Comunicar

New challenges for teachers in the context of digital learning

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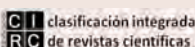
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Comunicar, 70, XXX (2022-1)

New challenges for teachers in the context of digital learning

Nuevos retos del profesorado ante la enseñanza digital

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Contents are peer reviewed, in accordance with publication standards established in the APA 7 (American Psychological Association) manual. Compliance with these requirements facilitates indexation in the main databases of international journals in this field, which increases the dissemination of published papers and therefore raises the profile of the authors and their centres.

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Each issue of the journal comes in a print (ISSN:134-3478) and electronic format (www.comunicarjournal.com) (e-ISSN: 1988-3293), identifying each submission with a DOI (Digital Object Identifier System).

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MEDIA EDUCATION RESEARCH JOURNAL

XXX, 70

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Comunicar 70

Special issue

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in the context of digital learning

8

Teachers' perspectives for a critical agenda in media education post COVID-19. A comparative study in Latin America

Perspectivas docentes para una agenda crítica en educación mediática post COVID-19. Estudio comparativo en Latinoamérica

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ABSTRACT

The COVID-19 pandemic in Latin America forced a transition from a face-to-face educational model to a distance model affected by emergencies, technological precariousness, and lack of planning. This has heightened the need for media literacy in the region. In this context, the changes that have occurred were analyzed in order to propose a critical agenda from the perspective of teachers. First, a desk research of official sources was carried out to learn about the strategies of the four countries under study: Argentina, Ecuador, Chile, and Peru. Secondly, eight focus groups were conducted with primary school teachers from public and private institutions to learn about their perception of their own and their students' media competencies, the impact of the pandemic on their practices and needs, and the emerging challenges in this crisis. The results shed light on the need for relevant ICT training from a media literacy perspective, and strategies to address connectivity gaps, lack of adequate environments and work overload. The specific results per country and the differences and demands of each context are discussed in this work as contributions to the development of a critical agenda in media education.

RESUMEN

La pandemia causada por la COVID-19 en América Latina obligó a transitar de un modelo educativo presencial a uno a distancia atravesado por la emergencia, las precariedades tecnológicas y la falta de planificación. Esto ha agudizado las necesidades de educación mediática en la región. En ese contexto, se analizó los cambios ocurridos para proponer una agenda crítica desde la perspectiva de los docentes. En primer lugar, se realizó una revisión documental de fuentes oficiales para conocer las estrategias de los cuatro países de estudio: Argentina, Ecuador, Chile y Perú. En segundo lugar, se llevaron a cabo ocho grupos focales con docentes de primaria de instituciones públicas y privadas para conocer su percepción sobre sus competencias mediáticas y las de sus estudiantes, el impacto de la pandemia en sus prácticas y necesidades, y los retos emergentes en esta crisis. Los resultados apuntan a la necesidad de capacitaciones pertinentes en el manejo de las TIC, así como estrategias que atiendan las brechas de conectividad, la falta de ambientes adecuados y la sobrecarga laboral. Los resultados específicos por país, las diferencias y demandas propias de cada contexto, se discuten en este trabajo como aportes al desarrollo de una agenda crítica en educación mediática.

1. Introduction and state of the art

Since the creation of UNESCO's "Media and information literacy curriculum for teachers" (Wilson et al., 2011) until its recent update, initiatives are being promoted around the world to influence teacher training that responds to the needs of mediatized citizens (Renés-Arellano et al., 2021). On the one hand, the digital transformation has generated new challenges related to managing personal data, the algorithmization of information systems, the need to build coherent online identities and combat disinformation and fake news (Unesco, 2021). On the other hand, the impact of COVID-19 in regions such as Latin America has exacerbated structural gaps. These include socioeconomic inequalities that determine high levels of school segregation and asymmetries in access to the media: 90% of households in the rural sector have no access to the Internet and the age group with the least connectivity are children from 5 to 12 years old. Moreover, low connection speeds limit or prevent remote education (Comisión Económica para América Latina y el Caribe, 2020). The gaps between rural and urban schools as well as public and private schools have also been exposed, adding to others such as gender (Mateus & Andrada, 2021).

In this pandemic context, there is an urgent need to study the scope and impact of distance learning strategies deployed by states, especially in less economically developed countries. At the same time, it is pertinent to reveal the voice of school teachers, still invisible in the literature (Perdomo, 2021), in order to contribute to building a critical agenda for media education. This agenda starts with recognizing the existing conditions in the region, proposing an alternative frame of reference to the hegemonic frameworks of developed countries, which are often not applicable due to the omission of disadvantaged structural and cultural contexts (Carlsson, 2020; Pettersson, 2018).

Media education refers to the set of critical and creative abilities to interact with the media that are developed within the formal system based on a series of conditions, such as the existence of a pluralistic media system, access and connectivity within citizens' reach, curricular policies and standards that encourage it as well as teacher training plans (Mateus et al., 2019). The approach to media education in Latin America, known as educommunication, includes at least two unique features. First, it is conceived from the theory of dependency and the pedagogical developments of Paulo Freire (2005) with respect to liberating the oppressed, the critical perspective, and the importance of dialogue as a methodology (Bermejo-Berros, 2021). This indicates that its development transcends the communication field and is built from culture and politics. Second, it is incubated in a context of inequalities and material insecurity in terms of access to the media.

With the inclusion of computer science in schools, known as the "technological leap" (Fuenzalida, 2005), the concern for sound and audiovisual media was replaced in many countries by massive purchases of digital devices and the creation of ICT courses, without this implying the development of teacher training policies that respond to the educommunicative tradition. Thus, the inclusion of digital competence, present in all study plans in the region, suffers from an excessively prescriptive tone linked to the concrete and instrumental use of education technology (Mateus et al., 2019). Along these lines, most of the reference frameworks that introduce ICTs in the teaching experience are "performative models of evaluation, control, and training in basic technical skills" (Castañeda et al., 2018: 14), which neither construct transmedia practices nor content generated by increasingly everyday users in the life experiences of children and adolescents with Internet access (Scolari et al., 2020).

This work subscribes to the idea that media education "cannot become a means to creating consumers and users of technology, nor can it depend in any way on the commercial interests of the dominant companies at all times" (Gutiérrez-Martín & Tyner, 2012: 32). It instead requires acknowledging the inherent complexity of contemporary digital capitalism (Buckingham, 2019). In addition, it proposes to "continue advancing in redefining and adapting the concept of media education to the current scenario" (Rodríguez-Vázquez et al., 2020: 52), beginning with the emerging changes caused by the global COVID-19 pandemic that have placed the education system in a situation of singular dependence on the media, and has made the historical tension between school and techno-media culture even more notable (Novomisky, 2020).

2. Materials and methods

2.1. Objectives

The objectives of the study were, first, to analyze the strategies deployed in Argentina, Chile, Ecuador, and Peru to respond to the educational context caused by the COVID-19 pandemic. Second, to explore the perception of teachers from the four countries on the challenges and opportunities of media education in this context, with the aim of thinking about a critical agenda that contributes to its development.

2.2. Procedure and sample

The research was conducted in four countries: Argentina, Chile, Ecuador, and Peru. The qualitative approach was selected because the purpose of the study was to delve into the views, interpretations, and meanings given by teachers to the topics of study (Hernández-Sampieri & Mendoza, 2018).

Initially, the work focused on searching for official documents that contained the government strategies implemented to carry out remote education in the context of COVID-19. Thus, reports disseminated on the institutional websites of the ministries of education of the four countries were reviewed as well as institutional news published in the media. The search spanned posts from March 2020 to May 2021.

Second, two focus groups were held in each country (eight in total), made up of teachers from private and public schools in urban areas. Convenience sampling was used according to the research needs. The participants were recruited through different channels. For example, by upholding institutional agreements or having participated in previous research projects. The participating teachers were mostly women (70%), and all taught different subjects to students between 9 and 11 years old, and in grades 4, 5, and 6 of basic education (primary). All of them previously expressed their consent to be part of the study. The focus group method is helpful to question several individuals in a systematic and simultaneous way based on a topic guide that, in this case, helped obtain data on lived experiences, perceptions, and descriptions in the remote education environment (Babbie, 2010). The focus groups were held on Zoom and comprised between seven and nine participants each, a sufficient number in function of the topic discussed (Creswell, 2005).

The number of focus groups was defined by comparing the results and confirming that the information obtained would no longer be new if more similar studies were conducted. According to Buss et al. (2013), the synergy of the group prompts a dynamic and unique process that allows each focus group to be understood as a context, which is why it was considered relevant and sufficient to obtain different information from one group in private schools and another group, including public schools of the urban areas, mentioned above.

The focus group guide (Table 1: https://doi.org/10.6084/m9.figshare.15070317) was developed from the literature review and was validated in a pilot focus group that served to organize the issues to be addressed and clarify some questions whose concepts were not clear. The questions were organized around three themes: digital culture and media literacy training; student media competencies; and challenges and opportunities detected in teaching practice to construct a critical agenda.

3. Analysis and results

3.1. Responses to COVID-19

In the four countries analyzed, in-person classes were suspended between March 12, 2020 and March 16, 2020, and strategies were generated such that students could continue with remote classes (Table 2). Thus, in Peru, the "Aprendo en Casa" [Learning at Home] strategy was implemented. It offers content for radio, television, and the Internet linked to the curriculum as well as socio-emotional and civic culture issues. In 2021, the authorities corrected some flaws that were detected in its initial implementation, such as the design of materials for students with specific environments and needs (special or intercultural) (Ministerio de Educación del Perú, nd). For its part, in Ecuador, the "Aprendemos Juntos en Casa" [We Learn Together at Home] plan was established. It has guidelines for the prioritized curriculum and content for different regions of the country and education levels. The "Aprender en la Tele" [Learn on TV] educational program was also designed. This is available on television and rural community radiostations (Ministerio de Educación del Ecuador, nd). In Argentina, the "Seguimos Educando" [We Continue to

Educate] program was created. It organizes the contents of TV, radio, a series of printed booklets, and digital materials (Ministerio de Educación de Argentina, nd). Finally, in Chile, the "Aprendo en Línea" [Learning Online] program was established with multimedia sections for students, teachers, and parents (Ministerio de Educación de Chile, nd). In addition, the Chile Educa educational TV channel was created. In short, the strategies aimed at emergency remote education in the four countries were based not only on websites that offered multimedia content but also included "traditional" media, necessary because of the connectivity gaps described above.

These plans were implemented along with specific deliveries of technological devices to students and teachers. In Ecuador, tablets were given to students within the public education system, and private companies donated laptops, phones, chips, among other devices, to the neediest students (Ministerio de Educación del Ecuador, 2020). Meanwhile, in Peru, tablets were delivered to students and teachers in targeted rural and urban areas, and some telecommunications companies developed initiatives to free up access to official content for users in hard-to-reach locations (RPP, 2021). In Argentina, a plan that included connectivity, equipment, teacher training and education, and a free federal educational navigation platform was implemented. Within this plan, laptops were delivered to students (Educ.ar, 2021). Similarly, in Chile, notebooks with free internet were given to 7th grade students (12 years old) in vulnerable situations (CNN Chile, 2020). In addition, students from the most vulnerable middle technical schools (16 years old) received free internet from the private sector (Ministerio de Educación de Chile, 2020a).

Table 2. Strategies of the ministries of education to manage the pandemic		
Country	Remote education strategies	ICT purchasing and distribution strategies
Argentina	Seguimos Educando [We continue educating] Juana Manso Federal Plan	100,000 notebooks (2020) and 633,000 notebooks (2021) for high school students.
Chile	Aprendo en Línea [I learn online] Educa Chile (TV channel)	122,000 notebooks with internet access for 7th grade and 16,000 tablets with internet access for high school technical-professional students.
Ecuador	Aprendemos Juntos en Casa [We learn together at home]	6,745 tablets donated by private companies. 100,000 tablets delivered by the Government.
Peru	Aprendo en Casa [I learn at home]	1,056,430 tablets for students and teachers in targeted rural and urban areas.

The previous training that teachers had received determined the implementation of media education initiatives during the emergency. In Peru, the Ombudsman's Office (2020) warned about the gap in preparing for the pedagogical use of ICTs, especially in rural sectors. In Chile, the 2009 curriculum adjustment left media education in a secondary tier and included technology as a subject in secondary education (Andrada et al., 2019). In Argentina, based on the "Conectar Igualdad" [Connect Equality] program, curriculum additions were deployed until 2016. Later, because of the economic crisis, focus was placed on reforms, such as the Priority Learning Nuclei of Digital Education, Programming and Robotics in 2018. Ecuador seems to be an exception: a study by Rivera et al. (2016) recognized that teachers had medium-level media competence, and students mostly consider their teachers to have the skills to design virtual teaching in the context of the pandemic (Tejedor et al., 2020).

In this context, the curriculum prioritization in the pandemic was limited to the use of technology to learn and know. In Ecuador, the curriculum prioritized during the emergency indicates the importance of developing digital competencies while recognizing asymmetries in access. In Peru, the Ministry of Education encouraged teachers to select relevant digital tools for the development of students' competencies and that these be included in the planning and formative evaluation processes. This required teachers of all subjects to evaluate their students' abilities and their performance in virtual environments. In Chile, curriculum prioritization was optional and flexible at educational establishments for two-years (2020–2021). This defines the "essential" knowledge that must be addressed and has three main criteria: balance between the objectives of the curriculum's focal points or training lines; coherence of learning and response to a progression in the cycle that facilitates learning; and essentiality to continue teaching the following year (Ministerio de Educación de Chile, 2020b). In Argentina, the reforms guide the curriculum to prioritize and reorganize knowledge; diversify teaching strategies and learning goals; review complementary times and resources as well as didactic proposals for intensifying teaching that combine

work at school and at home within the framework of the established calendars (Consejo Federal de Educación, 2020a).

On the other hand, one of the most serious consequences of the pandemic in the region has been school dropout, which has shown that not everyone has had equal opportunities to adapt to the virtual setting. In Ecuador, 3% of the total student population is at risk of dropping out of school, while 90,000 children and young people dropped out of school because of lack of technological tools (Teleamazonas, 2021) and 200,000 students went from private to public education (Ecuavisa, 2021). In Peru, the number of school dropouts reached 370,000 students (El Comercio, 2021). Thousands of private education centers closed, more than half a million students transferred from private to public institutions, and school enrollment decreased by at least 15% (Cueto et al., 2020). The consequences in Argentina are similar: it is estimated that one million students dropped out of the education system (Consejo Federal de Educación, 2020b), while in Chile, school dropouts reached 6% of the school population (Ministerio de Educación de Chile, 2021).

Given this, governments have sought to curb this problem. In Ecuador, pilot back-to-school programs were authorized, but circumstances forced the strategy to be reversed (Servicio Nacional de Gestión de Riesgos y Emergencias, 2021). In Peru, a regulation was released at the beginning of 2021 for the gradual, flexible, voluntary, and safe return to in-person classes, which is still in the process of implementation. In Argentina, the Ministry created a program for students who left the system, which reached more than 361,000 students (Consejo Federal de Educación, 2020b). In Chile, school directors used a contact management tool that made it possible to connect six out of 10 children who had dropped out of school between August and December 2020. In addition, the Early Warning System reports students at risk of school exclusion to implement targeted retention strategies (Ministerio de Educación de Chile, 2021).

3.2. Digital culture and teacher training

As results of the focus groups, the notions of digital culture, competencies, and media education coincided in the voices of teachers from the four countries, related to the emphasis on the use of technologies more as tools than as cultural mediators. In general, according to teachers, the definition of digital culture depends on technological access. In Argentina, Ecuador, and Peru, a marked difference was observed between public and private school teachers, since private school students have the most devices and "develop a greater digital culture." In Chile, they mentioned that there is "digital illiteracy among students" and, as in Peru, they recognized that the media was an emergency solution in the midst of the health crisis for the purposes of "communicating and integrating." Teachers from private institutions in Ecuador and Chile highlighted a paradigm shift: abandoning linear teaching and broadening their gaze toward other media. The concept of digital citizenship barely came up in the focus groups.

As for teacher training in media analysis, use, and production, in all four countries, governments and public institutions (and in many cases education institutions themselves) implemented training programs for teachers, mainly as part of projects subscribed with companies that provide them with technological services (Google, Microsoft, etc.). The teachers stated that the training received has not been sufficient or that they find it basic, which has forced them to learn on their own. It is also clear that ICT training is not homogeneous, and that training does not distinguish between the different levels of prior knowledge. In Argentina, teachers stated that training should be extended to students' families so that they can help children. The training received by the teachers was linked to virtual classroom management (Classroom, Moodle), video call platforms (Zoom, Meet, or Teams) or recreational tools (Kahoot, Quizizz), in addition to the use of programs to make digital presentations (PowerPoint, Prezi), among others. Some teachers received specific training in other tools, but only Ecuador reported the production of videos, comics, and memes as class activities, especially in private institutions where access to devices and the internet enable students to create such resources.

Another emerging issue was fake news. In Chile, teachers pointed to the importance of researching sources. Private centers mentioned specific criteria, such as verifying the spelling of texts, the presence of a logo, or the ease of recognizing authorship. Teachers in the four countries acknowledged deficiencies in their ability to identify and teach how to differentiate fake news in digital media. In Chile and Ecuador,

teachers noted their interest in approaching multimedia with the didactics of the message through images and video rather than the discourse in printed books. In Ecuador, they also mentioned their interest in using tools for online assessments, training on safe searches and information to be more efficient when performing them. Meanwhile, in Argentina and Peru, teachers demanded more specific and relevant training, since training is usually common for all levels and curricular areas.

The barriers that were identified in the four countries were a lack of access to electronic devices (because of their high costs) and a good internet connection, especially in public institutions. In Chile, they also mentioned being tired after working "so many hours" in front of a computer. In Argentina, some teachers think it is wrong to transfer in-person classes to remote learning without a more rigorous adaptation process. All the participants in the focus groups pointed to the increase in workload and the privacy risks as well as the difficulty of educational integration for students with different capacities.

3.3. Students' media competencies

At the curriculum level, the four countries were undergoing a digital transition before the pandemic, with new media or technological competencies in the curricula, especially with a transversal approach that removed the classic computer science subjects. In Ecuador, a teacher pointed out that the constant readjustment of the curriculum, which "has changed 5 times in 10 years," represented a barrier to developing students' media competencies. However, the curriculum mainstreaming allowed teachers of subjects such as History and Geography to contrast sources, develop arguments, and encourage students to communicate them; although, as in Chile and Peru, "they seek information, but there is no reflection on the media." In Peru, the curriculum started in 2017 contains insufficient guidelines that teachers consider continue to be associated with the subject of computing.

As with teachers, access gaps determine their students' media practices. There was agreement that poor connectivity is a determining factor in evaluating media capabilities. Some teachers in Peruvian schools, for example, pointed out that parents with fewer resources view ICTs as "excessive spending." These asymmetries have led teachers, especially in public schools, to work in an unbalanced way according to each student's technological possibilities, often supported only by printed materials without access to virtual classes. Those who can connect do so for a few minutes and with significant limitations. Chilean teachers added that it is difficult to work with younger students who do not have an adult to support them at home. This is compounded by the low cultural capital of some families because of the lack of stimulation children receive as part of their education. In Chile and Peru, private schools are considered "privileged" compared to public schools, and the differences in comfort to study in more suitable environments stand out. In addition, Chilean teachers reported differences in emotional intelligence among their students in the pandemic and stated that some families prefer that children go to work during the health and economic emergency rather than attend school.

Some students with more favorable technological access, especially in private schools, have demonstrated competencies related to the production and dissemination of content when preparing audiovisual resources. In Ecuador, teachers indicated that the use of media contributes to the development of oral expression. At institutions with greater resources, frequent skills involved producing videos and sharing them on platforms such as YouTube, creating memes, stickers, and comics with the help of applications that they taught themselves to use. Argentine public school teachers spoke about the opportunities offered by TikTok, although their Peruvian peers expressed concern about the risks that social networks entail. In the focus groups in Argentina and Peru, the narrative of the "digital native who learns quickly" was repeated. Meanwhile, in the Chilean focus group, the use of Instagram was discussed, but reference was made to knowledge without depth and only functional to entertainment.

Finally, the teachers recognized their students' ability to adapt to the virtual environment, particularly in Argentina, where collaborative and autonomous work stood out. Their Peruvian counterparts agreed in recognizing the development of a "language of their own" and a "sense of inquiry" in the virtual scheme, which they are not taking advantage of. This is nuanced by statements from Chilean teachers when they state that some students find it more difficult to perform on digital platforms because they have attention deficits, are shy, or more withdrawn. While they acknowledge the skills to produce content, Chilean and

Peruvian teachers pointed to the lack of basic skills such as "writing an email" as well as the absence of critical skills, as their students "cannot see beyond the device."

3.4. Constructing a critical agenda

Teachers propose a critical agenda in media education that starts with the priority of overcoming the material deficiencies present in each territory. Then, they propose training in critical skills to understand the media from its social role of informing as well as taking advantage of the opportunities they offer, considering the skills that are easily developed in trendy social networks but in a limited way in tasks that are different from these.

In Ecuador, some teachers stated that more thorough media training for students should be included, which goes beyond managing programs. Like their peers in other countries, they said that children "quickly grasp" how to operate platforms and applications, facilitating further learning as long as access, connectivity, and teacher training are favorable. Their view of the media and social networks is not positive; they associate the media with information, but with this information comes a lot of stress, bad news, and a negative and pessimistic approach to life. In Peru, teachers link traditional media to a dual role: entertaining and informing. They find that they are still far from having an educational role, even though they have a constitutional obligation to do so. Regarding digital media, they are concerned about information overload and the emotional impacts on their students: tiredness, weariness, fatigue, and information overload. Additionally, for rural schoolteachers, frustration due to poor connectivity and the fact that their students cannot take advantage of their right to education due to a lack of means to do so was mentioned. In Argentina, many of the comments that build the critical agenda arose from the shortcomings and deficiencies seen in the previous points: digital culture and student competencies. Here, teachers recognized three central aspects to be strengthened: the need to guarantee access to technological devices and connectivity, the essential nature of offering training, and the urgent need to invest in infrastructure, resources, and salaries.

Figure 1. Focal points of analysis and emerging concepts
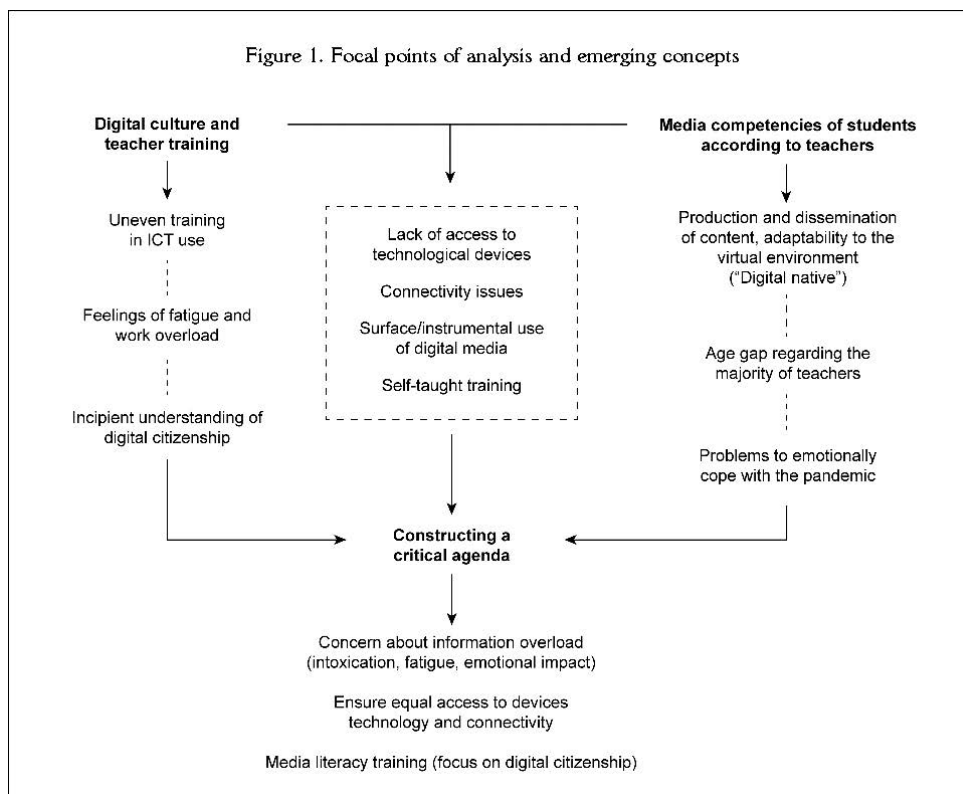
Regarding access to technology, teachers in state schools highlighted the role of some public policies, such as the "Conectar Igualdad" plan, which provided teachers and students with laptops and which was dismantled in 2016. They agreed on the need to establish support programs so that teachers and families can acquire the devices as well as guarantee universal internet access plans. As for curriculum content, they considered it important that computer and technology subjects be instituted at all levels and that they not be centered on instrumental use. They also pointed to the lack of specific topics such as the responsible use of networks.

In Chile, the view of the media is that its function is to inform but since the social outcry in 2019, they have been questioned because there is a perception that the media causes misinformation and confusion. In public schools, after the outcry, new media appeared on the internet that show what is not shown on television, thus, breaking the information bubble and showing that the role of the media should be to control power. Regarding education with media, such as remote education, the human side is lost because feelings are ignored and personal contact cannot be replaced, although more places can be reached. In private schools, it is emphasized that the media are in debt: the reporting method is traditional, and it does not take responsibility for the changes produced by the pandemic. In conclusion, the teachers interviewed highlight the need for internet connection, the essential use of devices to be able to offer pedagogical continuity in a pandemic, and the urgency of media education from a citizenship approach (Figure 1).

4. Discussion and conclusions

The responses to the health crisis in the four countries studied sought to safeguard the right to education with remote education strategies. They implemented multimedia channels based on web platforms and, to a lesser extent, provided certain vulnerable sectors with technology and connectivity. However, a relevant group has been excluded from school and another has impoverished the quality of their learning because of the lack of the minimum elements to study, especially in the public sector, where the majority of the population is concentrated. This coincides with results from other studies carried out in the region (Mateus & Andrada, 2021).

The study carried out revealed common characteristics in the four education systems. First, the technological deficiency, which is not only limited to the shortage of devices or lack of connectivity but also to the connection speed; second, the lack of teacher training that transcends the instruments of the environment; and third, students with greater access to ICTs more easily incorporate knowledge through platforms, programs, and applications. This should not limit the need for a media education that enables them to develop a critical view that in turn allows them to build appropriation capacities.

The development of media competences in school students improves with the training they receive in the area (Rey et al., 2017) and "necessarily goes through the training of teachers in this area" (Aguaded et al., 2021: 14). Generational gaps have resulted in much of this training being self-taught or more focused on experimentation as a personal initiative of teachers (Aguaded-Gómez et al., 2015). The teachers participating in the focus groups relate their media skills and those of their students with their material circumstances. To that extent, they feel removed from the concepts of media education or digital culture that many frames of reference in academic literature use. Specifically, they consider both, that the basis of their media training should rely on policies that guarantee equitable access, and that dialogue with a critical perspective that promotes democratic participation of citizens is required, in line with the educommunicative tradition (Bermejo-Berros, 2021). They also demand delving into the care and well-being of students as well as the training of criteria to search for and manage information, through support and parental mediation.

Given this, media education in Latin America must be understood politically from an equality standpoint: the most unequal region on the planet must integrate technologies, their use, and critical training in the classroom, from a perspective that gives way to conditions of equity or possible futures for their children. The provision of technology can no longer be decoupled from critical reflection on its use.

Teachers have achieved high levels of resilience, but they demand that their states provide the role of bridging the existing gaps exacerbated by the pandemic through sustainable policies. Training for the functioning of the education system in a pandemic, and a probable new educational normality of hybrid

environments, is not a problem that is solved only in the physical space of schools. Just as remote education enables the development of new forms of proximity for teachers, the accompaniment of families plays a main role in helping students to face uncertainty and give meaning to their educational process.

Another element that was demonstrated is the potential of policies that link traditional and digital media, since paper booklets to the latest generation platforms allow the deployment of pedagogical strategies that recognize the specific characteristics and the "vocabulary universe" of each student (Freire, 2005). As is apparent from the present study, it is also key to trust teachers, value their creative role, alleviate the bureaucratic burden, and bet on peer learning models that lead them to validate and share the skills acquired in a self-taught way.

The exceptional circumstances of the COVID-19 context prevent addressing the educational scenario in all its complexity and richness. We highlight this due to the type of survey of government information and educational statistics carried out, characterized by constant changes. For this reason, the qualitative analysis of teaching perspectives has at the same time an enormous wealth, but also limitations. It is in this tension that this article was developed.

The situation of lockdown and the violent transformation from in person to virtuality put schooling into disturbing terrain, but the resilience of educators, students, and families allows us to remain afloat. The keys and the enormous potential of the lessons learned in this framework can surely be found in the intersection of communication and education perspectives if we manage to learn from what happened in order to build the bases of a critical regional agenda, the result of our own practices, and experiences. Finally, the inclusion of new voices will make it possible to propose future works that contribute to the construction of a critical agenda for media education in Latin America.

Author Contribution

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ICT and Media competencies of teachers. Convergence towards an integrated MIL-ICT model

Competencias TIC y mediáticas del profesorado. Convergencia hacia un modelo integrado AMI-TIC

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ABSTRACT

This paper describes teachers' perceptions of their ICT and media competencies, and the importance they assign to these competencies in teacher training. A questionnaire was used as a data collection instrument based on UNESCO's proposals on ICT (Information and Communication Technologies) and MIL (Media and Information Literacy). A total of 402 teachers and pre-service teachers took part in the questionnaire. This is an exploratory cross-sectional study where quantitative descriptive and correlational methodology is used. Findings reveal that the self-perceived competence of teachers is low and that the self-perceived level is always lower than the importance given to the corresponding competence. Greater importance is assigned to MIL competencies than to ICT competencies of teachers; this questions the tendency to prioritize technological and didactic training over media education training. It concludes with the need for a paradigm shift towards convergence in teacher training policies for the digital age, and a global model of teacher competencies in media and ICT (COMPROMETIC) is proposed that integrates MIL competencies with those of ICT teachers. The model is based on a double convergence: that of different literacies, and that of the resulting multi-literacy with the specific training of education professionals in ICT and media.

RESUMEN

El objetivo de este trabajo es analizar las percepciones de los docentes sobre sus competencias mediáticas y el uso de las TIC, así como la importancia que asignan a dichas competencias en la formación del profesorado. Se ha elaborado un cuestionario a partir de las propuestas de la UNESCO en TIC (Tecnologías de la Información y Comunicación) y AMI (Alfabetización Mediática e Informacional) que ha sido respondido por 402 docentes y futuros docentes. El diseño del estudio es transversal de alcance exploratorio, que usa metodología cuantitativa de tipo descriptivo y correlacional. Los resultados demuestran que el nivel competencial autopercibido de los docentes es bajo y siempre inferior a la importancia que se otorga a la correspondiente competencia. Los docentes asignan mayor importancia a las competencias AMI que a las competencias en TIC, lo que cuestiona la tendencia de priorizar la formación tecnológica y didáctica sobre la mediática. Se concluye con la necesidad de un cambio de paradigma hacia la convergencia en las políticas de formación del profesorado para la era digital, y se propone un modelo global de competencias del profesorado en medios y TIC (COMPROMETIC) que integra las competencias en AMI con las de los docentes en TIC. Un modelo basado en una doble convergencia: la de diferentes alfabetizaciones, y la de la multialfabetización resultante con la capacitación específica de los profesionales de la educación en TIC y medios.

KEYWORDS | PALABRAS CLAVE

Media literacy, teacher training, digital competence, media and information literacy, educommunication, curriculum integration.
Competencia mediática, formación del profesorado, competencia digital, alfabetización mediática e informacional, educomunicación, integración curricular.

1. Introduction

The relationship between education, communication, and technology has become particularly relevant in the digital age. However, it can be traced back to the origins of language itself. The invention of the printing press in the mid-fourteenth century changed the world of culture and education, and the need to understand the printed text led to the development of formal education, with literacy as its fundamental goal. In the twentieth century, the emergence of film first and television later raised the issue of audiovisual and media literacy (Aparici, 1996). This new type of literacy has been fighting for a place in compulsory education for almost a century. According to Buckingham (2015: 87), in all these years, "there were times when it seemed that media education would become a fundamental right for all youths. However, this never happened, so far at least".

In the second half of the twentieth century, the development of audiovisual and information technologies brought about new devices that found their way into education centers after market and household saturation. The emergence of the Internet and the digital transformation were a turning point in the ways in which information was processed, stored, and circulated. Just like the printing press, Internet was a disruptive technology leading to a paradigm shift in economic, social and cultural terms. However, the response of educational institutions to the emergence of digital networks did not keep up with the latter's social impact. According to Cwaik (2020), the adoption of new technology goes way ahead of the understanding of its impact. Institutionalized education, deeply rooted in the age of Gutenberg, is gradually integrating new technology into learning, but it is still far from understanding and analyzing its impact from the perspective of an increasingly necessary media education. Integrating technology into formal education, either as a teaching resource or as an object of study in media education, requires adequate teacher training.

2. ICTs, media education, and teacher training

ICTs have made their way into the classroom as a learning resource not because of their indisputable advantages or teachers' demands, but as a result of the dominant discourse on technology, according to which they are essential, "transparent", and a sign of modernity. Technological innovation is often mistaken for educational innovation. Both curriculum integration of multimedia technology and teacher training focus on the mastery of technology, leaving aside the social and communication skills it enables and conditions. In the case of teachers, training in technology is sometimes accompanied by a didactic component that analyzes the advantages and disadvantages of the new media as resources, without raising the need to pay attention to the role and the relevance of new media for citizen education.

The importance of traditional media in education was made clear by the Grunwald Declaration on Media Education, urging political and educational systems to recognize their obligations to promote in their citizens a critical understanding of the phenomena of communication (UNESCO, 1982). Ten years later, a group of experts gathered in Santiago de Chile, convened by UNICEF, UNESCO, and CENECA, reached similar conclusions and coined the term "educommunication", meaning "the formation of an intelligent, critical sense of communication processes and messages, aimed at discovering our own cultural values and the truth" (Aparici, 2010: 9). At the risk of oversimplifying, in this paper, the terms "educommunication" and "media literacy/education" will be considered as synonymous, even though there are significant differences between them (Hoechsmann, 2019) and greater accuracy is needed when using them (Gutiérrez-Martín & Tyner, 2012).

Educommunication, or media education, has found its way into the school curriculum. However, until the 1980s, interest in this field was confined to a few countries only, including Canada, the USA, the UK, France, and Australia (Carlsson, 2019). Considerable research has been done on the presence and evolution of media education/literacy in education systems in Europe (Frau-Meigs et al., 2017; Hartai, 2014; McDougall et al., 2018); Latin America (Trejo-Quintana, 2016; Mateus et al., 2019; Soares, 2020); North America (CML, 2020; Hoechsmann & Wilson, 2019; MLN, 2020; Semali, 2017); Russia (Fedorov & Levitskaya, 2017); Australia (Dezuanni, 2019); and Africa (Egere, 2019). Since the press came to be known as the "Fourth Estate", and because of its interrelationship with the other three estates, communication education has been necessary; today, it is a must. In the age of post-truth, big data, and artificial intelligence, media education is necessary, but not sufficient to fight misinformation and

manipulation (Lee, 2018; McDougall, 2019). The Covid-19 pandemic has enhanced the presence of the media in our lives, along with information overload and infodemic, sparking the debate on the need for compulsory media education, new parental roles (Condeza-Dall'Orso et al., 2019), and teacher training in the era of uncertainty. Addressing teacher training needs in the digital age requires a global approach that goes beyond technology as a tool and school as the only learning environment. Such an approach should include education with media and education *on* media. It should integrate education technology and media education in classroom, virtual, and hybrid environments. It should be comprehensive, spanning all media-related competencies, ICTs, media education, and digital literacy.

So far, technology models or frameworks that considered education practitioners mainly as persons who teach have prevailed over approaches that are more in line with media education, prioritizing the educational role over the teaching function. Examples of the former are the TPACK (Technological Pedagogical Content Knowledge) model, by Mishra & Koehler (2006), and the NETS-T Standards (National Education Technology Standards for Teachers), by the ISTE (International Society for Technology in Education, Fuller, 2020). As to the concept of "digital skills", more than one hundred frameworks have been developed for both students and educators (All Aboard, 2015), focusing mainly on information and didactic competencies. One of the best-known is DigCompEdu (European Framework for the Digital Competence of Educators, Redecker & Punie, 2017), which served as the basis for the Spanish Common Framework for Educators' Digital Competencies (INTEF, 2017).

The frames of reference that stress educommunication or media competencies for educators are less common, as is media education itself in the classroom. The best example is UNESCO's *Media and Information Literacy: Curriculum for Teachers* (Wilson et al., 2011), which was preceded by a media education compilation for teachers, students, parents, and education practitioners (Frau-Meigs, 2006). An update to the UNESCO frame, the Alfamed Curriculum for Teacher Training in Media Education is a set of theoretical and practical guidelines for the acquisition of the media and information competencies that educators need to face the challenges posed by the post-Covid-19 era (Aguaded et al., 2021).

3. MIL-ICT training for teachers according to UNESCO

Since UNESCO was established in 1945, with the aim of building peace, eradicating poverty, and promoting sustainable development and intercultural dialogue through education, science, culture, communication, and information, it has considered teacher training to be essential to the accomplishment of its purpose. In the area of Communication education, the Grunwald Declaration calls upon the competent authorities to "develop training courses for teachers and intermediaries to increase their knowledge and understanding of the media and to train them in appropriate teaching methods."

Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all remains a major goal in a world where almost one fifth of the global population of children are not in school. Quality education is one of the 17 goals to transform the world in the 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015 (UN, 2015). UNESCO has done a remarkable job in media and ICT training for teachers, regarding both the integration of ICTs in education as a learning resource and the inclusion of media and information literacy in the compulsory curriculum.

The latest UNESCO publications show a global integrating trend for terms and competencies. MIL (Media and Information Literacy) is a concept that encompasses both types of literacy (Lau & Grizzle, 2020; Le-Voci-Sayad & Lau, 2020). Likewise, in its development policies, UNESCO takes a convergent approach for greater inter-ministerial and government cooperation. It suggests, for instance, that it is important that MIL is present "not only in education policy, but also in communication and technology, culture and other areas of public administration" (UNESCO, 2013a: 20). Despite this integrating trend, and regarding teacher training for the digital age, UNESCO has set forth an ICT competency framework for teachers (UNESCO, 2018) and, on the other hand, a media and information literacy curriculum for them as well (Wilson et al., 2011). The ICT competency framework was first published in 2008, followed by updates in 2011 and 2018. The fact that the media and information literacy curriculum (Wilson et al., 2011) has never been updated can be construed as the result of prioritizing instrumental over critical ICT and media education in teacher training. A new edition of the curriculum has been announced and

a summary has been released, but the document remained unpublished in July 2021. Our research on teachers' media and ICT competencies (COMPROMETIC) is based on these two key publications.

4. Objectives

This study focuses on the answers provided by the educators who took our survey, based on the ICT and MIL competencies considered by UNESCO as essential for teachers. Respondents were asked to rate their level in each of these skills and to say how important they thought each skill was. The study was aimed at:

- Describing teachers' self-perceptions of their ICT and MIL competencies.
- Analyzing the importance teachers attach to ICT and MIL competencies in teacher training.
- Assessing the need to raise ethical and social concerns when ICTs are used as a learning resource in the classroom.
- Offering an integrated global model of media and ICT competencies for teachers (COMPRO-METIC).

5. Material and methods

An exploratory cross-sectional study was designed using descriptive and correlational quantitative methods (Hernández-Sampieri & Mendoza, 2018). The procedure chosen was an online questionnaire, designed with Microsoft Forms and sent by email, WhatsApp or social media to multiple contacts in the field of education. Respondents were requested to send their answers between December 2020 and February 2021. The first draft of the questionnaire drew on the competencies described in the UNESCO documents mentioned above:

- ICT Competency Framework for Teachers Version 3.
- Media and Information Literacy Curriculum for Teachers.

