

Media and Information Literacy and Critical Thinking: A Systematic Review

Educación mediática e informacional y pensamiento crítico:
una revisión sistemática

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ABSTRACT

Introduction: Media and information literacy seems to be necessary in the formation of citizens capable of using information critically. The growing phenomena of misinformation, as well as the effects of the media and especially social media on certain groups, impels us to analyze how this type of education helps to create critical thinking. **Method:** This study offers a systematic review of the published scientific literature on the intersection of critical thinking and media and information

literacy. **Results:** We analyzed the databases of the Core Collection of the Web of Science and Scopus. A sample of 65 articles was analyzed after a screening based on pre-established inclusion and exclusion criteria. The analysis considered both the main bibliometric characteristics of the scientific production and the emerging themes. **Discussion:** The results showed that most of the scientific production has an empirical nature following three thematic patterns: the scope of application; instruments and assessment; and limits and difficulties. **Conclusion:** In conclusion, the review suggests that including media and information literacy in education improves critical ability.

Keywords: Critical thinking; Disinformation; Education; Media and information literacy; Systematic review; Communication; Media education.

RESUMEN

Introducción: La alfabetización mediática e informacional parece ser necesaria en la formación de una ciudadanía capaz de usar la información de manera crítica. Los crecientes fenómenos de desinformación, así como los efectos de los medios y en especial los medios sociales en ciertos colectivos, nos obliga a analizar de qué manera este tipo de educación ayuda a crear un pensamiento crítico. **Metodología:** Este estudio ofrece una revisión sistemática de la literatura científica publicada sobre pensamiento crítico y alfabetización mediática e informacional. Para ello, se analizaron las bases de datos de la *Core Collection* de la *Web of Science* y de *Scopus*. **Resultados:** Tras una criba en función de los criterios de inclusión y exclusión establecidos, se analizó una muestra de 65 artículos. En el análisis se tuvieron en cuenta tanto las principales características bibliométricas de la producción científica como los temas emergentes. **Discusión:** Se observó que la mayoría de la producción científica tiene una naturaleza empírica siguiendo tres patrones temáticos: ámbito de aplicación; instrumentos y evaluación; límites y dificultades. **Conclusión:** Como conclusión, la revisión sugiere que incluir la alfabetización mediática e informacional en la educación mejora la capacidad crítica. Sin embargo, en sí misma muestra algunas limitaciones como que su efecto se debilita con el tiempo o que necesite ser complementada con otros enfoques.

Palabras clave: Alfabetización mediática e informacional; Desinformación; Educación; Pensamiento crítico; Revisión sistemática, Comunicación, Educación mediática.

1. Introduction

In democratic societies, the formation of citizens capable of using, consuming and generating information from a critical perspective is considered essential. In this sense, recent disinformation incidents have highlighted the importance of media and information literacy and of the development of critical thinking. Disinformation is not only a consequence of deliberate action by certain agents, but also responds to our cognitive tendency to use and generate biased information, thus avoiding the examination of acquired beliefs and opinions (Haidt, 2001). Biased, prompted thinking thus poses a challenge for democracy, as well as those communicative practices which intentionally seek to disinform citizens. Beyond the need to implement mechanisms and routines that compel the practice of ethical communication, there's generalized consensus about the fact that this is a challenge that must be dealt with in part through education, and more specifically through media and information literacy.

UNESCO (2018) defines media and information literacy (MIL) as a learning and teaching process, and the application of critical thinking to the creation and consumption of information media and sources. Therefore, this definition combines two aspects: information literacy and media literacy, as a combined set of abilities, knowledge and attitudes.

The goal of media and information literacy is to promote literate societies that are capable of critically assessing the media and information sources. This guarantees the protection of fundamental rights

related to the exchange of ideas, the flow of information and the generation of opinions and beliefs that aid in sound decision-making.

