




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 Informativa) 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 informativa, 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 “edukommunikation”, 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 “edukommunikation” 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).

Edukommunikation, 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 (COMPROMETIC).

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.

| | | Gender | | Age | | Teaching Level | | | |
|------------------|------------------|--------|-------|---------|------|----------------|----------------|------------------|------------|
| | | Men | Women | Average | SD | Kindergarten | 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% |

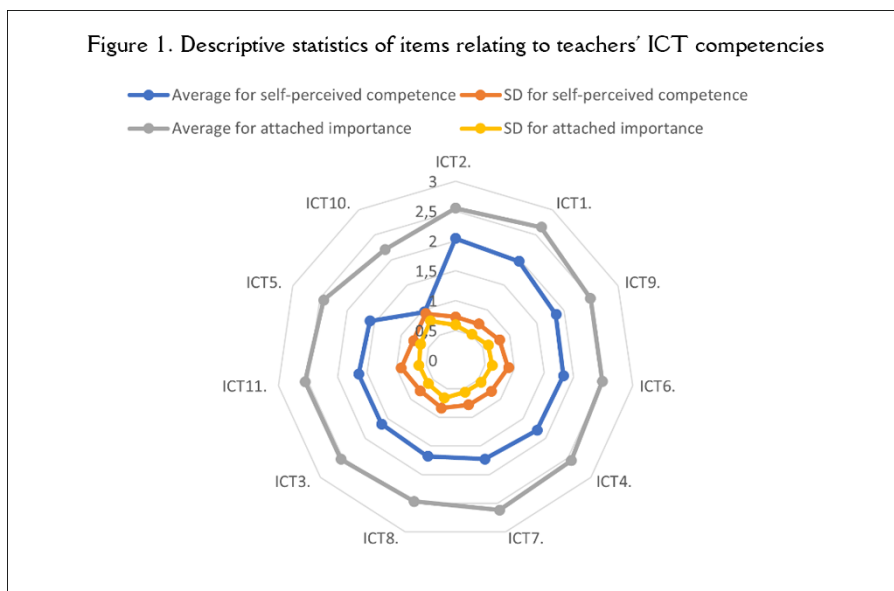
6. Results

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.

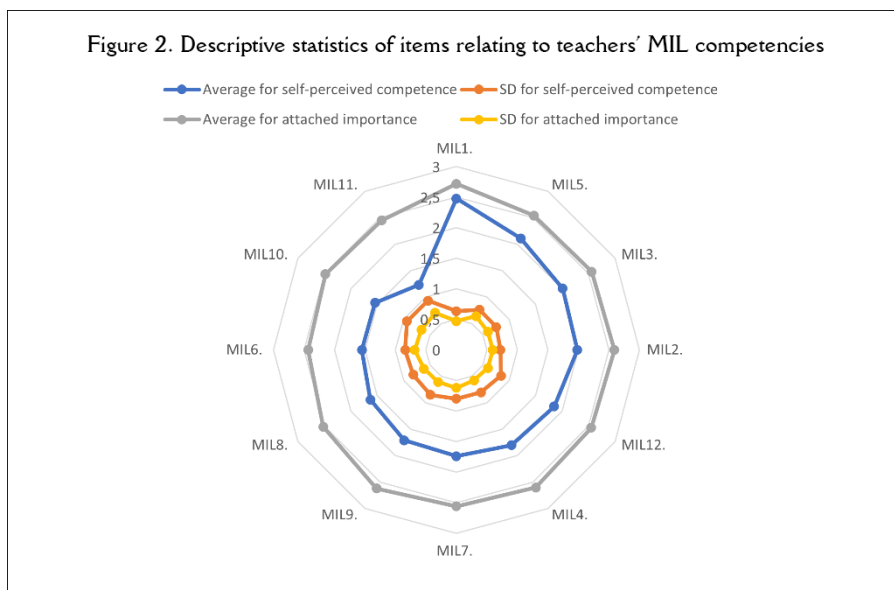
Regarding ICT competencies, respondents perceived their level as low and, in all cases, as lower than the importance they attached to the skills, particularly in the area of big data and its potential in education, and in the use of technology to improve learning and school management. On the other hand, 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.



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.



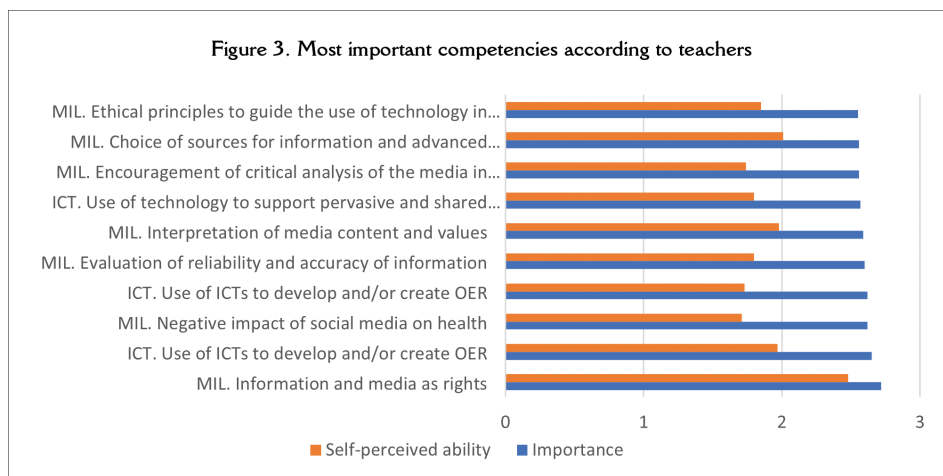
Pearson's correlation coefficient was used to analyze the correlations between the self-perception and importance variables for ICT and MIL competencies (Table 2). It showed a significant association between the importance attached to a competency and the self-perceived level of ability. Based on this 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.



7. Discussion and conclusions

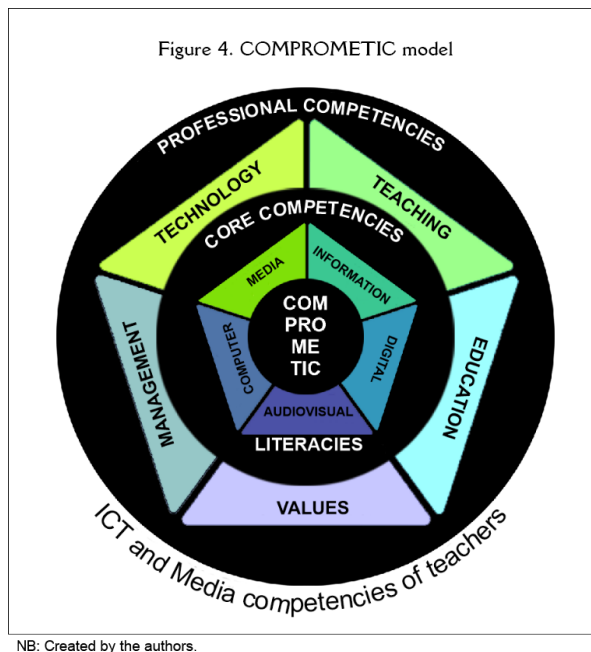
This study was aimed at describing self-perceived ICT and MIL competencies, and their importance for teachers, in order to assess the suitability of training models. The results suggest that teachers feel they are inadequately trained in ICT and MIL competencies, as shown by the low self-perceptions 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).



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

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