The first set of items included the 18 ICT competencies identified in the ICT Competency Framework, classified into six three-tier groups. The second set comprised the 21 MIL competencies in the Media and Information Literacy Curriculum, grouped into seven three-tier sections, the tiers being knowledge, assessment, and production. Version 3 of the ICT Competency Framework for Teachers also addresses issues beyond the use of ICTs to facilitate the teaching-learning process, such as mass and social media ethics, privacy protection, and inclusive learning, which are also dealt with in the "compound concept" of MIL as literacy for citizen empowerment (UNESCO, 2013b).

The convergence between the two lines of training (ICT and MIL) was reflected in the third set of 18 competencies based on section II.3 of the ICT Competency Framework for Teachers Version 3 (2018: 16-18), identifying 9 ICT innovations. Two questions were included for each innovation, referring to the use of ICT as a learning resource and the competencies in the first set on the one hand, and to media education and the competencies in the second set on the other. This first draft was tested in a pilot study with 12 participants, which revealed that the questionnaire was too long and some of the items were repetitive. Consequently, a second, abridged, version of the questionnaire was produced.

In the final draft, the three tiers in each section, which led to very similar items, were merged into single competencies. This did not affect the validity of the questionnaire, as the self-perception tier is shown in the value assigned to the competency – no value, low value, some value, high value. Accordingly, the number of items in the first set (ICT competencies) was reduced from 18 to 6, while the number of MIL competencies in the second set went down from 21 to 7. As to the 9 ICT innovations identified in the ICT Competency Framework, 4 were dismissed on the grounds that they were non-discriminative given their current low level of development as learning technologies: the Internet of Things; artificial intelligence; virtual reality and augmented reality; and coding. The other 5 – open educational resources; social networks; mobile technologies; big data; and ethics and privacy protection – were turned into 5 ICT competency-related items, added to the first set, now totaling 11 competencies (6 + 5), and into 5 MIL competency-related items, added to the second set, now totaling 12 competencies (7 + 5).

A final item was added to check the level of acceptance of a global teacher training model integrating the two types of competencies (objective 3). The resulting data collection tool is shown below. Respondents

had to answer their self-perceived ability for each item and the importance they attached to it. The items are shown in groups here; in the questionnaire sent to participants; however, they were randomly listed.

1) ICT competencies for teachers

1.A. Based on the ICT Competency Framework for Teachers Version 3 (UNESCO, 2018):

- ICT1. I am able to use ICTs in the classroom in accordance with official regulations and curricular projects.
- ICT2. I am able to use ICTs in the teaching-learning process and in evaluation.
- ICT3. I am able to design learning activities using ICTs, so that students can solve problems on their own.
- ICT4. I am able to use digital tools to support pervasive learning and share it in networks.
- ICT5. I am able to arrange the physical environment and implement technology strategies to improve learning and school management.
- ICT6. I am able to use ICTs to share good practices in professional networks to support my own professional development.

1.B. Based on the ICT innovations identified in the ICT Competency Framework for Teachers Version 3 (UNESCO, 2018: 16-18):

- ICT7. I am able to use ICTs to develop and/or create open educational resources (OER).
- ICT8. I am able to use social networks to improve teacher-student communication, promote interactive learning, and participate in educational communities.
- ICT9. I am able to plan and implement the use of mobile technologies to access information on the Internet and to promote learning anywhere, anytime.
- ICT10. I am ready to discuss big data, its potential in education, and how to convert it into a public good.
- ICT11. I am able to tell students how their personal data are used on the Internet.

2) MIL competencies for teachers

2.A. Based on the Media and Information Literacy Curriculum for Teachers (Wilson et al., 2011):

- MIL1. I understand the role of the media and I consider information and freedom of speech to be rights.
- MIL2. I am able to interpret the content of media products, their values and lack of ethics.
- MIL3. I have my own criteria for selecting my sources for information and I am able to conduct advanced searches.
- MIL4. I am able to compare information from various sources in order to evaluate its reliability and accuracy.
- MIL5. I understand the fundamentals of digital technology and the Internet, as well as their most common uses among the youth.
- MIL6. I am able to produce texts and create multimedia products from different perspectives for democratic citizenship education.
- MIL7. I am able to encourage in students the critical analysis of the media and the creation of responsible multimedia content for social networks.

2.B. Based on the ICT innovations identified in the ICT Competency Framework for Teachers Version 3 (UNESCO, 2018: 16-18):

- MIL8. I am able to use open educational resources (OER) to support educational transformation and bridge economic and social gaps.
- MIL9. I am able to address issues such as the negative impact of the excessive use of social media on mental and physical health, online bullying and harassment, and the deliberate or unintentional promotion of violence.
- MIL10. I am able to discuss the negative social and environmental effects of the mobile industry with students.
- MIL11. I am able to discuss with students the importance of digital data traces and the use of personal data by networks, companies, and other organizations (big data).

- MIL12. I am able to advocate the need for ethical principles in the development, implementation, and use of state-of-the-art technology, especially in education.

3) Convergence and competency integration

- IN1. I believe that ethical and social concerns should be raised about ICTs when they are used as a learning resource in the classroom.

The psychometric properties of the data collection tool were analyzed. First of all, Cronbach's alpha was calculated for the whole scale as a measure of internal consistency, the resulting value being .94. Then, an exploratory factor analysis was performed to determine the underlying structure.

Before analyzing the factorial solution, it was verified that the criteria were met to draw relevant conclusions: the Kaiser-Meyer-Olkin measure of sampling adequacy confirmed that the data and sample size were adequate (.95) and Bartlett's test of sphericity (.000) indicated that the model's significance level was high. The factor analysis determined the existence of four factors that accounted for 60% of explained variance – an adequate percentage for a measurement instrument.

As to the selection of participants, convenience sampling was used for the pilot test (n=12), sending the questionnaire to teachers and trainees from different levels of education – the study's target population. 50% were primary school teachers, 10% taught in secondary school, and the remaining 40% were university teachers.

Snowball sampling was used in the research study, asking the teachers who answered the questionnaire to share it with their colleagues. The choice of sampling techniques was conditioned by Covid-19 restrictions and the impossibility to visit education centers. Table 1 shows a description of both the pilot and the research samples.

Table 1. Description of pilot and research samples									
		Gender		Age		Teaching Level			
		Men	Women	Average	SD	Kindergarden	Primary school	Secondary school	University
Teachers	Pilot (n=8)	87.5%	12.5%	50.4	8.3	0%	50%	12.5%	37.5%
	Research (n=209)	27.8%	72.2%	47.8	10.9	13.5%	28.2%	13%	41.8%
Trainee teachers	Pilot (n=4)	75%	25%	34	15.8	0%	50%	0%	50%
	Research (n=193)	27.8%	72.2%	31.1	14.9	5%	41.4%	14.4%	20%
Total	n=402	27.8%	72.2%	39.8	15.4	10.1%	33.6%	13.5%	33%

6. Results

A descriptive analysis was performed of all questionnaire items in the two sets (ICT and MIL competencies, Figures 1 and 2) to address objectives 1 and 2. They provided evidence of the needs in ICT and media training as perceived by teachers. Particularly relevant to activity planning and design were the items for which respondents said their level was low but which they perceived as important for their training.

Regarding ICT competencies, respondents perceived their level as low and, in all cases, as lower than the importance they attached to the skills, particularly in the area of big data and its potential in education, and in the use of technology to improve learning and school management. On the other hand, they had higher self-perceptions in the use of ICTs in the teaching-learning process and evaluation, as well as in the inclusion of ICTs in the curriculum.

The analysis of the importance attached to each item shows that the average value was higher than the corresponding self-perception for each competency. The skill with the highest value was the ability to use ICTs in the classroom adequately, followed by the ability to use ICTs to develop and/or create open educational resources, a skill for which the self-perceptions were lower than for the former.

At the other end of the spectrum, the two items with the lowest values were those with the lowest self-perceptions as well, namely, the use of technology for school management and the readiness to discuss big data.

Figure 1. Descriptive statistics of items relating to teachers' ICT competencies

Regarding MIL competencies, the self-perceptions of respondents were relatively low, as shown in Figure 2. In this set, the competencies with the lowest levels of ability were the production of texts and the creation of multimedia products for democratic citizenship education, the discussion of the negative environmental impact of the mobile industry, and the discussion of the digital data traces left by the use of the Internet and social media. Self-perceptions were higher for the understanding of the role of the media and the recognition of information as a right, and for the understanding of the fundamentals of digital technology and the Internet, as well as for their most common uses among the youth, followed by the criteria to select sources of information.

Figure 2. Descriptive statistics of items relating to teachers' MIL competencies
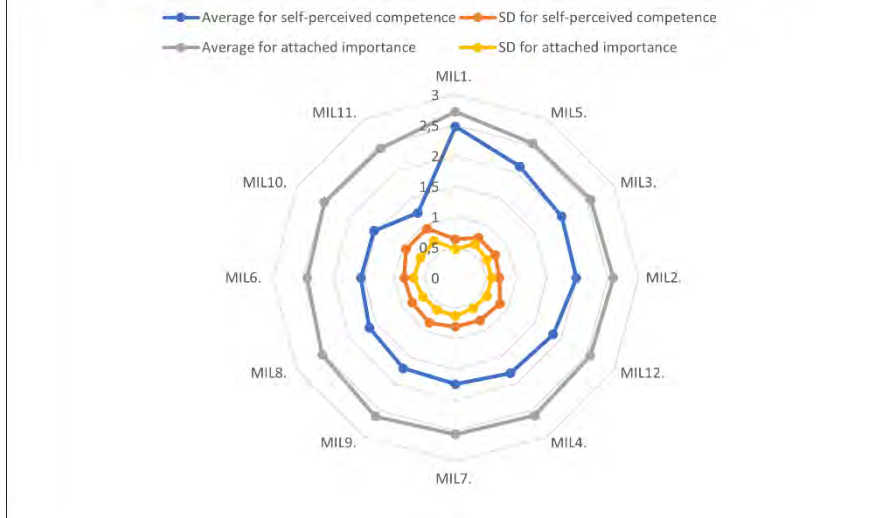
Pearson's correlation coefficient was used to analyze the correlations between the self-perception and importance variables for ICT and MIL competencies (Table 2). It showed a significant association between the importance attached to a competency and the self-perceived level of ability. Based on this finding, it would be suitable to design joint teacher training models encompassing both the ICT and the MIL dimensions.

Table 2. Descriptive statistics of teachers' ICT and MIL competencies						
N=403	Average	SD	Correlation			
			1	2	3	4
1. Teachers' ICT competencies	1.70	.58	1			
2. Importance attached by teachers to ICT competencies	2.10	.43	.812**	1		
3. Teachers' MIL competencies	1.80	.53	.807**	.708**	1	
4. Importance attached by teachers to MIL competencies	2.55	.47	.288**	.700**	.390**	1

N.B. **p<.01 (bilateral) *p<.05 (bilateral).

Consistent with the significant correlation between the ICT and the MIL dimensions that supports the suitability of global teacher training models, most respondents said they believed (49.3%) or very much believed (27.8%) that "ethical and social concerns should be raised about ICTs when they are used as a learning resource in the classroom". This meets objective 3 of the study.

As shown in Table 2, teachers considered themselves to have a higher level of ability in MIL than in ICT competencies, even though their self-perceptions were relatively low for both sets. Likewise, they attached more importance to MIL competencies than to ICT skills (Figure 3), against the dominant trend according to which technological and didactic training should prevail over media education.

Figure 3. Most important competencies according to teachers
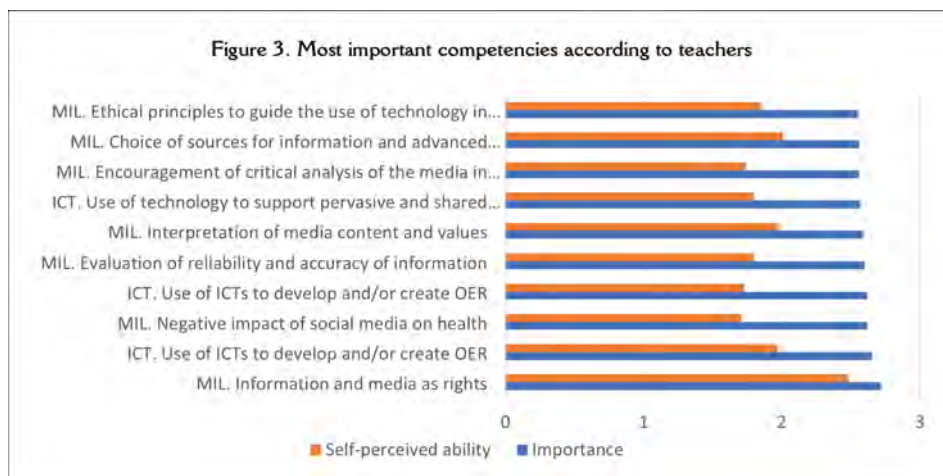
7. Discussion and conclusions

This study was aimed at describing self-perceived ICT and MIL competencies, and their importance for teachers, in order to assess the suitability of training models. The results suggest that teachers feel they are inadequately trained in ICT and MIL competencies, as shown by the low self-perceptions in all of them, but they also consider them to be very important for teachers and trainees. The data reveal the need for teacher training models that address the increasing demands for expanded, ubiquitous education in the digital age.

The emergence of digital technology in teaching led to the design and implementation of numerous digital training proposals for teachers, aimed at addressing the needs arising from technological developments. The growing importance of the media in society and their significant role as an agency of informal education have not gone unnoticed by teachers who demand more media and information literacy education rather than training in the use of ICTs, as shown here.

Based on the data collected, an integrated global model is being put forward to address the needs and demands of teachers for the digital age. Traditionally, teacher training in the use of ICTs and media education have been kept artificially separate. Organizations like UNESCO and the EU have them depend on different bodies, with their own specific plans. This distinction does not seem relevant for questionnaire respondents in this study, most of whom supported the MIL-ICT convergence, believing in the need to raise ethical and social concerns about ICTs when they are used as a learning resource in the classroom. Taking the first step toward convergence, UNESCO introduced the acronym "MIL" to bring media and

information literacy together (Wilson et al., 2011). Going one step further, Frau-Meigs (2015) coined the term "augmented MIL", signaling the convergence of MIL and digital literacy. The following step on the way to integration was "MILX" (Media and Information Literacy Expansion), expanding MIL to encompass other social skills (Grizzle & Hamada, 2019). UNICEF (Nascimbeni & Vosloo, 2019) has also embraced a global approach to digital literacy, bringing it closer to the other types of basic ICT and media literacy. The COMPROMETIC (acronym for Spanish "COMpetencias del PROfesorado en MEdios y TIC", Media and ICT Competencies for Teachers, Figure 4) moves in the same direction, based on two forms of convergence:

- The integration of different types of literacy into basic ICT and media education for critical citizenship in the digital age (basic competencies).
- The convergence between this basic education and the special training of teachers for their use of technology as education practitioners in real-world, virtual, and hybrid environments (professional competencies).

Figure 4. COMPROMETIC model

NB: Created by the authors.
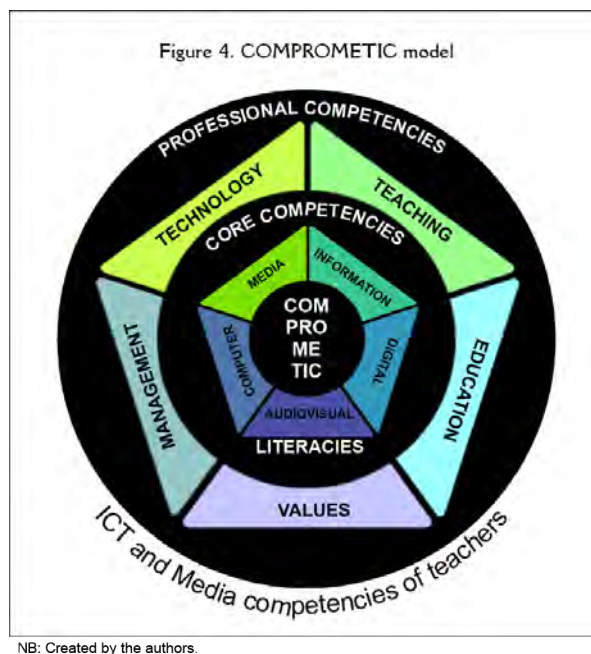
For the first form of convergence, an integrated global approach is suggested for basic training in communication and digital technology. This kind of basic training is common, although probably with varying levels, to teachers, as individuals and citizens, and everybody else who is literate (media, information, digital, audiovisual, and computer literacy). In the COMPROMETIC model, this basic training converges with the professional ICT and media competencies for teachers as education practitioners, including technology, teaching, education, values, and management skills. Designing teaching curriculums with the use of technology without taking into account the need for media education is out of step with teachers' needs and demands, and with the complexities of the digital society.

Based on the ten competencies with the highest importance in the questionnaire, it can be concluded that teachers are well aware of the implications of digital technology for the social evolution and the personal development of twenty-first century citizens. The top ten competences include three that were related to the use of digital resources in teaching and seven that have to do with media education, the role of the media, the selection of information, and the responsible, critical use of social media. The fact that more importance is attached to MIL competencies than to ICT skills reveals a change in trend in the demand for ICT and media training, from educational technology to media education. The results of the study confirm that even when teachers have to get students ready for the future, the education system is

quite slow in its response to the past. Teachers are not familiar with the most relevant ICT innovations identified in the latest version of UNESCO's ICT Competency Framework for Teachers, such as artificial intelligence, virtual and augmented reality, and coding. They were included in the pilot version of the questionnaire but were left out of the final version because respondents considered them to be unrelated to their professional training. Big data, however, was kept, but awareness of digital data traces and big data management were considered to be the least important competencies. This is particularly troublesome when we consider that the dominant role of mass media in communication has been transferred to digital media, where algorithms that reveal our digital data traces on the Internet and big data are used by big corporations to optimize their profits and minimize civic education (Mihailidis, 2020). On the other hand, teachers are aware of the growing importance of the media and social networks in education for the younger generations, as well as of the risks they entail, but they think they are not able to provide future prosumers with the media education they need.

The limitations of the study are self-reported measures, the cross-sectional design, and snowball sampling. The results should be interpreted with caution, but they are particularly significant in this unique moment in history when the need for teacher training for the digital age has become evident. The data were collected during the Covid-19 pandemic, which brought to light the digital skill deficits in teacher training, and this could have influenced the negative perceptions of respondents. In addition, the spread of fake news and misinformation that is characterizing this pandemic and the associated infodemic could have raised teachers' awareness of the importance of the media and of media education.

The pervasiveness of the media and the virtualization of everyday life have made the need for ICT and media education for critical citizenship more urgent than ever before. But dealing with this urgency will only be possible if teachers are aware of the diversity of environments and education agencies, and are able to adapt themselves to the uncertainties of an ever-changing world. Although addressing the needs pointed out by teachers in the questionnaire is a priority, teacher training for the digital age should also contribute to the knowledge of the most recent innovations and their social and educational implications. In any case, the ICT and media training needs identified by respondents in this study indicate the appropriateness of a paradigm shift toward the convergence of teacher training policies in the digital age. The goal should not be the development of digital competencies for teachers, but rather the development of a holistic approach to teachers' competencies for the digital world (Esteve et al., 2018). This approach would enable teachers not only to face the new teaching challenges but also to transform education into a means to redress inequalities, and to improve the quality of education and promote social progress through technological innovation.

Author Contribution

Idea, A.G.; Literature review (state of the art), A.G; R.P.; C.G.; Methodology, A.G; R.P.; C.G.; Data analysis, R.P.; Results, A.G; R.P.; C.G.; Discussion and conclusions, A.G; R.P.; C.G.; Writing (original draft), C.G.; Final revisions, A.G; R.P.; C.G.; Project design and sponsorship, A.G; R.P.; C.G.

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Student satisfaction with online teaching in times of COVID-19

Satisfacción de los estudiantes con la docencia online en tiempos de COVID-19

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ABSTRACT

Higher education is one of the driving forces behind the social and economic development of countries, with the ultimate aim of providing quality academic training. At present, teaching-learning models in virtual environments face a number of important challenges, particularly in the current situation caused by COVID-19. Some of these challenges will be addressed in this study. We worked with 225 third-year undergraduate students in health science degrees over two academic years during the pandemic. The objectives were: (1) to ascertain whether there were significant differences in student satisfaction with the teaching process in the first year of the pandemic (e-learning teaching) vs. the second year (b-learning teaching); (2) to determine whether there were significant differences in academic performance between the two groups. Quantitative research (using a 2x2 factorial design, ANOVA and ANCOVA) and qualitative research (using a comparative design with categorisation analysis) were carried out. The results indicate differences in some aspects of satisfaction and learning outcomes in favour of teaching in the second of the two years. Students rated the use of active methodologies and technological resources positively, although they concluded that their use required more work time. Future studies will seek to compare student satisfaction in other areas of knowledge.

RESUMEN

La Educación Superior es uno de los motores del desarrollo social y económico de los países, teniendo como objetivo último el de facilitar una formación académica de calidad. En la actualidad, los modelos de enseñanza-aprendizaje en entornos virtuales implican retos importantes, específicamente en la actual situación por la COVID-19. Algunos de estos desafíos se abordarán en este estudio. Se trabajó con 225 estudiantes de tercero de grado en titulaciones de Ciencias de la Salud, a lo largo de dos cursos académicos impartidos durante la situación de pandemia. Los objetivos fueron: 1) comprobar si existían diferencias significativas en la satisfacción de los estudiantes con el proceso docente respecto del primer año de pandemia (se aplicó docencia e-Learning) vs. el segundo año (se aplicó docencia b-Learning); 2) comprobar si existían diferencias significativas en los resultados académicos entre ambos grupos. Se realizó una investigación cuantitativa (se utilizó un diseño factorial 2x2, ANOVA y ANCOVA) y otra cualitativa (se utilizó un diseño comparativo con análisis de categorización). Los resultados indican diferencias en algunos aspectos de la satisfacción y en los resultados de aprendizaje, a favor de la docencia en el segundo año. Los estudiantes valoraron positivamente el uso de metodologías activas y de recursos tecnológicos, si bien concluyeron que su uso exigía más tiempo de trabajo. Futuros estudios se dirigirán a contrastar la satisfacción de estudiantes en otras ramas de conocimiento.

KEYWORDS | PALABRAS CLAVE

Online learning, technology innovation, satisfaction, project based learning, digital competence, COVID-19.
Aprendizaje en línea, innovación tecnológica, satisfacción, aprendizaje basado en proyectos, competencia digital, COVID-19.

1. Introduction and state of play

Higher education (HE) today deserves particular attention from governments and from society as a whole, since it is increasingly being seen as a key driver of countries' social and economic development. Within the framework of social equality and education equality policies, institutions today are receiving groups of highly diverse students (from different backgrounds and with different learning profiles) compared to student profiles in the later decades of the last century. In addition, and in response to labour market needs, European policy guidelines are now focusing on increasing the percentage of citizens who have a higher education qualification, whether through initial training or through the updating of professional competencies. This new environment poses major challenges for educational institutions and teachers alike within the framework of HE. In order to deal with these challenges, new ways of organising and structuring training within the teaching-learning process are required. These challenges are clearly set out in the "ICT Competency Framework for Teachers" put forward by UNESCO (UNESCO, 2019).

This article focuses on two of these challenges. The first stems from the progressive shift from a pedagogical model of teaching-learning grounded on the acquisition of information and knowledge to a different model where the focus falls on student development of skills. A second challenge is linked to the ever-increasing and intentional use of virtual learning environments, backed by the constant progress in information and communication technologies. Said environments are particularly important at the present time where there is a commitment to remote or online education. This choice has been brought on by the confinement measures imposed worldwide as a result of the health crisis triggered by the SARS CoV-2 virus. This article specifies these challenges as well as the possible ways in which they may be successfully addressed from the institutional and teaching standpoint. The ultimate aim is to achieve quality learning within this new educational scenario.

1.1. Competence learning in the European Higher Education area

Learning in HE must be based on the development of competencies. This was, and indeed continues to be, the challenge facing the European Higher Education Area (EHEA). As a result, every bachelor's and master's degree includes references to various kinds of skills (conceptual, procedural, and attitudinal), whose ultimate goal is to deliver quality academic training by offering students the best possible education. The final objective is to provide graduates with comprehensive development and employability, together with an interest in life-long learning (Šucha & Gamme, 2021). In this line, in 2020 the European Commission published a new framework of education to be applied over the period 2021-2025. Said communication attaches particular importance to achieving the aims mentioned previously. These goals have now been strengthened even further by the current pandemic (Commission to the European Parliament, 2020). The leitmotiv of the publication specifically refers to the need to train people to become independent and resilient so that they can make a high-level contribution to society. This goal is directly related to the changes that today's society requires in the way teaching and learning are undertaken. Said need has been established as a common objective of European Union countries. Likewise, this cooperation has led to adaptation and improvement in education by strengthening the common proposals that centre on the need to boost digitalisation, both amongst teachers and students. In particular, this communication refers to the need to foster further use in the acquisition of digital strategies and skills in artificial intelligence [takeaway 10 and Action 11 (Sucha & Gamme, 2021)]. Likewise, special emphasis is placed on the development of cross-sectional skills related to critical thinking, entrepreneurship, creativity, and civic commitment. These skills are deemed fundamental if future generations of students, researchers and innovators are to build a proactive and resilient society. This report also highlights the need to address the issue of under-performance and student drop-out rates at university (Casanova et al., 2018). All of these intentions are directly related to the proposals for teaching innovation that focus on preventing the digital divide between teachers and students (Sáiz-Manzanares et al., 2021).

Given this situation, it is particularly important to address the need to train teaching staff in the acquisition of digital skills. In this line, the European Framework for the Digital Competence of Educators (DigCompEdu) distinguishes six levels of digital competence (Redecker & Punie, 2017): Newcomers (A1) are teachers who have had very little contact with the use of digital tools; Explorers (A2) are teachers who

have taken their first steps in the use of digital tools, but who still lack a global approach; Integrators (B1) are teachers who use and experiment with digital tools for a range of purposes in an effort to discover which digital strategies work best in each context; Experts (B2) are teachers who use a series of digital tools with a certain degree of confidence, creativity and critical spirit in order to enhance their professional activities, and who are continually striving to broaden their repertoire of practices; Leaders (C1) are teachers who use a wide range of flexible, comprehensive and efficient digital strategies; and Pioneers (C2), are those teachers who question the appropriateness of current digital and pedagogical practices, in which they themselves are experts, whilst at the same time leading the way in innovation and standing as a benchmark for younger teachers.

These challenges, and the response of government decision-makers, lead to the conclusion that a major digital transformation is required in the teaching-learning process. Said transformation needs, on the one hand, a sound technological infrastructure (platforms, tools, interoperability) and, on the other, a pedagogical proposal (learning design, accreditation and assessment processes). This is why the structure of digital transformation would need to be addressed from a pyramid of actions. This would commence with education policy (strategies), identity and communication, and would then be followed by protocols of ethics, privacy and safety, academic adaptation of services, and would then continue with the design of the educational model. Finally, it would conclude by addressing curricular content (García-Peñalvo, 2021). This framework embraces a number of different models that can be used, prominent amongst which are: Technological Pedagogical Content Knowledge (TPCK) (Koehler & Mishra, 2009), a model which points towards interaction that is at the same level of importance amongst the pedagogical elements, the use of technological resources and a proposal of educational content. Another key model is the Substitution, Augmentation, Modification and Redefinition model (SAMR) (Garcia-Utrera et al., 2014), which prioritises the importance of technology in educational change. In this study, we apply the TPCK (Koehler & Mishra, 2009), since we believe that the weight of technology and of the pedagogical model used during the instructional process should have the same degree of relevance to achieve successful and effective learning amongst students.

1.2. Learning in virtual environments in higher education

Teaching in HE, whether face-to-face or blended, is increasingly taking place in virtual learning environments or in a Learning Management System (LMS). This has grown due to the current health crisis sparked by the SARS CoV-2 virus (García-Peñalvo, 2021). The pandemic has accelerated the digitalisation of teaching, since a large part of the teaching is currently delivered either completely online (e-learning), or partially online (blended learning or b-learning), depending on the outbreaks or spikes of the virus. This has major consequences for teaching staff vis-à-vis designing and implementing their teaching, which in turn affects student satisfaction with the process (Tang et al., 2021).

Recent studies (Leal-Filho et al., 2021) have shown that the pandemic caused by COVID-19 has brought about a global change in both teaching and learning. Perceived user (teachers and students) satisfaction is seen to vary depending on the confinement conditions imposed and the technological resources available (kind of device and connection networks). As a result, these authors highlight the need to implement policies that foster teaching innovation and improvements in technological resources if the challenge is to be met. Other studies carried out with health science students (medicine and nursing) have shown that satisfaction with online teaching during the early stages of the pandemic was higher amongst teachers than amongst students (Li et al., 2021). Moreover, in this latter group, differences were reported in the level of satisfaction depending on whether the situation affected practical clinical training.

Differences were also found depending on the country in question. For example, students in China and India reported a high level of satisfaction (80.29%) compared to a lower level amongst students in Jordan (26.77%). The authors also found that the level of student satisfaction was affected by their personal situation, their lockdown situation, socio-emotional support (family or friends), technological resources (network, laptops, etc.). Finally, teacher satisfaction was also influenced by the perceived satisfaction amongst their students. Another key study (Tang et al., 2021) into teaching during the pandemic underscored the importance of paying attention to detail when approaching pedagogical-technological

issues in teaching contexts, stressing the need to include more virtual activities in order to boost student motivation and foster interaction with them.

Within this framework, one important aspect vis-à-vis achieving satisfaction with the teaching-learning process of all the stakeholders involved concerns the design of LMSs (García-Peñalvo, 2021). Recent studies (Chakma et al., 2021) have reported that LMSs which include a metacognitive design foster student development of self-regulated learning (SRL) that is creative and autonomous. The use of videos is also emerging as an extremely valuable resource to promote effective learning during the current pandemic (Kidess et al., 2021). Experts have also posited the need to continue using these resources even when the health situation eventually improves (Lowe et al., 2021). Another highly effective tool is the use of tele-simulation, particularly in health science degrees (Diaz & Walsh, 2021). This strategy differs in certain aspects from experiences with virtual reality and virtual laboratories (Sáiz-Manzanares et al., 2021). In these experiences, various kinds of learning strategies related to developing students' cognitive, metacognitive, behavioural, motivational and technical skills are put into practice.

The use of flipped learning experiences applied to online project based learning (OPBL) (Sarwa et al., 2021) is also proving to be highly effective. Implementing this kind of experience has been linked to a high degree of student satisfaction with the teaching-learning process (Sáiz-Manzanares et al., 2021). All of these resources share a common feature; the design of a teaching environment that provides the student with deep learning opportunities. In addition to incorporating all of these innovative methodological tools, teachers need to have means available that include data visualisation techniques which allow them to monitor the teaching-learning process in virtual environments (Sáiz-Manzanares et al., 2021).

These tools should embrace a high degree of usability and include data analysis systems, within what has been called Educational Data Mining (EDM) and Artificial Intelligence (Bonami, 2020). Use of these resources will enable teachers to familiarise themselves with students' learning patterns and, based on these, to create individually tailored itineraries. Nevertheless, mixed research methods will be required in order to carry out such analyses (in other words, those which value both quantitative and qualitative aspects) (Anguera et al., 2018). This use will enable a better educational response to be provided to each student's learning needs (García-Perales & Almeida, 2019; Salinas-Ibáñez & De-Benito, 2020).

In sum, resources for virtualisation, measurement and analysis will be included in what has been termed Advanced Learning Technologies (ALT). In turn, ALT will enable the development of Self-Regulated Learning (SRL) and enhance student motivation (Azevedo & Gasevic, 2019). If all of these resources are to be applied correctly, however, training in digital skills by all the stakeholders involved in the teaching-learning process will be required (Redecker & Punie, 2017; Unesco, 2019). As an example of this a recent study (Sáiz-Manzanares et al., 2021) indicated that teaching staff with a B2 or C1 level in digital skills only put into practice 66.6% of the available resources offered in an LMS such as a Modular Object-Oriented Dynamic Learning Environment (Moodle). This is a key aspect to be considered by heads of university institutions, since it points the way towards a digital transformation aimed at promoting the development of training programmes for teachers and students in digital skills (García-Peñalvo, 2021).

In addition, teaching based on student experimentation and active practice needs to be fostered even further. This ties in directly with objective 4 (Quality Education) of the Agenda 2030 (United Nations. Department of Economic and Social Affairs, 2021). At the same time, the methodological and technological change in HE teaching, which was already a challenge for society in the 21st century, has been hastened due to the current pandemic. As a result, teachers should include in their teaching design various e-learning or b-learning teaching resources that allow them to successfully face up to this challenge.

1.2.1. Quantitative research

Taking into account the justifying framework set out above, the research questions (RQ) addressed in this study were:

- RQ1. "Will be there be any significant differences in satisfaction amongst health science students depending on when teaching was given; during the first year of the pandemic (e-learning teaching) vs. the second year (b-learning teaching)?".
- RQ2. "Will be there be any significant differences in the academic performance of health

science students depending on when teaching was given; during the first year of the pandemic (e-learning teaching) vs. the second year (b-learning teaching)?".

Qualitative research:

- RQ3. *"Which aspects will be open to improvement and which aspects will provide the greatest satisfaction in teaching during the COVID-19 pandemic? Will these aspects differ depending on when teaching was given; during the first year of the pandemic (e-learning teaching) vs. second year (b-learning teaching)?".*

2. Material and methods

2.1. Participants

We worked with a sample of 225 third year bachelor degree students who were taking a degree in health sciences (the Degree in Occupational Therapy, and the Degree in Nursing). The courses in which this study was carried out were taught in the second semester and lasted nine weeks. In order to control the type of teacher variable, the same teacher taught both courses. The teacher was an accredited expert in virtual teaching from the University of Burgos and her level of online teaching could be classified as a C1 skill level (Leaders (C1) in accordance with the DigCompEdu (Redecker & Punie, 2017). Convenience sampling was used to select the sample. Two groups were established: Group 1, in which teaching was given during the first year of the pandemic (academic year 2019-2020) using an e-learning teaching method, and Group 2, in which teaching was given in the second year of the pandemic (academic year 2020-2021) applying a b-learning teaching method. Descriptive statistics for the mean (M) and standard deviation (SD) of age broken down by gender can be seen in Table 1. This table shows there is a greater percentage of females than males, which is common in health science degrees. This is reflected in the latest university figures report issued by the Conference of Rectors of Spanish Universities (CRUE), which shows that the mean percentage of females in health science degrees is 73.8% (Hernandez-Armenteros & Pérez-García, 2018).

Table 1. Description of the sample																
Degree	**Group 1 (n=107)**								**Group 2 (n=118)**							
	Female (n=94)				**Male (n=13)**				**Female (n=105)**				**Male (n=13)**			
	n	%	Mage	SDage	n	%	Mage	SDage	n	%	Mage	SDage	n	%	Mage	SDage
OT	38	82.60	22.40	2.30	8	17.40	21.60	1.80	45	86.50	22.60	4.70	8	13.50	21.60	1.40
N	56	91.80	23.60	6.30	5	8.20	21.40	0.90	60	92.30	23.50	5.50	5	7.70	26.60	8.70

Nota. Mage=Mean age; SDage=Standard Deviation age; n=number of participants in each group; Group 1: 2019-2020. First year of the pandemic (e-learning teaching method); Group 2: 2020-2021. Second year of the pandemic (b-learning teaching method); OT=Degree in Occupational Therapy; N=Degree in Nursing.

2.2. Tools

a) UBUVirtual platform. This platform is an LMS, developed in Moodle. Version 3.9 was used.

b) Scale of learning strategies (ACRA for its initials in Spanish) (Román-Sánchez & Gallego-Rico, 2008). This scale has been widely applied in research focusing on learning strategies in Spanish-speaking environments (Carbonero et al., 2013). The ACRA scale identifies 32 strategies at different phases of information processing. In this study, the scale of metacognitive strategies was used, which includes the subscales of self-knowledge, self-planning and self-assessment. ACRA has a total Cronbach Alpha reliability coefficient equal to $\alpha=0.90$ and for the scale of metacognitive strategies of $\alpha=0.89$, a construct validity between evaluators of r=0.88, and a content validity of r=0.88. For this study, for each subscale, we found global reliability indicators for the scale of metacognitive strategies $\alpha=0.88$, and for the subscales of self-knowledge $\alpha=0.82$, self-planning $\alpha=0.86$, and self-assessment $\alpha=0.80$, respectively.

c) Design of the course. We applied a teaching method grounded on the use of online project based learning (OPBL) in LMS UBUVirtual. This involved applying the ABP method in e-learning environments. In other words, students draw up a project together in LMS. The materials used to apply this method can be seen in Sáiz-Manzanares (2018).

d) Two virtual laboratories that included multimedia resources were used. These laboratories are open access and can be examined in the Repository of the University of Burgos (Degree in Occupational

Therapy. Course: Early Stimulation: https://bit.ly/36U2ysn and https://bit.ly/3rykbr9; Degree in Nursing. Course: Quality Management: https://bit.ly/3rtuXyU).

e) We used flipped learning experiences that are open access and which may be consulted in the Repository of the University of Burgos (Degree in Occupational Therapy https://bit.ly/2TDSiBF and https://bit.ly/2UMAxAK. Degree in Nursing https://bit.ly/3rs01is and https://bit.ly/3rtXTGW).

f) Satisfaction survey with the teaching-learning process (ESPEA) (Sáiz-Manzanares, 2018). This is a survey drawn up ad hoc and which comprises 20 closed item responses measured on a Likert type scale from 1 to 5 points. The reliability indicators for the whole scale were $\alpha=0.93$, and for each element in the scale these were between $\alpha=0.92$ and $\alpha=0.94$. Also included, are four open questions that refer to aspects to be: changed, extended, reduced, and improved.

2.3. Procedure

Prior to conducting the study, it was approved by the University of Burgos Bioethics Committee (No. IR 30/2019). During the first week of the academic year, students signed the informed participation consent form. In Group 1, teaching was delivered during the first year of the COVID-19 pandemic online after the fourth week of the semester, following the government's declaration of the state of emergency, which implied using an e-learning teaching method. In Group 2, teaching was given during the second year of the pandemic. Teaching was provided through a b-learning method (lessons were given virtually through the Teams platform and practical lessons were given on site, adopting safety measures such as the use of FFP2 and FFP3 face masks and protective screens). All the courses involved the use of the OPBL method, virtual laboratories and flipped classroom experiences (see Tools section).

2.4. Research designs

A quantitative study was carried out in which we applied a 2x2 factorial design (type of academic year and type of degree) (Campbell & Stanley, 2005). A qualitative study was also carried out in which a comparative design was applied (Flick, 2014).

2.5. Data analysis

Quantitative study: prior analyses were carried out to verify the normality of the sample (asymmetry and kurtosis statistics) and group homogeneity, prior to intervention [descriptive statistics (mean and standard deviation), one-factor fixed effects ANOVA (first year vs. second year of the pandemic)]. The hypotheses were then tested, for which a one-factor fixed effects ANCOVA was used (first year in which teaching was given (e-learning teaching method) vs. second year (b-learning teaching method) and co-variate type of degree (Degree in Occupational Therapy vs. Degree in Nursing). All of the calculations were carried out using the SPSS v.24 statistical package (IBM Corp, 2016).

Qualitative study: the answers to the open ESPEA questions (Sáiz-Manzanares, 2018) were categorised. Co-occurrence analysis between the categorised answers and the open response documents was then applied. ATLAS.ti 9 software (Atlas.ti, 2020) was used for analysis.