2. Objectives

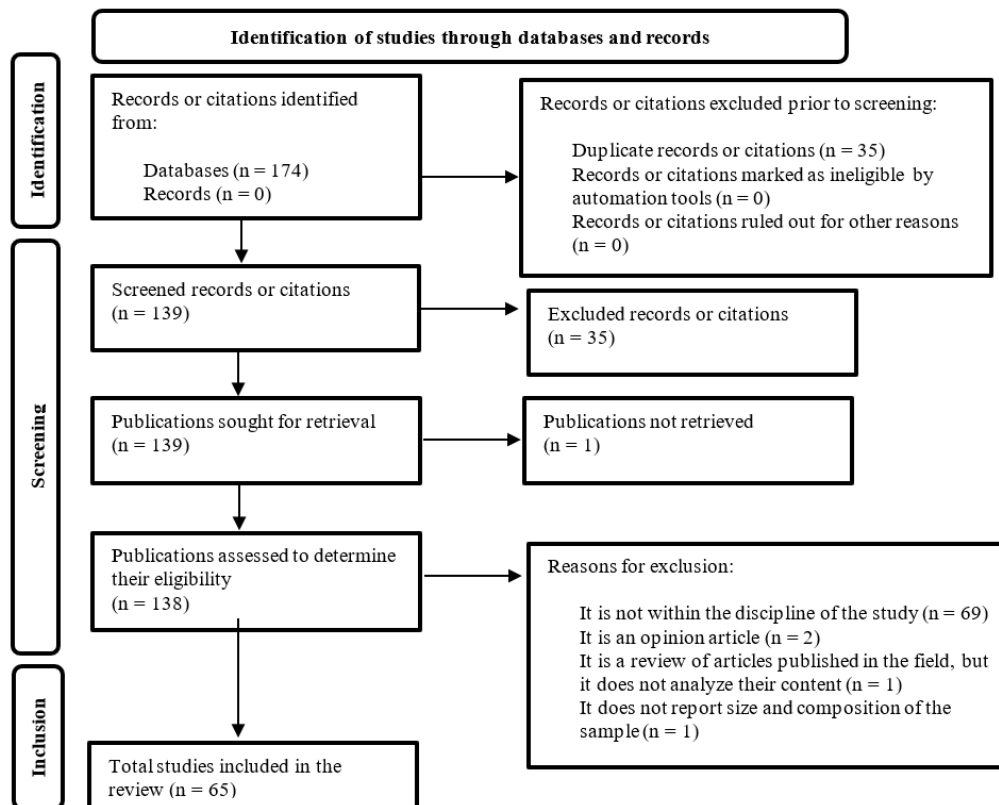
This article offers a systematic review of the literature on the interrelation between the concepts of media and information literacy and critical thinking (henceforth, MILCT). This review will allow us to summarize the fundamental contributions within this sphere of interdisciplinary knowledge (Siddaway et al., 2019). Thus, the relevant concepts are analyzed from the results of papers published over the last decade in the scientific databases of *Scopus* and in the *Core Collection* of the *Web of Science*. The objective of this study is to analyze the current state of research conducted on MILCT. Two research questions arose from this analysis, which are tackled in the results section: What are the main characteristics of studies analyzing MILCT? and, what are the main themes and thematic patterns of studies analyzing MILCT?

3. Method

3.1. Sample selection

Two databases have been used in this study in order to systematically compile the analyzed articles. The guidelines recommended by PRISMA have been followed in order to identify the relevant articles (Shamseer et al. 2015). Figure 1 shows the flow diagram itemizing the identification, screening and inclusion of the articles included in this systematic review. The results are reported following the PRISMA template for database and records reviews (Page et al., 2021).

Figure 1. PRISMA flow diagram



Source: Prepared by the authors.

The search was carried out in June 2022, employing the most widely used databases in the scientific field: Scopus and the Core Collection of the Web of Science. The selection is carried out from the year 2012, since our interest is to deal with a current view of the evolution of MILCT. To identify the articles, the following keyword searches were implemented: (“*Media*”) AND (“*literacy*”) AND (“*critic**”) AND (“*thinking*”) AND (“*information**”). The search was carried out in *All Fields* in the case of the *Core Collection* of the *Web of Science* and in the *Article title, Abstract, Keywords* in the case of *Scopus*. Table 1 shows the inclusion and exclusion criteria that were used to assess the eligibility of each article.

Table 1. *List of inclusion and exclusion criteria*

Inclusion/exclusion criteria

1. Belonging to the *Articles or Reviews* categories
 2. Published between the years 2012 and 2021
 3. Published in English or Spanish (the languages used by the authors of this research)
 4. Belonging to the scope of the object of study
 5. If empirical, it must report composition and size of the sample
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Source: Prepared by the authors.

3.2. Procedure and data analysis

In order to extract the data from the chosen articles, a standardized form was used, which was previously tested and used in earlier systematic reviews (Gil-Fernández & Calderón-Garrido, 2021). The extracted information was grouped into the following variables: journal, date, type of article, discipline of the study, objectives, country of the study, sample, analytical approach and main results, as well as other bibliometric indicators.

After identifying the above data, we carried out a thematic analysis aimed at extracting common patterns in the documents to be reviewed. This technique involves the detection of common discussion points and ideas within the texts, so as to identify and categorize areas of similarity (Crabtree & Miller, 1992). Three researchers on the team independently coded approximately one third of the material each, and then met to share their coding. Once the coding process was complete, emerging themes were ascertained.

4. Results

The results obtained from the two research questions are shown below.

Q1. What are the main characteristics of studies analyzing MILCT?

