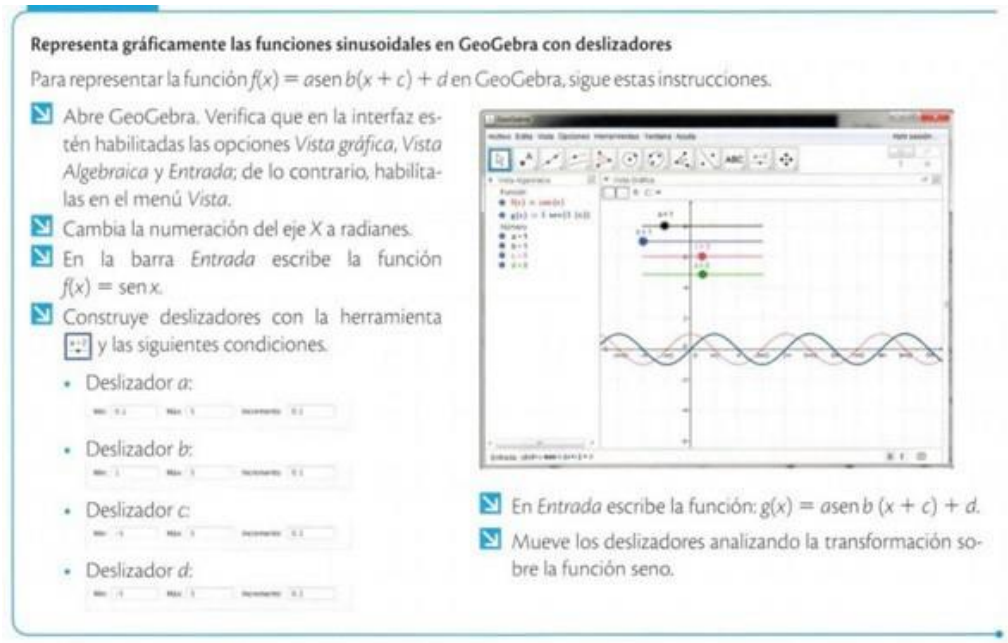


Source: Text 1 Activity Image

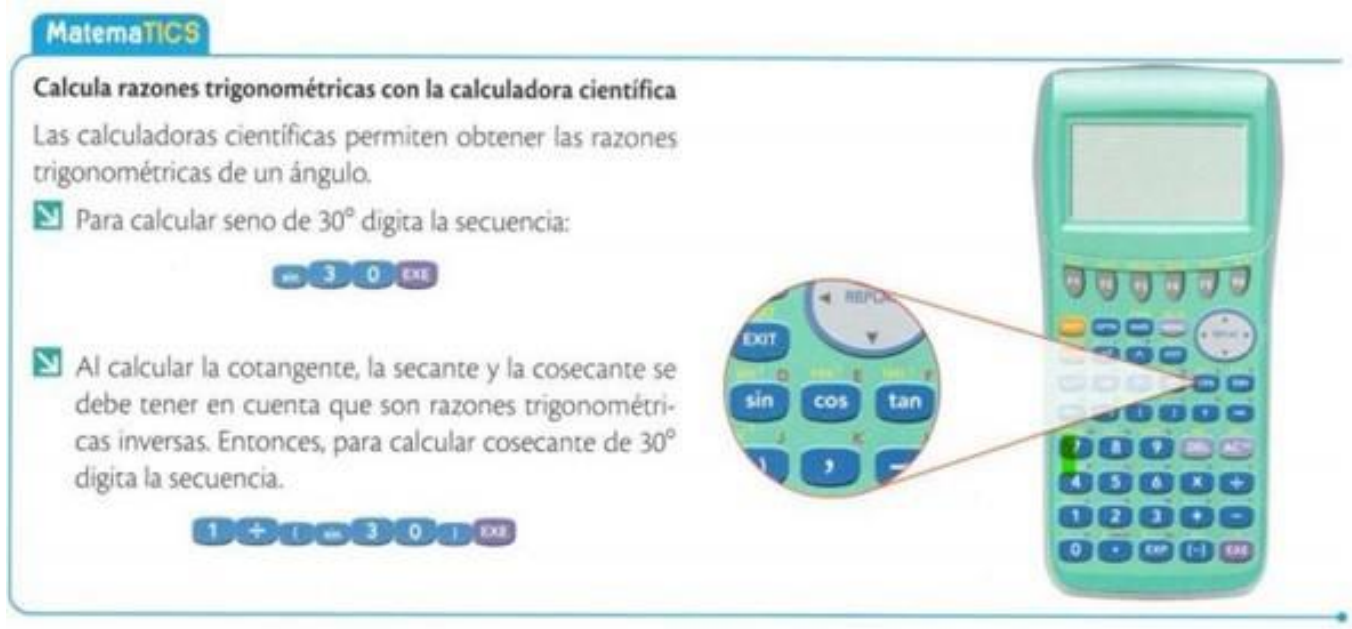
From a *cognitive analysis*, regarding *cognitive demands and expectations on learning* the two books integrate technological resources for some activities to strengthen skills *interpret, argue, propose, army and solve problem,* do not evidence integration of ICT resources to deal with possible *learning difficulties*.