3. Analysis and results

3.1. Prior analysis

Prior to testing the hypotheses, we checked to see whether the sample distribution complied with the parameters of normality, for which we found the indicators of asymmetry and kurtosis compared to the results in the ACRA Scale of Metacognitive Strategies (Román-Sánchez & Gallego-Rico, 2008), a test which was applied to the various groups prior to commencing intervention. No extreme values were found for asymmetry (extreme values are considered to be those above $|2.00|$) or for kurtosis (extreme values are those between 8.00 and 20.00) (Bandalos & Finney, 2001), so that the sample can be said to display a normal distribution (Table 2). As a result, parametric contrast tests were applied in the quantitative study.

Table 2. Test for distribution normality							
Román-Sánchez & Gallego-Rico (2008) Scale of Metacognitive Strategies	Mean	Standard Deviation	Asymmetry	Standard Asymmetry Error	Kurtosis	Standard Kurtosis Error	Score
Self-knowledge	20.00	2.30	-1.20	0.20	4.30	0.30	28
Self-planning	12.50	2.00	-1.00	0.20	3.00	0.30	16
Self-assessment	19.30	2.30	-1.00	0.20	4.30	0.30	24

We then carried out a one-factor fixed effects ANOVA to test whether, prior to intervention, there were any significant differences between the groups in the results of the Metacognitive Strategies Scale (Román- Sánchez & Gallego-Rico, 2008). Differences between means in the two groups of students were minimal (from 0.1 to 0.3), and no statistically significant differences were found (Table 3), so that the groups were considered to be homogeneous prior to intervention.

Table 3. One-factor fixed effects ANOVA "modality type" in the ACRA Scale of Metacognitive Strategies (Román- Sánchez & Gallego-Rico, 2008)										
Román-Sánchez & Gallego-Rico (2008) scale of metacognitive strategies	N	n	G1 M (SD)	n	G2 M (SD)	n	gl	F	p	η²
Self-knowledge	225	107	19.9 (2.2)	42	20.2 (2.5)	118	(1,223)	0.14	0.71	0.001
Self-planning	225	107	12.5 (1.6)	42	12.5 (2.0)	118	(1,223)	0.05	0.82	.001
Self-assessment	225	107	19.3 (2.1)	42	19.2 (2.4)	118	(1,223)	0.14	0.72	.001

Note. Group 1: 2019-2020. First year of the pandemic (e-learning teaching method); Group 2: 2020-2021. Second year of the pandemic (b-learning teaching method).

3.2. Quantitative analysis

In order to test the RQ1, a one-factor fixed effects ANCOVA was performed [teaching given in the first year of the pandemic (e-learning teaching) vs. second year of the pandemic (b-learning teaching) and covariate (type of degree)]. Significant differences were found in ESPEA (Sáiz-Manzanares, 2018) with regard to the independent variable first academic year (e-learning teaching) vs. second year of the pandemic (b-learning teaching) in items 10 (expectations of the course), 18 (comparison with other courses), 19 (evaluation of the virtual laboratories), and 20 (general satisfaction), in all cases in favour of the group with e-learning teaching. An effect of the covariate value type of degree was also found in items 8 (addressing all elements of the teaching guide), 9 (help with job placement), 17 (satisfaction with the dynamics of the course), 18 (comparison with other courses) and 19 (evaluation of virtual laboratories). This effect was, however, seen to be low in all cases (see Table 4 in https://bit.ly/2UFS5OD). In other words, differences were minimal in the means of the two groups.

In order to test the RQ2, a one-factor fixed effects ANCOVA was performed (first year that teaching was given (e-learning teaching) vs. second year (b-learning teaching) and covariate (type of degree)). Results point to significant differences in the independent variable, academic performance, in favour of Group 2 (b-learning teaching) and no effects of the covariate type of degree were found (Table 4). In this case, the differences between the means were also minimal and the size of the effect was low.

3.3. Qualitative analysis

With regard to the analysis of the responses to the open questions in ESPEA (Sáiz-Manzanares, 2018), 16 documents were analysed which included answers concerning aspects to be changed, extended, reduced and/or improved. Students' answers were subsequently categorised, distinguishing between the type of degree and the year of the pandemic in which teaching was given. Answers were grouped into two analysis criteria (i) aspects to be improved, and (ii) most highly valued aspects. ATLAS.ti 9 was used to process and analyse data. A co-occurrence analysis was then performed between the categorisations by academic year and the documents. Areas that could be improved in the Occupational Therapy Degree related to carrying out real practical work with children, an aspect which was highlighted both in the first as well as in the second year of the pandemic, and facilitating decision making vis-à-vis therapeutic intervention, an aspect which was only pointed out in the first year of the pandemic (e-learning teaching).

In the Nursing Degree, no suggestions were put forward for the first year of the pandemic (e-learning teaching) but were for the second (b-learning teaching). These suggestions concerned doing workshops

during the practical training in order to explain the teaching-learning methodology and reducing the syllabus a little. Regarding the aspects considered to be most positive by students, 80% felt that the courses were well-structured, and that the syllabus was comprehensive and fitted well with the time devoted to teaching. The method used was deemed to be innovative and was seen by students as very positive in terms of their learning. Nevertheless, they felt that this type of method demanded more work time from them and that it included many technological resources they were not accustomed to using.

4. Discussion and conclusions

The digital transformation of teaching within the framework of HE was already a challenge for government heads before the onset of the COVID 19 pandemic (García-Peñalvo, 2021). The health crisis triggered by the SARS CoV-2 outbreak only hastened this process. The need to digitalise the teaching and skilling environment of both teachers and students alike (Sucha & Gamme, 2021) has had to be undertaken with urgency and addressed immediately at an institutional level all over the world. Teachers and students on degrees that were taught face to face have been forced to adapt rapidly to new forms of teaching and learning, respectively, in a context of e-learning or b-learning teaching. These contexts are directly related to the inclusion of innovative teaching and technological resources in teaching methods (Sáiz-Manzanares et al., 2021). In order to be addressed in a coherent and reliable manner, said changes should be focused on a pyramidal structure, commencing with legislative proposals related to providing a sound technological and pedagogical infrastructure in TPCK-type models (García-Peñalvo, 2021). In addition, studies need to be carried out to gauge the effectiveness and impact on learning outcomes and student satisfaction.

This study specifically compares student satisfaction with the teaching provided during the two years of the pandemic. During this period, two types of e-learning teaching were applied (first year of the pandemic) vs. b-learning (second year of the pandemic). It has been shown that students experienced greater satisfaction with teaching during the first year of the pandemic. E-learning teaching was applied during this period because of the circumstances surrounding the pandemic. The results can be explained by the stricter nature of the lockdown imposed during this period and because the method applied, when compared to other more traditional systems, offered students the chance to continue receiving teaching in a more fluent manner (e.g. the digital resources used, such as videos and virtual laboratories, were particularly valued). Yet, attention should be drawn to the fact that in the two years of the pandemic, satisfaction with this particular type of teaching based on didactic and technological innovation was very high (means of 4.14 and 4.08 out of 5) with very low dispersion indicators (DT=0.30 and DT=0.37), evidencing a high degree of agreement between the two groups. These results concur with those reported in other studies (Leal-Filho et al., 2021), specifically in health science degrees (Li et al., 2021). Moreover, these results highlight the importance of pedagogical design in virtual teaching contexts in which it is necessary to include hypermedia resources that promote interactivity aimed at boosting student motivation and fostering student interaction (Tang et al., 2021).

In addition, the results of the qualitative analysis underpin how the kind of subject matter involved may influence certain aspects of student satisfaction with the teaching provided. Nevertheless, in all cases this type of teaching was felt to be a very useful resource for learning even though it meant increasing the amount time students had to spend working. In this regard, students highlighted the need to include content related to the use of technological resources in their education. Differences found in the learning outcomes in favour of the group in which b-learning teaching was applied can be explained by aspects related to the collaborative work which at that point in the pandemic could be carried out face to face. As pointed out by the studies of Leal-Filho et al. (2021) and Li et al. (2021), being confined at the height of the pandemic lockdown led to situations of social isolation that affected students' mood and which ultimately impacted their performance.

The second year of the pandemic, the period during which restrictions were less severe, enabled greater interaction between student and teacher, which accounts for the improved academic performance. This aspect should, however, be subject to analysis in future studies that include students from other areas of knowledge. Finally, it should be pointed out that the learning outcomes were high in both groups, Group 1 (e-learning teaching), mean=8.74; Group 2 (b-learning teaching), mean=8.93, which bears out

the effectiveness of the teaching method applied. This centred around the use of OPBL and SRL in virtual environments. As has been shown in the studies of Sarwa et al. (2021), its use proves to be very effective for achieving successful learning responses. Future studies will, however, compare the learning outcomes in other subjects in which traditional teaching methods have been applied. The results to emerge from this work should, however, be taken with some degree of caution, since the research evidences certain limitations related to how the sample was selected, the specificity of the knowledge area in question, and which year of the degree the students were taking. This section points to a number of different aspects to be taken into account in future inquiry in order to enhance the generalisability of the findings.

In sum, the conclusions to emerge from this study align with the needs set out by UNESCO (UNESCO, 2019), the DigCompEdu (Redecker & Punie, 2017) and the goals of the Agenda 2030, which point towards a digital transformation in HE (García-Peñalvo, 2021). This is the challenge being faced by those responsible for university management around the world. At the same time, it should be emphasised that student and teacher satisfaction with the teaching-learning process in virtual environments must be assessed systematically in order to implement the required improvements as soon as possible. Because of this, future research will address perceived teacher satisfaction with regard to the teaching process in virtual environments during the COVID-19 pandemic. In this process of evaluation, it is important to apply a mixed research method (Anguera et al., 2018; Bonami, 2020; Sáiz-Manzanares et al., 2021; Salinas-Ibáñez & De-Benito, 2020), since this will enable quantitative or qualitative data to be obtained on the perceived student and teacher satisfaction that will aid education policymakers in their decision making.

Author Contribution

Idea, M.C.S.M.; Literature review (state of art), M.C.S.M., L.A.; Methodology, M.C.S.M., L.A., L.J.M.A.; Data analysis, M.C.S.M., L.A.; Results, M.C.S.M., L.A., L.J.M.A.; Discussion and conclusions, M.C.S.M., L.A., L.J.M.A.; Writing (original draft), M.C.S.M.; Final revisions, M.C.S.M., L.A., L.J.M.A., J.C., J.A.L.; Project design and sponsorship, M.C.S.M., L.A., L.J.M.A., J.C., J.A.L.

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Critical media literacy to improve students' competencies

Alfabetización mediática crítica para mejorar la competencia del alumnado

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ABSTRACT

Media literacy training is an urgent need of our time. Educational institutions must stand as fundamental domains to collectively address reflection on digital and media environments and prepare school-age citizens to constructively deal with the impact of the media. To do so, a paradigm shift to approach the issue is required: a critical awareness of the new scenarios created by the media and a broad reflection on their characteristics. A new framework where the spotlight is on the media, the surrounding environment is an essential reference point and training proposals are based on results and evidence. This study is part of a Design-Based Research, aimed at the creation, implementation and evaluation of a Critical Media Literacy program for high school students at the Escuela Normal Superior del Putumayo (Colombia). In this paper we present the results obtained by applying the Alfamed media competence "pre" and "post" questionnaire to the students participating in the program. The results obtained show a significant improvement both in the overall level of students' media competence and in four of the six dimensions that make up the theoretical reference model ("Technology", "Language", "Ideology and Values" and "Production and Dissemination").

RESUMEN

La formación en las competencias mediáticas constituye una necesidad urgente en nuestra época. La escuela debe posicionarse como un entorno fundamental donde abordar de manera colectiva la reflexión sobre los entornos digitales y mediáticos y la preparación de los ciudadanos en edad escolar para afrontar de forma constructiva el impacto de los medios. Para ello, se impone un cambio de paradigma en el abordaje de la cuestión: una conciencia crítica ante los nuevos escenarios que crean los medios y una reflexión amplia sobre sus características. Un nuevo marco en el que lo mediático se torne central, el entorno próximo sea un referente imprescindible y las propuestas formativas se apoyen en resultados y evidencias. El trabajo que se presenta es una parte de una Investigación Basada en Diseño, orientada a la creación, implementación y evaluación de un programa de Alfabetización Mediática Crítica para el alumnado de bachillerato de la Escuela Normal Superior del Putumayo (Colombia). Se presentan los resultados obtenidos mediante la aplicación "pre" y "post" del cuestionario de competencias mediáticas Alfamed al alumnado participante en el programa. Los resultados obtenidos muestran una mejora significativa tanto en el nivel global de competencia mediática del alumnado, como en cuatro de las seis dimensiones que configuran el modelo teórico de referencia en el que se apoya el estudio ("Tecnología", "Lenguaje", "Ideología y Valores" y "Producción y difusión").

KEYWORDS | PALABRAS CLAVE

High school, media literacy, instructional design, educational innovation, educational research, media.
Bachillerato, competencia mediática, diseño instructivo, innovación educativa, investigación educativa, medios de comunicación.

1. Introduction and state of the art

At present, media deployment impacts relationships and forms of human socialization in such a way that it is difficult to imagine a space untouched by the media. As Floridi (2016) points out, we have become inhabitants of an "infosphere" which is often influential and means more than just analog reality. In the lives of adolescents, screens play a central role and alter the ways of perceiving, feeling and constructing the notion of reality (Serres, 2016). In this new technosocial environment, the school must promote learning spaces and opportunities to aid young people in the development of a critical and broad perspective of these phenomena. The necessary transformation of educational institutions to adapt to the times, as well as the difficulties in adaptation derived from the regulatory rigidity and austerity policies practiced in the last decade, have led to wide criticism about its role in modern societies, even going so far as to predict its disappearance. This discourse is reinforced by some in the big tech sector, naively underestimating the social function of the school and directing it towards a model that would lead to the "uberization of education" (Adell-Segura et al., 2018). This approach is based on the idea that a large portion of human problems (regardless of their complexity) can be solved exclusively by technology, that is, a kind of technological solutionism (Morozov, 2015).

The COVID-19 pandemic has highlighted how simple these approaches are and the crucial role played by schools as a system that guarantees equal opportunities, as well as institutions for socialization and key agents in the face of the complexity of the digital fabric in which we live (algorithms, disinformation, datafication, privacy, new learning and so on). Discourses questioning the idea that today's media environments contribute (on their own) to forging more fair and democratic societies are becoming increasingly common. Moreover, considering the turning point that the pandemic has meant in the world of both education and work, and the fact that the role of technologies has been tested, it has become more evident that the media is related to a complex network of variables and interests that relate to such issues as technological development, business, economics, politics, and human behaviors among others (Castañeda & Williamson, 2021).

In this sense, schools as spaces for alternative and critical views must play a prominent role for reflection on these processes. In the words of Simons and Masschelein (2014), schools could position themselves as spaces of "suspension" that summon and sustain a type of relationship that surpasses other spaces (family, social), articulating a deep relationship with knowledge. Schools, throughout their historical evolution, have been linked to «the technological»: where the pedagogical was at times given special privilege and at other times, center stage was given to technologies in the teaching and learning processes were given center stage.

1.1. Mediatization and new challenges in media literacy

The mediatization of society often causes a normalization of very critical nuances, which is also reinforced by the opacity in how the media is configured. The same dizzying speed of interaction that occurs with screens leaves little room for thoughtful analysis. Likewise, positions emerge from moralistic discourses that do not help the analysis and debate required by the complexity of these issues. In this sense, media literacy must necessarily address key questions of our time such as phenomena affecting personal autonomy and decision-making capacity that promotes the development of a critical awareness of the new scenarios created by the media, and a broad reflection on their characteristics. We acknowledge that there are many voices alerting the decline of media education precisely when the need to train a critical citizenry in the face of the media is most urgent (Gutiérrez-Martín & Torrego-González, 2018). In other words, it is imperative to forsake the approach that is aimed at learning which is merely focused on the proper handling of devices. Media skills are an urgent necessity in our time. Schools must position themselves as fundamental environments in which to collectively address the reflection on these surroundings and constructively prepare school-age citizens to face the impact of the media.

The studies by Dussel and Trujillo-Reyes (2018) and Valdivia-Barrios (2010) highlight that, in their interactions with the media environment, adolescents prioritize and uncritically assume the language and aesthetics proposed in the media. Thus, students' practices replicate much of the logic sustained in these environments (now even more incumbent after mediatization and algorithms) and little do they approach

other types of perspectives and spaces for reflection. In the daily relationship of adolescents with the media, there are few alternative references to this trend. The education system should call for other perspectives, as well as other ways of relating to media environments, favoring the education of a citizenry with a critical mind when dealing with technology and media, and as content creators (Buckingham, 2016; Dussel, 2010).

The figures outlined in the latest DANE study (2019: 23) allow us to accurately reflect of the extent to which mediatization has been growing in importance in Colombia. This study highlights that the main device by which people tend to maintain some kind of connection with the Internet is through cell phones (84,9%). Dussel and Trujillo-Reyes (2018: 71) point out that "cell phones are probably the devices that have most disrupted the socio-technical landscape in recent years, perhaps only comparable to the revolution that the plane represented at the beginning of the twentieth century". Likewise, it highlights that the main use that people make of the Internet is limited to social networks (82,2%). Secondly, we find uses associated with the search for information (59,3%) followed by inherent uses in electronic messaging.

In this vein, Winocur (2013) proposed questioning the idea that citizens who are constantly connected to several screens and devices and interacting with their networks simultaneously do not necessarily become more critical of reality and more open to difference. Assuming that students are guaranteed knowledge, making them "digital natives", just because they were born, raised and surrounded by the media means leaving aside many situations of analysis and neglecting the responsibility of the educational system in the media education of the young. Being surrounded by, and constantly using the media, does not guarantee the development of a complex and critical understanding of it. Although it is true that they have more skills to adapt to these environments, it is necessary above all to address with them basic processes of information management, deep analysis of messages and the processes of safe interaction with the media and the contents they convey (Cabrera-Hernández, 2017). Most often, they show a greater development in instrumental skills related to playful and social aspects with very noticeable deficiencies in the understanding of their language and impact. Educational institutions must promote the reflective look that is scarce in most media practices, putting values that are transferred in the media into perspective, from the popular to the widespread, as well as on the processes of homogenization (aesthetic, cultural) that are fostered from these environments (Jiménez, 2019).

One of the main efforts made in the promotion of media literacy in school environments is led by UNESCO (Wilson et al., 2011) by designing a curriculum for teachers in this field. However, this proposal requires a revision that encourages in-depth reflection on current conditions while going beyond the understanding of these languages and their creation. This revision involves addressing the critical reading about information structures as a way of grouping the media into certain media groups or conglomerates and the relationships that unite them with other structures and superstructures. In other words, it involves studying the relationships between "media-business power and messages" (Alcolea-Díaz et al., 2020: 112). Understanding the complexity of the media means constantly reviewing these approaches.

We must recognize the lack of this training in our environment together with the evidence of the significant influence of the media in the daily lives of students. We must also assume that, considering that one of the fundamental missions of the *Escuelas Normales Superiores* in Colombia (ENS) is teacher training, it is urgent to work towards the goal of teachers incorporating new phenomena, languages and resources derived from the media environment into their reflections and practices. This concern has led us to ask ourselves the following questions to frame this research: how do we incorporate critical media literacy in the context of ENS in Colombia? What elements should be taken into consideration to develop an effective critical media literacy program at the high school level? How do we implement it from the didactic point of view to guarantee the development of the basic media skills that a future teacher requires?

2. Material and methods

To answer the questions raised, a Design-Based Research (DBR) was conducted, focusing on the design, implementation and evaluation of a training program for the development of media competences of students from the Escuela Normal Superior del Putumayo (ENS). De-Benito and Salinas (2016)

point out that DBR is a type of research that centers on educational innovation, whose fundamental characteristic is the introduction of a new element to transform a situation. Wang and Hannafin (2005: 6) describe DBR as a "systematic but flexible methodology that aims to improve educational practices through successive approaches in analysis, design, development and implementation, based on collaboration between researchers and participants in real contexts, leading to design principles and context-sensitive theories". These authors stress, among other characteristics of this research methodology, pragmatism and a contextualized, iterative and flexible character.

The choice of this methodology and the reason for implementing it in the context of the ENS were motivated by the conviction that it was necessary to transform the school's approach to media education, which could clearly be improved. Since it could not be handled systematically from a merely instrumental standpoint, it was therefore necessary to incorporate in the training curriculum of the ENS the social and cultural impact of the media and the approach of educational skills, to help students interact critically and constructively with the media environment. The research was therefore conceived as a construction of media training based on a rigorous study whose results supported the proposal with scientific evidence. With this in mind, the research problem was defined in four objectives:

- To know the level of media skills in ENS students, and their educational needs in this field.
- To identify the ENS teaching staff's uses of digital media in the classroom and the ENS students' uses both in the classroom and outside it.
- To design, implement and evaluate a training program for the development of media skills in the ENS.
- To identify general design principles for future similar activities (transfer to the context of other ENSs in Colombia).

All the actions developed in the first phase of the study formed the basis of the program together with the proposed theoretical approach guided by the premise that in the face of the new scenarios created by the media it is necessary to form a critical awareness and a broad reflection of its characteristics. The program is therefore oriented to the education of a citizenry with a critical mind when dealing with technology and media, and as content creators (Buckingham, 2016; Dussel, 2010). The improvement of media skills in Critical Media Literacy (CML) programs focused on four dimensions: (a) student competencies, encouraged in the activity; (b) a particular media product; (d) the participation of the members of the group. In general terms, the training program was configured around the following contents directly related to the six dimensions of the theoretical model of reference in the study (Ferrés & Piscitelli, 2012):

- Case analysis: Cambridge Analytica (Dimensions 1 Technology, 2 Language and 4 Ideology and values).
- Media languages. Transitions and alterations to visual culture (Dimension 2 Language).
- Fake news and disinformation (Dimensions 1 Technology, 2 Language and 4 Ideology and values).
- Does anyone know what an image is? (Dimensions 1 Technology and 2 Language).
- Audience and interaction processes (Dimension 3 Interaction processes).
- Analysis of aesthetics within the same genre. The selfie (Dimension 6 Aesthetics).
- Information search processes (Dimensions 1 Technology, 2 Language and 5 Production and dissemination processes).
- Media creation processes: scriptwriting and audiovisual language (Dimensions 1 Technology, 2 Language and 5 Production and dissemination processes).
- Processes of media creation: one eye on the camera and the other on the script, filming all the scenes (Dimensions 1 Technology, 2 Language and 5 Production and dissemination processes).
- Processes of media creation: editing (Dimension 5 Production and dissemination processes).
- Reflection on an episode of the series created by Charlie Brooker (Dimension 4 Ideology and values).
- Digital identity. How do we build our identity in media environments? (Dimensions 1 Technology, 2 Language, 3 Interaction Processes and 4 Ideology and values).

2.1. Research stages and instruments

The study was developed in four phases following the model proposed by McKenney and Reeves (2019). The first phase focused on collectively (teachers, families, researchers) defining the elements that were perceived as problematic with respect to the approach that the ENS was taking to media education. It also allowed us to identify the main characteristics of the relationship of students with the media. In the second phase, the media literacy program was developed under the supervision of internationally recognized researchers in this field.

Table 1. Research phases/stages, instruments and objectives			
Stages	Qualitative data collection tools	Quantitative data collection tools	Research objectives
STAGE 1 Identification and analysis of problematic elements	Student focus groups Family focus groups Teacher focus groups Document analysis	Alfamed media competence questionnaire (first application-Pre)	To know ENS students' level of media skills and their education needs in this field. To assess the use of digital media by ENS students in the classroom and outside of it. Identify how ENS teachers use digital media in the classroom.
STAGE 2 Critical Media Literacy (CML) Program Design			Design a program for the development of media skills in the ENS.
STAGE 3 Implementing the CML Program	Field notes/journal Student creations		Implement the educational program (12 sessions of an hour and a half in the ENS facilities).
STAGE 4 Evaluation and reflection to improve solution implementation	Semi-structured interviews (teachers and students)	Alfamed media competence questionnaire (second application-Post)	Evaluate the educational program Identify general design principles for similar future developments.

During the third phase, the training program model created in the ENS was implemented and all the necessary data for its evaluation were collected. Finally, in the fourth phase, the analysis of all the data obtained and the reflection of the process were carried out, in order to improve the designed proposal for education in critical media skills. From this analysis, a deep understanding of the process and the results was generated, drawing conclusions for the improvement of the program and its implementation, which led to the formulation of a proposal for the curricular inclusion of media education in the ENS.

The fieldwork was approached by combining five types of instruments, which produced a vast amount of data that allowed a deep understanding of the phenomena raised in the research. Table 1 synthetically presents the design and sequence of the research offering a complete view of the process and decisions taken. In this paper we will refer exclusively to the results obtained in terms of improving the skills of students through the Alfamed questionnaire.

2.2. Population and study sample

The participants of the research were selected according to the requirements and purposes of each of the phases/stages, focusing the proposal on the baccalaureate students. In the first phase, data were collected from three sources:

- The Alfamed media skills questionnaire that was answered when first handed out by all ENS students (366 students aged between 13-17 years), including the 29 who took the program and to whom the questionnaire would again later be given.
- Six focus groups (35 students, 12 teachers and nine family board members)
- Documentary analysis. The main documents and regulations existing in Colombia that guide the practices in media education (public policies and institutional policies of the ENS).

In the third phase of implementation of the CML program (September to December 2018), an intentional sampling was carried out looking for maximum variability in the representation of the students and following the recommendations of the teachers of the ENS depending on the objectives of the research. A total of 29 students aged between 14 and 15 years were involved in the Media Literacy program. In this phase, data were collected from two sources:

- The field diary of the principal investigator.
- Artifacts: student creations that collect the knowledge developed during the process.

Finally, in the fourth phase of process evaluation and reflection, data were collected from two sources in order to generate a retrospective reflection and analysis with the participants, as well as to assess the level of students' media competence after applying the program:

- Semi-structured group interviews with both students and teachers. Two interviews were conducted: one with the students (seven participants) and another with the teachers (three participants) who were selected according to criteria of interest in the program and involvement in its development.
- The Alfamed Network media skills report, which was answered the second time around exclusively by students participating in the critical media literacy program (29 students aged between14 and 15).

3. Analysis and results

To assess the students' media competence level, the Alfamed media competence questionnaire (Aguaded et al., 2018) was applied, both before and after the program, to the participating students and the scores of both samples (pre and post) were registered. This instrument, widely tested in different countries and validated in educational contexts, structures media competence around knowledge, skills and attitudes related to the six dimensions of the Model of Ferrés and Piscitelli (2012): "Technology", "Language", "Interaction Processes", "Ideology and values", "Production and Dissemination Processes" and "Aesthetics". According to the sample size (Gómez-Gómez et al., 2003) and the scale of measurement of the levels of competence of the Alfamed (ordinal) instrument, we determined the application of non-parametric statistics, specifically, the Wilcoxon Signed-Rank Test for related samples (Flores-Ruiz et al., 2017; Weaver & Etxeberria-Murgiondo, 2006). The samples studied were made up of the same participants and related for analysis.

3.1. Evolution of the global level of student media competence after applying the CML program

In order to obtain evidence of the progression of the global levels of the students' media competence, the Wilcoxon signed rank-test was applied to related samples taking the results obtained in all dimensions into account. To know if the global level of media competence of the students varied after applying the CML program, the following hypotheses were formulated:

- Ho. There are no differences between the levels of student media competence before and after the program.
- Ha. There are differences between the levels of student media competence before and after the program.

Table 2. Wilcoxon signed-rank test (pre & post). Media competence				
		N	Average rank	Sum of ranks
Post_MC - Pre_MC	Negative ranks	0a	.00	.00
	Positive ranks	12b	6.50	78.00
	Ties	13c		
	Total	25		
Test statistics				
		Post_MC - Pre_MC		
Z		-3.357 [b]		
Asymptotic sig. (bilateral)		.001		

The result of the test (sig=0.001<0.05) showed differences in the level of student media competence before and after applying the Critical Media Literacy program. The program therefore led to an improvement in the level of the participants' overall media competence.

3.2. Evolution of the level of media competence in dimension 1 "Technology"

To obtain evidence of the progression of levels of competence in the "Technology" dimension, which focuses on knowledge, skills and attitudes related to the use of technological and communicative tools, the same test was applied by formulating the corresponding hypotheses (Ho: There are no differences in dimension 1. Ha: There are differences in dimension 1).

Table 3. Wilcoxon signed-rank test (pre & post). Technology Dimension				
		N	Average rank	Sum of ranks
Post_Dim1- Pre_Dim1	Negative ranks	3[a]	5.00	15.00
	Positive ranks	9[b]	7.00	63.00
	Ties	13[c]		
	Total	25		
Test statistics				
			Post_Dim1 - Pre_Dim1	
Z			-1.979 [b]	
Asymptotic sig. (bilateral)			.048	

The result (sig=0.048<0.05) showed differences in the level of student competence before and after the implementation of the program, suggesting an improvement in the level of competence in the 'Technology' dimension.

3.3. Evolution of the level of media competence in dimension 2 "Language"

To obtain evidence of the progression of levels of media competence in the "Language" dimension, which focuses on knowledge, skills and attitudes related to the interpretation of the various codes of representation and messages as well as the capacity for expression, the same test was applied by formulating the corresponding hypotheses (Ho: there are no differences in dimension 2. Ha: There are differences in dimension 2).

Table 4. Wilcoxon signed-rank test (pre & post). Language Dimension				
		N	Average rank	Sum of ranks
Post_Dim2- Pre_Dim2	Negative ranks	1[a]	5.00	5.00
	Positive ranks	10[b]	6.10	61.00
	Ties	14[c]		
	Total	25		
Test statistics				
			Post_Dim2 - Pre_Dim2	
Z			-2.653 [b]	
Asymptotic sig. (bilateral)			.008	

The result (sig=0.008<0.05) showed differences in the level of student competence before and after the program, suggesting an improvement in the level of competence in the 'Language' dimension.

3.4. Evolution of the level of media competence in dimension 3 "Interaction processes"

To obtain evidence of the progression of levels of media competence in the "Interaction processes" dimension related to knowledge, skills, and attitudes in the interaction *with* and *through* the media as well as self-regulation of use, the same test was applied by formulating the corresponding hypotheses (Ho: There are no differences in dimension 3. Ha: There are differences in dimension 3).

The result (sig=0.206>0.05) showed no differences in the level of student competence before and after the program. Thus, it meant there was no improvement in the level of competence in the 'Interaction processes' dimension.

3.5. Evolution of the level of media competence in dimension 4 "Ideology and values"

To obtain evidence of the progression of levels of media competence in the "Ideology and values" dimension related to knowledge, skills, and attitudes in the critical analysis of the media, their intentions and how these modulate opinions and identities, the same test was applied by formulating the corresponding hypotheses (Ho: There are no differences in dimension 4. Ha: There are differences in dimension 4).

Table 5. Wilcoxon signed-rank test (pre & post). Ideology & values				
		N	Average rank	Sum of ranks
Post_Dim4- Pre_Dim4	Negative ranks	3ᵃ	5.50	16.50
	Positive ranks	12ᵇ	8.63	103.50
	Ties	10ᶜ		
	Total	25		
Test statistics				
			Post_Dim4 - Pre_Dim4	
Z			-2.568ᵇ	
Asymptotic sig. (bilateral)			.010	

The result (sig.0.010<0.05) showed differences in the level of student competence before and after the program, suggesting an improvement in the level of competence in the 'Ideology and values' dimension.

3.6. Evolution of the level of media competence in dimension 5 "Production and dissemination processes"

To obtain evidence of the progression of levels of media competence in the "Production and dissemination processes" dimension related to knowledge, skills, and attitudes of and towards the systems and techniques of production and dissemination of media content, the same test was applied by formulating the corresponding hypotheses (Ho: There are no differences in dimension 5. Ha: There are differences in dimension 5).

Table 6. Wilcoxon signed-rank test (pre & post). Production & dissemination processes				
		N	Average rank	Sum of ranks
Post_Dim5- Pre_Dim5	Negative ranks	2ᵃ	12.25	24.50
	Positive ranks	17ᵇ	9.74	165.50
	Ties	6ᶜ		
	Total	25		
Test statistics				
			Post_Dim5 - Pre_Dim5	
Z			-2.984ᵇ	
Asymptotic sig. (bilateral)			.003	

The result (sig=0.003<0.05) showed differences in the level of student competence before and after the program, suggesting an improvement in the level of competence in the 'Production and dissemination processes' dimension.

3.7. Evolution of the level of media competence in dimension 6 "Aesthetics"

To obtain evidence of the progression of levels of media competence in the "Aesthetics" dimension related to knowledge, skills, and attitudes associated to aesthetic quality and mobilization of emotions, the same test was applied by formulating the corresponding hypotheses (Ho: There are no differences in dimension 6. Ha: There are differences in dimension 6). The result (sig.=0.035<0.05) showed differences in the level of student competence before and after the program, but the sum of negative ranks in this case was higher than that of positive ranks, so the results indicated worse levels in this dimension.

4. Discussion and conclusions

This research is based on two fundamental ideas that are widely shared by education and communication specialists. After two decades into the twenty-first century, the attention given to these ideas by educational administrations in their strategies for the digitization of education has been found wanting. On the one hand, digital technologies and media environments alone do not contribute to a fairer and more democratic society. On the other hand, the mere widespread use of the media does not guarantee the digital and media skills that twenty-first century citizens need. Preparing young people to understand with a critical perspective the techno-social environment and the phenomena associated with it and successfully face the impact of the media on all dimensions of life, is today a fundamental component of the right to education and an inexcusable duty of educational systems. In the last two decades, much has been written about this right, the basic corpus of this literacy has been conceptualized and systematized

and, in short, progress has been made in its conceptualization. Moreover, its systematic incorporation into official educational curricula or teacher training plans has not been consolidated.

The pandemic that we are experiencing has further demonstrated the urgency of extending this right, placing the emphasis on the fact that digital technologies can and should play a role in the transformation of education. However, the social polarization that we are experiencing on a global scale, and the role that the media are playing in this phenomenon, are bringing to light the risks that a permanent media exposure entails and without the most basic tools that allow for a broad understanding of its impact from a critical perspective. The problem addressed in this study is how to transform this body of knowledge around media literacy into relevant training proposals to ensure the acquisition of skills in compulsory education. For this reason and convinced that educational innovation must be based on evidence, we face this problem in a specific educational context. We developed a study that allowed us to design in context a program of critical media training with the intention that it be institutionalized in the curriculum. We experimented and evaluated the whole process in an iterative dynamic to hone a proposal for its inclusion in an educational curriculum.

As can be perceived, the development and evaluation of the proposal far exceeds the approaches and results that we have been able to present in this article, but in our opinion, it should be the object of interest of the scientific community to know, together with the multiple monographs, the reflections and experiences developed in all these years on the issue, to provide proposals supported by evidence that allow us, through rigor, to open paths both in the task of incorporating media literacy in official curricula and in the training of teachers.

The results obtained in the first application of the Alfamed questionnaire to all high school students of the ENS, showed that a majority of students acquire their digital and media literacy from self-learning (85.2%) and almost half have not received any training in audiovisual education (49.2%). Hence the urgency of systematically introducing media literacy into the educational curriculum so that the school is positioned as a space for media literacy, as proposed by Simons and Masschelein (2014). Our Critical Media Literacy program was the first step towards that goal: designing it and demonstrating its impact. In general terms, taking into account the results presented, it can be said that the program designed to improve the media competence of high school students of the Escuela Normal Superior del Putumayo had a significant impact on the levels of student media competence performance, and that the participating students significantly improved their level of overall media competence. If we focus with greater precision on the six dimensions that make up media competence in the model proposed by Ferrés and Piscitelli (2012), the results obtained show a significant improvement in the level of competence of the participating students in four of the six dimensions. Thus, the 'Technology' dimension improved the skills for handling the technological innovations that make multimodal and multimedia communication possible, and the understanding of the role played in society by media environments and their repercussions on society as a whole.

In the "Language" dimension, they augmented the skills to interpret and evaluate the various codes of representation and the role they play in a media message. They also strengthened their capacities to express themselves through a wide range of systems of representation and significance. In the "Ideology and values" dimension, they improved the ability to detect intentions or interests that underlie both corporate and widespread productions to analyze virtual, individual, and collective identities as well as to detect stereotypes, especially in terms of gender, ethnicity and culture. In the "Production and dissemination" dimension, the students improved their abilities in production systems, programming techniques, and media dissemination mechanisms. They also incorporated skills to manage creative processes using communicative technologies.

Contrarily, in the "Interaction processes" dimension, there were no improvements in the ability to evaluate the cognitive effects of emotions, nor in the knowledge of the legal possibilities of claiming for non-compliance with the current rules on audiovisual matters and in the development of a responsible attitude to these situations. This data suggests we should review the elements of the program linked to this dimension to reformulate the training proposals and refine the proposal. Finally, in the "Aesthetics" dimension, results showed that the students' abilities to make aesthetic judgments did not improve either;

on the contrary, worse results were obtained after the implementation of the program. Therefore, in a new phase of program design, both the focus and the approach of the training activities linked to this dimension will also have to be reviewed. This result deserves to be addressed taking into account the need to respond to the problem posed by the impact of language and aesthetics currently projected by the media (Dussel & Trujillo-Reyes, 2018; Valdivia-Barrios, 2010).

Despite the limitations revealed in the results obtained and in the design of the research itself (as it is only one case), this research has thoroughly examined the context involving all agents. It has also designed, implemented, and evaluated a training program obtaining successful results in terms of improving student media competence and has calibrated the strategic value of the study in national and Ibero-American contexts. The results presented therefore represent an unyielding advance for the improvement of the proposal and the implementation of media competence in the Colombian educational curriculum and hopefully, in the near future, in the Escuelas Normales Superiores of the country.

Author Contribution

Idea, W.A.M.R., C.F.M.; Literature review (State of the art), W.A.M.R.; Methodology, W.A.M.R., C.F.M., B.C.L.; Data analysis, W.A.M.R., C.F.M.; Results, W.A.M.R., C.F.M..; Discussion and conclusions, W.A.M.R., C.F.M., B.C.L.; Drafting (original draft), W.A.M.R., C.F.M., B.C.L.; Final revisions, W.A.M.R., C.F.M., B.C.L.; Project Design and sponsorship, W.A.M.R., C.F.M., B.C.L.

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Families' perception of children's academic performance during the COVID-19 lockdown

Percepción de las familias sobre el desempeño escolar durante el confinamiento por COVID-19

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ABSTRACT

The COVID-19 pandemic forced many countries to impose a strict lockdown policy on citizens during a prolonged period of time, which led to changes in lifestyle habits. This unprecedented situation has given rise to numerous studies aimed at determining the effects of the changes brought about by this widespread lockdown. One of the important changes was the digitisation of education and, therefore, teaching, which caused a forced and abrupt immersion in distance learning. In this study, a quantitative methodology based on an ex post facto research design was used with the aim of analysing the impact of the COVID-19 lockdown on the academic performance of schoolchildren (aged 3-12 years). A total of 529 parents completed an ad hoc questionnaire on the impact of COVID-19 on their children's education in Spain. The results produced a robust model based on structural equations that explain 39.7% of the variance in academic performance at home. The family-school relationship was the variable with the greatest explanatory weight (β=.505; p<.05). In conclusion, the benefits derived from a strong relationship between families and schools, evidenced by the creation of cooperation and communication links, facilitate the management of shared educational challenges such as on-line education in times of crises.

RESUMEN

La situación generada por el obligado confinamiento a la sociedad por la COVID-19 ha llevado, en muchos países, a cambios en los hábitos de vida que han generado numerosos estudios para conocer los efectos de esta nueva situación social. Un importante cambio fue la digitalización del trabajo y, por ende, de la enseñanza, provocando la inmersión forzada en una educación escolar a distancia de una manera abrupta. Se realizó un estudio empleando metodología cuantitativa y basado en un diseño ex post facto, con el objetivo de analizar el impacto que ha tenido el confinamiento por COVID-19 en el desempeño de los escolares (de 3 a 12 años de edad). Un total de 529 participantes completaron el cuestionario CIEN (Cuestionario sobre el Impacto Educativo en la Infancia) sobre impacto educativo de la COVID-19 en sus hijas e hijos escolarizados en España. Los resultados arrojaron un modelo robusto basado en ecuaciones estructurales que explicó el 39,7% de la varianza en el desempeño escolar en casa, siendo la relación familia-escuela, la variable que reveló mayor peso explicativo (β=.505; p<.05). En conclusión, los beneficios derivados de una relación entre la familia y la escuela, patente en el establecimiento de lazos de comunicación y cooperación, facilitan el afrontamiento de retos educativos compartidos tales como la educación a distancia en tiempos de COVID-19.