The analyzed studies were published in 54 different journals, with the more frequent ones being *Societies* (n=3) and *Thinking Skills and Creativity* (n=3). As for the date of publication, the vast majority of studies were published in 2019 (n=11), 2020 (n=18) and 2021 (n=18).

Regarding the number of countries used as the first source of data, only one was carried out in more than one country: China, the United Kingdom and Russia. As for the studies focused in a single country, the main source is the United States (n=10), followed by Spain (n=5), Russia (n=3) and Indonesia

(n=3). The analyzed articles comprise 22 different countries, with a wide variety from the cultural and economic development standpoints. This implies that research on MILCT is of global interest.

As for the disciplines in which the studies have been framed, a total of 14 different ones have been identified, with Education Sciences (n=27) and Communication (n=16) being most prevalent, followed by Communication and Health Sciences (n=6), Education Sciences and Communication (n=5) and Library Science (n=2). The rest of the disciplines have one article each and they are the following: Theology (n=1), Geography (n=1), Communication and Library Science (n=1), Health Sciences (n=1), Education Sciences and Health Sciences (n=1), Library Science and Education Sciences (n=1), Education Sciences, Sociology and Communication (n=1), Education Sciences and Cultural Studies (n=1) and Philosophy and Communication (n=1). Considering the total presence of the most frequent disciplines, independently and in combination with other disciplines, it is observed that there are 36 articles catalogued within Education Sciences, 29 within Communication and 8 articles within Health Sciences.

Regarding the types of methodologies present in the articles, the vast majority of papers were empirical in nature (n=46), while 19 were conceptual. Quantitative methods were the main methodological approach (n=23), while 18 studies applied conceptual approaches, 17 used qualitative methods and 7 applied mixed approaches. The methodological procedures used were surveys or questionnaires (n=16), the combination of techniques (n=9), the case study (n=8), content analysis (n=7), the interview (n=2), the comparative method (n=1) and others (n=22), which include conceptual articles, ethnographic articles and the use of focus groups and textual analysis.

Q2. What are the main themes and thematic patterns of studies analyzing MILCT?

Three main thematic categories were identified: (1) fields of application, (2) instruments and assessment, and (3) limits and difficulties. Each category is explained below:

- Fields of application: it groups articles dealing with the different fields in which MILCT is applied and used, as well as the modes of used adapted to each field. Two subcategories are identified: 1. Disciplines, which considers how MILCT is used in the teaching of different areas of knowledge; 2. Social, which deals with analysis of MILCT in various fields and social issues, such as youth, families, civic participation and the social inclusion of transgender people.
- Instruments and assessment: it encompasses the papers proposing instruments for the implementation and evaluation of MILCT. Within this category, three subcategories are included: 1. Measurements; 2. Toolkits; 3. Conceptualization and definitions. The articles grouped under Measurements assess the MILCT levels in different fields (schools, universities, families) and evaluate the effectiveness of tools created to improve these levels. The ones classified under Toolkits present and evaluate didactic instruments to promote MILCT in different levels. Lastly, the studies classified in the Conceptualization and definitions group provide a theoretical assessment of MILCT and other related concepts.
- Limits and difficulties: contains articles highlighting the problems and limitations of MILCT, especially in vulnerable sectors of society, such as children and young people.

For each thematic group, the following articles were identified.

4.1. Fields of application

4.1.1. Disciplines

Alcolea-Díaz et al. (2020) carried out a quantitative and qualitative content analysis of semantic fields, using the Keyword in context technique (KWIC), from which they identified a strong presence of the thematic areas of the Structures of Information discipline in the UNESCO MIL curriculum. However, they perceived fundamental weaknesses with regard to the structural approach of the information.

Vrabec et al. (2013), analyzed the application of MILCT in religious education in Slovakia, through a content analysis of the syllabi of the subjects Catholic religion and Religious education. They observed a cross-presence of media literacy in the syllabi of the subject Religion, but in many cases its application was limited to an ambiguous use of the term (media literacy as the simple use of media in teaching) and that the faculty were not specifically trained in media.

Novitasari et al. (2020) carried out a study on digital literacy applied to mathematics in elementary school in Indonesia. Through the combination of participant observation of mathematics lessons, interviews and document analysis, they reached the conclusion that digital literacy brought about improvements in the critical mathematical thinking of the students.

Nygård et al. (2021) worked with the application of MILCT in Didactics, through a study on the teaching of critical thinking to adolescents in Finland. They observed the lessons of two Education for Health eighth grade teachers and their students, paying attention to the attitudes and roles of the teachers when the students work in groups, in combination with one-hour interviews to the teachers. The authors found two roles adopted by the teachers: the role of cognitive authority and that of administrator/trustee, which marked lesson dynamics. When the teachers didn't position themselves as cognitive authorities, the class experienced puzzlement, but in some occasions the guidance of the teacher in continuing to look for information resulted in learning.