Regarding the i*nstructional analysis,* the *materials and resources* are highlighted. The text makes use of several computer programs to solve and consolidate activities, while text 2 it uses a computer program (GeoGebra) and the scientific calculator (Figure 3).

Figure 3. Embedded computer programs in text 2



ISSN (electronic): 2346-0806 ISSN (printed): 1794-8932



Source: Text 2 Activity Image

Finally, in the evaluation analysis the constant identified in both texts are activities without the use of ICT.

Conclusions

The remarkable divergence between the discourse of most teachers and that observed in their professional practice is striking, noting that they recognize the relevance of ICT resources, their importance and possibilities that they offer to education. However, the lack of use in classroom planning prepared before the periods of beginning of remote classes is marked, being very few cases where their use is found. The frequent situtaion is basing the development of their pedagogical acts on the texts and physical guides and master classes without the use of ICT resources. The results obtained are consistent with previous empirical evidence, which highlights the notable trend for the non-use of ICT in educational processes (Valencia et al., 2016; Laitón et al., 2017; Valenzuela & Varela, 2020). Among those who do use them, the use of low complexity procedures is common, mainly of an instrumental nature, this finding is repetitive in microcurricula in remote teaching time. It is clear that the use of these resources requires developing skills, possessing skills and knowledge to properly use the technologies (Grisales, 2018; Valenzuela & Varela, 2020), so most of the microcurricula studied designed by the teachers in the sample have a use from the pedagogical and didactic aspects of the ICT at the exploratory level in the skills studied.

Thus, it is concluded that there is a lack of reflection on the part of teachers so that ICT can impact the micro-curriculum and their professional pedagogical practice, in addition to the need to develop ICT competencies in teachers and these, in turn, in their students in terms of the disciplinary knowledge studied. By working on the development of these ICT skills and integrating them into educational processes in a way that supports the entire process from the pedagogical and didactic point of view, teachers would advance in their ICT appropriation processes, in their development and in the improvement of these competencies. Thus, in any occasion such as the use of remote teaching for face-to-face education, classroom planning would be designed with resources in such a way that with appropriate use of technology student learning is enhanced as suggested by some previous results (Ángel & Patiño, 2018; Sullivan et al., 2020; Trouche et al., 2020) and not trying to force and replicate the processes of a "face-to-face" in remote teaching.

In turn, the findings of this study present a diversity of elements that highlight the importance of ICT and the implementation of different strategies using these resources for teaching and mathematics learning, allowing to foster collaborative learning, and innovate in the classroom, generating changes in their practice,

which has shown coincidences with previous work (Carvajal et all., 2019). Similarly, the emerging aspects in this study are complementary to the previously described in the literature, highlighting the possibility of optimizing school learning, developing critical thinking in students, developments in research in mathematical education in relation to technology as a real and effective mediator of the educational process, not as an eventuality but as a usual and daily practice that develops thought and skills in the teacher and this in turn in his students and in a broad analysis panorama, another emerging aspect is the use of ICT from the disciplinary point of view.

The two textbooks analyzed make little use of ICT resources and for when they are used, it falls mostly on specialized computer programs, which can become support for the teacher for the development of skills of this nature. However, these programs are used with a marked emphasis on streamlining calculations on the development of learning processes and since only one of the four computer programs used in the commercial editorial text is free to use substantially weakens the strength of these resources to develop educational processes. This perspective brings out another aspect related to the imperative need to raise the ICT teacher's skills beyond a purely instrumental use in order to locate them in developments at an innovative level.

In summary, it is desirable that the teacher has adequate use of the specific knowledge of ICT from its didactic and pedagogical use, which promotes effective professional performance (Llinares, 2012; Pochulu, Font, and Rodriguez, 2016) and that all material resources contribute to promote and strengthen ICT skills.

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