KEYWORDS | PALABRAS CLAVE

Socio-emotional impact, family-school relationship, e-learning, academic performance, lockdown, COVID-19.
Impacto socioemocional, relación familia-escuela, desempeño escolar, educación a distancia, confinamiento, COVID-19.

1. Introduction and state of the issue

In its initial stages, the COVID-19 pandemic, which has affected the entire planet, forced authorities to confine citizens to their homes or to "lockdown" society in an attempt to decelerate and contain the spread of the potentially lethal virus (Siqueira et al., 2020). During the lockdown, only those in professions deemed to be essential by the authorities (healthcare, food, emergency services, etc.) were allowed to work. Many companies and employees adapted to remote working or teleworking from home where possible. However, this was not the only change that families had to face. The interruption to the school agenda due to the COVID-19 pandemic brought with it a new format of unplanned online teaching and learning referred to as "emergency remote teaching" (Hodges et al., 2020). To ensure continuity and not disrupt the educational process (Muñoz-Moreno & Lluch-Molins, 2020), classroom learning was moved to the home and supported by families, in what has recently been termed as "home-based learning" (Zainuddin et al., 2020).

In this situation, existing and limited resources were used, including a preference for digital platforms, which put the well-known digital divide back in the spotlight. The digital divide has affected and continues to affect both families and teachers and ultimately generates inequitable educational contexts (Rodicio-García et al., 2020; García-Díaz, 2020). Mass school closures have increased educational inequalities and, in consequence, the risk of negative social, emotional and behavioural patterns (Drane et al., 2020). In many countries, children were stopped from attending school, which changed their habits and routines, their participation in extracurricular activities, and their interaction with social groups and peers, all of which disappeared overnight (Daniel, 2020). The lockdown situation led to a decrease in student's academic motivation, especially in younger children, with no differences found in terms of gender or parents' level of education (Zaccoletti et al., 2020).

The situation also limited children's interaction with natural spaces, along with play and contact with their peers, which brought to the surface the negative consequences derived from a lack of outdoor activity and relationships (Jorquera-Rojas, 2019). In other words, children were deprived of the elements and conditions they needed for their full physical, social and emotional wellbeing (Cheng, 2020; López-Bueno et al., 2020). Balluerka-Lasa et al. (2020) argue that the most damaging consequences of the COVID-19 pandemic lockdown on the population's physical and psychological wellbeing were the loss of habits and routines, as well as psychosocial stress. In a recent cross-cultural study (Orgilés et al., 2021), stress levels in schoolchildren and adolescents (aged 3-18 years) from Spain, Portugal and Italy were analysed to gauge how they were coping with the COVID-19 lockdown. Data was collected using a questionnaire answered by parents on possible symptoms of depression and/or anxiety they might have perceived in their children. The results of the total study sample revealed symptoms of depression in 19% of the children and anxiety in 38%. The data for Spain were particularly discouraging, with 56% of Spanish parents reporting symptoms of anxiety in their children.

Two major deficiencies were identified that may be the origin of the symptomatology suffered by children in lockdown: a) lack of contact and relationships with peers, and b) the change of learning environment. The education centre where learning is usually mediated by professional teachers was substituted by a screen or virtual modality, and learning had to be supported by families. This situation gave rise to inequalities in access to education, given that improvised "home-schooling" depends both on the accessibility to and mastery of digital technologies, and on the support that the family context can offer in terms of technical resources, academic level, and time (Sahlberg, 2020). It has been established that the act of physically going to school not only facilitates conceptual and procedural content learning, but also attitudinal learning, such as models of democratic participation, respect, empathy, etc. As a result, the school is recognised as a space for socialisation and citizen training (Manosalva, 2019). Schools are places where relationships between equals are paramount and necessary at an age when individuals are being formed, which is why education is considered a social institution (Jara-Parra & Jara-Parra, 2020). Interaction based on language, egalitarian dialogue, and imitation are the true foundations of educational transformation (Ordóñez-Sierra & Rodríguez-Gallego, 2016).

Given the need to strengthen the ties between families and schools, another point of interest is to explore parents' perception on the relationship between educational contexts and implementing that same

context at home under the supervision of the family. The role of parents in supporting and assisting their children adequately must also be considered. This can be a very complex task, primarily due to a lack of knowledge of pedagogical strategies and contents (Vázquez-Soto et al., 2020). Studies show that the rapid transition from face-to-face education to distance learning is an arduous and difficult task for families to undertake, consequently, the effects and the perception of the change need to be studied. The literature indicates that families' difficulty in managing the change was positively related to stress levels, which were lower in higher self-efficacy and well-functioning families (Moscardino et al., 2021). In the same vein, support from schools to enhance parents' self-efficacy could be very beneficial, as could mentoring and supporting families who lack technological resources. Direct collaboration from schools can improve children's quality of life and their interest in educational activities (Elboj-Saso et al., 2021). In short, the family-school relationship is essential in the teaching-learning process, especially during the initial school years, whose role may have been accentuated by the pandemic situation.

In contrast, staying at home all day for the youngest children brought with it a new reality that generated the need to restructure school time in order to reschedule both leisure activities and homework (Szabo et al., 2020; Varela et al., 2021). The quality of supervised leisure time at home must also be taken into account: the type of games (analogue or digital), time spent watching TV, reading, doing household chores, or physical activities that could be practised at home. Broadly speaking, the COVID-19 lockdown in Spain has been a challenge at all levels, and especially for education (Álvarez-Zarzuelo, 2020; Cabrera, 2020). Consequently, it is essential to determine the impact that this period has had on minors in terms of the intended continuity of learning at home and how it is implemented, the family-school relationship, and the socio-emotional impact. The objectives and hypotheses of the study are explained below.

1.1. Objectives

The general objective of the study is to determine the impact of the COVID-19 lockdown on schoolchildren's academic performance. The following specific objectives emerge from this general overview:

- To study parents' perception of the impact of the COVID-19 lockdown on the family-school relationship, emotional impact, healthy and supervised leisure activities, social impact, and academic performance at home.
- To analyse the relationships between variables considered to be predictors or influencers of parents' perception of the impact of the COVID-19 lockdown on their children's academic performance at home.

1.2. Hypotheses

H1. The variables family-school relationship, emotional impact, healthy and supervised leisure activities, and social impact are predictors of parents' perception of the impact of the COVID-19 lockdown on their children's academic performance at home.

H2. A robust model based on Structural Equation Modelling (SEM) is optimal for identifying the interaction between predictor variables and the explanatory weight they exercise on parents' perception of the impact of the COVID-19 lockdown on their children's academic performance at home.

2. Material and methods
2.1. Participants

The sample consisted of 529 participants, parents of schoolchildren, selected using non-probabilistic purposive sampling. The mean age of the participants was M=39.94 years old and the standard deviation SD=6.33. Of the total sample, 465 were female (M=39.44; SD=6.02) and 64 males (M=43.58; SD=6.15). Of those surveyed, 67 participants were from a rural setting (M=39.57; SD=5.64), and 462 from an urban area (M=39.99; SD=6.43).

Although it is true that both parents are involved in the educational process of their children from the beginning of schooling, mothers show a higher level of involvement and make a greater effort to balance family and work time (Fernández-Freire et al., 2019); a fact that would justify the gender distribution of

the sample. The children of the participants were aged 3-12 years and were attending pre-school and primary schools in Spain.

2.2. Methods

An ad hoc questionnaire for data collection was designed and it was titled, Questionnaire on the Impact of Children's Education (CIEN for its initials in Spanish), in which 63 questions were asked on various topics. The questionnaire was distributed through the collaboration of the research team members and various organisations such as the Andalusian Association of Headteachers of Infant, Primary and Residential Schools (ASADIPRE for its initials in Spanish), the Andalusian Confederation of Parents of Pupils for Public Education Associations (CODAPA for its initials in Spanish), the Federation of Parents of Pupils of Subsidised Schools Associations (CONCAPA), the Scientific Culture and Innovation Unit (UCC + i) of various Andalusian public universities, education trade unions, subsidised school networks such as SAFA, and public and subsidised school management teams. This extensive network gave us access to families from different socio-cultural backgrounds. The aim of the CIEN questionnaire was to analyse the impact of the COVID-19 lockdown on children that were confined to their homes during the lockdown and the suspension of face-to-face teaching in five different dimensions:

- Emotional impact: understood as parents' perception of the feelings of nervousness, sadness, joy, fear, serenity and anger they observed in their children.
- Social impact: refers to parent's perception of their children's feelings of loneliness, the time spent with them, as well as boredom, the frequency of family tension situations, and the nostalgia directed at school, their friends, and non-cohabiting family members.
- Impact on leisure activities at home: understood as the hours spent on supervised leisure activities at home. Aspects such as traditional family play or digital play, which may be supervised or alone; reading; television; collaboration in household chores, and physical activity.
- Impact on educational activities (studying from home): refers to parent's perception of the educational instruction and material provided by the teaching team; adjusted and appropriate assignment of tasks; quality and relevant use and motivation to use online tools, and the importance of family support in the teaching-learning process.
- Impact on the family-school relationship: refers to the communication between teachers, families and other schoolchildren, as well as attendance to online classes, and the perception of mentoring and maintaining the pace of learning.

This assessment is based on parents' perception of their children's socio-emotional state, their leisure and educational activities, and their relationship with school while subject to the pandemic situation of lockdown. The questionnaire was validated by an expert panel consisting of a selection of professionals based on their trajectory in relation to the construct. The panel analysed the items to determine their relevance and representativeness and made suggestions to include items at their own discretion (Pedrosa et al., 2013). A pilot study was conducted with 400 participants to detect possible errors and redistribute the items if needed. Subsequently, exploratory factor analysis was performed to identify the factor structure, each factor representing one of the dimensions previously studied. Cronbach's alpha gave an internal consistency measure of $\alpha = .81$.

2.3. Procedure

The procedure performed in this study was developed using a quantitative methodology and an ex post facto design. An online questionnaire was disseminated during the period coinciding with the end of the COVID-19 lockdown and the period immediately after. Parents completed the untimed questionnaire individually via WhatsApp on their mobile devices. This required an Internet connection and a device, a smartphone, to complete it. Before the questionnaire was sent, informed consent was obtained from the participants to confirm that they were of legal age and agreed to participate, anonymously and voluntarily, in the study on the impact of lockdown on education. The data were stored directly in a database specifically designed and organised for that purpose.

2.4. Analysis and data processing

Responses were collected using a 5-point Likert-type scale from the lowest value (1: strongly disagree) to the highest value (5: strongly agree). To calculate the totals for each dimension, response scores were reversed to unify the direction of the evaluation. The social and emotional impact dimensions were calculated in a negative direction (reversing positive scales, e.g., those relating to joy and serenity), while other dimensions such as time spent on healthy and supervised leisure activities at home, impact on academic performance (home-schooling), and family-school relationship were calculated in a positive direction, i.e., the higher the score, the higher the satisfaction (in contrast to the social and emotional impact dimensions).

The data analysis was descriptive and inferential in order to respond to the research objectives and hypotheses. The data was analysed using the SPSS 24.0 statistical package to calculate the descriptive, correlational and stepwise multiple linear regression analyses, which produced the coefficients for the independent variables introduced in the model. The Durbin-Watson d statistic was used to test for autocorrelation in the residuals from the regression analysis and the EQS 6.2 package to represent the interaction between the variables. To this end, the robust maximum likelihood (RML) estimation method was used to calculate a series of indices to contrast the suitability of the proposed models based on their fit using Hu and Bentler's (1999) criteria, among them: the non-normed fit index (NNFI), the comparative fit index (CFI), the goodness-of-fit index (GFI), and the root mean square error of approximation (RMSEA); as well as the Satorra-Bentler scaled chi-square statistic (Satorra & Bentler, 2001).

3. Analysis and results

First, the descriptive statistics listed in Table 1 were calculated for the dimensions assessed by the CIEN questionnaire.

Table 1. Descriptive statistics of the selected variables ue to the impact of COVID-19				
	Min	Max	M (SD)	Me
Emotional impact	6	30	15.72 (.22)	16
Social impact	7	35	21.63 (.20)	22
Healthy and supervised leisure activities at home	11	41	30.97 (.23)	30
Family-school relationship	11	40	27.20 (.29)	28
Educational activities and performance at home	13	55	38.40 (.32)	39

To obtain more information about the relationship between the variables studied, bivariate correlations were calculated using Spearman's correlation coefficient. The results are shown in Table 2.

Table 2. Bivariate correlations calculated for the analysed variables					
	1.	2.	3.	4.	5.
Emotional impact	1				
Social impact	.519**	1			
Healthy and supervised leisure activities at home	-.022	-.091*	1		
Family-school relationship	-.174**	-.158**	.286**	1	
Educational activities and performance at home	-.282**	-.250**	.285	.584**	1

Note. *(p<0.05); **(p<0.01).

The most significant correlation was obtained between parent's perception of educational activities and their children's academic performance at home, followed by the correlation between social and emotional impact. The latter correlation is to be expected, given that they are interdependent constructs that are separable in the analysis but coexist as a single psychological condition.

To test the first hypothesis (H1), a stepwise multiple linear regression analysis was performed, which produced four models (Table 3). The fourth model shows the highest explanatory power. Consequently, taking into account the adjusted R^2 values, 37.1% of the variance in the perception of educational activities and academic performance at home could be predicted by social impact, emotional impact, healthy leisure activities at home and the family-school relationship, thus the first hypothesis (H1) is accepted.

Table 3. Results of stepwise multiple linear regression analysis with four predictive models								
				Change statistics				
Model	R	R²	R² adjusted	SE of the estimate	R2 change	F change	Sig. F change	Durbin-Watson
1	.569a	.324	.322	6.07	.324	252.05	.000	
2	.596b	.355	.353	5.94	.032	25.87	.000	
3	.608c	.370	.366	5.87	.014	12.06	.001	
4	.613d	.376	.371	5.85	.006	5.07	.025	1.85

Note. a) Predictor variables: (Constant), Family-school relationship; b) Predictor variables: (Constant), Family-school relationship, Emotional impact (negative); c) Predictor variables: (Constant), Family-school relationship, Emotional impact (negative), Healthy and supervised leisure activities; d) Predictor variables: (Constant), Family-school relationship, Emotional impact (negative), Healthy and supervised leisure activities, Social impact (negative). Dependent variable: Educational activities and performance at home.

It also shows that the t-value is associated with a probability of error of less than .05 (p<.05) for all four variables included in the predictive model. The null hypothesis was tested to ensure the regression coefficient was zero using the results of the t-test and its critical value.

In turn, the standardised coefficients (Table 4) show the weight that each of the variables in the explanatory model has in relation to the explanation of the dependent variable: the family-school relationship (β=.500); the emotional impact on schoolchildren (β=-.137); the amount of time spent in healthy and supervised leisure activities (β=.118), and the social impact on children (β=-.091). All indices contributed favourably or incrementally to explaining the variability of scores on positive perception and satisfaction with academic performance at home.

Table 4. Stepwise multiple linear regression analysis coefficients								
Model		Unstandardised coefficients		Standardised coefficients	t	Sig.	Collinearity statistics	
		B	SE	Beta			T	VIF
4	(Constant)	24.85	2.156		11.52	.000		
	Family-school relationship	.542	.040	.500	13.66	.000	.891	1.123
	Emotional impact (negative)	-.192	.057	-.137	-3.38	.001	.730	1.370
	Healthy and supervised activities at home	.164	.050	.118	3.24	.001	.907	1.103
	Social impact (negative)	-.143	.064	-.091	-2.25	.025	.733	1.365

Note. T: Tolerance; VIF: Variance Inflation Factor.

To validate the model, the Durbin-Watson d statistic was used to test for autocorrelation in the residuals. The result d=1.85 (close to 2) confirms the absence of autocorrelation. Similarly, adequate values of Tolerance and VIF were also obtained, which confirms the absence of multicollinearity and the stability of the estimates.

Figure 1. MIMIC Structural Equation Model for educational activities and performance at home
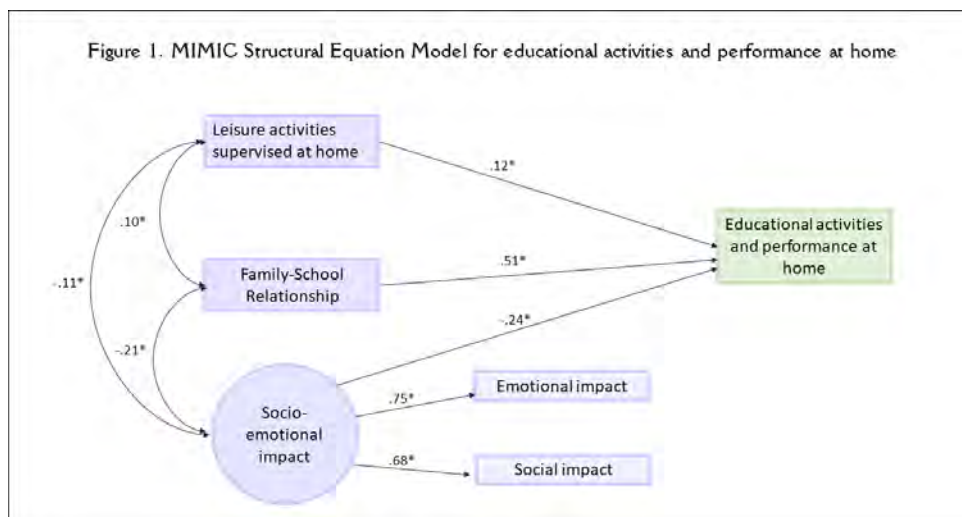
In order to analyse the relationship between the dependent variable and, in particular, how the different independent predictor variables relate to one another, a structural equation model was calculated, which also supports the second hypothesis (H2). Due to the characteristics of the constructs analysed, a latent

variable was produced to consider the perceived socio-emotional impact, which can be inferred from the observed variables, social and emotional impact. The model also considered the covariance between the predictor variables of the model.

To assess the model's goodness-of-fit, Hu and Bentler's (1999) cut-off criteria were followed. The results of the indices, which are the most widely used (Ruiz et al., 2010), show the fit of the model: χ^2SB=2.23; p=.13, CFI=.997, NNFI=.971, NFI=.995, RMSEA=.04; CI (.00-.13). The results show that the model used was optimal, given that 39.7% of the variance in the explanation of satisfaction with educational activities and performance at home was predicted, thus the second hypothesis (H2) is accepted. The relationship shows the importance of the variables included in the model, whose standardised regression coefficients reveal their influence on the dependent variable. The standardised coefficients for the different predictor variables were as follows: family-school relationship (β=.505; p<.05), amount of time spent in healthy and supervised leisure activities (β=.121; p<.05), and socio-emotional impact (β=.121; p<.05).

4. Discussion and conclusions

Traditionally, research has focused on the weight of parents' perceptions and expectations of children's academic performance, and especially their role in such essential educational aspects as early literacy. Results from longitudinal studies (Manfra, 2019) indicate that parental beliefs about academic performance in early childhood may be predictive of performance in higher education at university. Furthermore, family involvement and participation raise parents' expectations, positive perceptions of education and student performance (Froiland et al., 2013). The results of this study can be read positively on the basis of the inadvertent yet essential involvement of the family in educational activities during lockdown. They could also shed light on the general objective of the study by increasing the impact that the measures taken due to COVID-19 have had on schoolchildren's performance.

While it is true that the quality of parental involvement in schoolwork is more important than the number of activities they undertake, the family-school relationship can help to improve parental participation (Garbe et al., 2020). There is a positive relationship between communication and support from the school directed at the family with the aim of improving the quality of their participation, which is shown to be a key performance factor leading to improved student performance and wellbeing (Dettmers et al., 2019; Elboj-Saso, 2021). The results of the present study are in line with this, given that the family-school relationship is the variable that obtained the greatest weight in explaining parents' perceived academic performance of their children. In a previous study, Hampden-Thompson and Galindo (2017) argued that positive school-family relationships are a predictor of academic performance, and that this association is mediated by the degree of parent's satisfaction with school. Consequently, active and collaborative school-family relationships and high levels of school satisfaction stimulate the drive for academic success. Along the same lines and specifically in the case of the COVID-19 pandemic and the lockdown, a study performed in Germany by Steinmayr et al. (2020) showed that the frequency of family-teacher communication and relationship was associated with children's motivation and learning progress, and thus with their parent-perceived academic performance.

Furthermore, another impact of COVID-19 was to increase the amount of time children were spending at home, which parents had to structure to ensure their socio-emotional wellbeing (Balluerka-Lasa et al., 2020; Cheng, 2020; López-Bueno et al., 2020). In response to this demand, parents were willing to accept advice on how to manage the situation, echoing proposals for flexible activities that were proposed with the aim of favouring the prosocial development of children (Szabo et al., 2020; Varela et al., 2021). Owing to this, and other reasons, a study in Spain showed that children adapted positively to the changes, both in terms of routines, self-care, household chores, and their prosocial behaviour (Romero et al., 2020).

Although the values are low, in this study the predictor variables covary to reveal a relationship between negative socio-emotional impact and activities at home. In relation to this, the importance of parental practices that limit the socio-emotional impact and favour beneficial adaptation in crisis situations become particularly relevant (Lai et al., 2018). Social support for students is also provided by teachers as mentors in the educational context and as supervisors of students' pace of learning. Support from teachers facilitates

an optimal family-school relationship, which, in addition to providing parents with strategies, buffers the socio-emotional impact on schoolchildren (Manosalva, 2019; Ordóñez-Sierra & Rodríguez-Gallego, 2016; Jara-Parra & Jara-Parra, 2020; Lai et al., 2018). Similarly, and in line with the results obtained in this study, Romero et al. (2020) highlight that involving children in family activities helps them to adapt and reduces the emotional impact of lockdown.

The present study ratifies the results of the aforementioned literature by providing a new perspective. In other words, by highlighting the correlation between several variables, considered relevant in previous research, and their explanatory capacities on academic performance. In short, by accepting the initial hypotheses of the study. While the COVID-19 pandemic has challenged both families and schools, it has also highlighted the importance of educational contexts and the benefits of the collaboration between both parties in dealing with crisis situations. Although supervision and teaching activities were limited by resources and the need to train agents of education in digital competence across the board, the acknowledged pedagogical work of families and the restructuring of activities and times, considering not only academic learning but also shared leisure time, were key to children's socio-emotional adaptation. In short, although the family-school relationship was already considered important for positive progress and success at school, in view of the COVID-19 situation, the need to forge an alliance between different agents of education, based on effective communication and mentoring during the teaching-learning process of distance learning, has become clear. As a result, teachers face a new pedagogical challenge of creating active digital communication channels in order to be able to deal with future situations similar to that experienced during the COVID-19 health crisis.

One of the limitations of the study is that it does not analyse the situation and the implementation of distance learning from the teacher's perspective, especially as teachers are the principal agents in the teaching-learning process. Although this study focuses on the family context, comparing both perceptions may provide interesting data that could be used to implement interventions and assistance strategies. Having highlighted the collaboration between both contexts, i.e., the family-school relationship, as the principal factor in academic performance, a possible course of action could be to improve the interaction and communication competence skills of teaching staff with the aim of achieving teaching excellence (Guzón-Nestar & González-Alonso, 2019). As a future prospect, and in addition to including teachers, monitoring families and analysing perceptions of the pandemic situation once it has advanced could prove interesting.

Author Contribution

Funding Agency

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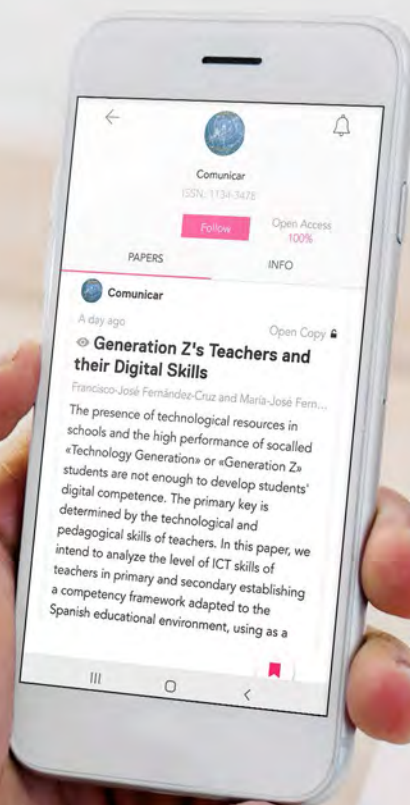
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Latin American professors' research culture in the digital age

Cultura investigativa del docente en Latinoamérica en la era digital

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ABSTRACT

The processes of social confinement caused by the global health crisis (COVID-19), have forced professors to assume new research competencies that allow them to improve science indicators and contribute to the research culture in the digital era for the Latin American region. This article analyzes the research culture of Latin American professors in 20 countries in the digital era, and their relationship with the production of scientific papers indexed in the Journal Citation Report (JCR) between 1996 and 2019. A questionnaire (with validity and reliability criteria) with a Likert-type scale was applied to 2,215 professors selected from five international scientific events. The main results show that 78% of the professors have less than 15 years of teaching experience, with ages under 44 years of age and 38.9% of them with an undergraduate academic level, 62.5% of whom responded that they have never published in indexed journals, and that they do not know the proper application of paradigms and research designs. On the other hand, 23.86% of the total citations are self-citations. Therefore, the results reflect a significant relationship between the research culture of professors and Latin American scientific production. Finally, Latin American professors have found themselves in economic, political and social circumstances that affect good research and scientific publication practices, leaving a training gap in research competencies in the new digital era.

RESUMEN

Los procesos de confinamiento social provocados por la crisis de salud mundial (COVID-19), han obligado a los docentes a asumir nuevas competencias investigativas que le permitan mejorar los indicadores de ciencia y aportar a la cultura de investigación en la era digital para la región latinoamericana. Este artículo analiza la cultura investigativa de los docentes latinoamericanos de 20 países, en la era digital y su relación con la producción de documentos científicos indexados en Journal Citation Report (JCR) entre 1996 y 2019. Se aplicó un cuestionario (con criterios de validez y confiabilidad) con escala tipo Likert a 2.215 docentes derivados de cinco eventos científicos internacionales. Los principales resultados dan cuenta que el 78% de los docentes tienen menos de 15 años de experiencia docente con edades que no superan los 44 años y un nivel académico del 38,9% de pregrado. Estos, a su vez, en un 62,5% respondieron que nunca han publicado en revistas indexadas, además desconociendo la aplicación adecuada de los paradigmas y diseños de investigación. Por otra parte, el 23,86% de las citaciones totales son auto citas. Por tanto, los resultados reflejan una relación significativa entre la cultura investigativa del docente y la producción científica latinoamericana. Finalmente, los docentes latinoamericanos se han visto en circunstancias económicas, políticas y sociales que afectan las buenas prácticas de investigación y publicación científica dejando entre ver una brecha de formación sobre competencias investigativas en la nueva era digital.

1. Introduction and state of the art

The mission of the contemporary university is to promote, stimulate, and disseminate knowledge aimed at seeking continuous improvement in the integral formation of human beings and their role within society. They are also platforms for the continuous development of innovation, science, and technology. New professionals should not only focus on good academic training, but also on promoting a commitment to good research practices (Batista-Mainegra et al., 2017). To this end, academic centers, research groups, and other entities involved in scientific processes tend to organize themselves according to the criteria established by international quality systems (Strauka, 2020). Institutions with state-of-the-art higher education profiles tend to boast about their good work, effectiveness, efficiency, greater connection with the public, private, and social spheres, and their capacity to produce multidisciplinary and applied knowledge (Basso et al., 2021), in contrast to the supposedly unproductive and self-referential inertia of traditional university research, based on codified knowledge and socially irrelevant and economically sterile disciplinary jurisdictions.

International university rankings have been an alternative used by governments and international cooperation agencies to provide funding for projects and scholarships (Kalhor & Mehrparvar, 2020). These quality processes are examined through an evaluation system and indicators such as teaching qualification aspects, research, transfer, and internationalization. However, the increase in scientific production and its impact are determining factors in world rankings such as Webometrics Ranking of World Universities, The World University Ranking, World's best universities Ranking, Ranking Shanghai, Performance Ranking of Science Papers for World Universities, and the Leiden Ranking. In summary, worldwide research is measured by indicators of productivity, impact, and the academic visibility of its researchers (Powell, 2020).

The research materialized in documents produced and their social impact permeates the relationship between educational quality and development through scenarios for knowledge management and intellectual efforts of their professors, crystallized in the knowledge and ability to produce scientific knowledge. Universities that allocate resources to the generation of knowledge increase their scope and impact on society, as their responsibility is not only to give quality education to their students but also to promote the development and professional improvement of their professors in terms of research, aiming to provide them a sustainable research culture for the benefit of society (González-Díaz et al., 2021). However, this new era has brought with it new challenges and ways of doing science through virtual technologies; this requires a diagnosis (institutional and individual) of the new professor's training needs and to be able to maintain the institutional educational-quality criteria. Thus, universities try to connect pedagogical practice with current knowledge derived from empirical evidence of each area of study, fostering spaces for a sustainable research culture where the scientific growth of each member of the university community is stimulated (Castro-Sánchez, 2021).

It should be noted that the features of a research culture refer to a set of cognitive, evaluative, and attitudinal elements shared by a particular educational community and, at the same time, to the practice, promotion, and irradiation of these elements directed to those who are linked to it. At the core of the research culture, these shared elements refer to a set of meanings, values, and behaviors that permeate the entire network of activities (concerning training, service, and innovation) developed as part of social interactions in specific contexts. Therefore, it can be associated with the set of interactions present in the research activity, focused on the concept of responsibility in the academic context with its own characteristics (Criado-Dávila et al., 2020). The effects of research culture extend to its different manifestations, from the relationship between research and teaching, research training, the integrity of the actors, among others with interest in publishing, authorship, prevention, and plagiarism control (Espinoza-Freire, 2020).

Currently, the educational policies of institutional accreditation show that the processes to achieve quality in university education are associated with the research practice, where the institutional purpose is to promote a research culture, thus increasing the scientific productivity of professors and students who meet the criteria to develop attitudes and facilitate the exchange of knowledge through productive research projects according to the institutional lines of research (Guerrero-Sosa et al., 2021). In other words,

professors and students are the ones who must pertinently conduct, consult, and apply the research in the development of the curricula (Bracho, 2012). In Latin America, this situation has become more acute. On the one hand, the number of scientific papers published in databases such as SCOPUS has been increasing over the last three years by an average of 7.7% (2017-2020) (Vázquez-Miraz & Posada-Llorente, 2020). However, the number of cited papers remains at a decreasing rate of 20.2%, i.e., the number of scientific papers published in Latin America has been growing, but their social impact has been decreasing. This situation has awakened the commitment of those who work in the higher education system. Universities are a space to foster and promote innovation processes and generate new knowledge through scientific, technological, and social research. The interest of universities in the Latin American region has been to improve the research skills of professors who have shown certain weaknesses in this area, affecting the practical research culture (Castro-Sánchez, 2021).

This accentuates the gap that stands in the way of the development of scientific production both in the research programs of universities as well as in publicly oriented organizations in these countries. Based on this perspective, the question posed by this research is: How is the research culture of professors in the digital era concerning science in Latin America? Therefore, the present study analyzes the Latin American research culture and the scientific production between 1996 and 2019 of professors in the digital era. For this purpose, 2,215 professors dedicated to research from 20 Latin American countries were surveyed.

The results show that there is a strong relationship between educational level and publications in indexed journals, showing that the higher the academic degree of the professor, the greater the interest in publishing in indexed journals. Likewise, the countries with the highest scientific production show a high level of total citations. However, countries with very low scientific production show a higher impact in terms of citations in the scientific community. Despite the complex systemic and structural crisis in the Latin American region, university professors have taken advantage of the benefits of the internet for self-training and improving research skills.

1.1. Research culture and the advancement of scientific knowledge

In an organizational environment, culture is not the only factor that influences managerial and work behavior (Velandia-Mesa et al., 2021). This behavior is influenced by different levels of culture, ranging from the supranational level (regional, ethnic, religious, linguistic) to the national, professional and organizational levels, down to the group level (De-Filippo et al., 2021). In recent years, research culture has been present in foreign policy debates on research and development among International Cooperation Agencies such as UNESCO (United Nations Educational, Scientific and Cultural Organization).

Since the 1998 World Conference on Higher Education, they have been stressing the topic of research for development. Since 1999, the World Bank has presented the problem of scientific knowledge as an essential element for the generation of wealth. Subsequently, UNESCO, at the World Conference on Science (1999-Budapest), pointed out that research processes must be accompanied by technological and intellectual investment from the economic sectors and the government in order to create a space for the generation of new knowledge.

Meanwhile, research culture, from the perspective of the epistemological foundations, dates back to the advancement of positivism and the rehabilitation of hermeneutics, providing an integrative approach to mixed methods (MM) approaches, allowing the merging of qualitative and quantitative perspectives during the research process as a unique method of producing knowledge in social sciences, which has changed the research landscape (Bolívar, 1995; Bagur-Pons et al., 2021). It should not only be a discourse, but a reflection approached from the structuring of intellectual capital (Guedes-Farias & deAndrade-Maia, 2020) in academic and scientific environments where human talent, technological infrastructure, and relational capital are articulated.

Scientific literature reports the discussion on the strengths of a research culture and its intellectual capital associated with educational and business organizations, research seed beds, and research groups dedicated to the production of scientific knowledge that provides answers to the new demands of the labor market (Fu et al., 2020).

In Latin America, the research culture attempts to articulate intellectual production with human and technological aspects, constituting a set of intangible capacities of diverse nature with different strategic implications (Limaymanta et al., 2020). Although Latin American countries share different cultural behaviors, it can be stated that the lack of cooperation and cohesion between researchers in the scientific processes characterize them (Guedes-Farias & de-Andrade–Maia, 2020). In this respect, institutions try to establish mechanisms to stimulate teamwork between national establishments and between countries through a set of invisible or intangible off-balance assets that allow this type of organization to function, thus creating value for itself and for society as a whole. These aspects of the research culture give hope for improving the impact on knowledge, intangibility, and value creation, which are relevant factors when defining institutional strategic capabilities (Oliveira-Filho, 2020).

1.2. Challenges for the research professor in the digital era

The world is facing the dizzying development of the digital era, one of its greatest challenges since its existence and professionalization (Briseño-Senosiain, 2021). Digital media such as the Internet, Google, social networks, and the various platforms that exist in the market have literally flooded humanity with information, especially university professors, forcing them to acquire and develop skills to and adapt to changes in the process of higher education that increase as time passes and they face increasing innovation every day.

This is how universities, as higher education centers, are the ones in charge of the task of knowledge management and where the teaching-learning activity of every strategy and practical theoretical resource is developed (Rodriguez & Espinoza, 2017), aiming to train quality professionals and contribute innovative and creative ideas that meet the needs of society and the labor market.

For this reason, the role of university professors and their role in the teaching-learning processes is essential; these processes must be based on the integration and execution of the competencies of higher education professionals in Information and Communication Technologies (ICTs) (Cruz-Rodríguez, 2019). These are defined as competencies that involve practical skills and knowledge, recognizing the use of new technologies as one of the most important—known as digital competence—which have been considered as strategic resources for training management and learning in the last decade.

Therefore, the continuous training of educational agents acquires great relevance today (Pozos & Tejada, 2018), even more so considering the challenges they have faced as a result of the global crisis, which has exposed their competencies in the research practice, confronting them to the new era without the necessary tools and knowledge to change from a face-to-face to a virtual paradigm.

This study considers professor professionalization as a current need that can be approached from a new technological and digital perspective. Currently, the professionalization of professors is a latent need for the higher education sector at the national and international levels it is necessary to pay attention to this aspect as it is essential for the updating and transformation of university professors (Rojas et al., 2016). This implies generating a training path with new studies and training methods for the development of teaching competencies needed in the 21st century, which should improve the functions of the professor, thus contributing to the acquisition of new skills and abilities in the new digital era.

2. Materials and methods

This study was carried out using a field research, non-experimental, cross-sectional design since the study variables were not manipulated and the data were collected once and then analyzed to obtain the results. In this regard, Hernández et al. (2020) state that in this type of design, the data collected at a single moment enable the description of the studied variables to analyze their impact on the units of analysis or participants, which, in this case, are the university professors surveyed for the research.

Regarding the unit of analysis, it was chosen through simple random sampling in five scientific events held by the International Center for Research and Development — ICRD (related to the construction of scientific articles virtually), for a total of 2,215 professors-researchers surveyed, stratified as follows (Table 1).

Table 1. Stratification of professors surveyed in Latin America (2020)			
Latin American countries with publications in the JCR	Frequency	Percentage	Cumulative percentage
Peru	437	19.7%	19.7%
Bolivia	16	0.7%	20.4%
Colombia	182	8.2%	28.6%
México	104	4.7%	33.3%
Ecuador	12	0.5%	33.8%
Chile	104	4.7%	38.5%
Venezuela	56	2.5%	41%
Brazil	626	28.3%	69.3%
Panama	48	2.2%	71.5%
Honduras	75	3.4%	74.9%
Costa Rica	4	0.2%	75.1%
Dominican Republic	8	0.4%	75.5%
Argentina	111	5%	80.5%
Cuba	87	3.9%	84.4%
Uruguay	65	2.9%	87.3%
Puerto Rico	60	2.7%	90%
Nicaragua	70	3.2%	93.2%
El Salvador	81	3.7%	96.9%
Guatemala	69	3.1%	100%
Total	2,215	100%	

The data analysis process was developed in three phases.

Phase 1: The following research hypothesis system was determined:

- H0 (Null Hypothesis): There is no significant relationship between the research culture of professors in the digital era and scientific production and impact in Latin America.
- H1 (Alternative Hypothesis): There is a significant relationship between the research culture of professors in the digital era and scientific production and impact in Latin America.

The hypothesis testing for the relationship between the variable (categorical)=Research Culture of professors in the digital era and the variable (numerical)=Scientific production and impact in Latin America through citations, whose numerical data, according to the Kolmogorov-Smirnov normality test, are abnormal for a sample. Therefore, the chi-square goodness-of-fit test was used, which is based on the fit between the frequency of occurrence of the measurements in an observed sample and the expected frequencies obtained from the hypothetical distribution. The asymptotic significance level considered is 0.05. The contingency coefficient was considered to determine the strength of the relationship.

Phase 2: To determine the "Research Culture of professors in the digital era" variable, the data collection instrument was a questionnaire composed of 26 items, where beliefs and values about research, critical judgment of research, and research competencies were included. It was validated by five experts and pilot-tested to calculate its reliability; to this end, the Cronbach's Alpha coefficient was used to determine the reliability of the instrument, which was 0.93 (Very high).

The questionnaire presented two sections: 1) Characterization of the Latin American digital professor (single-choice answers). The items are related to teaching experience, work location, academic level of teaching, area of study, age range, gender, level of education, and publication in indexed journals; and 2) Research culture of the Latin American professor (3-point Likert scale).

Phase 3: To determine the "scientific production and impact" variable, the Latin American scientific production from 1996 to 2019 was considered based on the data collected from SJR. For this purpose, the following categories were explored: 1) Total documents, 2) Total citations, and 3) Self-citations. Likewise, the total population by Latin American country in the year 2019 was considered based on the global population clock (http://ww1.worldodometers.info/), which is calculated according to the World Population Prospects prepared by the Population Division of the United Nations (UN). To facilitate the interpretation of the results regarding population and scientific production, these are divided into 5 categories according to WorldOdometers. Population (Number of inhabitants in 2019 (WorldOdometers)): 1) less than 5,000,000 (Very low), 2) between 5,000,001 and 15,000,000 (Low), 3) between 15,000,001 and 35,0000,000 (Medium), 4) between 35,000,001 and 100,000,000 (High), and 5) more than 100,000,001 (Very high). Scientific production (papers published in SJR (1996-2019)): 1) less than 20,000 (Very low), 2) between 20,001 and 100,000 (Low), 3) between 100,001 and 250,000 (Medium), 4) between 250,001 and 500,000 (High), and 5) more than 500,001 (Very high).