Lacković (2020) studied the acritical consumption and interpretation of images in the digital world. With her analysis, she made a methodological proposal for the analysis of photographic signs through the PSC method (production-signification-consumption), which considers the three instances in which images acquire meanings. She also proposed the existence of a relationship between the affective reactions to images and the creation of meanings, and she posited that photographs are digital and postdigital signs, plausible of existing both in material and digital formats, which must be considered in education in order to promote their critical consumption.

Herrero-Diz and López-Rufino (2021) researched the role that libraries played during the COVID-19 pandemic in the fight against disinformation. They carried out a content analysis of the activities and resources of 216 libraries in various countries in America, Asia, Europe and Oceania. The results showed that public libraries were the most active in generating content that aided information literacy and avoided disinformation.

Alhothali (2021) applied MILCT to randomly chosen school principals in Saudi Arabia (n=50). When comparing the results with teachers in Finland and Malaysia, it was found that they showed MILCT levels below the ones in these countries.

Kaufman (2021) places MILCT within the discipline of civic education. This author reports some lessons extracted from a case study carried out in a class. She stresses the importance of class discussion with teachers in order to deactivate false information.

4.1.2. Social

A group of articles focused on decision-making in the family environment. Austin et al. (2018) conducted six sessions of a workshop on media literacy and nutrition for 100 parent-child pairs in the United States. They concluded that a media literacy curriculum designed for the family environment would improve the media using skills of parents and decrease young people's susceptibility to food advertising. Along the same lines, Austin et al. (2015) applied a survey about media critical thinking to 134 parents in the state of Washington (United States). Its results show that critical thinking on the media by parents affects their levels of expectation about media messages related to food and about family receptiveness to nutrition-related attitudes.

González-Fernández et al. (2019) diagnosed the media literacy processes taking place within Spanish families and identified the training needs of parents in order to offer training proposals. The study was organized in 10 focus groups with 5 to 7 parents each, to whom 25 open questions were posed, reaching a total of 51 participants. Afterwards, a content analysis was carried out with Atlas.ti and a conceptual analysis. They identified two relational dimensions: media typologies and construction of messages through the media. They concluded that the parents' level of media literacy is less of a defining factor in their children's use of the media than their concern and dedication.

Kinsky and Smith (2013) explored the role of media in children's understanding of people and cultures different from their own, by analyzing representations of ethnicity and race in the children's program "Maya & Miguel". They carried out a textual analysis of 12 episodes of the program and found representations of different cultures and ethnicities that tried to move away from stereotypes, and characters in varying degrees of assimilation with American culture, which would make it easier for children watching the program to find some character to identify with.

Other articles analyze the relationship of young people with the media. Melro and Pereira (2019) worked with first- and second-year undergraduate students from various disciplines at two Portuguese universities (Universidade do Minho and Universidade da Beira Interior) in order to understand young people's interactions with news and disinformation, and the importance they attach to critical thinking in their country's civic and political life. They applied a questionnaire to 562 participants and, based on its results, they created focus groups with 45 students. They concluded that the participants showed limited critical analysis of information, although they showed themselves concerned about disinformation and proposed measures to fight it.

McDougall (2019) assessed the role of media education as a facilitator of resilient media engagement by young citizens. She developed an ethnographic research, with interviews, dialog workshops among different stakeholders, and an extensive literature review. With 88 participants in total (25 in the interviews, the rest as workshop participants), from China, the UK and Russia, the study concluded that critical media literacy, if included as a compulsory subject in schools, would provide young citizens with better tools to be resilient in the face of information disruption than reactive sources (fact-checking and verification).

Austin and Pinkleton (2016) analyzed academic sources to weigh the effectiveness of media literacy in reducing the influence of biased messages on young people and in improving their decision-making regarding substance use (alcohol, tobacco and others). They found that media literacy helps to address substance abuse and other health-related issues.

Austin et al. (2016) administered an online survey to 472 undergraduate students at a public university in the United States to investigate the effectiveness of media literacy in the context of personality

factors, in the case of alcohol advertising. Their results show that media literacy improves decision-making regarding alcohol consumption, beyond personality differences, by decreasing the effectiveness of advertising messages.

Yasdin et al. (2021) conducted a survey with 122 young Indonesians undergoing vocational training. It was found that literacy in new technologies and the development of critical thinking are essential for the formation of soft skills, i.e., tools to discern information in the media environment.

Finally, Krutkowski et al. (2020) worked with MILCT as a tool to raise awareness of gender issues among the university population. They created and measured the effects of the workshop: *Fake News Trans edition*, for the staff of the Library Science, Technology and Media Studies departments at the University of Roehampton (UK) by demystifying false information about trans identities and informing about a new university policy on transgender people. They noted that workshop participants claim to be more aware of transphobic media coverage, and that this will help them reduce bias and support transgender students and staff.