This made it possible to calculate the real impact of scientific publications through the indicator: citations per document. To this end, self-citations are subtracted from total citations in order to determine the real impact of the publications in other regions. This allowed generating discussions on the research culture of Latin American professors in the digital era and the impact on the generation of scientific knowledge.

3. Analysis and results

3.1. Latin American research culture

With the information collected and processed, it is possible to characterize the digital-era teaching population in Latin America. 78% of the professors have less than 15 years of teaching experience (50% have less than 5 years). 91.9% of their academic practice is in undergraduate studies. As for the area of study, 31% are in the social sciences, 27.4% in business and technology, 25.4% in human sciences and education, and 14.2% in health sciences. The age group of digital-era professors is as follows: 38.9% are under 35 years old; 29.8% are between 35 and 44 years old; and 21.7% are over 45 years old. Regarding the professors' academic level, 69.8% have a bachelor's degree, 17.1% have a master's degree, and 6.3% have a doctorate (Carabantes-Alarcón, 2020).

Concerning Latin American research culture, 62.5% of the professors responded that they have never published in indexed journals, while 70.5% state that they have good practice in citing documents. 64.9% do not know how to use the research paradigm in relation to the object of study. 90.9% consider that they always use a research design in accordance with the objectives of the study. 77.4% do not know how to adequately use qualitative methods, 68.7% do not know how to adequately use quantitative methods, and 82.7% do not know the different ways of integrating mixed methods. 58.1% of professors-researchers state that they only receive research training occasionally.

Figure 1. Box plot on research culture by publication in indexed journals and age range
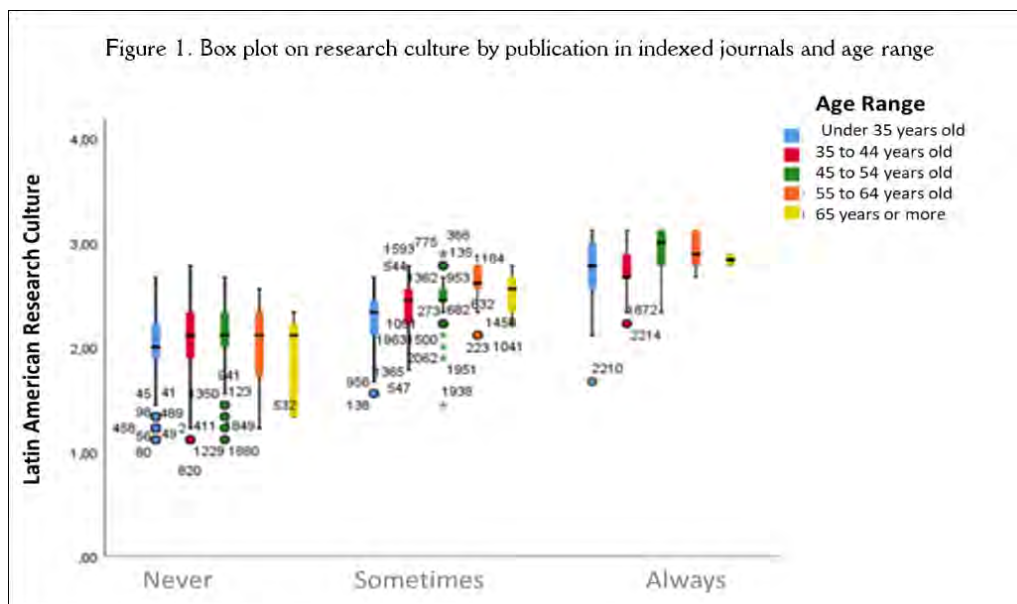
Figure 1 shows a relationship (Contingency Coefficient: 0.473 - Strong) between educational level and publication in indexed journals, showing that the higher the academic degree of the professor, the greater the interest in publishing in indexed journals. To Carranza-Esteban et al. (2020) and Guerrero-Casado (2017), the exercise of scientific research for professors in the digital era is fundamental for the development of science. The results of this research show that there is a significant group of professors with master's degrees who only publish scientific papers occasionally. Likewise, it is shown that the age group with the highest number of scientific publications is the 45 to 54-year-old group. However, between the ages of 35 and 44, Latin American research professors focus on teaching and extension activities.

Country	Population (2019)	Population category	Scientific production category	Documents	Citations	Self-citations	TOTAL citations
			Table 2. Latin American population and scientific production				
Brazil	212,559,417	Very high	Very high	1,027,748	8,249,466	3,974,976	12,224,442
Mexico	128,932,753	Very high	High	347,369	3,568,883	858,560	4,427,443
Colombia	50,882,891	High	Medium	114,495	994,178	182,309	1,176,487
Argentina	45,195,774	High	Medium	225,079	2,892,542	685,135	3,577,677
Peru	33,050,325	Medium	Low	29,732	410,882	48,810	459,692
Venezuela	28,435,940	Medium	Low	41,751	484,046	57,393	541,439
Chile	19,116,201	Medium	Low	163,593	2,041,116	462,718	2,503,834
Guatemala	17,915,568	Medium	Very low	3,614	57,623	3,795	61,418
Ecuador	17,643,054	Medium	Low	23,889	217,281	33,329	250,610
Bolivia	11,673,021	Low	Very Low	5,203	117,588	8,090	125,678
Cuba	11,326,616	Low	Low	41,945	300,193	63,170	363,363
Dominican Republic	10,847,910	Low	Very low	1,962	25,062	1,339	26,401
Honduras	9,904,607	Low	Very low	1,675	24,263	1,075	25,338
Paraguay	7,132,538	Low	Very low	2,796	39,233	2,523	41,756
Nicaragua	6,624,554	Low	Very low	1,916	33,435	2,290	35,725
El Salvador	6,486,205	Low	Very low	1,646	23,643	1,136	24,779
Costa Rica	5,094,118	Low	Very low	14,192	261,872	26,566	288,438
Panama	4,314,767	Very low	Very low	7,941	262,289	22,968	285,257
Uruguay	3,473,730	Very low	Low	21,262	334,210	44,456	378,666
Puerto Rico	2,860,853	Very low	Very low	17,995	411,510	22,110	433,620

Table 2 shows the Latin American population in 2019 and its relation to scientific production. Latin America is a continent with political, social, and economic weaknesses, so most of the countries in this region suffer from the same problems which prevent it from being a region with a high level of scientific production (Guerrero-Casado, 2017, Guerrero-Sosa et al., 2021). For the results of the present research, the Latin American population (20 countries studied) comprises a total of 633,470,842 inhabitants, a production of scientific documents indexed in Journal Citation Reports (JCR) in 2019 of 2,095,803 documents between 1996 and 2019, with a total volume of citations of 27,252,063, of which 23.86% are self-citations, leaving a real impact of 76.14% in other regions.

Figure 2. Simple 3D dispersion of citations by population and scientific production
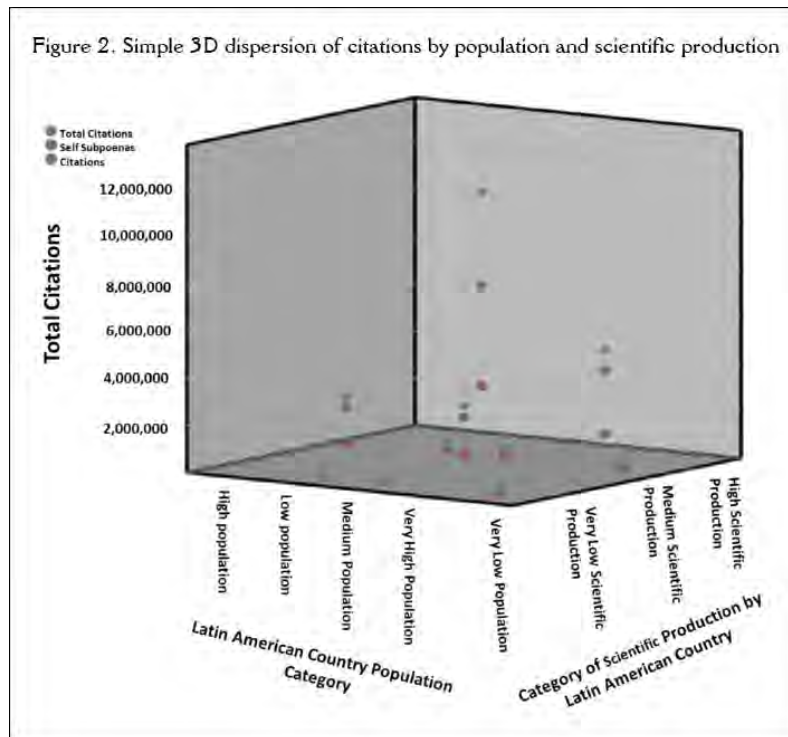
Figure 2 shows the grouped 3D dispersion of citations in relation to total citations and self-citations. It is shown that countries with medium and very high populations tend to have very low citations, high

self-citations, and a high H-index. Although Latin America is a very large area covering 46 countries, it has a relatively low weight in the world's scientific production, as well as a low impact (citations per document) when compared to developed regions (Hermes-Lima et al 2007, Chinchilla-Rodríguez et al., 2015; Bonilla et al., 2015). Specifically, the results show that countries with very low populations had an impact of 23.87% of citations on average per published document, while countries with low populations obtained 15.16% of citations on average per published document. Countries with medium populations obtained 12.59% of citations on average per published document, countries with high populations have 10.77% of citations on average per published document, and countries with very high populations have 9.15% of citations on average per published document (Figure 3).

Figura 3. Histograma apilado de media de citaciones por país latinoamericano
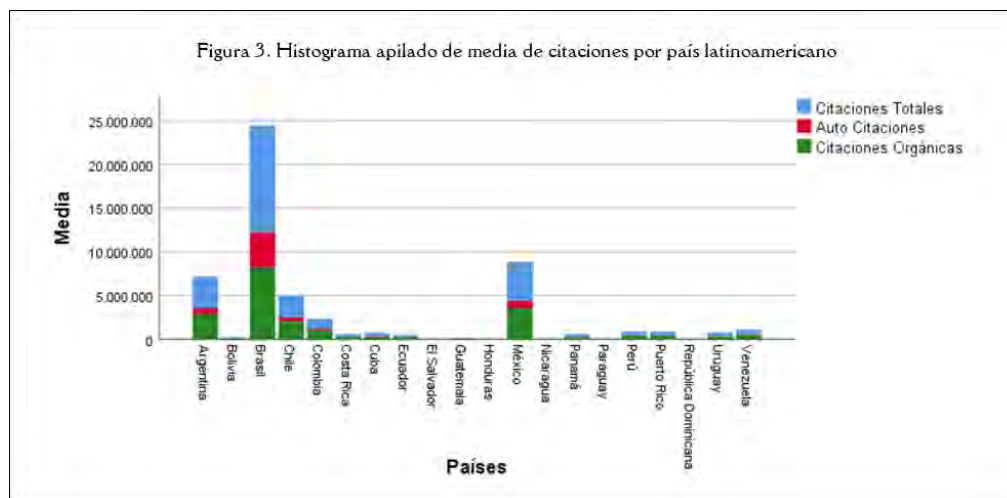
Figure 4 shows the different Latin American countries studied and categorized according to their scientific production (SJR documents): Countries with very high scientific production (Brazil), high scientific production (Mexico), medium scientific production (Argentina, Chile, Colombia), low scientific production (Cuba, Venezuela, Peru, Ecuador, Uruguay), and very low scientific production (Puerto Rico, Costa Rica, Panama, Bolivia, Guatemala, Paraguay, Dominican Republic, Nicaragua, Honduras, El Salvador).

Figure 4. Box plot grouped between research culture and Latin American country
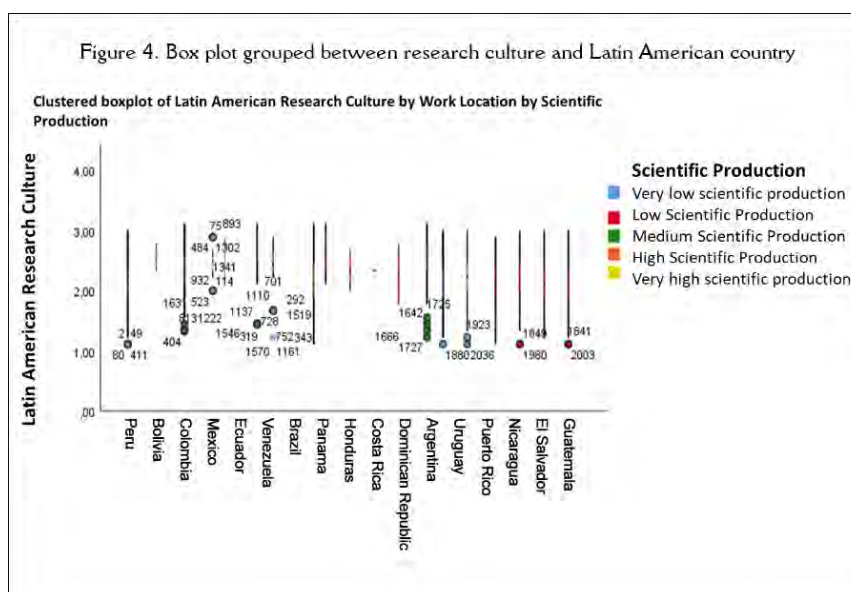
Countries with the highest scientific production have a high level of total citations. However, countries with very low scientific production have a greater impact with citations in the scientific community (Chinchilla-Rodríguez et al., 2015; Bonilla et al., 2015, Guerrero-Sosa et al. 2021).

To determine the relationship between research culture and the level of scientific production, a Pearson's Chi-square test (221, 997th), Likelihood Ratio (241,001), and Linear-by-Linear Association (0.242) were applied. The results reflect an asymptotic significance (bilateral) of .000 with a moderate-low strength. This result rejects the null hypothesis and accepts the alternative hypothesis. In other words, there is a relationship between the research culture of professors in the digital era and scientific production and impact in Latin America (Castro-Sánchez, 2021). Figure 3 shows that when a country has an adequate research culture that promotes cooperation, collaboration, and cohesion, it is likely to produce scientific papers in indexed journals.

4. Discussion

The results show a clear relationship between the research culture of professors in the digital era and Latin American scientific production. These findings are consistent with those presented by Limaymanta et al. (2020) and Vázquez-Stanescu et al. (2020), who describe a new era of knowledge management stimulated by times of confinement and instability in the educational system, which constitutes a challenge for higher education institutions to guarantee stimulating scenarios for home-based research. One of the main findings of this research is that the Latin American region is characterized by a population of young professors with little experience, who generally work at the undergraduate level with a greater inclination towards the social sciences, with master's degrees, and only a few of them have published in indexed journals. Given the above, Figure 1 shows that professors focus on teaching and extension work.

However, those who publish have good practices regarding the writing and citation of scientific writing, despite not recognizing onto-epistemic aspects in the research processes, which confirms their lack of knowledge with regard to quantitative, qualitative, and mixed methodologies. Table 2 shows that 23.86% of the total citations are self-citations, with a real impact on other regions of 76.14%. The research culture reflected in this study reveals the weaknesses of Latin American society caused by the deficiencies in the research systems of each country. These results agree with those reported by King-Domínguez et al. (2020) and Vázquez-Stanescu et al. (2020), who consider that, despite the evident increase in indicators such as the number of citable documents, there has been a substantial decrease in the impact of scientific publications.

To González-Díaz et al. (2020), these scenarios are becoming increasingly complex due to the increasing administrative and academic workload that professors must face. This has led to situations of academic stress and a decrease in the quality of scientific production. Undoubtedly, Latin American countries with smaller populations and scarce budgets for research and development do not reach the expected levels of scientific production, with some exceptions in South America such as Chile, which, despite being a country with a medium-sized population, when compared to countries with high population densities, achieves high levels of scientific production. However, the main challenge for Latin American professors is to achieve high-quality levels in their scientific writings in order to impact the scientific community at the global level. According to the data collected in this research, countries such as Brazil, Mexico, and Argentina are the main producers of scientific knowledge in Latin America, establishing a balance in the self-citations of their scientific papers. Citations show the real impact of the science generated by a country in other regions of the planet. On the other hand, the research perspectives for the progress of Latin America in the 21st century lie in the planning of emerging ideas within public and private organizations, as well as organizations of a social nature, adopting innovative strategies in accordance with the challenging demands of the environment. For this reason, traditional organizations are incorporating mechanisms that provide answers to the world's research needs in order to become intelligent, proactive, dynamic, creative, and decentralized organizations, where competencies are the cornerstone for the achievement of strategic goals in all Latin American nations.

To Torres-Samuel et al. (2021) and Kumar et al. (2020), who present a critical discussion on Latin American research and development, the knowledge management of Latin American higher education

institutions is characterized by its low level in global impact indicators for the development of science. Likewise, Hermes-Lima et al. (2007) state that one of the central aspects of the deterioration of research in Latin America is the low investment towards activities associated with science, technology, and innovation, with an "investment of less than 8 billion dollars per year, which represents 2.3% of the global spending on the sector and the brain drain" (Vega-Muñoz et al., 2021: 23).

According to Torres-Samuel et al. (2020), Latin American countries invest less than 1% of their Gross Domestic Product (GDP) in research and development, except for Brazil, which invests more than half of the total investment in research and development in Latin America, followed by Mexico and Argentina.

As for the investment in technology, innovation, and science in Latin American countries—except for Brazil and Mexico—it represents less than 0.5% of the GDP on average, while, in developed countries, it is between 2% and 3% of the GDP in most cases. This situation is exacerbated by the dependence on the state for funding research and development projects (Fu et al. 2020). On the contrary, in developed countries, investments in this sector are almost entirely made by private companies (Wouters et al., 2020). These institutions generate good prospects as they act by creating shared actions with their citizens, directing their efforts towards the search for efficiency with the commitment to contribute to the management of cooperation networks without excluding those that operate under social principles.

Despite this scenario, Latin American professors have improved the amount of scientific production indexed in databases with an impact factor thanks to cooperation networks, strategic allies, foreign researchers, sponsorships, and funding from independent research centers that share their technological communication platforms and contribute to the international cooperation of research projects (Valdés-Pérez, 2020). Guedes-Farias and De-Andrade-Maia (2020) and Limaymanta et al. (2020) note the importance of research for the development of modern science, where every effort by Latin American professors to publish high-impact scientific publications involves a sacrifice that ranges from socioeconomic and political conditions to lowering family expenses to pay for publication fees.

Hernández et al. (2020) emphasize that the articulation of public and private institutions with research and development groups is the main problem. In most Latin American universities, the research projects that are developed, in the best of cases, remain in the repositories of institutional libraries as bibliographic material with no impact on the scientific knowledge society.

5. Conclusions

Based on the objective of this research, which was to analyze the research culture of professors in the digital era concerning science in Latin America, it is considered that the work carried out has provided an interesting information infrastructure that will help to develop a more sustainable research culture for professors in Latin America. This situation generates good prospects that would facilitate policy initiatives to create research culture and investment in technology and innovation scenarios in these regions, which would demonstrate the great interest in research development through guidelines and regulations that bet on a rigorous, integrated, and, most importantly, supported exercise in which professors and students in the digital era take advantage of the benefits of research for their social, environmental, personal, and professional development.

This shows that Latin American professors in the digital era who participated in this research have faced economic, political, and social circumstances to adequately exercise their profession, to the point of obtaining a doctoral degree but not doing research, thus affecting good research practices and exposing a training gap in research competencies, interest in research, and management of skills for the new digital era. The findings of this study show a problem to be solved in this field of teaching. The problems that arise require a collaborator who is well acquainted with the scientific field in which he/she operates and who has a number of competencies and skills that, together with an innovative method, enable him/her to produce knowledge through the scientific research process.

Finally, and based on the results obtained from the analysis of the information, it can be said that the research culture of Latin American professors in the digital era shows a vertiginous interest in adapting to changes, generating communicative and investigative competencies necessary for research. In addition to meeting the aforementioned characteristics, professors in the digital era must know their field and must like it

in order to find their work fun and fascinating. According to the main findings of this research, it is estimated that universities articulated with the State and society should work in a coordinated manner to improve the research capabilities of their academic bodies and thereby the deconstruction and reconstruction of academic programs.

† Dedication

This work is dedicated to the memory of a young and promising researcher, Dr. Romel González-Díaz. He leaves us the task of promoting research culture throughout the world.

Author Contribution

Idea, A.A.D.; R.G.D.; Literature review (state of the art), R.G.D.; A.A.D.; Methodology, R.G.D.; A.A.D.; Data analysis, A.A.D.; Results, A.A.D.; R.G.D.; Discussion and conclusions, A.A.D.; R.G.D.; Writing (original draft), A.A.D.; R.G.D.; Final revisions, A.A.D.; R.G.D.; Project design and sponsorship, A.A.D.; R.G.D.

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Alfamed media education curriculum for teachers

Ignacio Aguaded, Daniela Jaramillo-Dent & Águeda Delgado-Ponce (coords.)

Octaedro **Editorial**

Updated guide on media and information literacy for educators, in which participated 22 researchers from 12 countries of America and Europe.

Communication bibliometric research in Latin American scientific journals (2009-2018)

Investigación bibliométrica de comunicación en revistas científicas en América Latina (2009-2018)

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ABSTRACT

The objective of this article is to analyze the distinctive characteristics of research production in the field of communication in Latin American scientific communication journals. Meta-research is necessary because it allows re-evaluating the field and offers new horizons in knowledge production. Two studies were conducted: 1) Bibliometric analysis of 116 journals in eight databases and 24 publications in the Web of Science and Scopus; 2) Content analysis including that of 407 articles over a period of 10 years (2009–2018). The findings demonstrate a research trend in the Latin American region toward international standards, evidenced by a preponderance of empirical over essay studies. Universities in the region published most of the journals in the field and circulation was predominantly biannual. Contrary to expectations, the most widely disseminated topic was health communication, partly owing to a large sample of Brazilian journals. Within the empirical research, the qualitative approach was predominant. The interview was the most widely used research method in the region. Finally, the most used theories were agenda setting and framing. Imminent challenges arise, i.e., to strengthen indigenous theoretical production and to position the region's themes and reflection more decisively in knowledge production at a global level.

RESUMEN

El objetivo del presente artículo es analizar las características distintivas de la producción de investigación en el campo de la comunicación en las revistas científicas de comunicación latinoamericanas. La meta-investigación es necesaria, ya que permite revaluar el campo y ofrecer nuevos horizontes en la producción de conocimientos. Se realizaron 2 estudios: 1) Análisis bibliométrico a 116 revistas presentes en ocho bases de datos, y luego a 24 publicaciones presentes en Web of Science y Scopus; 2) Análisis de contenido, que incluye el análisis de 407 artículos en un periodo de 10 años (2009-2018). Los hallazgos demostraron una tendencia en la investigación en Latinoamérica a los estándares internacionales, evidenciada en la preponderancia de los estudios empíricos sobre los ensayísticos. Las universidades de la región editan la mayoría de las revistas del campo y predomina la circulación semestral. Contrario a las expectativas, la temática más difundida fue comunicación en salud, en parte por la muestra amplia de revistas brasileñas. Dentro de la investigación empírica predomina de manera amplia el enfoque cualitativo. La entrevista es el método de investigación más usado en la región. Finalmente, las teorías más usadas en Latinoamérica fueron el establecimiento de la agenda y el enmarque. Surgen desafíos inminentes: fortalecer la producción teórica autóctona y posicionar la reflexión y las temáticas de la región de manera más decida en la producción de conocimiento en el concierto global.

KEYWORDS | PALABRAS CLAVE

Meta-research, communication, academic papers, Web of Science, Scopus, Latin America.
Metainvestigación, comunicación, artículos académicos, Web of Science, Scopus, América Latina.

1. Introduction

Meta-research has acquired great relevance in different disciplines, thanks to the possibility it offers scientists to "redesign science, identify areas that need to be re-examined, re-evaluate previous certainties, and point out new paths" for research (Evans & Foster, 2011: 721). Meta-analysis, meta-knowledge, or critical-reflective analysis in the field of communication (Fuentes-Navarro, 2019) already has a consolidated trajectory in an international context (Günther & Domahid, 2017; Rains et al., 2018). It is possible to find important historical (Löblich & Scheu, 2011), methodological (Scharkow, 2013), biographical (Meyen, 2012; Rogers, 1997), and thematic (Günther & Domahid, 2017) reviews, even on the same meta-analyses in the field (Rains et al., 2018). The production of knowledge in academic journals during this century is particularly interesting (Bryant & Miron, 2004; Demeter, 2017, 2018; Feeley, 2008; Kim et al., 2010; Walter et al., 2018).

In Spain, meta-research in communication from periodical publications has also achieved an extraordinary momentum (Fernández-Quijada & Masip-Masip, 2013; Goyanes et al., 2018; Martínez-Nicolás et al., 2019). In recent decades in Latin America, there has been incipient interest in the subject (Rogel-Salazar et al., 2017), although very specific studies that explore knowledge production in certain journals or countries have prevailed. Thus, we find studies related to knowledge production in Brazil (Krohling, 2009; Liberatore & Herrero-Solana, 2009; Pivatto-Brum et al., 2016), Mexico (Gómez-Rodríguez et al., 2017), Colombia (Arroyave-Cabrera et al., 2020; Gregorio-Chaviano, 2007) and Uruguay (Picco et al., 2014). A few have reviewed the presence of the region's journals in the major international databases (González-Pardo et al., 2020; Rogel-Salazar et al., 2017). However, there are no studies mapping knowledge production in the field, focusing on the main publications in the Latin American region. Meta-research is justified because it is necessary to identify new lines of research, "re-evaluate previous certainties and point out new paths" (Evans & Foster, 2011: 721), and, in this way, better understand the particularities of the field in Latin America. The objective of this article is to analyze the distinctive characteristics of research in the field of communication in Latin America from the main periodical publications. The following section reviews the regional research in the field to derive the major research questions.

2. State of the question: Previous empirical studies in Latin America

The representation of Latin American journals in large international databases is marginal. No journal is indexed in the SSCI (WoS) database and only 3.2% (14 of 434) are in Scopus (González-Pardo et al., 2020). Among the reasons given for this scarce representation are a lack of professionalization of the editors and the publishing body in general in the region and a scarcity of funds (Salager-Meyer, 2015). The publications maintain other dynamics related to the publishers of these journals and the periodicity of their circulation (Cetto & Alonso-Gamboa, 2011). Unlike the international context, neither publishers nor associations have had an important role in publishing journals in Latin America (Navas-Fernández, 2017). Regarding geographic distribution, the leading country is Brazil, publishing 35% of all journal titles, 2.5% worldwide (Navas-Fernández, 2017). Therefore, such editorial leadership is expected to extend to the field of communication. However, there remains a gap in the characterization of the periodicity and geographic distribution of journals in the field. The following research questions emerge from this review of previous studies:

- P.I. 1. In which databases are Latin American communication journals indexed?
- P.I. 2. What is the periodicity of circulation?
- P.I. 3. Who publishes existing communication journals in the region?
- P.I. 4. What is the geographic distribution of communication journals in the region?

Various reviews in Latin America have raised certain topics that have stood out in the field: alternative communication, communication policies, communicative imperialism, and cultural studies (Barranquero, 2011). Gobbi (2008) analyzed 1,576 papers presented at the annual conferences of the Latin American Association of Communication Researchers (ALAIC for its initials in Spanish) from 1998 to 2006, finding that the most common topics were reflection on the media, 12% on television and 9% on the Internet, and research theories and methods at 8%. It is striking that 57% of the papers could not be classified because

they were "so diluted" that it was impossible to do so. Moyano (2018) analyzed 672 papers presented from 2000 to 2010 in six ALAIC conferences and three meetings of the Latin American Federation of Social Communication Faculties (FELAFACS in Spanish), identifying the following predominant thematic categories: Communication and Media Processes (29%), Media, Technologies and Politics (21%), Media, Technology and Culture (18%), and Media, Technologies and Education (17%). Gómez-Rodríguez et al. (2017) reported that in the journal Comunicación y Sociedad (Communication and Society) in Mexico, four topics stood out: sociocultural environment (43.6%), academic (24.9%), socioeconomic (16.7%), and socio-political (14.8%). Although there was no homogeneity in the categories used in the studies, there was a gap in the topics addressed in the journals in the field for Latin America, so the following question was posed:

• PI. 5. What themes will be more frequent in Latin America?

The most important antecedent in knowledge production research within research journals dates to the pioneering work of Orozco-Gómez (1997), who analyzed 10 journals published in Latin America on the celebration of the anniversary of the first school of journalism in the region (National University of La Plata, Argentina, 1934). One of the central conclusions of the study was that the essay, particularly the superficial (light), was the most widespread form for presenting research by academics in the region. At the end of the last century, the Mexican researcher emphasized the need for more empirical studies that would advance theory in Latin America.

The globalization of academia and institutional pressures to climb in international rankings have led researchers to adopt international standards and perform research with empirical evidence, more common in international publications (Alvesson et al., 2017; Goyanes, 2020). Murphy and Zhu (2012) reported a new neo-colonialism in the international academy that tends to impose standardization and empiricism as a widespread norm in scientific production. Goyanes et al. (2018) and Piñeiro-Naval and Morais (2019) showed a new trend in Spanish journals, which have gone from theoretical reflection to research based on empirical evidence. It is expected that a similar change may be occurring in the field in Latin America, based on which the question arises:

• PI. 6. Will empirical studies prevail over essay studies?

McAnany and La-Pastina (1994) reviewed Latin American audience studies from a little over two decades (1970–1993). After analyzing 26 texts, they concluded that one of the major problems in most studies was their methodological deficiency; some texts did not even include a methodology section showing the procedures followed to arrive at their conclusions. The two most common methods found were the survey and ethnography. Moyano (2018: 313) stated that "7 of 10 works (68%) presented evidence of a methodology, but only 2 out of 10 (19%) contained explicit references to the application of methods, production techniques and/or research tools...or any other methodological by-product". In presentations that showed direct or indirect evidence of a methodology, 76% were qualitative, 9% quantitative, and 13% mixed. Whereas McAnany and La-Pastina (1994) reviewed studies that included master's and doctoral theses, Moyano focused on papers presented at ALAIC and FELAFACS over a decade (2000–2010). Therefore, it is of great interest to explore the methodological approaches in academic journals of the region.

• PI. 7. What methodological approach and methods are the most common in the articles?

Various international studies have explored the most-used theories in research in the field of communication. After tracking 48 years of research in six leading journals in the field, Bryant and Miron (2004) established that the theory of framing, agenda setting, and cultivation analysis were the most used over nearly half a century. This finding was corroborated by Walter et al. (2018) in their investigation of all knowledge production in the Journal of Communication, from its creation in 1951 through 2016. Chung et al. (2013) agreed that the framing theory was the most used in the field, whereas Piñeiro-Naval and Morais (2019) concluded that framing, agenda setting, and uses and gratifications were the most frequent theories in Hispanic American journals. However, there are no studies that explore this topic in Latin American journals.

3. Material and method

To answer the first four research questions, variables were defined from which a bibliometric analysis was developed for all Latin American communication journals present in eight databases: Latindex, Dialnet, DOAJ, Scopus, AHCI, SSCI, REDIB, MIAR, ESCI and Google Scholar Metrics (GSM). Initially, 129 journals were identified. After several purification procedures according to validity, relevant subject areas, and the scope of journal contents, this number became N=116. Subsequently, 24 Latin American communication journals belonging to Web of Science and Scopus were selected. A decision was made to focus on the decade 2009–2018 (years for which the latest data were available for the coding procedure), as it is considered a sufficient period to identify the distinctive characteristics of the journals studied. The initial sample yielded 9,547 documents. Editorials, reviews and other texts that were not academic articles were excluded, which left a final sample of 5,660 articles. For the data extraction procedure, the methodological techniques were applied in two phases. In the first, information extracted from the metadata was characterized through a bibliometric analysis using the VOSviewer software (Van-Eck & Waltman, 2010). This enabled highlighting the study topics that were the most cited in scientific articles.

To identify the main topics in Latin American journals (P.I. 5), considering the results of the KW+ present in Scopus and ESCI, a clustering algorithm was applied in an integral way, with a resolution parameter ≥10. This created 17 thematic groupings in which the degree of similarity of the KW+ was indicated, considering the communication sub-disciplines to which they belong, and which were proposed by Walter et al. (2018) and the thematic groups established by the Latin American Association of Communication Researchers (ALAIC in Spanish). The most representative KWs were coded in terms of content area, and conceptual definitions of the sub-disciplines established in the codebook: 1) organizational, business and public relations communication; 2) Communication and human behavior; 3) Political communication and public opinion; 4) Communication and education; 6) Reception and media studies; 7) Popular communication, community, and citizenship; 8) Theory and methodology of communication research; 9) Communication, technology, and development; 10) Communication and sociocultural studies; 11) Communication for social change; 12) Communication in marketing and advertising scenarios; 13) Discourse and communication; 14) Studies of journalism; 15) Communication and history; 16) Ethics, freedom of expression, and right to communication; 17) Digital communication, networks, and processes. This thematic division has been adequately validated by the scientific community in Latin America over the more than four decades since the beginning of ALAIC.

In the second phase, we conducted a quantitative content analysis (Riffe et al., 2014; Wimmer & Dominick, 2010). We developed a sampling plan to identify the articles and a codebook based on similar studies (Fernández-Quijada & Masip-Masip, 2013; Goyanes et al., 2018; Kim et al., 2010; Martínez-Nicolás et al., 2019; Saperas & Carrasco-Campos, 2018). We addressed variables such as the empirical or essay typologies of the articles, predominant methodological approach and research methods, and theories most used in Latin American journals. In the analysis of the theories in the articles, the variable was structured based on results of the theories most cited in the studies of Bryant and Miron (2004), Walter et al. (2018) and Piñeiro-Naval and Morais (2019), in which 16 theories were defined that were conceptualized from the most representative authors. For the article type variable, several definitions were considered (Raiche & Gaudreault, 2014, cited by Bermejo-Berros, 2014; Baiget & Torres-Salinas, 2013; Piñeiro-Naval & Morais, 2019), understanding empirical articles to be those characterized by the presentation of results derived from data collection via the application of some technique or instrument. Essays are those in which various purposes were distinguished, such as the definition of concepts or the identification of problems or unresolved research questions. Finally, there are review articles, which present a state of the art or study of the situation in an entire area or of a topic in which there is critical analysis of how much has been published about it.

Regarding sampling, methodological decisions were guided by previous paradigmatic studies as follows. Bryant and Miron (2004) selected three journals and analyzed one journal edition per year, for a total of 1,806 over 44 years (1956–2000). Walter et al. (2018) examined 1,574 articles from the Journal of Communication over 65 years. Similarly, Kim et al. (2010) analyzed the entire production of Health Communication articles over 22 years, including 642 texts. In their scientometric study on the use of

grey literature, Joachim and Hélène (2020) evaluated 10% of a sample of 700 articles. For the present study, given that most publications had a semi-annual or quarterly circulation, we selected two articles per year and per journal, covering most publications. The final sample consisted of 470 articles chosen randomly over 10 years. It is important to note that there were journals that did not report articles in some years: Austral Comunicación (2009–2011); Oficios Terrestres (2018); Revista Comunicação Midiática (2009). For the coding process, three professionals were trained, all with communication background and two with postgraduate degrees. For the intercoder test, a random subsample of ~10% of the cases (n=47) was selected. The statistical parameter used to calculate reliability between the coders was Krippendorff's alpha (Krippendorff, 2011), found by using the "macro Kalpha" (Hayes & Krippendorff, 2007). Coding data were exported to SPSS (version 25) and the average reliability was found to be favorable: $M(\alpha k)=0.90$, with values between 0.81 and 0.99.

4. Analysis and results

Regarding the first research question about the type of indexing of journals in Latin America (P.I. 1), Latindex was the database with the greatest presence in journals of the region (68), followed by Google Scholar (66), DOAJ (62), MIAR (37), Dialnet (28), ESCI (15), Redib (13), and Scopus (14) (Table 1). There were no Latin American journals indexed in SSCI (WoS); the Spanish Comunicar Journal and Profesional de la Información were the only Spanish-language ones in that database.

Table 1. Number of journals per database and comparative analysis by communication collection and presence in Latin America					
Database	**Total collection**	**Communication collection**	**Percentage**	**Latin American collection**	**Percentage**
SSCI	4,781	88	1.84	0	0
Scopus	43,317	434	1.00	14	3.2
ESCI	7,727	131	1.70	15	11.5
Latindex	32,745	457	1.40	68	14.9
DOAJ	14,903	234	1.57	62	26.5
MIAR	46,840	598	1.28	37	6.2
Dialnet	10,824	92	0.85	28	30.4
Redib	3,365	100	2.97	16	16

On the other hand, regarding the periodicity with which Latin American journals circulate (P.I. 2), semi-annual publications were predominant in the region (61%). Only GSM had two bimonthly publications. Scopus and ESCI had two quarterly publications. There was a trend for which the less demanding was their indexing, the longer their publication periods. This was the case of Latindex, GSM, DOAJ, MIAR and ESCI.

Regarding the editors of the main communication journals in the region (P.I. 3), most of the journals were from educational institutions (95), followed by universities (81.89%), associations (7.75%), and study centers (3.44%). Only the journal Cine Documental de Argentina was produced by a publishing house. Only four journals converged in the five databases: The Colombian Palabra Clave and Signo y Pensamiento, the Chilean Comunicación y Medios, and the Argentinian Ética y Cine. Regarding geographical distribution (P.I. 4), most publications were from Brazil (54.31%), surpassing second-place Argentina (14.65%) by 39.65%. Colombia (9.48%) and Chile (6%) held third and fourth places, respectively.

Table 2. Distribution by country of Latin American communication journals in scientific databases							
	Latindex	**GSM**	**DOAJ**	**MIAR**	**Dialnet**	**ESCI**	**REDIB**	**SCOPUS**
Brazil	29	42	36	15	0	4	4	7
Argentina	16	5	7	4	6	4	2	0
Colombia	7	7	6	6	8	1	2	2
Chile	5	3	3	3	4	3	3	2
Ecuador	1	2	3	1	1	1	1	0
Venezuela	2	2	1	0	2	0	1	0
Mexico	1	2	1	3	1	0	0	1
Uruguay	2	1	2	2	2	1	1	0
Peru	3	2	3	3	4	1	2	1
Bolivia	2	0	0	0	0	0	0	0
	68	**66**	**62**	**37**	**28**	**15**	**16**	**13**

National, local, or institutional journals were predominant. Very few in the region had an international reach. The distribution by country in the eight databases (Table 2) shows Latindex with the greatest

coverage, followed by GSM, DOAJ, and MIAR. Brazil had the greatest presence in the databases. It was trailed at great distance by Argentina and Colombia. Bolivia had the least presence. In all the journals identified in ESCI, from which 1,482 documents were recovered, and in those of Scopus, with 3,016 documents, health communication was the main topic in the 106 KW+ (21.12%). In detail (Table 3), it is seen that three sub-areas of communication had the highest frequency (48.261%): health, sociocultural studies, and research theory and methodology. Areas related to marketing and advertising, history, and popular and citizen communication were the least frequent.

Table 3. KW+ ranking by communication subdiscipline			
Subdiscipline	KW+	Frequency	Percentage
Communication and Health	106	1,412	21.12
Communication and Sociocultural Studies	83	1,214	16.53
Theory and Methodology of Communication Research	55	1,056	10.96
Digital Communication, Networks and Processes	42	666	8.37
Organizational and Business Communication, and Public Relations	39	467	7.77
Reception and Media Studies	35	652	6.97
Communication and Education	33	548	6.57
Political Communication and Public Opinion	22	157	4.38
Regional and Sectoral Studies	17	262	3.39
Communication and Human Behavior	17	137	3.39
Journalism Studies	13	274	2.59
Communication, Technology and Development	12	98	2.39
Speech and Communication	10	141	1.99
Ethics, Freedom of Expression and Right to Communication	10	128	1.99
Communication in Marketing and Advertising scenarios	4	42	0.80
Popular, Community and Citizen Communication	2	27	0.40
Communication and History	2	28	0.40

Regarding the type of prevalent articles (P.I. 6), upon exploring this variable in relation to the subdisciplines of communication (Figure 1), it was observed that most articles were empirical (52.15%), followed by essay (27.66%) and review (2.98%). Breaking down these data, 52.15% belonged to sociocultural studies (15.64%), education (13.50%), journalism (12.58%), and digital communication (10.43%).

Figure 1. Distribution of article type from methodological approach vs. methods used
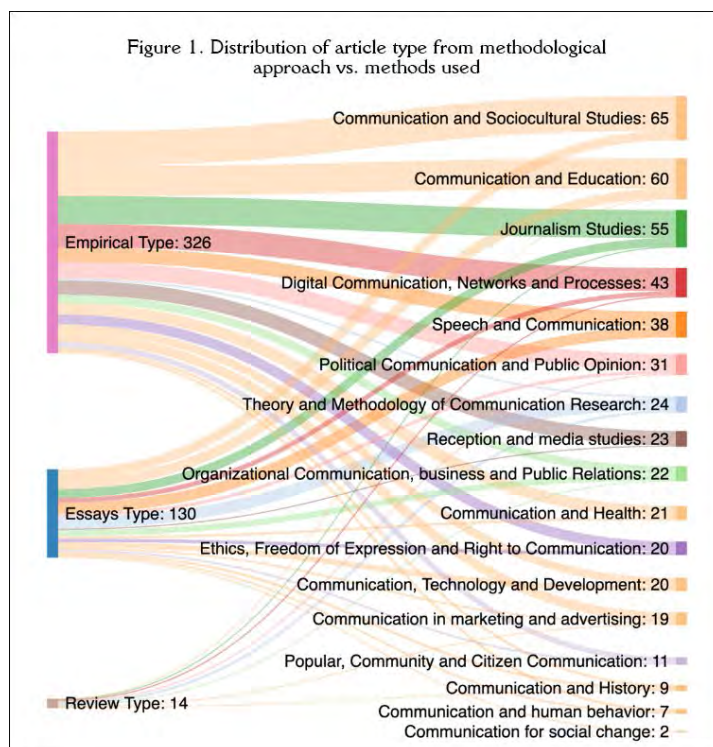
Analyzing in detail the sub-disciplines on which each type of article focused, the essay documents, present at 57.69%, addressed other areas such as the theory and methodology of communication research (13.08%), discourse (12.31%), education (11.54%), sociocultural studies (10.77%), and journalism (10%).

The subdiscipline of communication and sociocultural studies was the most addressed by empirical studies at 13.83%, closely followed by education (12.77%) and journalism (11.7%). These three subdisciplines made up 38.30% of the total. Below 10% were digital communication (9.15%), discourse (8.09%), political communication and public opinion (6.38%), and theory and methodology of communication research (5.11%). These four sub-disciplines constituted 28.94% of the total. The only subject area without empirical studies was communication for social change. The 14 review studies focused on eight of the 17 sub-disciplines: theory and methodology of communication research (28.57%); there was less representation by political communication and public opinion (with the same percentages of 14.29%), communication in marketing and advertising scenarios, and digital communication, networks, and processes.

The predominant methodological approach in the articles was another research question (P.I. 7). We found (Figure 2) that upon separately analyzing the empirical articles (326), 73.93% were qualitative (241), 20.86% quantitative (68), and 5.21% mixed (17). Likewise, 253 articles (77.61%) used a single research technique, 55 (16.87%) used two, 4.29% (14 articles) used three, and only 1.23% (4 articles) used four.

In terms of the seven most-used research techniques, which accounted for 85% of the total, 61.25% concentrated on five qualitative techniques and 23.33% on two quantitative techniques (Figure 2). The five qualitative techniques were the interview (16.46%), case study (13.82%), discourse analysis (12.71%), narrative analysis (10.21%), and textual analysis (8.51%). For the quantitative approach, the most-used technique was content analysis (14.46%) and survey (9.36%). It is striking that the experiment showed marginal use in the region (0.43%).

Figure 2. Consolidated Sankey graph of the relationship between article type and methodological approaches and techniques
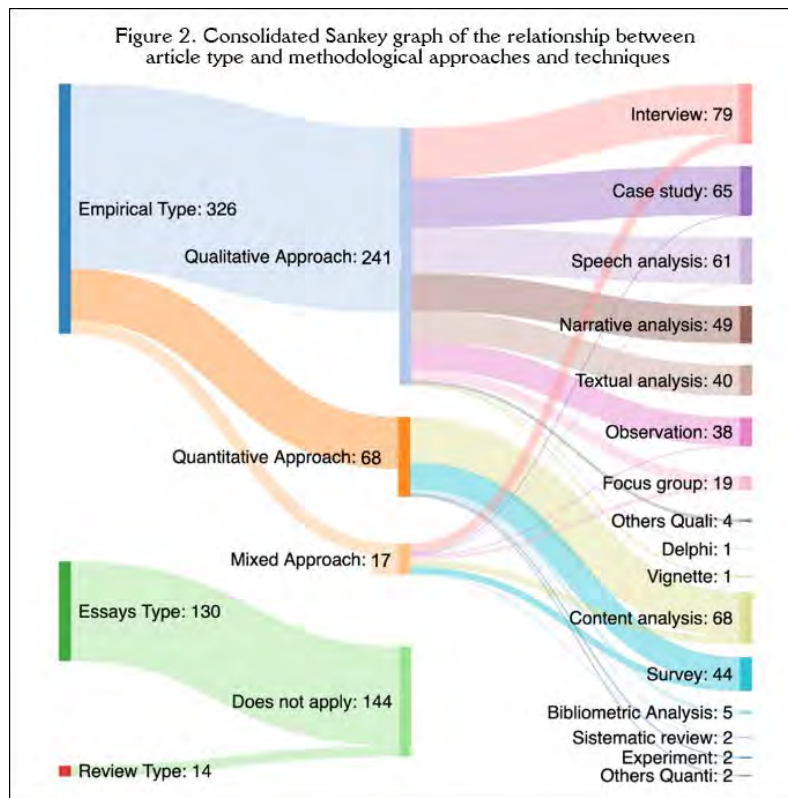
Finally, regarding the presence of theories in the articles (P.I. 9), the scarce use of theories in academic publications of the region is striking. Only 17.66% of the articles explicitly presented at least one theory.

In agreement with similar studies at the international level, the theory of agenda setting (18.54%) and framing (14.16%) were the most-used in the sample (Bryant & Miron, 2004; Piñeiro-Naval & Morais, 2019). McLuhan's theory of media (14.16%) ranked second as well. This popularity can be explained by its usefulness in the thematic area of digital communication, networks, and processes.

As evident from Figure 3, the other theories made up less than 10%, where it is seen that only the theories of uses and gratifications (7.08%) and that of the four functions of the media and the Marxist (each with 4.42%) exceeded 4% of the entire sample. This allows us to observe that in all 83 articles with at least one theory, reflections were exclusively concentrated in six and represented 76.11% of the entire sample.

Figure 3. Theories present in articles of Latin American communication journals
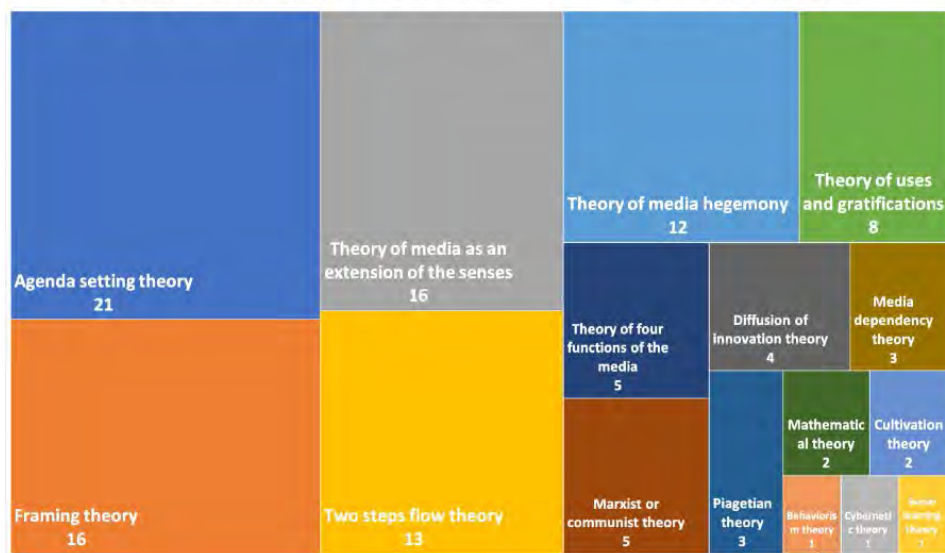
5. Discussion and conclusions

The objective of the present work was to analyze knowledge production in the field of communication in Latin America from academic publications. The most important finding is the identification of a research trend that is close to international standards. We have gone from an approach characterized by theoretical-argumentative disquisitions of essay type (Orozco-Gómez, 1997) to an empirical approach, in which the methodological aspect is essential to arrive at conclusions based on evidence. More than half the articles published in the 24 journals in the field (52.15%) were characterized by an empirical approach, compared to 27.66% that had an essay approach. As recently reported by Goyanes et al. (2018) and Piñeiro and Morais (2019) in Spain and Latin America, the globalization of research is advancing, and academics in the region have adopted an approach more in accord with the international context.

However, far from celebrating this state of affairs, the thought arises as to whether said change is not motivated by the institutional pressure of many universities to appear in or climb positions in the major international rankings. One of the key indicators of this process is the number of citations and publications in the hegemonic databases (WoS/Scopus). Barranquero (2011) had already highlighted that one of the strengths of the "Latin Americanism of communication" was a questioning of the functionalist and empiricist informational model and the search for a participatory paradigm, as well as a strong commitment to a social reality that privileges aspects such as alternative, popular and pro-social communication, aspects close to the local context. Marques-de-Melo (1999) emphasized as distinctive the theoretical hybridism product of the interweaving of European, Meso-South American (pre and post-colonial) and African traditions, which has become a unique mestizo research in the region. By assuming international standards, many researchers from the Global South (GS) are pressured to abandon their own indigenous epistemologies

and methodological approaches, or even topics closer to the local context, which do not always fit in publications in the international context (Demeter, 2018). Another important finding was the limited use of theories in academic articles. Fewer than one in five articles cited a theory. This finding is consistent with various international studies (Bryant & Miron, 2004; Piñeiro & Morais, 2019; Walter et al., 2018). This recurrent finding arouses interest in future studies on the use of theory in research within the field of communication. Although one of the purposes of science is to produce theories, it seems that this is a long road filled with many approaches, before advancing solid constructs with some universal validity.

Another issue in the region that deserves deep reflection is the use of communication theories. Those that were the most used are also the most popular reported in international studies of the same topic (Bryant & Miron, 2004; Potter et al., 2014; Walter et al., 2018). The most used included agenda setting, framing, and the theory of media as an extension of the senses. This finding corroborates the idea that the region's researchers have embraced the globalization of research. However, none of these theories had Latin America or a country in the GS as its author or geographic focus. This finding reaffirms the theory of academic dependency according to which the Global North (GN) and the periphery coexist in the same research ecosystem. However, by possessing cultural, symbolic, and material resources, the GN maintains its sovereignty as a producer of knowledge. Demeter (2018) noted that in 42 years of journals in the field indexed in WoS, South America contributed only 1%. It is therefore essential that the wide-ranging discussion that has taken place in the region within the field of communication be more noticeable and enter the great international conversation from a horizontal dialogical perspective.

The data analyzed herein confirm that the qualitative approach is preferred in the region. The interview, case study, and discourse analysis were the qualitative research methods most used by academics. This reaffirms the long humanistic tradition closest to the qualitative approach that has been present in the social sciences. However, content analysis was the second most-used method, and the survey occupied sixth place. It is striking that the experimental method, which was the most used in the *Journal of Communication*, a journal considered central to the field, was used very infrequently in the region. Later studies could explore the reasons for this lack of use. The finding that the most frequent subfield or topic was communication and health was surprising. This subfield has a recent history in the region, although it has been consolidating in the last decade, led by the knowledge production that has occurred in Brazil (Soares-de-Araujo & Cuberli, 2020). It is likely that the large sample of journals from Brazil had an influence on this result. The following themes were predictable if we consider that there has been a very valuable reflection on sociocultural aspects in the region, led by authors such as Jesús Martín-Barbero, Néstor García Canclini and Beatriz Sarlo, among others (De-Moragas-Spà, 2011). Likewise, reflection on theory and methodology has been provided by great reflections fostered by authors such as Pasquali, Verón, Beltrán, Marques de Melo, Fuentes Navarro, Galindo, and Vidales.

The present study is not without its limitations. The large sample of Brazilian journals influenced some results, although it corresponds to the bibliographic production of the region. Some journals studied were not published for some years, affecting the entire sample. Subsequent studies should be able to analyze knowledge production by expanding the sample and longitudinal study that allows observing changes and trends over time. The present research contributes to the theoretical body of knowledge production in the field of communication in Latin America.It explores in an original way and with empirical rigor variables that had not been previously studied in regional academic journals. Likewise, as suggested by Evans and Foster (2011), it points to clues about the specific challenges that communication research must tackle. Making theorizing and reflection in the region more visible is undoubtedly one of the essential challenges. so that the voice is heard more clearly in the great conversation in both the institutional spaces of the major associations and conferences and the journals of the hegemonic publishers in the field.

Author Contribution

Idea, J.A.A.C.; Literature review (state of the art), J.A.A.C., R.G.P.; Methodology, J.A.A.C., R.G.P.; Data analysis, R.G.P.; Results, R.G.P.; Discussion and conclusions, J.A.A.C., R.G.P.; Writing (original draft), J.A.A.C., R.G.P.; Final revisions, J.A.A.C., R.G.P.; Project design and sponsorship, J.A.A.C., R.G.P.

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Audiovisual project for childhood
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Disinformation and multiliteracy:
A systematic review of the literature

Desinformación y multialfabetización:
Una revisión sistemática de la literatura

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ABSTRACT

Disinformation is a serious problem for democratic systems in open societies. It is a global phenomenon that must be studied from different approaches and the educational dimension is one of the most relevant. It is necessary to know what educational models have been developed to empower citizens against disinformation. A systematic review of the literature (2011-2020), following the PRISMA protocol, was carried out by analyzing articles (n=76) extracted from three databases (Wos, Scopus and ERIC). Reference management and text mining software was used to data analyse. Eight research questions were answered on the conceptual framework, bibliometrics characteristics and pedagogical dimension. From the results of the content analysis emerges a vision of the role of multiliteracies in educational research and the problem of disinformation: media and information literacies are the most relevant and news and data literacies are incorporated. The need to adopt interdisciplinary approaches is confirmed. From the results of the educational dimension, three pedagogical approaches are identified: strategies for competencies development; focused on content and education for citizenship. Workshops and lesson plans are the most common teaching practices. The development of critical thinking, experiences in the co-construction of knowledge, and the values of civic education are fundamental against disinformation.

RESUMEN

El problema de la desinformación es una amenaza para los sistemas democráticos. Es un fenómeno global que debe ser abordado desde múltiples perspectivas, siendo la pedagógica una de las más relevantes y, por ello, es necesario conocer qué modelos didácticos se han desarrollado para empoderar a la ciudadanía ante la desinformación. Se llevó a cabo una revisión sistemática de la literatura (2011-2020) bajo el protocolo PRISMA y se analizaron artículos de investigación (n=76) extraídos de tres bases de datos (Wos, Scopus y ERIC). El análisis fue realizado con apoyo de gestores bibliográficos y de minería de textos. Se da respuesta a ocho preguntas de investigación sobre el marco conceptual, las características documentales y la dimensión pedagógica. El análisis documental ofrece una visión del papel de las alfabetizaciones múltiples en la investigación educativa sobre el fenómeno de la desinformación, destacando la relevancia de la "alfabetización mediática" y la "informacional", así como la emergencia de la "alfabetización en noticias" y en "datos". Se evidencia la necesidad de adoptar enfoques interdisciplinares. Con relación a los resultados educativos, se identifican tres enfoques pedagógicos: estrategias competenciales, centrado en contenidos y educación para la ciudadanía. Las prácticas de enseñanza más frecuentes son la realización de talleres y el diseño de programaciones didácticas. El desarrollo del pensamiento crítico, las experiencias en co-construcción de conocimientos y los valores de la educación cívica son fundamentales contra la desinformación.

KEYWORDS | PALABRAS CLAVE

Disinformation, fake news, media literacy, informational literacy, digital literacy, educational model.
Desinformación, noticias falsas, alfabetización mediática, alfabetización informacional, alfabetización digital, modelo educativo.

1. Introduction

Freedom of expression is a fundamental value of open democratic societies. The information received by citizens must be varied and verifiable to enable them to form an opinion on the issues that affect them in their lives. However, the deliberate, large-scale and systematic spread of disinformation seriously endangers democracy and poses a huge challenge to education systems. The European Union has drawn up an "Action Plan against Disinformation" and determined, as one of its pillars, to increase the awareness and capacity of society to respond to this phenomenon. This involves improving the literacy of citizens to understand how to detect and counteract misinformation (European Commission, 2018). The most effective way is to promote "Media and Information Literacy" (MIL), which includes a set of skills recognized by UNESCO as essential for the participation of citizens in the current media environment (Wilson et al., 2011). The Council of Europe has advised ministries of education to create an internationally standardized curriculum on information literacy for all ages, including critical assessment of information sources, the influence of emotion on critical thinking and the implications of algorithms and artificial intelligence (Wardle & Derakhshan, 2017). In the academic field, various studies have highlighted the educational shortcomings of students in dealing with disinformation (Breakstone et al., 2021; Herrero-Diz et al., 2019; Johnston, 2020).

1.1. Informational disorders

Disinformation and so-called "fake news" are informational disorders that are intentionally emitted and elaborated through the creation of doubt and false debates, with the purpose of obtaining economic profitability or an ideological advantage (Del-Fresno-Garcia, 2019). Wardle and Derakhshan (2017) define the concept of "dis-information" as false information, which is deliberately created and disseminated to generate harm, to confuse and to misrepresent. It differs from "mis-information", consisting of imprecise information that is not disseminated with the intention of lying, nor does it intend to cause harm. Finally, the term "mal-information" is defined as information based on real evidence, which is used cunningly, with the intention of causing harm to individuals, organizations or countries. The use of the term "fake news" has been questioned since disinformation is a complex phenomenon, involving uncertain content mixed with facts, the dissemination of which takes place in multiple formats and through various digital practices (European Commission, 2018; López-Flamarique & Planillo-Artola, 2021). Its use is considered to tend to destroy the credibility of information and to generate an oxymoron, since the concept of "news" is associated with verification and public interest (UNESCO, 2018).

Disinformation is an expanding phenomenon caused by info-saturation, that is, the information overload that prevents people from making rational decisions. It is also favored by the rise of information banalization, which seeks to capture the interest of the audience through inconsequential content. Finally, it spreads due to the difficulty in identifying the source of the information and to the "mediamorphosis", since the Internet has substantially altered the concept of authority, by diluting the identity of the source of information. At the same time, the search for "informative asepsis" by the media requires readers with a greater handle on current affairs to interpret the facts that are actual news (Aguaded & Romero-Rodríguez, 2015).

Weiss et al. (2020) identify different factors that explain the spread of disinformation among citizens: (a) The "principle of minimum effort" and the rise of pseudo-contents: Information consumers prefer easily accessible resources, regardless of their intellectual value or relevance. b) The use of logical fallacies and excessive trust: Repeated manipulated arguments about misleading or invented news encourage disinformation. The Kruger-Dunning effect suggests that people can overestimate their informational skills and knowledge of a subject, leading to misjudgments about the veracity of information. c) Use of propaganda: It is used for partial presentation of facts, to distort the relationship with reality and to draw biased and inaccurate conclusions. d) Acceptance of rumor: Rumors are distortions derived from ignorance and repetition of misinformation in an involuntary manner. f) Parody, satire, and simulation of likelihood in political discourse: A joke, caricature, or irony, due to the loss of context, can be interpreted as valid information and, even if identified correctly, can be used as a partisan excuse to attack the ideological adversary.

1.2. Multiple literacies

Selber (2004) understands digital technologies as interwoven artifacts within the social context and consequently, their use requires an understanding of the rules governing human communication. He believes that critical thinking is a logical extension of functional skills and that students must perceive digital tools as cultural products to become critical users of technology. In order to achieve this objective, the key perspectives that shape design and technological cultures must be understood, as must the intrinsic relationship between digital infrastructures and contextual factors of a political, economic and educational nature. Multi-literacy encourages students to apply their functional and critical skills to become reflective media consumers and producers (Damasceno, 2021). Different types of literacy have been conceptualized. "Media literacy" is the ability of a citizen to access, understand, analyze, and evaluate media information, as well as to produce information for a specific purpose, in various formats (image, sound, text). Its objective is to train informed and autonomous citizens who question the information they receive (Jones-Jang et al., 2019).

"Informational literacy" is the ability to think critically and make argued judgments about any information. Citizens must be empowered to obtain and express an informed vision of reality (CILIP, 2018). "News Literacy" incorporates an understanding of the role of news in social context, the ability to find, critically evaluate and produce news, as well as the underlying reasons for its consumption (Kajimoto & Fleming, 2019). "Data literacy" training enables the use of data generated in digital practices and includes data identification, understanding, reflection, use and tactics (Pangrazio & Selwyn, 2019). "Digital literacy" refers to a competence in the adequate use of digital tools and devices to identify, access, manage, integrate, evaluate, analyze, and synthesize digital resources, build new knowledge and communicate with others in specific situations and reflect on this process (Martin & Grudziecki, 2006). Via multiple avenues, students must develop "critical literacy" skills necessary to navigate the digital world and question the information they find online. The aim of this study is to investigate the current educational response to the phenomenon of disinformation through the results of research conducted over the last decade.

2. Material and methods

A systematic review consists of the compilation of the entirety of the research according to previous selection criteria, with the aim of answering specific research questions. The report of this systematic review applies the PRISMA 2020 standards to identify eligibility criteria, sources of information, search strategy, selection process, data collection process and data set. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement was published in 2009 to help researchers transparently report why a review is made, how it has been performed, and what its findings are. PRISMA 2020 includes an updated guide on methods for identifying, evaluating, and synthesizing studies, along with a checklist of 27 items (Page et al., 2021). The systematic review process that has been applied in this study consists of different phases (Buntins et al., 2019):

- Phase 1: Research Questions (RQ). They are organized around three areas: (a) Conceptual framework, to analyze the relationships between key words identified in literature (RQ1); (b) Documentary characteristics, to identify themes, geographical location, Q levels of journals and research methodologies used (RQ2-RQ5); and c) Pedagogical dimension (RQ6-RQ8), to recognize the educational levels, areas of knowledge, pedagogical approaches, teaching practices and teaching tools in the analyzed studies.
- Phase 2: Eligibility criteria and sources of information. This includes English or Spanish articles published in scientific journals between January 2011 and December 2020, containing in their title the concepts of "fake news", "disinformation" or "misinformation", abstract or keywords or the term "literacy". Theoretical and empirical studies with quantitative or qualitative methods are also included. The exclusion criteria applied involves articles that do not develop educational research related to informational, media, digital, data or news literacy. Articles whose purpose is the presentation of special issues were also excluded.
- Phase 3: Search strategies. The Web of Science (Wos), Scopus and ERIC databases were used for the selection of articles. In each database, the keywords "fake news", "disinformation",

"misinformation" and "literacy" were used and the search was limited to the established time frame of 10 years. The search syntax is included in the coding sheet (https://bit.ly/3BycHZT).

- Phase 4: Study selection process. The initial search resulted in 280 articles, of which 74 were duplicates. All the researchers analyzed the 206 articles based on the title and abstract, according to the inclusion-exclusion criteria. After consolidating the results, 186 articles were excluded. The remaining 94 were analyzed independently by researchers, in full text, in a second selection process, resulting in the agreement to exclude 20 articles. The snowball method was applied to citations included in the 74 selected articles and 2 articles were added that completed the final sample of documents for systematic review (n=76).

Table 1. Scopes, questions, and initial coding criteria		
Scopes	**Investigation Questions**	**Initial Codification**
Conceptual Framework	RQ1. What is the conceptual network around the terms "fake news", "disinformation", "misinformation" and "literacy" that is extracted from literature?	Map of co-occurrence by keywords. Automatic coding and selection of nodes and subnodes.
Document Characteristics	RQ2. What is the distribution of articles according to the type of literacy and their position in the database?	Quartile of the journal and year of publication of the article. Types of literacy.
	RQ3. What are the topics of the articles according to journal category in the databases?	Thematic categorization of journals according to the database (Wos, Scopus).
	RQ4. What is the geographical distribution of publications?	Country of residence of the first author of the article.
	RQ5. What research methodologies are used in the selected studies and what is the size of their respective samples?	Theoretical studies / Instructional designs / Quantitative or qualitative research / Mixed.
Pedagogical Dimension	RQ6. What educational levels are included in the research and what areas of knowledge are involved?	Primary / Secondary / Higher / Adult Education / Vocational Training.
	RQ7. What are the pedagogical approaches adopted in the literature regarding the use of multiple literacy to tackle the problem of fake news and disinformation?	Competence strategies. Education for citizens. Content-Focused. Other specific approaches.
	RQ8. What teaching practices and teaching tools are identified in studies regarding literacy to overcome fake news and misinformation?	Internships: Curricular integration / Specific courses / Workshops / Other internships. Didactic tools: Evaluation instruments / Pedagogical design / Educational resources.

- Phase 5: Data coding and synthesis. The Zotero bibliographic manager was used for data collection. Data synthesis was performed using a coding sheet with 23 fields. VOSViewer and NVivo 12 Plus were used for the analysis of the conceptual network. In the review, the three researchers, first independently and then by consensus, acted in the different phases of selection according to criteria for prior inclusion and definitive inclusion.
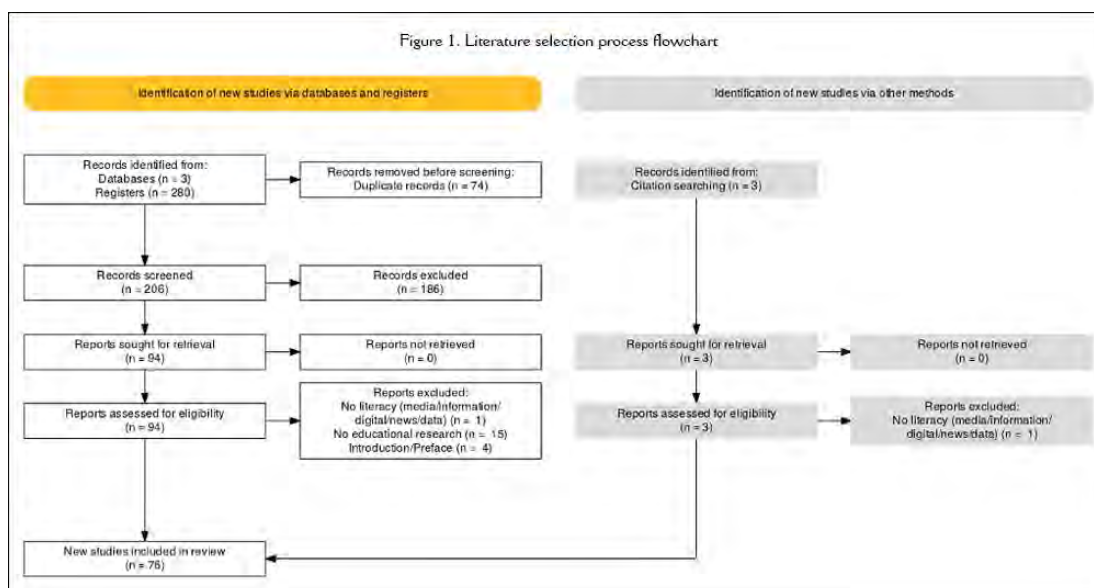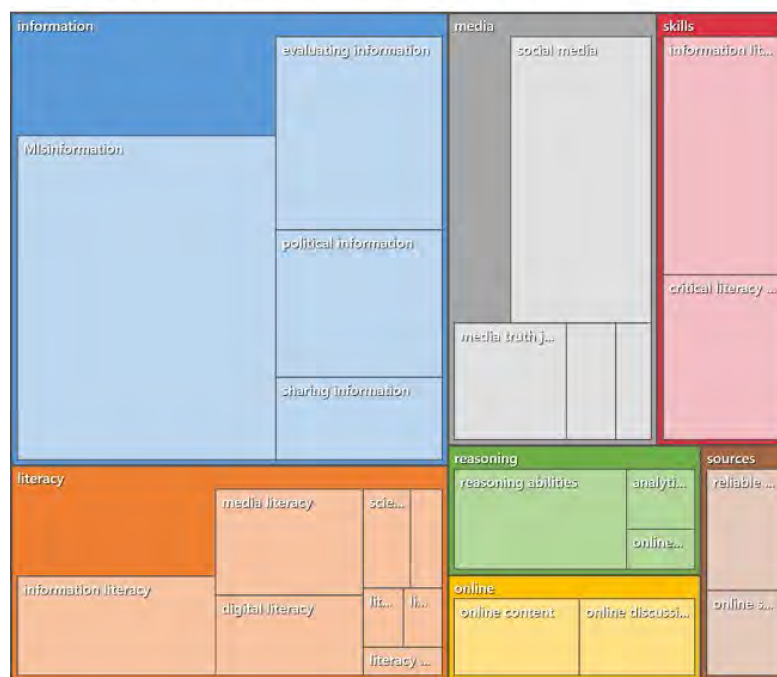

Figure 1. Literature selection process flowchart

3. Analysis and results

• RQ1. What is the conceptual network around the terms "fake news", "disinformation", "misinformation" and "literacy" that is extracted from the literature?

To analyze the network of concepts, a series of clusters generated by the co-occurrence of keywords in the articles, were identified. A first cluster, in green color, identifies the concept of "fake news" and its relationship with "post-truth", "fact-checking" or "pedagogy". The blue cluster includes the concepts of disinformation ("disinformation" and "misinformation") and their links to informational and news literacy. The red cluster brings together the concepts of "critical thinking" and their relationships with "deception", "teaching methods" or "librarians".

Figure 2. Co-occurrence map by keywords (minimum frequency=2)

The yellow cluster identifies the concept of "news media" and its link to "critical reading", "credibility" or "prejudice". Finally, the purple cluster picks up on media literacy and its relation to "scientific literacy", "civic education" or "digital media". In order to develop this conceptual network in depth, the full texts of the articles were analyzed using automatic coding with NVivo 12 Plus. 13 automatic nodes were obtained and subsequently merged by their thematic affinity into seven nodes (Figure 3). The three main nodes identified were "literacy", "information" and "media". The first "literacy" node includes different sub-nodes such as "media literacy", "information literacy" or "digital literacy". The second "information" node consists of the sub-nodes "disinformation", "information assessment", "political information" and "information sharing". In the third "media" node, the sub-nodes "social media", "media effects", "media truth judgment" and "social media influencers" emerge. The remaining four nodes are identified by the concepts: "sources", "skills", "online" and "reasoning". This double conceptual analysis provides a useful theoretical framework for studies on literacy and misinformation, as well as instructional designs that apply effective teaching methods to the problem of fake news.

• RQ2. What is the distribution of the articles according to the type of literacy and their position in the database?

The systematic review is distributed, according to the Q level of the journals, as follows: 27.6% are in quartile 1 (Q1), 23.7% in Q2, 19.7% in Q3 and 14.5% in Q4. A total of 11 articles (14.5%) belong to journals not indexed in Wos or Scopus that were incorporated from ERIC. 40.7% of the articles deal with media literacy, 39.5% with information literacy and 14.4% with news literacy. Digital literacy is a central theme in 4% of the articles reviewed. Data literacy is identified in one article (Q1).

Figure 3. Conceptual network of nodes and sub-nodes from full-text coding

• RQ3. What are the topics of the articles according to journal category in the databases?

The category of journals with the greatest presence in this systematic review is "Education-Educational Research" (38.2%), followed by the journals in the category "Information Sciences and Biblioteconomia" (36.9%). In third place, there are the journals belonging to the category of "Communication" (15.8%). The rest belong to the categories of "Social Sciences" (Miscellaneous) and "Experimental Psychology", both with 2.6%; and "Multidisciplinary Sciences" and "Linguistics and Language", each with 1.3%.

• RQ4. What is the geographical distribution of publications?

14 countries have been identified, from which the largest contribution is made by the United States (64.5%), followed in equal proportion by the United Kingdom and Spain (7.9%).

• RQ5. What research methodologies are used in the selected studies and what is the relative size of their samples?

The most frequent methodology in this review, as shown in Figure 5, corresponds to theoretical studies (32.9%). In second place, research based on questionnaires make up 28.9%. Thirdly, instructional design contributes 15.8%. Case studies represent 10.5%. With the same percentage (3.9%), are empirical studies and content analyzes. The least common methodologies are mixed methods, thinking out-loud, and ethnography (each representing 1.3%). With regard to the size of the samples used in the non-theoretical studies, it is evident that the most frequent samples are between 25 and 100 subjects (13.2%). Next, we see samples between 101 and 500 subjects (9.2%). Lastly, with the same percentage, there are samples between 501-2,000 subjects and those less than or equal to 25 (6.6%).

• RQ6. What educational levels are included in the research and what areas of knowledge are involved?

If we look at the educational level on which the research focuses, we find that the highest percentage corresponds to Higher Education (38.2%), followed by Secondary Education (11.8%). The third place is occupied by Adult Education (7.9%), followed by training for professional updating (6.6%).

Figure 4. Distribution and number of articles by literacy typology, Q level and database
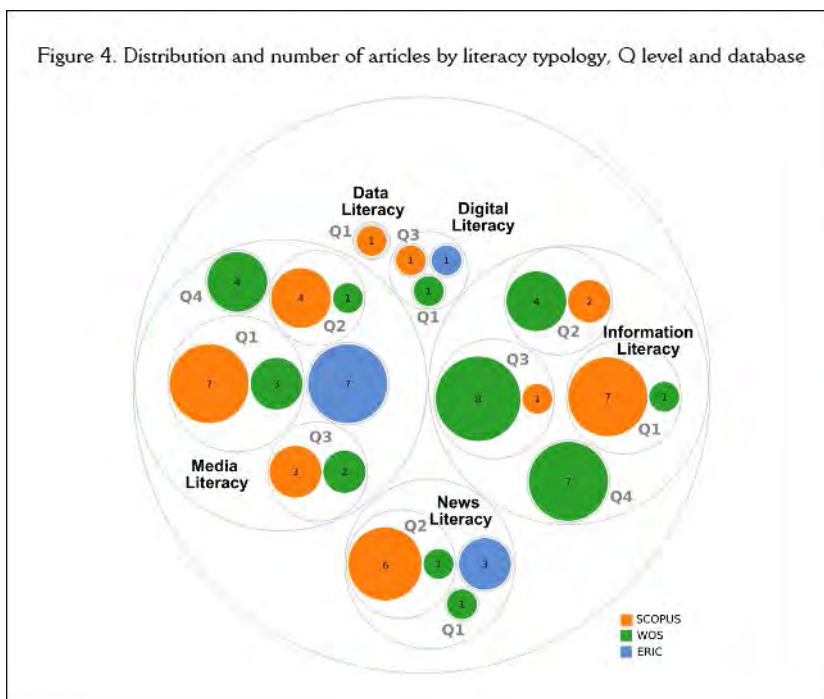
With the same percentage (2.6%), research is carried out in Primary Education compared with the two levels of Secondary Education and University, put together. 28.9% of the theoretical studies do not identify a specific educational level. With regard to the areas of knowledge, disciplines or subjects directly involved in the pedagogical design, study of variables or educational intervention of the research analyzed, it is evident that Library Science is the most frequent (27.6%). Much lower down is Pedagogy (5.3%), followed by Communication (3.9%). With the same percentage (2.6%) are Health Education, Journalism and Physical-Natural Sciences. Other areas present in the review (1.3%) are: Civic Education, Communication and Education, Education and Journalism and English as a Second Language.

Figure 5. Typologies of research methodologies and their relation to the different literacies
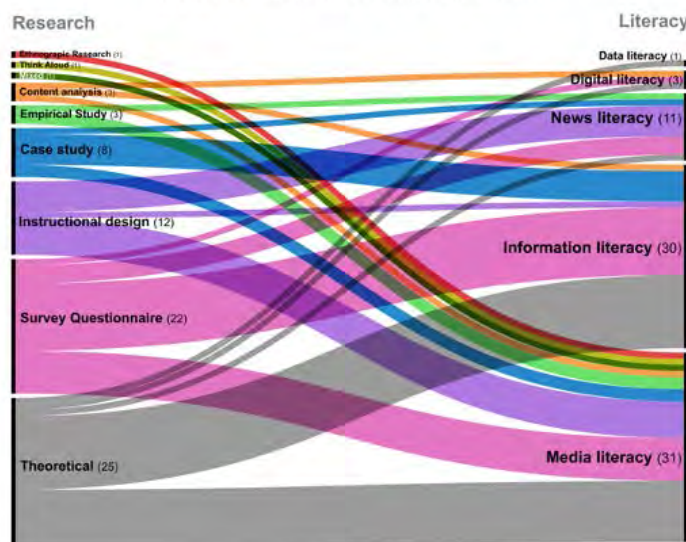
- RQ7. What are the pedagogical approaches adopted in the literature regarding the use of multiple literacies in the face of the problem of fake news and misinformation?

Various pedagogical approaches have been identified regarding the educational perspective which guides studies on fake news and misinformation within the context of multiple literacies. These approaches have been categorized into three dimensions: a) Competency-based strategies (38.1%), which are oriented towards the acquisition of skills, abilities, and attitudes. b) Content-Focused (29%), with proposals directly linked to the evaluation and production of information. c) Education for citizenship (23.6%), which is situated in a socio-political and democratizing environment.

Finally, a number of particular approaches are identified around psychological aspects and specific literacies.

- Competency strategies.

1. Critical thinking (25%). To counteract unreflective or passive thinking, the objective is to encourage intentional and self-regulatory judgment that leads to interpretation, analysis, evaluation and inference and includes explanations of the conceptual, methodological and contextual considerations on which the judgment is based. It is a competence that, in addition to these cognitive skills, requires two attitudes: open-mindedness and trying to be well informed (Fisher, 2021). Critical thinking contributes to adopting a proactive approach, which allows being selective about reliable information (Weiss et al., 2020). Its introduction as mandatory content in the official curriculum and its presence in teacher training has been proposed. This includes a specialization for teachers related to digital media literacy (Horn & Veermans, 2019). This critical approach should avoid promoting global skepticism and a generalized distrust towards the media. Similarly, it must be linked to the contemporary media ecosystem in order to be able to apply critical thinking in context (McDougall, 2019).

2. Lateral reading (5.3%). This is a strategy for deciding where to direct searches or inquiries. Leaving a website to check what other digital sources say about the information is a more effective strategy than focusing exclusively on what one source reports about itself. The key feature of "sideways reading," paradoxically, is not reading. In fact, those who can efficiently discern the quality of information intelligently, ignore significant amounts of text that are not essential for assessing the reliability of a digital source. Less reading is required to learn more. This requires a good level of informational and digital skills such as knowing how to display and manage different tabs in a browser or how to quote expressions in order to obtain more efficient search results. In addition to saving time, this often leads to more accurate judgments than those achieved by more complex methods (Wineburg & McGrew, 2019).