4.2. Instruments and assessment

4.2.1. Measurements

Zou'bi (2021) administered a questionnaire to 134 students in a Faculty of Education in Jordan. The results showed an acceptable degree of critical thinking in interpreting media content. The most difficult messages to interpret were those containing misleading elements and spelling errors. Difficulties were noted in distinguishing news items with insults to politicians and other public figures. Explicitly offensive messages were the easiest to distinguish.

Ku et al. (2019) studied the relationship between news consumption on social media, news media literacy and critical thinking in adolescents. Through a questionnaire applied to 1505 adolescents aged 12-18 years, from 12 schools in different districts of Hong Kong (China), they reached three conclusions: 1. some news consumption habits on social media are related to higher critical thinking and were more common in older adolescents; 2. when asked to critically reason about news, they responded well in several areas, but poorly in evidence assessment; 3. knowledge of news media is a good predictor of independent critical thinking.

Zhu et al. (2021) analyzed the relationship between information literacy and social media competence in university students in China by means of an online questionnaire. The sample consisted of 1843 first-year students from a university in Shanghai. They concluded that the most critical factors in predicting students' social media competences are the ability to use information technologies to solve problems and the sense of responsible behavior in cyberspace.

Walton and Hepworth (2013) examined whether a mixed (face-to-face and online) approach to teaching information literacy could significantly improve undergraduate students' information discernment. They conducted an experiment with an information literacy course taught in three formats: mixed (experimental group), face-to-face with interactive online information (intermediate group), and face-to-face with non-interactive online information (control group). They analyzed the assessments of the sources used (2 books, 2 articles and 2 web pages) from a gradable paper of 35 first-year UK Sport & Exercise undergraduate students aged 18-20 years. Students in the experimental group (face-to-face and online) showed better information discernment skills.

Austin et al. (2020) studied the effect of a media literacy course on reducing the effects of food marketing and improving nutrition in families. They developed a statistical analysis of differences between a pretest and a posttest to measure the effectiveness of the course applied to 189 participants in parent-child pairs (children aged 9-14 years), from two rural and three urban counties in the state of Washington. According to their results, the media education program was effective.

Pilgrim et al. (2019) conducted a comparative study between present-day and 2006 elementary school students in the United States regarding their ability to identify a fake website. They conducted interviews with 68 students in grades 1-5, from two schools with a high percentage of students from low-income families, and school availability of technology resources. The results were compared with those of a study on the same deceptive web conducted in 2006. The comparison shows improved web literacy skills in students.

Mohan et al. (2020) administered the Test of Scientific Literacy Skills to all first-year students in four medical colleges in India. The study was repeated for three years, reaching a total of 525 students. The students showed a low level of scientific literacy, requiring an upgrade of school curricula to improve it and an inclusion of specialized social media literacy.

Nygren and Guath (2021) investigated the skills of Swedish high school students in assessing online news. By applying an online survey and a performance test to 2216 senior secondary school students in Sweden, they concluded that credible news appreciation, related to the students' skills in finding news, assessing texts and images and corroborating biased information about a web page, was the decisive element in their performance. However, they found a gap between students from different programs.

Johnston (2020) assessed how secondary school students analyze content from social media, with a questionnaire and eight activities to evaluate written and visual content uploaded to social media applied to 37 students from two secondary schools in Australia. The results showed that students trusted TV more than social media and were able to differentiate opinion from information, but they did not distinguish biases related to political affiliations, nor did they contrast evidence or recognize the possibility that images and videos could be altered. The author proposes that media literacy should focus more on assessing information.

Martínez-Cerdá and Torrent-Sellens (2017) analyzed and validated scales for measuring the media empowerment of university students. They applied an online questionnaire in Catalan and Spanish on two dimensions (active citizenship and diversified media use) to 544 alumni of the Universitat Oberta de Catalunya (Spain). They concluded that the measurement scale constructed is consistent and reliable.

Kachkaeva et al. (2020) conducted a longitudinal study in two periods (2014-2017 and 2018) on the effects of a media education course on university students in Russia, regarding their critical thinking abilities and their degree of trust in the media. They applied two surveys, pre- and post-course, to 166 first- and second-year Journalism students (2014-2017) and to 166 students of media and non-media majors (2018) of the Russian Research University 'Higher School of Economics'. The studies showed significant differences between the results of pre- and post-course surveys. The results prove a subject devoted to media education helped them corroborate more of the information they consume, broaden their channels of information consumption and be more skeptical of the media.