3. Inquiry (3.9%). In this educational proposal, the expository class on misinformation is eliminated by encouraging student interaction, so that, as active participants, learning is more effective. The conditions of this approach are: 1) To create a space for research where decision-making skills can be applied to use in everyday life in order to assess the credibility of information sources; 2) To show rather than interpret news about which students could research autonomously; and 3) To adopt a global point of view, such that misinformation is identified as an international problem, eradicating a localist view (Glisson, 2019).

4. Game-based learning (3.9%). Through "newsgames", a ludic and interactive dimension on fake news is introduced. In this type of video game, informative simplification is produced and the emotional design is enhanced to promote identification and empathy. Different components of fake news are introduced: veracity/falsity, news generation, and dissemination through social networks. As the effectiveness of these resources is based on the player's ability to discover the game's intentions, teacher participation is essential, as a mediator of the game's interpretation and to overcome a use which is limited to mere entertainment (Gómez-García & Carrillo-Vera, 2020). Additionally, students can be involved in the design of their own "newsgames" (Literat et al., 2020).

- Content-focused

1. News evaluation (21.1%). This educational approach focuses on the skills and knowledge that news consumers need to navigate the news ecosystem consciously and critically. It informs how news content is assimilated. It enhances knowledge about the impact information can have on society and reveals the disconnect between mediated reality and external reality (Hameleers, 2020). Educational practices are geared toward training specific information-seeking behaviors for conducting effective evaluations of online news: a) Examining the entire website to judge the reliability of the information; b) Using multiple sources to answer a question; c) Scanning the search results found; or d) Spending adequate time identifying and evaluating online news (Auberry, 2018).

2. News production (5.3%). It proposes that students become familiarized with the journalistic process and the role played by journalists in the creation and exchange of information. By showing what happens in the management of news by professional media, a contribution is made to decrease skepticism and maintain a disposition towards the search for quality sources of information (Rush, 2018). Creating one's own news channel allows one to gain an in-depth understanding of the nature of news production, as well as how social networks and other digital communication platforms work (Lim & Tan, 2020).

3. Knowledge co-construction (2.6%). The social mediation policies and procedures used by the Wikipedia community to maintain credibility and protect against problematic information can be leveraged for educational purposes. The main policies used by Wikipedia to build trust by combating fake news and information are: a) Verifiability: instead of deciding what is true, the Wikipedia community arbitrates on what is verifiable from reliable sources; b) Transparency: the editorial process is completely open and public; c) Viewpoint neutrality: articles should introduce opposing viewpoints; and d) Salience: criteria for determining whether a given topic deserves its own article. Involving students as contributors to Wikipedia is an educational practice that contributes to the fight against misinformation (McDowell & Vetter, 2020).

- Education for citizens

1. Civic education (10.5%). Democratic society needs adequate spaces for dealing with disinformation and fake news. Civic education offers the opportunity for students to be competent for active participation in the use, dissemination, debate, and production of political content (non-partisan), through digital technologies. This approach raises the need to develop "citizen workshops" that offer tools and knowledge for the full performance of civic participation (Carmi et al., 2020); as well as "civic media literacy" that encourages reflection on prejudices and ideological biases in information (Hodgin & Kahne, 2018); or the impact of media on political, social or cultural issues that define democracy (Mihailidis & Viotty, 2017).

2. Vaccine effect (10.5%). Disinformation is considered a "sociocultural epidemic" fostered by digital news and propagated through social networks. The pathogen (virus) is fake news, which can be partially blocked through technological self-detection tools. The routes of transmission are the toxic platforms that generate fake news (social networks, blogs, news sites, etc.), on which legal regulations must be established. The potential recipients of infection are the users, gullible or info-saturated, who must be treated with educational "vaccines" to overcome the "disease" (Rubin, 2019).

3. Vulnerable citizenship (2.6%). This approach stresses the importance of providing information literacy training to digitally disadvantaged groups in order to improve their skills to effectively assess the credibility of their information sources (Seo et al., 2020). Educational intervention should be targeted, as a priority, to people with lower educational levels, lower economic incomes and little experience using the Internet (Khan & Idris, 2019).

• Other specific approaches.

1. Specific literacies (5.2%). Various perspectives are identified such as "multi-literacy" teaching, i.e. educating about the different types of information available in the 21st century and how to find, verify and use it (Walsh, 2010). "Meta-literacy" is another perspective concerned with the ability to search, identify, evaluate and manage information, as well as to be aware of the mechanics involved in its dissemination and participation online (De-Paor & Heravi, 2020). Digital competence is understood as the ability to navigate and select information (Jones-Jang et al., 2019).

2. Psychological-attitudinal approach (3.9%). This includes attention to "social motivations" in order to try to combat the uncritical sharing of misinformation by mere interaction or by wanting to be conspicuous (Chen et al., 2015). "Observational correction", involves users of social networks updating their own attitudes after witnessing the correction of another user (Vraga et al., 2020). Finally, "techno-cognition" is proposed in order to include technological solutions that incorporate psychological principles (Lewandowsky et al., 2017) in the fight against fake news.

• RQ8. What teaching practices and didactic tools are identified in the studies in relation to literacy to overcome fake news and misinformation?

Most of the educational practices described in the articles analyzed take the form of training workshops and the design of didactic programs for their development in the classroom. In a more innovative way, "mindfulness" (Lee & Shin, 2019) or the creation of "memes" (Ireland, 2018) are included. This review has identified a group of tools described in the studies analyzed. The teaching materials have been categorized as follows: 1) Evaluation instruments (Evaluation of academic resources or "checklist", Evaluation of news sources, Detection of fake news and Tests or Questionnaires). 2) Pedagogical design (Competency frameworks and Teaching methods). 3) Educational Resources (Educational repositories and platforms, Video Games). The complete list of these tools is available in the Table of Educational Resources for fake news (https://bit.ly/3iyaa9p).

4. Discussion and conclusions

The aim of this article has been to explore the role of multiple literacies in relation to the problem of fake news and misinformation. To this end, a systematic review of the literature has been developed, which allowed us to respond to eight research questions regarding the conceptual framework built around the phenomenon. We observed the document characteristics of the articles in relation to the typologies of literacy, the thematic areas from which they are studied, and the research methodologies used. Finally, with respect to the pedagogical dimension of the studies, the identification of different educational approaches, a typology of teaching practices, and didactic tools emerge.

The most relevant findings of this systematic review involve, on the one hand, the identification of the conceptual network that emerges from the research analyzed and that has been developed with the support of digital tools for text mining. This network allows us to study not only the key concepts that articulate the knowledge on literacies and misinformation but also the relationships that experts establish between them. In this way, an indicative "map" of the current state of knowledge is available and a deeper exploration can be initiated of this scarcely researched territory but one with great educational and social relevance.

Furthermore, this systematic review provides a description of the characteristics of the documents analyzed that allows us to recognize how the different types of literacies have been studied in relation to the phenomenon of fake news. It has become evident that media literacy is the one that obtains the greatest interest in the studies, followed by information literacy and news literacy. Digital literacy, which is more global in its objectives, has a smaller presence and data literacy emerges as a new option to be considered. Literacies have been identified as a solution to overcome or mitigate the problem of misinformation in previous reviews. Specifically, information literacy has been considered in numerous studies as an essential skill in the face of the fake news phenomenon due to its capacity for the development of critical thinking (Machete & Turpin, 2020). Meta-reflexivity, that is, the search for autonomy to

adopt a permanent critical attitude towards information, favors greater media competence and motivation towards information verification (Golob et al., 2021). The thematic categories of the journals that allow us to explore the areas where the problem of misinformation is studied along with the role of multiple literacies in tackling it. These are: "Education-educational research", "information sciences-librarianship" and "communication". This result suggests the importance of interdisciplinarity in the research of this educational phenomenon and identifies which areas should work in a coordinated manner to achieve deeper and more applicable knowledge. It is a conclusion that coincides with that obtained by Blanco-Alfonso et al. (2019), who suggest the need to promote interdisciplinary work that allows the involvement of researchers from different areas or fields of great interest for the theoretical and practical approach to fake news (Psychology, Education, Law, Engineering or Sociology). Simultaneously, the review has shown that the research has provided more theoretical than empirical studies. Among the latter, there is a greater frequency of research based on questionnaires, instructional designs or case studies. Consequently, the current state of scientific knowledge on this problem presents gaps that should be filled in order to have more evidence on the quality of educational methods and practices that can be more effective against disinformation.

Finally, this study has enabled the identification of the main pedagogical approaches being used to address the problem of misinformation. Three educational perspectives emerge from the analysis, which are aimed towards the use of competency strategies, civic education, and information content as the axis of training. From a global vision of these approaches, more integrated pedagogical proposals should be developed in the future, which consider the necessary skills and attitudes towards the consumption of information, in coherence with the defense and consolidation of democratic societies and clearly contextualized in the reality from which the informative content emerges. We consider that another practical contribution of this review is the identification and categorization of a set of quality educational tools that have emerged from the documents analyzed. These educational materials include 15 assessment tools (checklists, fake news detectors, news source evaluators, tests), 10 resources for pedagogical design (competency frameworks and methods) and 9 educational resources (repositories, platforms and video games). It is necessary to consider that the results of this study are based on a selection of articles extracted from three databases, not including other scientific and pedagogical documents, which would expand knowledge on this topic.

The results of this systematic review of the literature allow us to conclude that an adequate educational approach to the phenomenon of disinformation requires: (a) A didactic approach with a broad vision of the disinformation phenomenon that enhances critical thinking, generates information production experiences and promotes attitudes compatible with a civic education; (b) Initial and ongoing teacher training that fosters the development of media and information literacy and digital competence; and (c) The development of interdisciplinary education and communication teams for research and teaching.

Author Contribution

Idea, J.V.B.; Literature review (state of the art), J.V.B, A.G.F., J.A.B.; Methodology, J.V.B; Data analysis, J.V.B. Results, J.V.B., J.A.B.; Discussion and conclusions, J.V.B., A.G.F.; Writing (original draft), J.V.B; Final revisions, A.G.F., J.A.B.; Project design and sponsorships, J.V.B, A.G.F., J.A.B.

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Engagement and desertion in MOOCs: Systematic review

El engagement y la deserción en los MOOCs: Revisión sistemática

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ABSTRACT

Massive and open online courses (MOOCs) satisfy learning needs from the particularities of their typologies (xMOOC, tMOOC, cMOOC, iMOOC, among others) even though their high dropout rate is still latent. Recent studies reaffirm engagement as an alternative to reduce dropout rates. The literature analyzed has not yet been able to systematize responses as to how to guarantee engagement in MOOCs and thus reduce their attrition rate. And, consistent with that question, are there still challenges for teachers in this area of educational technology? These answers motivated us to carry out this systematic review to determine how engagement has been studied to help reduce the attrition rate in MOOCs. Articles from journals indexed in Scopus or WoS were reviewed applying the PRISMA protocol. At the end of the protocol, it was defined to analyze 40 studies. The results reflect that the main variables are: the design of e-activities, intrinsic and extrinsic motivation, and communication between students. This paper confirms that the main challenges to guarantee engagement in MOOCs are individualized tutoring, interactivity, and feedback. Due to the scarcity of studies that analyze the variables in an integrated way, it is proposed as future work to determine what relationships exist between these variables that interfere with engagement and dropout in MOOCs.

RESUMEN

Los cursos en línea masivos y abiertos (MOOCs) permiten satisfacer necesidades de aprendizaje desde las particularidades de sus tipologías (xMOOC, tMOOC, cMOOC, iMOOC, entre otras), sin embargo, es aún latente su alta tasa de deserción. Estudios recientes reafirman el engagement como una alternativa para disminuir los índices de deserción. La literatura analizada aún no logra sistematizar respuestas a ¿cómo garantizar el engagement en los MOOCs y disminuir así su tasa de deserción? Y, en coherencia con esa pregunta, ¿existen aún retos del profesorado en este ámbito de la tecnología educativa? Ello motivó a realizar esta revisión sistemática para determinar cómo se ha trabajado el engagement para contribuir a disminuir la tasa de deserción en los MOOCs. Se revisaron artículos de revistas indexadas en Scopus o en WoS aplicando el protocolo PRISMA. Al finalizar el protocolo se definió analizar 40 estudios. Los resultados reflejan que las principales variables son: el diseño e-actividades; la motivación intrínseca y extrínseca y; la comunicación entre los estudiantes. Se ratifica que los principales retos para garantizar el engagement en los MOOCs son: la tutoría individualizada; la interactividad; y la retroalimentación. Debido a la escasez de estudios que analicen de forma integrada las variables antes mencionadas, se propone como trabajo futuro, determinar qué relaciones existen entre estas variables que intervienen en el engagement y la deserción en los MOOCs.

1. Introduction and state of the art

The study of massive and open online courses (MOOCs), their evolution, design, and assessment has been the subject of analysis since the last century. However, in the last 15 years focus on this topic has increased due, fundamentally, to the rise in educational offers and the increasing demands and learning needs of society (Palacios-Hidalgo et al., 2020). In this context of virtual education, there are different didactic and psycho-pedagogical foundations according to the different types of MOOCs. Several authors (Mellati & Khademi, 2020; Osuna-Acedo et al., 2018; Romero-Frías et al., 2020; Teixeira et al., 2019) classify them as: (1) cMOOC or cMOOCs (Connectivist MOOCs) in which collaborative work and cooperation are promoted through connectivism; (2) xMOOCs or xMOOCs (eXtendedMOOCs) where the interaction is strongly linked to the student-teacher relationship and the assessment process focuses on closed questions; (3) madeMOOCs, encouraging the use of videos, interactivity and co-evaluation; (4) synchMOOCs, establishing time limits; (5) adaptiveMOOCs, developing dynamic assessments using adaptive algorithms and methods; (6) gMOOC, including to a greater extent gamification; (7) sMOOC (Social Massive Open Online Course) which promote greater interaction in learning and the constant accessibility and ubiquity of its educational resources; (8) tMOOC (transferMOOC) contributing to higher levels of learning transfer and pedagogical transformation; and, (9) iMOOC (intelligent MOOC) promoting the personalization of training.

Therefore, nowadays, to carry out a theoretical study of MOOCs would imply either selecting a certain typology or analyzing them "in their unit" from an interdisciplinary perspective. There are different platforms used to design MOOCs, highlighting edX, Udacity, Moodle, and Coursera. Annually, as an initial statistic, more than 40,000 people enroll in different "MOOCs" (Deshpande & Chukhlomin, 2017; Zainuddin et al., 2020), a representation of their importance and relevance even when there is a high dropout rate among those enrolled (Zhu et al., 2020a). There are several explicit causes in the literature, from which a few stand out: motivation, time availability, attitude, interest, tutoring, interactivity and feedback, the accessibility of educational resources, engagement, among other causes (Alturkistani et al., 2020; Fırat et al., 2018; Palacios-Hidalgo et al., 2020).

Previous studies declare that one of the most debated variables in the scientific community is engagement. This term refers to the participation, school commitment, passion, interest in the study, enthusiasm, energy, and dedication that the student demonstrates. This has been the object of pedagogical analysis from the field of learning, academic performance, and the permanence/dropout of a student in a course (Doo et al., 2020; Er et al., 2020; Gallego-Romero et al., 2020). Engagement has its beginnings in the 1980s. However, in the context of MOOCs, it has been fundamentally studied in the last ten years, related to dropout, interactivity, motivation, quality of digital educational resources, e-activities and, virtual tutoring (Deng et al., 2020). It is interesting that in 2020, due to the existing theoretical shortcomings (Deng et al., 2020), an exhaustive analysis of the literature is carried out, scientifically validating a scale to measure engagement in MOOCs, updating the following dimensions: social engagement, emotional engagement, cognitive engagement, and behavioral engagement.

Table 1. Systematic reviews related to the use of MOOCs (2016-2021)		
Research	**Period**	**Aspects**
Fuentes-Cancell et al. (2021)	2015-2020	Relationships between digital social networks and MOOCs
Monique and Chiappe (2020)	2009-2019	Research trends
Palacios-Hidalgo et al. (2020)	2012-2019	Origins, concept, and didactic applications
Sallam et al. (2020)	2012-2018	Language teaching
Khalid et al. (2020)	2012-2019	MOOC recommendation systems and engagement
Alturkistani et al. (2020)	2008-2018	Assessment methods; engagement and motivations
Araka et al. (2020)	2008-2018	Self-regulated learning
Zainuddin et al. (2020)	2016-2019	Gamification, engagement, and motivations
Jarnac and Mira (2020)	2014-2019	Gamification
Zhu, Sari and Lee. (2020)	2009-2019	Research techniques, themes, and trends
Foley et al. (2019)	2008-2018	Assessment methods
Almatrafi and Johri (2019)	2013-2017	Discussion forums; engagement, and motivations
Wong et al. (2019)	2013-2017	Learning, engagement and self-regulated motivations
Paton et al. (2018)	2013-2017	Engagement
Joksimović, Poquet et al. (2018)	2012-2015	Engagement
Zhu et al. (2018)	2014-2016	General analysis of scientific production.
Nortvig et al. (2018)	2014-2017	Relationship between performance, satisfaction, and engagement
Veletsianos and Shepherdson (2016)	2013-2015	General analysis of scientific production

Regarding the trends of MOOCs, various meta-analyses, reviews, and systematic mappings have been published in the last five years, highlighting those of journals indexed in the Web of Science (WoS) or Scopus (Table 1). Table 1 reflects the main topics analyzed in these articles. Of these, only eight articles study engagement and its relationship with MOOCs (Almatrafi & Johri, 2019; Alturkistani et al., 2020; Joksimovi et al., 2018a; Khalid et al., 2020; Nortvig et al., 2018; Paton et al., 2018; Wong et al., 2019; Zainuddin et al., 2020; Zhu et al., 2018). Recent studies evidence that the correlation between engagement and MOOCs is not a new trend (Monique & Chiappe, 2020). However, these studies do not systematize and group the variables of engagement and dropout in MOOCs (Galikyan et al., 2021). In this sense, in virtual education, it is essential to study and identify the current challenges of teachers to promote and ensure engagement in MOOCs. We consider that these studies (Table 1) do not answer the following question: how can we ensure or encourage engagement in MOOCs and reduce their dropout rate? And, consistent with that question, are there still challenges for teachers in this area of educational technology and digital teaching? These questions motivated us to carry out this systematic review.

2. Material and methods

The PRISMA protocol was applied (Urrútia & Bonfill, 2010) and the considerations of how to carry out a systematic review (Moher et al., 2016). This protocol provides a checklist and a four-phase process that guides the proper design of systematic reviews.

Step 1: Purpose of the study. The objective is to carry out a systematic review to analyze how to reduce the attrition rate in MOOCs from engagement. The scientific questions developed to fulfill the aim of the research were:

(1) What are the platforms and study modalities most used in research studying engagement in MOOCs?

(2) What are the most studied variables in engagement to reduce the dropout rate in MOOCs?

(3) What are the main challenges associated with engagement in MOOCs?

2.1. Threat validity criteria

Step 2: Review protocol.

- Internal validity. Each study was analyzed using a protocol that involved: (1) keywords, (2) description, (3) type of research, (4) research design, (5) analysis of results, and (6) argumentation of the conclusions.
- External validity. Articles (case studies or experimental studies) that do not validate their results are highlighted.
- Conclusion validity. A form was applied using the keywording technique (Petersen et al., 2008), the assessment criteria for systematic reviews proposed by the Joanna Briggs Institute (Lockwood et al., 2015), and the guidelines for quality, transparency, and replicability (Díaz-Iso et al., 2020).

2.2. Selection process and inclusion and exclusion criteria

- Selection and classification process. The keywording technique (Petersen et al., 2008) allowed the researchers to classify the variables and the psycho-pedagogical foundations of constructivism framed the analysis of these studies. Mendeley was used to identify duplicate papers. In any discrepancies between the authors, we analyzed the opinions of three guest researchers.
- Inclusion criteria. (1) Papers published between 2017 to February 2021; (2) articles in journals indexed in Scopus or WoS; (3) case studies or experimental studies; (4) research that studies engagement and its relationship with dropping out of MOOCs; (5) articles written in English or Spanish and peer-reviewed.
- Exclusion criteria. Level of the description of the research, type of research (essays, tutorials, meta-analyses, reviews, and systematic mappings), relationship with the object of study (engagement and desertion in MOOCs), and publication period.

2.3. Search strategy

- The scientific literature search was carried out in Scopus and WoS.

- Combinations between the logical AND / OR operators were used. The keywords were: engagement, MOOC, MOOCs, xMOOCs, cMOOC, iMOOC, sMOOC, tMOOC, experimental studies, case studies, pre-experiment, quasi-experiment, empirical experiences, and studies.
- Several terms associated to MOOCs (MOOC, MOOCs; xMOOCs; iMOOC; tMOOC and sMOOC) were used and similar terminologies were examined (cMOOC or cMOOCs; xMOOC or xMOOCs).
- General search strings -in Spanish and English-: KEY ((MOOCs OR xMOOC OR MOOC OR iMOOC OR sMOOC OR tMOOC OR cMOOC) AND (engagement) AND (experimental studies OR pre-experiment OR case studies OR quasi-experiment OR study) OR TITLE (MOOCs OR xMOOC OR MOOC OR iMOOC OR sMOOC OR tMOOC OR cMOOC) AND (engagement) AND (experimental studies OR pre-experiment OR case studies OR quasi-experiment OR study). In the case of WoS, only the following indices were searched: Social Sciences Citation Index (SSCI) and Science Citation Index Expanded (SCIE).

2.4. Quality criteria

To reduce research biases, all articles were assessed on a scale from 1 to 5. The value 5 is the maximum score conferred on the basis of each researcher's criteria. Among the criteria used, the following questions stand out: Are the instruments and the research process described? Are the results argued? Is there coherence between the type of study and the methodology used?

Step 3: Data extraction. Through in-depth analysis of evidence content, their information and relevant knowledge were stored in a data matrix to analyze, synthesize and group the information (Díaz-Iso et al., 2020; Lockwood et al., 2015; Petersen et al., 2008). In the stored information, the following factors stand out: the authors, publication date, study variables, type of research, and education level.

Step 4: Data analysis. The process included the grouping of variables, trend analysis, and statistics. Cohen's Kappa coefficient (k=0.826) was applied, obtaining 96% of «agreements» achieving a match in the researchers (Tang et al., 2015).

3. Analysis and results

3.1. Overview of the systematic review

Of the 40 selected studies (Figure 1), 77.5% (Figure 2) are from the last three years, highlighting the researches of case studies with pre and post-test (65%) and experimental studies (27.5%).

Figure 1. Procedure for the selection of studies according to the PRISMA protocol
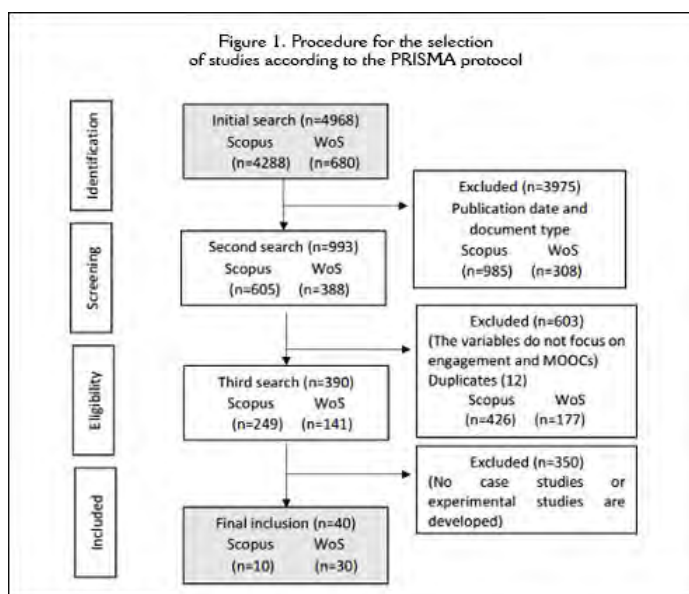
RQ1: What are the platforms and study modalities most used in research studying engagement in MOOCs?

Educational experiences are mainly focused (Figure 3) on edX platforms (n=14), Coursera (n=8), FutureLearn (n=4), and Moodle (n=4).
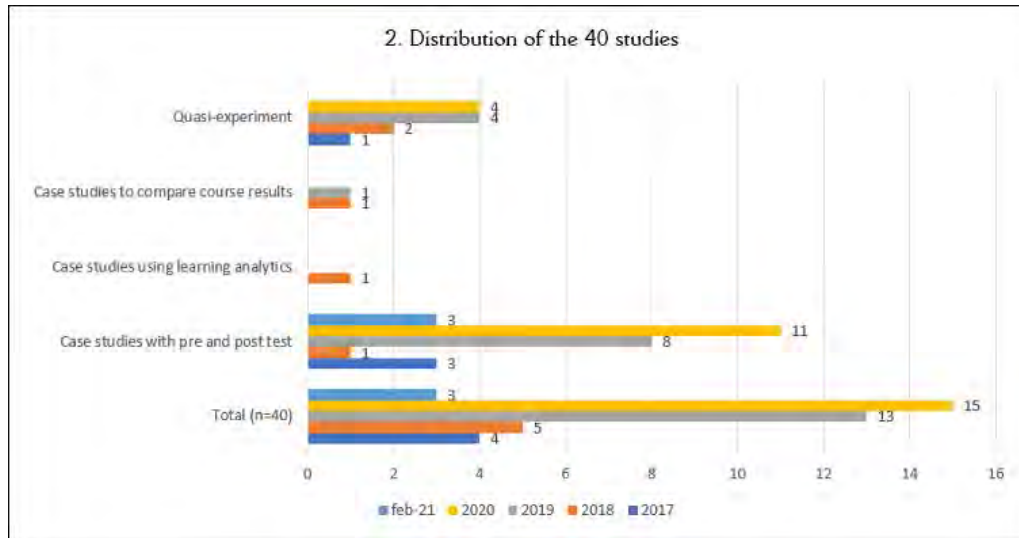
E-learning is the most used modality with an emphasis on online learning (n=34). Therefore, in this modality, a greater diversity of learning management platforms is used.

Figure 3. Most used platforms
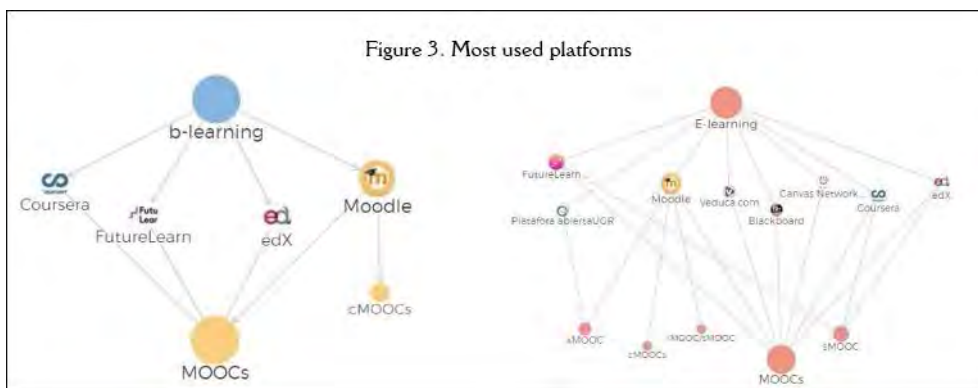
Some papers (b-learning and e-learning modalities) use MOOCs but do not classify them. In the case of e-learning, the xMOOC and sMOOC are mainly used. The least used typologies are cMOOCs and iMOOCs. The research relationship, study modality, and platforms are presented in Table 2.

RQ2: What are the most studied variables related to engagement in order to reduce the dropout rate in MOOCs?

Three scenarios stand out in the research (Figure 4):

- General education –students of different ages. The most studied variables are the following: data privacy, forum design, education democratization, gamification, satisfaction, and perceived quality.
- University education. In this scenario, the following variables stand out: design of electronic learning activities (e-activities), intrinsic and extrinsic motivation, personal learning networks, and peer review.
- Postgraduate education. The following variables stand out: communication and social media, design of e-activities, motivation, and intrinsic communication.

| Table 2. Synthesis of the information extracted from the 40 studies				
Items	Papers	Variables	Context	Typology
I1	Jiménez (2017)	Personal learning networks	University education	MOOCs
I2	Velázquez-Sortino et al. (2017)	Communication		cMOOC
I3	Deshpande and Chukhlomin (2017)	Navigation, accessibility, and interactivity	University and postgraduate education	MOOCs
I4	Shapiro et al. (2017)	Attitudes	Postgraduate education	
I5	Joksimović, Dowellet al. (2018)	Communication and social media		cMOOC
I6	Kubincova et al. (2018)	Design of e-activities		cMOOC/xMOOC
I7	Tang et al. (2018)	Design of e-activities	University education	cMOOCs
I8	Watted and Barak (2018)	Intrinsic and extrinsic motivation		MOOCs
I9	Fırat et al. (2018)			xMOOC
I10	Kovanović et al. (2019)	Learning strategies		
I11	Sanz-Martínez et al. (2019)	Collaborative learning		
I12	Stöhr et al. (2019)	Didactic video design		
I13	Gordillo et al. (2019)	Design of e-activities		MOOCs
I14	Sun et al. (2019)	Autonomy and intrinsic motivation		
I15	Cornelius et al. (2019)	Effectiveness of b-learning		
I16	Dale and Singer (2019)	Effectiveness of b-learning		
I17	Teixeira et al. (2019)	Design of e-activities	Postgraduate education	iMOOC/sMOOC
I18	Prinsloo et al. (2019)	Data privacy	General education	sMOOC
I19	Vayre and Vonthron (2019)	Psychological factors in exams	University education	MOOCs
I20	Xing et al. (2019)	Design of e-activities / forums	General education	MOOCs
I21	Zhang et al. (2019)	Democratization of education		
I22	Antonaci et al. (2019)	Gamification		
I23	Gallego-Romero et al. (2020)	Behaviour	Postgraduate education	MOOCs
I24	Maya-Jariego et al. (2020)	Satisfaction and perceived quality	General education	
I25	Mellati and Khademi (2020)	Design of e-activities	Educación universitaria	cMOOCs
I26	Littenberg-Tobias y Reich (2020)	Access, quality, and equity	University education	MOOCs
I27	Ballesteros et al. (2020)	Commitment and time management	Postgraduate education	cMOOCs
I28	Adam (2020)	Didactic and open design of digital educational resources		MOOCs
I29	Doo, Tang et al. (2020)	Intrinsic motivation and communication		
I30	Doo, Zhu et al. (2020)	Openness, altruism, and self-efficacy		
I31	Deng et al. (2020)	Commitment		
I32	Dai et al. (2020)	Satisfaction and attitude		
I33	Douglas et al. (2020)	Expectations		
I34	Er et al. (2020)	Peer Review	University education	
I35	Rajabalee et al. (2020)	Design of e-activities		
I36	Zhu, Bonk y Doo. (2020)	Self-control and self-management		
I37	Romero-Frías et al. (2020)	Intrinsic and extrinsic motivation		xMOOC
I38	Feitosa et al. (2021)	Perceived quality of the design of digital educational resources.		MOOCs
I39	Blum-Smith et al. (2021)	Student-centered learning		
I40	Kasch et al. (2021)	Peer Review		

Table 2 exposes the research-variables relationship. When grouping and analyzing the studies, it is highlighted that the variables most used from engagement to reduce the dropout rate in MOOCs are: e-activity design, intrinsic and extrinsic motivation, and communication between students.

RQ3: What are the main challenges associated with engagement in MOOCs? The analysis of each paper allowed to identify the following challenges (pair research-challenges) (Table 2).

- I1: Validity of the educational offer; mentoring according to individualization and diversity.
- I2: Makeup of the learning community and interaction.
- I3: Tutoring according to individualization and diversity.
- I4: Money, infrastructure, and internet access.
- I5: Makeup of the learning community and interaction.
- I6: Tutoring; previous preparation of how to use the MOOCs.
- I7: Interactivity and feedback
- I8: Quality of digital educational resources.
- I9: Interactivity and feedback.
- I10: Tutoring according to individualization and diversity.
- I11: Generation of collaborative activities from group work.
- I12: Quality of digital educational resources.
- I13: Accessibility and reusability of content.
- I14: User interface and interactivity.
- I15: Interactivity.

- I16: Interactivity and feedback.
- I17: Interactivity and collaboration.
- I18: Data privacy.
- I19: Interactivity and collaboration.
- I20: Tutoring according to individualization and diversity.
- I21: Educational information policy.
- I22: Quality of digital educational resources.
- I23: Diversity of activities in various MOOCs.
- I24: Personalization of the training itinerary.
- I25: Technological literacy, control of learning materials, availability of teaching materials, and assessment criteria.
- I26: Tutoring according to individualization and diversity.
- I27: Tutoring and little familiarity that some teachers have with technology.
- I28: Quality of digital educational resources.
- I29: Interactivity and feedback.
- I30: Teaching methods in MOOCs.
- I31: Quality of digital educational resources.
- I32: Curiosity.
- I33: Interactivity and collaboration.
- I34: Interactivity and collaboration.
- I35: Activity-based learning designs.
- I36: Autonomy.
- I37: Interactivity and collaboration.
- I38: Quality of digital educational resources.
- I39: Tutoring according to individualization and diversity.
- I40: Interactivity and feedback.

Figure 4. Variables studied in the researches analyzed
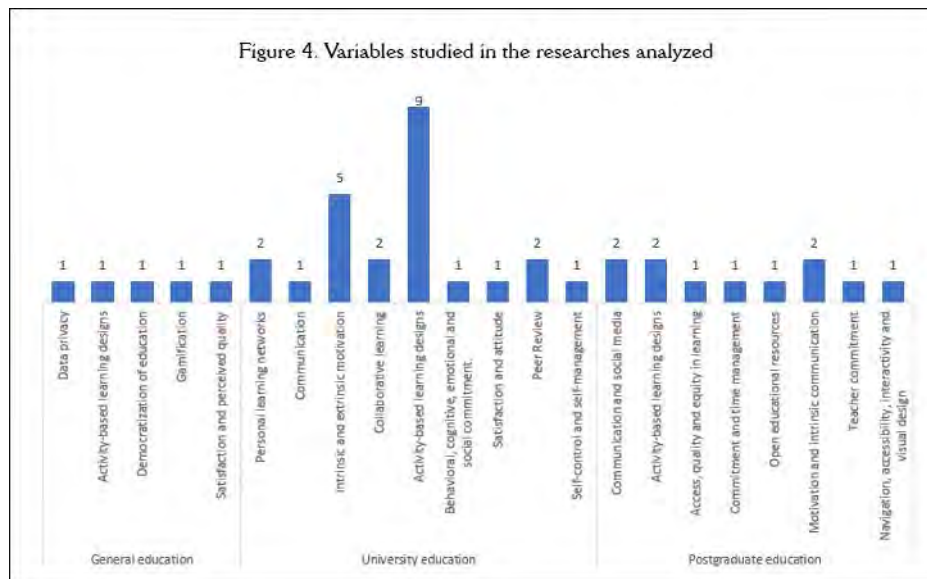
In summary, when analyzing the papers and grouping them by year, the most recurrent challenges are:
- 2017: Individualized tutoring and the training of learning communities.
- 2018: The development of learning communities and interactivity.
- 2019: Interactivity, feedback, accessibility and user interface, and individualized tutoring.
- Articles published from 2020 to February 2021: interactivity, feedback, quality of digital educational resources, and individualized tutoring.

In essence, the analysis, selection, and grouping of the variables made it possible to determine that the main challenges, among others particular to each study, are: (1) individualized tutoring; (2) interactivity; and (3) feedback.

4. Discussion and conclusions

Desertion or abandonment in MOOCs concerns the community of teachers because there are differences between initial enrollment and the number of students who complete the courses. Its causes are diverse, highlighting interest, previous academic experience, repeated absences, systematic self-learning, tutoring, interactivity and feedback, accessibility of educational resources, and engagement (Martinez-Navarro, 2021; Alturkistani et al., 2020; Fırat et al., 2018; Palacios-Hidalgo et al., 2020). For this reason, the scientific community studies for alternatives to reduce the dropout rate in MOOCs. In this sense, engagement is one of the theoretical foundations applied to achieve this goal. That is why this systematic review identifies those engagement variables' that reduce the dropout rate in MOOCs.

Regarding the first question (RQ1), MOOCs are frequently designed using the EdX, Coursera, FutureLearn, and Moodle platforms. We all need constant professional improvement and therefore, the open alternative of MOOCs is reaffirmed as the main route of virtual education. The analyzed articles focus on university and postgraduate training due to the age of the participants, their employment situation, and economic expectations.

The above justifies that e-learning is the most widely used modality due to its potentialities related to online education. In this modality, the MOOCs developed in university education were fundamentally designed in the typology cMOOCs and "MOOCs" –the authors declare this, without arguments– while, in postgraduate education, they were referred to as xMOOCs. Although innovative experiences are expressed through the sMOOC and the tMOOC –as the latest trends in MOOCs, there is still a lack of studies to ratify the achievement of collaborative work, the transfer of learning, pedagogical transformation and, the "generating interest towards the professional action and interaction" (Osuna-Acedo et al., 2018). Regarding the second question (RQ2), several variables assure or provide engagement in MOOCs. In the analysis of the results, the following variables stand out:

- In the design of e-activities in MOOCs, the following are recurrent: (1) promoting the cognitive freedom of the student and their involvement in the learning activity; (2) autonomy; (3) foster collaborative learning and interaction between the student and a digital educational resources system and; (4) the orientation and development of skills that allow students to search, interact, analyze, select and manipulate the information present in the learning environment (Cabero-Almenara & Palacios-Rodríguez, 2021; Gros Salvat, 2018). At the same time, the assessment of the e-activities requires the interweaving between the "appropriate" learning rubrics, self-management of learning, learning strategies, tutoring, and personal learning environments. Therefore, the assessment is according to the typologies of the e-activities: 1) analysis and synthesis, 2) problem solving, 3) interaction and communication, 4) collaborative knowledge construction, and 5) reflection activities (Maina, 2020).
- The relationship between intrinsic and extrinsic motivation and demotivation is known. This study does not analyze these theories from conductive, cognitivist, or constructivist psychology. However, in the analyzed studies (Table 2), it is declared that these variables are essential to promote or assure engagement in MOOCs. The scientific literature reinforces the hypothesis that in the development of the psyche, motivation (intrinsic and extrinsic) and demotivation are complex and dynamic processes conditioned by internal and external situations, thus reinforcing their biological, psychological, and social character. Therefore, that extrinsic educational rewards (congratulations, accreditations, certificates, among others) and intrinsic rewards (self-esteem, among others) contribute to learning, academic performance, and the student's permanence in the course, which contrasts with what has been declared by Acosta et al. (2014).
- The third most used variable is "communication between students", highlighting interaction and interactivity. Most of the studies focus on interactivity in MOOCs. However, educational

communication transcends these limits, as it includes the pedagogical labor of the teacher, the style and form of educational communication, and individualized and group educational communication. Therefore, the design, development, and assessment of e-activities should develop social interaction, collaboration, and social inclusion in an environment of educational communication, constant feedback, and pedagogical direction. The aspects described above evidence a possible relationship between these three variables. However, we consider that the literature lacks studies that demonstrate the relationship between these variables through experiments; and how, in its unit, it affects engagement in MOOCs.

Finally, consistent with the results obtained in the two previous questions, the main challenges (RQ3) to guarantee engagement in MOOCs are grouped into the following aspects:

- First challenge: individualized tutoring. It is known that this educational activity is carried out personally and directly. However, e-learning and b-learning tutoring have become more complex due to the diversity of interaction scenarios. In effect, the introduction of MOOCs increased the complexity of the educational process with the massiveness of tuition. Therefore, trends have emerged to promote new tutorials even when teachers are not always prepared. In this sense, the peer support process is characteristic of xMOOCs and the cMOOCs, tutoring is transformed and supported by the relationships, nodes, and interactions present in the virtual environment, whether cognitive, didactic, or social. This development of cMOOCs evolved until the creation of recommender systems, but there is a lack of emerging pedagogies for their use.

In recent years, tMOOCs have accentuated two actors in the pedagogical process: the "tutor" and the instructor or teacher (s) of the course. From a humanistic and educational perspective, personalization of learning, concern for student performance and motivation, learning outcomes, and course engagement are aspects that involve these two actors. For this reason, this unresolved and poorly approached challenge is sometimes a product of the commercialization of education and the individualization of the teaching staff which affects student engagement (Maré & Mutezo, 2020).

- Second challenge: interactivity. This "well-known" aspect is vital in e-learning and b-learning modalities. However, its presence in current challenges to cause engagement in MOOCs is reiterated. Therefore, if there are already several studies (theoretical and empirical) to promote interactivity, why is it a current challenge? This systematic review confirms an increase in the learning demands of the student (person of any age, mainly adults), implying the need for new MOOCs courses. The instructional design of some courses lacks fundamentals because teachers often lack pedagogical, didactic, and communication skills.

There are various e-activities carried out in MOOCs, with forums being one of the most widely used. The literature reiterates the need to train teachers and tutors in how to assure or promote engagement in MOOCs and achieve interaction in discussion forums, collaborative learning, MOOC teaching methods, and MOOC assessment methods (Wu, 2021). This challenge is summarized in that the teacher, tutor, and instructor must "know" and "know how to do" the interaction in the discussion forums and integrate them with the online reviews of the MOOCs.

- Third challenge. Feedback. Feedback is conceived from three perspectives: (1) centered on the teacher, (2) dialogue centered on the process, and (3) sustainable action (Quezada-Cáceres & Salinas-Tapia, 2021). However, the massification of MOOCs does not allow the correct educational orientation and individual monitoring of the student (Gordillo et al., 2019). In this sense, it is a current need for the teacher to design and produce digital educational resources with a high level of accessibility, ensuring that they adapt to the student and provide feedback according to the learning and performance needs. This challenge requires that feedback transcends the communicative limits of the teacher-student, including educational tools and resources designed to provide feedback to the student. This challenge, therefore, circumscribes teacher training in the use of the author's tools. In summary, there are coincidences and concerns about implementing feedback in MOOCs, involving the pedagogical actions of the teacher, the design and production of digital educational resources, and the training of teachers. The

teacher must use, interpret, and analyze the tools and functionalities of the learning platforms to determine the current and prospective state of student learning. It is concluded that the design of MOOCs solves various learning needs, however, although its effectiveness and relevance is undoubted, the high dropout rate is its main Achilles heal. Along these lines, various studies have explored how to mitigate this limitation, highlighting the line of engagement.

In the last decade, studies of engagement and dropout in MOOCs identify their main variables (design of e-activities; intrinsic and extrinsic motivation; and communication between students) but, it is still a pending challenge. This systematic review identifies, ratifies, and groups the main challenges to ensure engagement in MOOCs. These challenges are individualized tutoring, interactivity, and feedback (Almatrafi & Johri, 2019; Nortvig et al., 2018).

Extension limitations make it impossible to delve into the results and their discussion. We consider that this study has several shortcomings. First, only papers indexed in Scopus and WoS written in English or Spanish were analyzed, therefore, other studies that may diversify the results obtained were omitted. Second, the alternative solutions to the challenges present in the literature are not determined. Therefore, this weakness encourages carrying out theoretical and empirical research to solve these challenges. Finally, it would be important to refine the search criteria in terms such as madeMOOCs, synchMOOCs, adaptiveMOOCs and gMOOC as they were not intended in our search strings. Conclusively, it would be interesting to determine what relationship or relationships exist between the variables linked with engagement (e-activity design, intrinsic and extrinsic motivation, and communication between students) and the dropout rate in MOOCs.

Author Contribution

Idea, O.E., D.R.F.C.; Literature review (state of the art), O.E., D.R.F.C.; Methodology, O.E., D.R.F.C.; Data analysis, O.E., D.R.F.C.; Results, O.E; Discussion and conclusions, O.E., D.R.F.C.; Writing (original draft), O.E; Final revisions, O.E., D.R.F.C.; Project design and sponsorship, O.E.

Funding Agency

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Exploring cyber violence against women and girls in the Philippines through Mining Online News

Explorando la ciberviolencia contra mujeres y niñas en Filipinas a través de Mining Online News

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ABSTRACT

Violence against women and girls (VAWG) is not a recent phenomenon. What is new is the additional increasing threats that millions of women and girls face because of the rapid spread of ICTs and the expansion of social media. Cases of VAWG wherein ICT and social media are used as platforms by cybercriminals can be seen in the news media coverage. This study aims to understand and determine the trend and the state of cyber VAWG to raise awareness through mining online news websites. News articles were scraped from popular news websites between 2015 to 2020. The preprocessed articles (N=3,506) were analyzed by year using the Topic Keyword Model (TKM). It was observed that the cyber VAWG articles topic trends are increasing with most of the articles focusing on the topics "Online sexual exploitation and sexual abuse of children" and "ICT-related violations of privacy". Text mining methods may address the limitations of traditional qualitative approaches. Understanding the cyber VAWG issues by mining news articles is a novel approach that could help create programs and policies to address this societal concern. Additional studies should be conducted related to sentiment analysis of news data to verify and measure the influence of cyber VAWG-related topics.

RESUMEN

La violencia contra las mujeres y las niñas (VCMN) no es un fenómeno nuevo. Lo nuevo son los crecientes peligros a que se enfrentan los millones de mujeres y niñas debido a la difusión de las TIC y redes sociales. Los casos de la VCMN donde se utilizan como plataformas las TIC y las redes sociales se encuentran fácilmente por medio de la cobertura mediática. Este estudio tiene como objetivo la comprensión y la definición de la tendencia y el estado de la ciber-VCMN para crear conciencia por medio del análisis de los sitios web de noticias online. Entre 2015 y 2020, se recopilaron artículos de los principales sitios de noticias. Se utilizó el Modelo de palabras claves temáticas para evaluar los artículos preprocesados (N=3.506) por año. Se señaló que la mayoría de los artículos sobre ciber-VCMN se centraban en temas de «Explotación sexual y abuso sexual de niños en línea» y «Violaciones de la privacidad relacionadas con las TIC». El análisis de los textos ayuda a trascender las limitaciones de las metodologías cualitativas tradicionales. Comprender las preocupaciones de la ciber-VCMN mediante la extracción de artículos de noticias podría ayudar a crear iniciativas y políticas para solucionar este problema. Proponemos que se lleve a cabo una investigación utilizando análisis de sentimiento de los datos de noticias para verificar y cuantificar el impacto de los problemas relacionados con la ciber-VCMN.

KEYWORDS | PALABRA CLAVE

Cyberviolence, news, content analysis, text mining, cyber VAWG, topic modeling.
Ciberviolencia, noticias, análisis de contenido, análisis de textos, ciber-VCMN, modelado de temas.

1. Introduction and state of the art

Because of their gender, millions of women and girls around the world are subjected to deliberate violence and misogyny (Ellsberg et al., 2015; Tandon et al., 2015). It is a global social problem, that has long been overlooked and tolerated (García-Moreno et al., 2015). It occurs in all countries, cutting through borders, races, classes, communities, affecting victims deeply, as well as the people around them and society as a whole (Krantz & Garcia-Moreno, 2005). For that reason, the United Nations has passed resolutions to end Violence Against Women (VAW).

The use of digital technologies can play an important role for women to exercise all human rights, including the right to freedom of opinion and speech, and for them to participate fully, fairly and effectively in political, economic, cultural and social life (Abebe & Jepkiyeny, 2016). However, technology has become an unwilling accomplice that enables a gender-based violence called cyberviolence. Cyberviolence is defined as the use of computer systems to cause, facilitate, or threaten violence against individuals that results in, or is likely to result in, physical, sexual, psychological or economic harm or suffering and may include the exploitation of the individual's circumstances, characteristics or vulnerabilities (Council of Europe, 2018: 5). Cyber Violence Against Women and Girls (cyber VAWG) is a type of gender-based violence that occurs online and reinforces physical violence (Van-Der-Wilk, 2018). Although both women and men may be affected by online abuse, women and girls are subjected to more severe forms of cyberviolence. These include online stalking, sextortion, online threats and blackmail, identity theft and online child pornography (including photo and video voyeurism), and "revenge porn" (Malhotra, 2015; Tandon et al., 2015). All these constitute the universe of aggression and violence women face online.

Addressing cyberviolence is important since it is often misunderstood and not considered as serious. It is imperative to note that although cyberviolence may arise online, it usually ends offline and has a detrimental effect for the victims and their families. This poses moral and psychological threats, with victims and survivors suffering anxiety and depression as a result (Nixon, 2014; Saltz et al., 2020). For example, online threats and blackmail, online incitement to suicide, online solicitation of women and girls for sexual purposes can result in self-harm or being subjected to a physical attack by the perpetrator. This can also hinder their economic empowerment and impose direct and indirect costs on individuals and society in the short- and long-term, which may include loss of livelihood (García-Moreno et al., 2015). Thus, it is critical to take action to stop cyber VAWG incidences from happening. Accordingly, there is a global pandemic of cyber VAWG (Tandon, 2015; Web Foundation, 2020) and the number of cyber VAWG cases has increased during COVID-19 (Brudvig et al., 2020; United Nations Women, 2021). The key highlights in the global survey in 180 countries conducted in February 2020 by the World Wide Web Foundation and the World Association of Girl Guides and Girl Scouts (2020) are as follows: 1) 52% of young women and girls have experienced online abuse, including threatening messages, sexual harassment and the sharing of private images without consent; 2) 64% of all respondents know someone who has experienced harassment, abuse or violence; 87% of girls think the problem is getting worse; 3) young people's top concern is the sharing of private images, videos or messages without their consent. Others are concerned about mean and humiliating messages, abusive and threatening language, sexual harassment, and sharing of false content (14%); and 4) 51% of those who have experienced online abuse say it has affected their emotional and/or physical well-being.

The Philippines, like other countries, uses technology in almost all aspects of society and the economy. An estimated 73 million people in the country were already using the Internet as of 2020 (Miniwatts Marketing Group, 2020), with around 72 million active social networking profiles (Statista Research Department, 2021a). It is not a surprise that the cases of cyberviolence in the country are also rising (Gonzales, 2019). According to the Philippine Commission on Human Rights, online sexual harassment, including peer-to-peer cyber violence, is on the rise against women and girls, with victims facing threats of rape, stalking, defamation, and even death (Aguilar, 2020). Moreover, there are studies that have highlighted the relevance of awareness in mitigating different forms of cyberviolence. On the report by the University of New Brunswick (2015), survey participants suggested that teaching people and incorporating in the curriculum strategies to deal with cyberviolence could greatly help to eliminate the problem, while

others shared that being aware of available resources is already a huge influence to eradicate cyberviolence. Further, news media play an important role in raising public awareness, framing public opinions, affecting policy formulation, and acknowledging societal issues (Carll, 2003; Sutherland et al., 2019; Zolnoori et al., 2019). Carll (2003) argued that one of the strongest instruments in combating the endemic problem of violence against women is objective news coverage and information dissemination.

Previous research that focused on news media coverage of violence against women was conducted using traditional content analysis. Over the course of four months in three Australian states, Sutherland et al. (2019) manually retrieved news headlines on violence against women from online news sites using the media monitoring and retrieval service (iSentia). Their study concluded that media reporting is an important indicator of community attitudes and beliefs about violence against women and thus a critical site through which to measure progress towards shifting social norms.

While cyber VAWG is a societal issue and a challenge that must be tackled, it has received little attention. Online news media is one of the platforms where information about cyber VAWG is reposited and one that can be explored through text mining. The increasing amount of text data available from various applications has created a need for advances in algorithmic design (Aggarwal & Zhai, 2012) such as online news articles. Several disciplines have sought to apply text mining to extract useful information and knowledge from huge amounts of text in recent years (Antons et al., 2020; Gupta et al., 2020). Text mining or text analytics is a scientific field that analyzes and processes unstructured data, which accounts for almost 95% of all big data (Gandomi & Haider, 2015). It is an interdisciplinary field encompassing data mining, statistics, artificial intelligence and machine learning, computational linguistics, library and information sciences, and databases (Miner et al., 2012). Text mining methods may address the limitations of traditional qualitative approaches. Qualitative content analysis is expensive, time-consuming, and resource intensive (Zolnoori et al., 2019) it relies on human engagement, affecting the results and limiting the amount of data (Piepenbrink & Gaur, 2017).

In addition, topic modeling is a commonly used text-mining tool for automatically organizing, analyzing, searching, and summarizing large electronic archives to uncover hidden topics and annotate the documents according to the latter. (Cho, 2019).

In this study, the text mining approach, which includes topic modeling, was utilized to efficiently analyze news items and investigate cyber VAWG reports with the aim of understanding and assessing the trend and state of cyber VAWG, as well as to increase awareness by mining news articles. Though several studies have already been conducted in the same context wherein the text mining method was applied to extract information from news articles, these studies tackled different issues. In a study by Zolnoori et al. (2019), they employed state-of-art text mining to conduct sentiment analysis and topic modeling on over 3 million Reuters news articles from 2007 to 2017 to discover coverage, sentiments and focuses for public health concerns based on top keywords from public health scientific publications. Results of the study showed that news coverage for seven public health concerns declined over time, while coverage for "sexual behavior," "pregnancy," and "air pollution" fluctuated during 2007-2017. They concluded that topic modeling represented the media's focus on public health concerns. Hori (2015) utilized the online archives of two newspapers, the Japan News and the International New York Times, to perform an exploratory study by mining for news items on "water" and "society". Here, a clustering technique was applied for dividing a collection of documents into mutually exclusive groups based on related themes.

1.1. Framing cyberviolence

Because of the broad use of ICTs and social media, as well as the ongoing pandemic of VAWG, cyber VAWG has emerged as a growing global issue with serious economic and societal implications (Council of Europe, 2018; Tandon et al., 2015). The concept and types of cyberviolence in this study are adapted from "the mapping study on cyberviolence" conducted by the Council of Europe's Cybercrime Convention Committee (2018). Many of the overlapping examples of cyber-violence types can be seen. Since there is no clear lexicon or typology of crimes categorized as cyber-violence, not all types or instances are similarly serious, and not all of them necessitate a criminal law response. These are briefly discussed in the next section.

1.1.1. Cyber harassment

Perhaps the most prevalent type of cyber-violence is cyber harassment, which involves a persistent and repetitive action, or "storm of abuse" directed at a single person with the intent of causing severe emotional distress and, in some cases, fear of physical harm. In common discourse, cyber harassment may be defined as or associated with "revenge porn" or "sextortion". Cyber harassment encompasses several acts, which include cyberbullying and revenge porn, for example. Cyberbullying can comprise any action by individuals who repeatedly communicate negative or offensive messages via electronic media to harm or discomfort others (Segura et al., 2020). It is more commonly associated with teen victims, whereas "cyberstalking, sextortion, and revenge porn" is more commonly associated with adults or young adults (Patchin & Hinduja, 2020).

Not all types of cyberbullying are inherently violent offenses. Cyberbullying acts include cyberstalking, denigrating, engaging in exclusion or gossip, falsifying an identity to post online material or flaming, impersonating, outing, phishing, sexting, and trickery (Notar et al., 2013; Runcan, 2020). Some of these acts are sometimes more serious than others. They have contributed to sexual exploitation, nonconsensual production, and posting of intimate visual images and coercion that will lead to self-harm and suicide of victims (Myers & Cowie, 2019; Saltz et al., 2020). Revenge porn refers to sexually explicit images that are circulated without the subject's consent. Other terms include "nonconsensual pornography" and "image-based abuse" (Kirchengast & Crofts, 2019). The phenomenon primarily involves a partner spreading the content online to shame or threaten the victim publicly.

1.1.2. ICT-related violations of privacy

Several types of cyberviolence infringe on victims' privacy. This can involve computer intrusions, investigating and distributing private data ("doxing"), or actions like "cyberstalking or sextortion/revenge porn" to procure, steal, expose or exploit intimate data, photo manipulation of data or images, and impersonation.

1.1.2.1. Cyberstalking.
Cyberstalking refers to stalking that occurs in an electronic format. With the anonymity, ease, and efficiency of the Internet, cyberstalking can happen in a multitude of ways. Cyberstalkers can use personal information about the victim to threaten intimidation. Cyberstalkers can also send unwanted, repetitious emails or instant messages that may be hostile and threatening in nature. Cyberstalkers can also impersonate their victims online by stealing login information for an email account or social networking page and posting messages on other peers' pages. (Marcum et al., 2014: 48). As per study, cyberstalking by intimate partners is often used as a method of coercion in the context of domestic abuse (Woodlock, 2017). Accordingly, "stalking encompasses a pattern of repeated, intrusive behaviors such as following, harassing, and threatening – that cause fear in victims" (2017: 585).

1.1.2.2. Sextortion.
"Sextortion is the threatened dissemination of explicit, intimate, or embarrassing images of a sexual nature without consent, usually for the purpose of procuring additional images, sexual acts, money, or something else" (Patchin & Hinduja, 2020: 1).

Sextortion starts out innocently with a request for explicit videos or images, but soon escalates. Minors are the usual targets as they do not know how to deal with predators who threaten them or pressure them of exposing their explicit images (Hong et al., 2020). According to Howard (2019), this could lead to emotional distress that affects a large number of people, with their explicit images and videos being exposed online after they fail to comply with the predator's demands (Howard, 2019).

1.1.2.3. Online sexual exploitation and sexual abuse of children.
Children are the most common victims of cyberviolence, particularly when it comes to online sexual violence (Council of Europe, 2018). While child sexual exploitation and abuse are not recent, ICTs encourage and exacerbate the issue. Other forms include child pornography, child prostitution, and sexual solicitation of children.

There are several ways wherein the Internet can be abused by individuals with a perverted sexual interest in children: a) exchanging child pornography; b) locating potential victims for sexual abuse; c) engaging in inappropriate sexual communication; and d) corresponding with other individuals who have a deviant sexual interest in children (Kloess et al., 2014: 1).

1.1.2.4. ICT-related hate crime. Discrimination based on a victim's perceived personal association may inspire cyberviolence. Race, gender, faith, sexual orientation, and disability are only a few examples of these categories. Hate crime has far-reaching implications for individuals and communities, and it can lead to group disputes and the destabilization of whole communities (Council of Europe, 2018; Iganski & Sweiry, 2018).

1.1.2.5. ICT-related direct threats of or physical violence. Cyberviolence may also involve explicit threats of violence or actual physical violence. Computer systems may be used in cases of murder, kidnapping, rape, and other acts of sexual assault or extortion. Medical device interference that causes injury or death, as well as cyber-attacks on critical infrastructure, are examples of direct violence (Council of Europe, 2018). Another example is "swatting", which involves deceiving an emergency service by using telephones and, in some cases, computer systems to direct local police to a particular location based on a bogus report.

1.1.2.6. Cybercrime. In light of the above definition, acts of cyberviolence such as unauthorized access to personal data, data destruction, and blocking access to a computer system or data may be categorized as cybercrime.

2. Materials and methods

In this study, text mining methods were employed to efficiently evaluate big data from news media and to extract relevant insights on news coverage of cyber VAWG issues. The methods in this study were based on the study of Zolnoori et al. (2019), which focused on mining news media for understanding health concerns. It consisted of four steps: 1) Identifying cyber-violence-related news; 2) Pre-processing; 3) Identifying the focus of news articles associated with the types of cyber VAWG; and 4) Analyzing news articles trends related to cyber VAWG. Figure 1 below shows the schematic view for mining news sites.

Figure 1. Schematic view for mining news sites
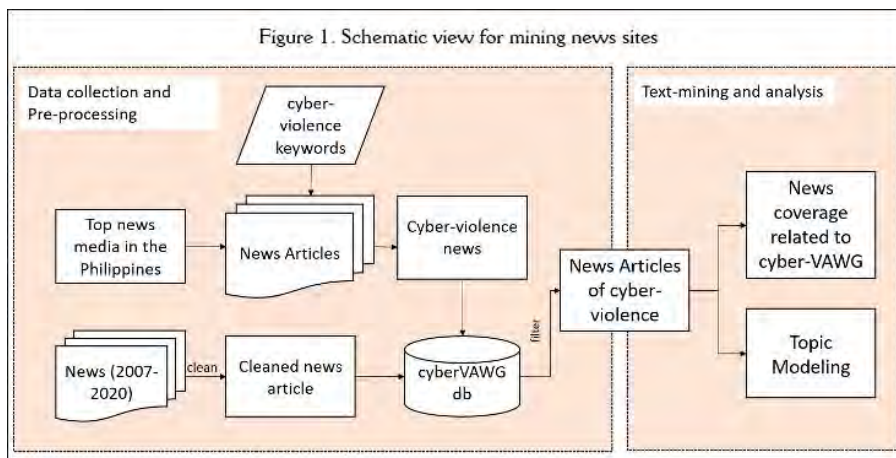
2.1. Identifying Cyber VAWG issues

The types of cyberviolence used to categorize the news were based on the Council of Europe cyberviolence framework (Council of Europe, 2018). As mentioned, cyberviolence can take many forms, including stalking, breach of privacy, sexual assault and exploitation, and bias offenses against social groups or communities.

2.2. Pre-processing news articles

a) Collecting news articles

To assess the coverage of cyber VAWG, reports from top online news sources with a strong media presence and trusted news outlets in the Philippines were analyzed (Statista Research Department, 2021b, 2021c; W3newspapers, 2020). Major online news sites were used as a vital source of our data

considering its reliability and its quality as representative of general opinion (Krawczyk et al., 2021). News articles were collected from Inquirer, GMA, Manila Bulletin, Philippine Star, Philippine Daily Inquirer and Rappler.

Published news articles using cyber VAWG-related terms were scraped through a web crawler developed using DOM (Document Object Model), which navigates through the web pages to download the news articles from an online archive of the mentioned news agencies, to collect the internal hyperlinks and dump them in the database. There were 9,842 news articles specific to cyber violence collected between January 2007 to June 2020.

b) Cleaning news articles

Normally, scraped data is noisy. Articles can contain unwanted content or unwanted string characters, and during web scraping, the DOM was relied upon to query specific elements in the web page. A set of specific elements from an article was first located and used to get the data needed from the web page. Regular expression (regex) was used to remove unwanted strings or special characters or to replace them with whitespaces. Regex is an "object that describes a pattern of characters which are used to perform pattern-matching" (Goyvaerts, 2007). For example, characters and tags such as ... or | were removed. In addition, the article keywords were mapped based on the cyber VAWG related terms like, "girl", "woman", "arrested", "nabbed", "sextortion", "cybercrime" by creating a regex pattern python script based on Huang (2019).

c) Filtering News Articles on cyber VAWG

A developed phyton script collected all articles that matched the search keywords related to the cyberviolence framework. The filtered article was imported into the cyber VAWG database. The title was carefully read to assess whether it fitted the topic. If not, it was marked as 'out of scope' to filter out the article from the data-table. And when it was closer to the topic, the article was read and marked as part of the cyber VAWG scope.

Figure 2. Workflow for mining news sites
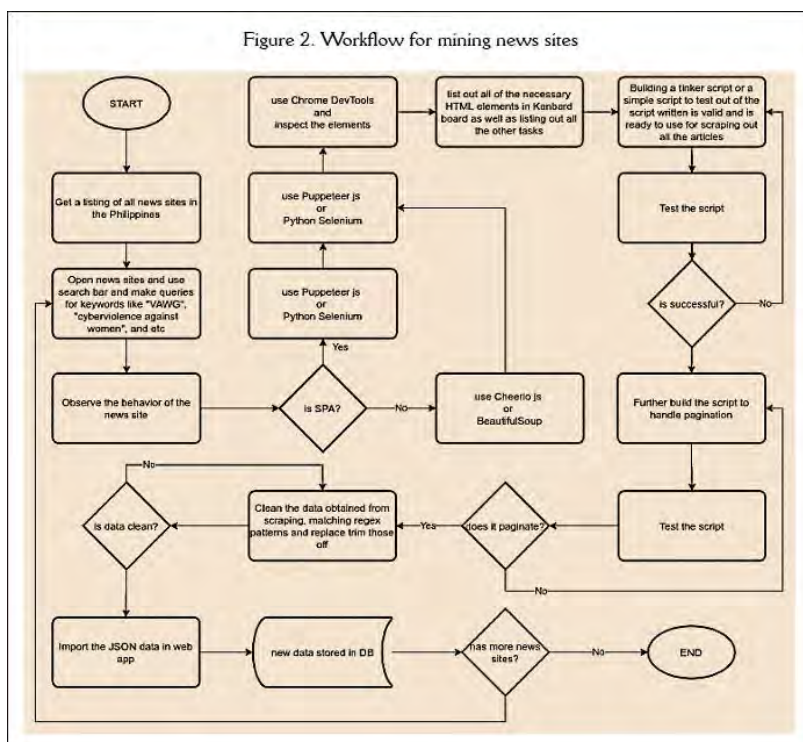
The detailed steps on how the data were collected and pre-processed from selected news sites are briefly explained in the steps below. These are applicable to any text-mining related study, and are depicted in the flowchart as shown in Figure 2:

- Step 1: Get a list of all the news sites that have a pagination pattern from their search results.
- Step 2: Use the page's search feature to search for keywords (e.g. VAWG, cyberviolence against women, and cyberviolence) to check if it can handle the query.
- Step 3: Observe the behavior of the news site to know which technology to use. If the website is dynamically rendering HTML elements, either use Puppeteer or Selenium library. If not, use simple libraries like Cheerio js or Beautiful Soup.
- Step 4: Use the Chrome DevTools to inspect the elements of the page, find the necessary elements to get relevant data such as the element containing the rows of news articles from the search results, the title elements, the href attribute to get the URL for that particular content, the element containing date, and the pagination elements to navigate through the other pages.
- Step 5: List out all the elements and write up simple scripts for scraping.
- Step 6: Build and execute a script out of all the limits listed to scrape data from a single page to obtain data.
- Step 7: Write the complete script to export data as a JSON format.
- Step 8: Use regular expressions to clean the data.
- Step 9: Import the JSON file into the web app and parse this so it gets uploaded into the server and stored in the database.
- Step 10: Reiterate.

2.3. Topic modeling

Topic modeling is a technique for extracting a group of words (i.e., topic) from a set of documents that best represents the information in the set. It can be thought of as a methodological approach to derive recurring themes from text corpora that is a subset of text mining (Schmiedel et al., 2018). It is carried out in studies that analyze a variety of content, including newspapers, scientific journals, and social media. In this study, topic modeling was used for content analysis by developing a phyton script to identify the structure of news articles based on TKM (Topic Keyword Model) package (Schneider, 2018) to identify the hidden topic structure of articles related to the five (5) categories of cyberviolence.

TKM associates a word with a subject if it or its surrounding words have a high topic association score. As a result, the issue to which a word relates is significantly impacted by the words around it. During topic modeling, TKM evaluates the dissimilarity of subjects and only maintains the topics that are significantly different from each other. TKM is able to figure out how many unique subjects to include in a text document. In addition, while inferring word distributions across a subject, TKM distinguishes between a common and a characteristic word for a topic, and it adjusts the association probability (score) of a word with a topic based on its commonness and uniqueness among topics (Zolnoori et al., 2019). The results of the topic modeling were further evaluated by creating an intuitive UI to cluster the data according to category, crime type and location.

3. Analysis and findings

After excluding repeated articles, culling repeated news and irrelevant entries not related to cyber VAWG, 3,506 news articles were collected from January 1, 2015 to June 6, 2020 as shown in Table 1. These news articles are stored in a database. The result of this study is accessible at http://app.cybervawgphilippines.co/.

Table 1. Number of Cyber VAWG news article by year	
Year	Number of Articles
2015	464
2016	494
2017	601
2018	608
2019	681
2020	658

TKM was used to classify topics related to cyber VAWG issues from news articles. The news coverage of articles associated with the cyber VAWG category ("Cyber harassment", "ICT-related violations of

privacy", "Online sexual exploitation and sexual abuse of children", "ICT-related hate crime", "ICT-related direct threats or actual violence" and "Cybercrime") of each year from 2015 to 2020 were calculated to determine the five (5)-year state. Figure 3 shows the number of news articles that were rescaled relative to the highest number on each sub-figure. It showed that the news coverage of Cyber VAWG from the year 2015 up to 2020 were increasing within these years where it reached its highest peak in the year 2019. It can be noted that the data from year 2020 is up to June 6 but coverage was already high.


Figure 3. Cyberviolence Trends by category
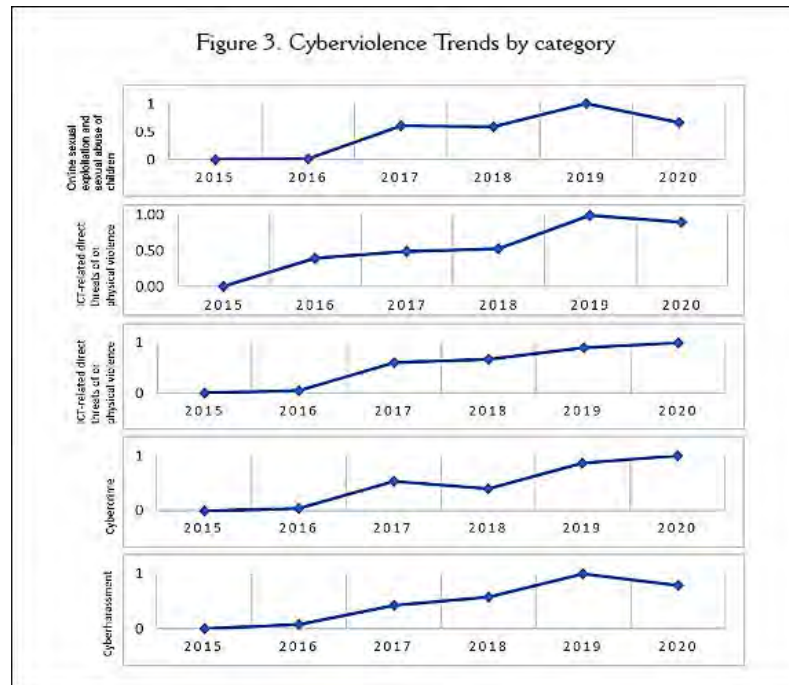
Note. Normalized numbers of news article trends by category.

The period 2015-2020 had five topics on cyber VAWG: T1 "Online sexual exploitation and sexual abuse of children", T2 "ICT-related violations of privacy", T3 "Cybercrime", T4 "ICT-related direct threats of or physical violence" and T5 "Cyber harassment". Table 2 below shows the result of the topic modeling from 2015-2020.

An examination of the proportions of the topics revealed that most of the articles were focused on topic 1 and topic 2, although all topic trends are increasing. Topic trends are shown in Figure 4 and the most frequent words are shown in Figure 6.

Table 2. Analysis results of topic modeling from 2015 to 2020			
Topic No	Topics	Words	Proportion
T1	Online sexual exploitation and sexual abuse of children	nude videos, prostitution, pornography, corruption, exploitation, solicitation, livestreaming sexual abuse, cybersex, sexual abuse, livestream, sextortion, grooming.	0.21
T2	ICT-related violations of privacy	computer intrusion, taking/sharing/videos /images, data manipulation, sextortion, stalking, doxing, identity theft, impersonation, fake identity, voyeurism, poser, doxing, intrusion, without consent.	0.21
T3	Cybercrime	illegal access, phishing, illegal interception, data interference, forgery, pornography, online scam, hack, libel, computer fraud, system interference, data interference, fraud, hacking/hack.	0.20
T4	ICT-related direct threats of or physical violence	rape, kidnap, murder, sexual violence, torture, extortion, blackmail, swatting, incitement to violence, critical infrastructure, attacks.	0.19
T5	Cyber harassment	coercion, denigration, defamation, reputation damage, cyberbullying, threats of violence, insults, threats, revenge porn, incitement, unwanted post, unwanted sexually explicit emails/online message, hate speech, insult, threaten, sexually harassed, stalk, aggression, impersonation, cyber/online stalking, threats.	0.19

The occurrences of Cyber VAWG in some areas in the Philippines are more frequent in big cities. The hotspots' areas that Cyber VAWG will likely occur are in Metro Manila, Quezon City, and Marikina City. In Visayas region, it is likely to occur in Bacolod City and Cebu areas. In the Mindanao region, it is most likely to occur in Cagayan De Oro City.


Figure 4. Topic trends from 2015-2020
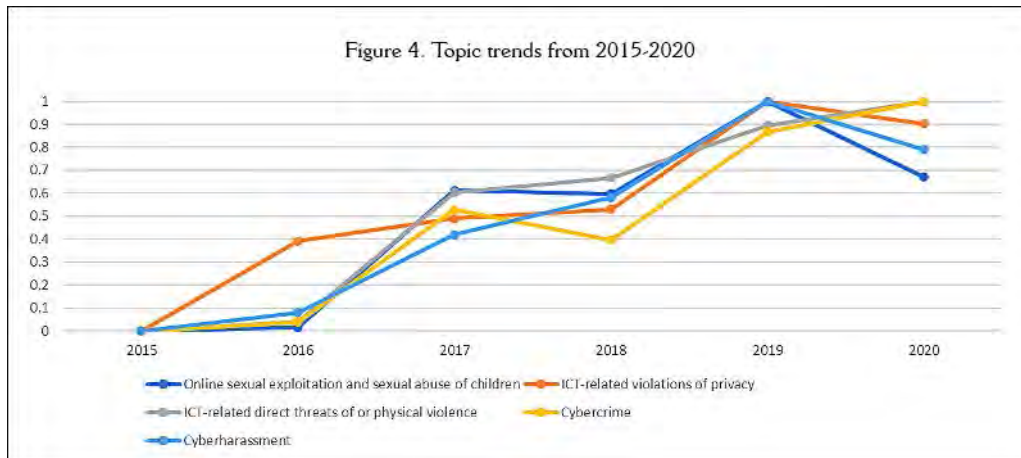
Moreover, social networking sites have been used to commit cybercrimes. Facebook is one of these, and it is very popular in the Philippines. Other offenders also use cybersex website platforms.

Figure 5. Cyber VAWG hotspots in the Philippines

The most frequent words of Cyber VAWG are shown in Figure 6. These are mostly related to sexual activities such as sexual exploitations, child pornography, sextortion, photo voyeurism, video voyeurism, and other crimes connected to it. The larger-size text in each category reflects heavier weights. In addition, TKM identified 12 topics of the news articles related to Online sexual exploitation and sexual abuse of children. By interpretation of the identified topic keywords, the three (3) meaningful topics of the news

articles on Online sexual exploitation and sexual abuse of children were mostly related to "pornography", "cybersex", "sextortion", prostitution and "solicitation of children for sexual purposes".

TKM also identified 16 topics of the news articles related to ICT-related violations of privacy. By interpretation of the identified topic keywords, the five (5) meaningful topics of the news articles on ICT-related violations of privacy were mostly related to "identity theft", "sextortion", "manipulation", "doxing, and "impersonation". TKM identified 16 topics of the news articles related to Cybercrime. By interpretation of the identified topic keywords, the five (5) meaningful topics of the news articles on Cybercrime were mostly related to "fraud", "hacking", "phishing" and "forgery". TKM identified 11 topics of the news articles related to ICT-related direct threats or physical violence. By interpretation of the identified topic keywords, the four (4) meaningful topics of the news articles on ICT-related direct threats were mostly related to "blackmail", "incitement to violence", "extortion" and "rape". TKM identified 26 topics of the news articles related to Cyberharassment. By interpretation of the identified topic keywords, the five (5) meaningful topics of the news articles on Cyber harassment were mostly related to "cyberbullying", "defamation", "hate speech" and "revenge porn".

Figure 6. World cloud of Topic #1 – Topic #5
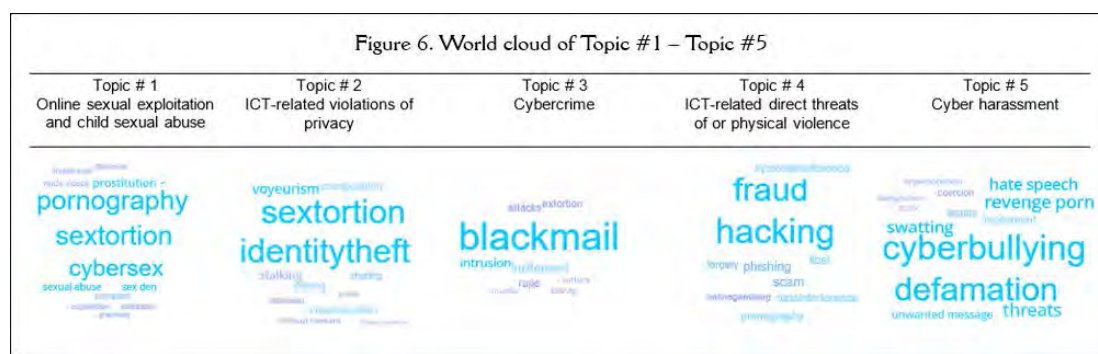
4. Discussion and conclusions

The convenience in the information flow of online platforms has enhanced civil participation in society. However, one backlash of the comfort offered by social media and internet platforms inolves the underlying risks for cyber violations such as the act of cyber VAWG. This is an additional growing threat that millions of women and girls face. It is a social problem and a social issue that needs to be resolved. This study navigated the extent of cyber VAWG and the prevalence of cyber VAWG incidence in the Philippines through mining the online news media sources. Results of the study showed the magnitude of the violence that many women had experienced in the country. Through mining and analyzing all the available data from online news media, the different forms of technology-related-violence that women experience were captured: Online sexual exploitation and sexual abuse of children, ICT-related violations of privacy, cybercrime, ICT-related direct threats of or physical violence, and cyber harassment.

Mutual topics arise from the report mentioned about sextortion, pornography, cybersex, defamation, and blackmail. This result may link to the reports that despite having prostitution as illegal in the country, Philippines is still considered as one of the most popular countries for "sex tourism" (Aguilar, 2019). When it comes to forced labor in the sex industry, 99% of the victims were women and girls, and of these, 21% are children (Aguilar, 2019). These sex providers are considered victims of poverty and social change; thus, it is crucial to address related problems. Oftentimes, victims of cyber VAWG are terrified to share and report their stories and are strained to suffer in silence for fear of reprisal or social stigmatization.

The increasing number of news coverage extracted relating to cyber VAWG is a manifestation of a significant number of cases reported by the mainstream media and the number of cases of cyber -VAWG is still increasing yearly despite the convenience of gaining facts and information about VAWG online. The numbers have led to the emergence of cyber VAWG as a continuing problem with potentially significant bearings on victims' mental health. Reports point to psychological trauma, suicidal ideation and depression, and anxiety due to the fears of shaming, humiliation, harassment, and stigma associated with cyber (sexual) violence (Pashang et al 2018). Big cities also create greater returns of harassment and violence compared

to small cities maybe because perpetrators have a greater density of victims in urban areas. Cyberviolence signifies a daunting challenge to policymakers, law enforcement officials and even to those in the academe. While the Philippines has several legislations in place to protect women, the Commission on Human Rights (CHR) spokesperson pointed out that its implementation remains to be a challenge (Aguilar, 2020). There is a notable absence of public policy to incorporate more preventive programs, and to strengthen institutions and support mechanisms against cyber-VAWG. It is highly suggested to organize awareness programs and attitude-changing educational intervention intended especially for women and girls on how to safeguard their identity, and how to deal with cyberviolence incidents. Empowering women by raising awareness against cyber VAWG in any form, and understanding why such violence happens, may encourage victims to share their stories. Media could also play a vital role to change the stigma raised by society towards victims of cyber VAWG. Through their coverage, they can reach a wider audience and can inform the public of the services available against violence, guarantee fair investigation processes in cases of violence against women and ensure that obligations be translated into policies.

Awareness can change the attitudes and behavior not only by women but also by men who perpetuate or disregard the diverse forms of violence against women and girls. Consequently, it is urgent for policymakers to establish more solid laws that will sanction offenders of cyberviolence. The use of text mining to analyze newspapers can help increase the societal awareness of acceptable and sustainable cyber-VAWG solutions. Moreover, further research is needed using sentiment analysis of news data in order to verify and quantify the impact of cyber-VAWG-related issues.

Author Contribution

Funding Agency

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