Shomova (2020) studied the consumption of memes in Russian students and their possible use as sources of information, through an anonymous survey in fall 2019 of undergraduate students with media literacy subjects. The sample consisted of 138 second-year students of the National Research

University ‘Higher School of Economics’, Journalism students and students in other courses. The students consumed memes uncritically and considered them to be containers of ‘facts’, even though they recognized that they were satirical and humorous. In many cases they fell for false information and did not contrast the information. There were also cases in which they gave alternative interpretations of the memes.

Šuminas and Jastramskis (2020) empirically assessed the impact of media and information literacy on the news evaluation process among Lithuanian youth, using a questionnaire and a gaze-tracking device. The questionnaire consisted of general information and then an experiment where students assessed the credibility of three news items. A gaze measurement instrument was used to identify entry points, focus, reading patterns and time spent. Forty students from Vilnius University (Lithuania) participated, half of which had taken several MILCT-related courses and the other half having received training that was minimally related to MILCT. Differences were found in the manner and motives for the identification of news credibility between the two groups, and it was concluded that MILCT training led to differences in the students’ assessment of news.

Archila et al. (2019) conducted a study on the evaluation of inaccurate news in the press dealing with scientific topics. They performed a frequency analysis to identify the degree of acceptance of inaccurate scientific information, and a verbal analysis of written and oral arguments and of audio and video records, with 141 university students in Colombia. They found that participants perceived false or inaccurate information in different ways, but generally overestimated the truth attributable to scientific information presented in the press.

Ling et al. (2019) analyzed the factors affecting youth’s media literacy in their understanding and interpretation of the historical documentary “The Malayan Emergency”, using an experimental method. They determined control and treatment groups to which were applied pre- and post-tests on media literacy and an experiment consisting of watching the documentary in its unmanipulated (control group) and manipulated (treatment group) versions. The sample consisted of at least 300 students from public higher education institutions in Malaysia with similar media literacy levels, from History and Communication courses, with diverse ethnic compositions. The authors concluded that critical thinking, media aesthetics, and Internet exposure influence interpretations of the ideology conveyed in the documentary.

Forzani (2020) developed a method to assess the credibility and relevance of published online news. According to this method, there are three main levels of analysis: source, content and context of the news.

Lebid et al. (2020) surveyed 216 Ukrainian university students via Telegram. They concluded that their MILCT level was low, finding that they had few skills to develop critical thinking, and that their level of media and information literacy was low. They emphasize the importance of fact-checking tools in educating young audiences.

Yakub et al. (2020) propose a new tool to assess media literacy, called *Fallasigns*. This tool is based on identifying the most common fallacies and argumentation errors, especially within the context of news that are new to the public. They test its effectiveness through a content analysis of 600 news stories that appeared in media on two topics that were controversial in Australia in 2017.

Zanin-Yost and Freie (2020) report a case study with students in the United States where the tool known as “Behrman's Critical Literacy Practice” was applied. The aim was for students to increase their level of MILCT. Pre- and post-activity measures were taken. The article does not show the scores obtained.

4.2.2. Toolkits

Hintermann et al. (2020) presented a critical media literacy toolkit, created from a study of young people's identity construction strategies in the migrant society of Vienna (Austria) and their online behavior from the perspective of civic education. First, they conducted an online survey of students from all schools in Vienna to select participating schools. Then, they applied the workshop "Deconstruct MiIdentity" and implemented a critical media literacy program in classrooms to 79 students from three schools. Their teachers were also trained to conduct the workshops and group discussions. The evaluated workshop encouraged students to reflect on and become aware of the role of social media in the construction of meanings and identities.

Triviño-Cabrera and Vaquero-Cañestro (2020) evaluated and promoted audiovisual communication competence among students of the Primary Education Teaching Degree at the University of Malaga (Spain) by working with the video clip of "Malamente" by Rosalía. They carried out a workshop and collected the results through an individual commentary, a group debate, a co-evaluation and the creation of an individual critical-creative teaching portfolio. A total of 78 students from the Didactics of Plastic Expression course and 40 from the Didactics of Social Sciences course participated. From this work, a didactic toolkit for audiovisual literacy was proposed, with insights on sexist and cultural roles and stereotypes, beliefs, traditions and values.

Reed et al. (2019) present results from the implementation of a 16-week course on disinformation in the realm of scientific knowledge. The course addressed failures in the public understanding of science and the manipulation of scientific knowledge, and it was applied to an unspecified number of U.S. undergraduate journalism and STEM students. The results showed improvements in the ways students understand the difficulties of communicating in and about science.

Semakula et al. (2020) conducted a longitudinal study with 675 parents of young people in Uganda to test whether the use of a medical treatment podcast improved their health literacy. In a previous phase, the podcast was found to increase their knowledge. However, a new questionnaire one year after exposure to the podcast showed that their health literacy had decreased almost to the levels of the control group.

Archila et al. (2021) conducted a quantitative study based on questionnaires, together with a qualitative one with a classroom interaction, so as to generate a tool that would help science literacy. A total of 115 students from Colombia participated, testing a method they called *teaching-learning sequence*. The results showed that this method was appropriate for improving the students' scientific literacy, helping them to reflect on the construction of fake news.

Pilgrim and Vasinda (2021) tested a protocol to evaluate the reliability of web pages before even selecting them for consultation in a school population. Questionnaires were administered to 354 children aged 6 to 10 years living in the United States. It was found that the participants did not have adequate tools to distinguish pages with reliable information from those without it.

Lawless (2021) conducted a case study consisting of a classroom activity in which students discussed with their teacher information from social media and cases of attacks against teachers. In the context of MILCT, it was noted that the activity increased the students' level of reflection on it, and also increased the credibility of the teacher in the classroom with respect to his or her students.

4.2.3. Conceptualization and definitions

Yıldırım (2015) put forward a synthetic definition of media literacy within the framework of the multi-media current reality, summarizing different definitions of media literacy, the power of media and the importance of media literacy for an informed citizenry.

Molerov et al. (2020) re-conceptualized MILCT as Critical Online Reasoning (COR), and attributed three main characteristics to it: (1) online information acquisition ability; (2) ability to critically assess the acquired information; (3) reasoning based on evidence, argumentation and synthesis skills.

Goulart Righetto et al. (2021) conducted a bibliographic study on the development and effective use of information literacy in the context of the disinformation society. Starting from the idea that today's society is marked by social "imbecilization", whose basic characteristics are the mechanization of functions, mechanized and mediated substitution of experiences, the fragmentation of information, they conclude that information literacy enables people to manage "imbecilization".

Chanda (2017) reviews literature on different perspectives associated with literacy. He concluded that combining pedagogy with media literacy helps to link theory and practice, boosting the acquisition of basic media skills and critical media literacy.

Mateus (2021) developed a conceptual framework to specify three attributes of media education. Internet access must be a fundamental right, accompanied by education in critical thinking. Media education policies should focus on empowering the population. Finally, continuous teacher training is necessary.

Fedorov and Mikhaleva (2020) conducted a narrative review of the literature on MILCT. Among their conclusions they highlight its restructuring within the scope of UNESCO's objectives, positioning MILCT as a strategy that enables access to information and knowledge, and that promotes free, independent, mediatized and pluralistic social environments.

Another group of papers evaluated theoretical models on MILCT. Kim (2019) analyzed the critical media literacy model and methodology proposed by James Potter and the Center for Media Literacy (CML) based on the three Kantian principles of reflection. Kim proposed a reflective media literacy, focusing the reading of information on the why, the ethical value of the practice, and the possibility of doing a common good.

Jacobson and Mackey (2013) assessed the meta-literacy model to conceptualize information literacy. They proposed that meta-literacy enables the expansion of cognitive competencies to adapt to changes in emerging technologies, as well as reflection on one's own thinking and the development of literacies with a metacognitive component.

A third group of articles addresses MILCT in relation to the web realm and its challenges.

Tsvetkova (2017) studied the impact of speed and acceleration on the preservation of informational balance and critical thinking skills. She proposed reevaluating the advantages of speed reading and promoting slow reading within the framework of universal literacy. She also postulated the need to create niche information literacies for various categories of people to suit their profiles and needs.

Gálik (2017) proposes that cyberspace shapes contemporary education in two ways: a new understanding of information and its new organization. Cyberspace has caused education to move

away from discursive thinking and emphasize associative thinking, especially based on images. This is a type of thinking that requires the application of critical thinking and information literacy.

Gretter and Yadav (2016) proposed a joint approach to computational thinking and media literacy, to encourage the development of the skills required in the 21st century in students.

Meneses (2021) produced a critical essay, in which he synthesized and clarified the key criteria for the evaluation of controversial content on the web, delving into the critical thinking dispositions necessary to evaluate online content. As a result, he proposed four evaluation criteria: author's position, author's motivation, systematicity and independent scrutiny.

Weiss et al. (2021) developed a conceptual framework to examine the factors that determine whether a person is prone to disseminating fake news. They designed a model with seven factors: (1) degree of trust in the Internet; (2) degree of self-display on the Internet; (3) amount of social comparison; (4) degree of FoMO anxiety; (5) degree of social media fatigue; (6) self-perception and role identity; and (7) educational level reached.

Lastly, Silber-Varod et al. (2019) conduct an analysis of the evolution of MILCT, through a study where they identified trends of change in education academic literature on digital literacy competences from 1980 to 2016. They created a dictionary of words related to the topic, to be used as key concepts in literature search. Afterwards, they conducted a semi-automated content analysis. Finally, they identified trends of change and found that education literature lags behind other disciplines in its recognition of the digital competences needed for learning.

4.3. Limits and difficulties

Tejedor-Calvo et al. (2012) reflected on ways to empower young people in the face of risks and challenges arising from the Internet, particularly grooming and cyberbullying. Based on the analysis of academic sources, they considered the eight risks identified in UNESCO's media and information literacy curriculum and concluded that grooming and cyberbullying are the most concerning. The authors proposed training teachers and professors regarding Internet risks.

Chassiakos et al. (2016) carried out a critical review of the literature from a pediatric perspective, from which they synthesized the benefits and risks of using new media on the health of children and adolescents. They proposed ways for families to manage these risks, controlling the times and manners of use, in particular, the implementation of the AAP Family Media Use Plan.

Sinatra and Hofer (2016) analyzed the challenges for public understanding of science through a critical reading of academic sources. They proposed that better public understanding of science requires not only greater scientific literacy, but also a shift in epistemic cognition and confidence. They suggested changes in education (teaching processes, teaching for deep understanding, promoting epistemic cognition), and in policy-making (funding research on thinking processes, supporting standards that promote focusing on how to think rather than what to think, supporting the development of more malleable psychological skills, and more rigorous teacher training standards).

Bissonnette et al. (2021) conducted six semi-structured interviews with 16-17-year-old adolescents in Canada to look at their critical and informational thinking skills. The interviewees showed a very uneven use of the tools. On the one hand, their media education had enabled them to understand texts and develop everyday skills. However, they were inefficient in justifying their decisions and comparing the value of different arguments.

Mata et al. (2021) gave a questionnaire to 250 secondary school students in Spain. Participants were presented with two tweets exhibiting anti-democratic values. The results indicated that students mostly fell into the trap set by the messages and were not critical enough of their content.

Wang et al. (2021) designed an experiment with 201 participants living in the United States. They wanted to test whether the inclusion of descriptive norms in messages promoting healthy lifestyle habits made them more effective. They found that, paradoxically, participants with lower rates of media literacy and critical thinking received the messages better, while those with higher rates were more averse to the content.

Astuti (2021) examined whether university professors are more or less vulnerable to fake news, given their assumed informational competence. He conducted a survey of Indonesian professors, and demonstrated that being a university professor did not make them immune to fake news.

Table 2 summarizes the main results of this review, organized by keywords.

Table 2. *Summary of the main results of the review on MILCT.*

| MILCT fields of application | | |
|---|---|---|
| <i>Disciplines</i> | <ul style="list-style-type: none"> • Religious education. • Mathematics. • Didactics. • Civic education. • Digital realm. | <ul style="list-style-type: none"> • Science. • Pediatrics. • Library science. • MILCT associated to students and faculty. |
| <i>Social</i> | <ul style="list-style-type: none"> • The role of families in MILCT. • MILCT associated to good nutrition habits. • Cultural differences in MILCT application. | <ul style="list-style-type: none"> • MILCT in the adolescent and young population. • MILCT associated to substance use, including alcohol. • MILCT associated to gender issues. |
| MILCT instruments and assessment | | |
| <i>Measurements</i> | <ul style="list-style-type: none"> • Factors associated with a greater level of MILCT: (1) greater habit of news consumption, (2) greater sense of responsibility, (3) greater skill in using information technology, (4) mixed face-to-face and online approach (5) greater involvement of the family, (6) greater skill in students for news search, | <ul style="list-style-type: none"> (7) broadening of information consumption channels, (8) greater ease of access to the Internet, (9) use of fact-checking, (10) greater ability to identify fallacies and errors in logic. • Differences in manner and motives for identification of credibility. • Three levels of credibility depending on the source, content and context of the news item. |

Toolkits

- Dialogic activities between students and faculty.
- Workshops with delivery of final report.
- 16-week courses.
- Podcast.
- Fake news assessment protocols.
- Fake news checklists.

Conceptualization and definitions

- MILCT in three attributes: (1) ability to acquire the information, (2) critical assessment, (3) evidence-based reasoning.
- MILCT together with UNESCO goals on free, independent and plural social environment.
- Imbecilization of the population as a general framework of MILCT.
- MILCT in three attributes: (1) Internet access, (2) empowerment of society, (3) continuous teacher training.
- Kantian principles for information consumption.
- Metaliteracy.
- Slow reading as MILCT strategy.
- Evolution from discursive to associative thinking.
- MILCT together with computational thinking.
- Critical reading in four attributes: (1) author’s position, (2) author’s motivation, (3) systematicity, (4) independent scrutiny.
- Factors that lead to disseminating fake news.

Limits and difficulties of MILCT

- Overestimation of the trust placed in scientific information.
- MILCT decreases in longitudinal studies over a period of 12 months.
- Grooming and cyberbullying as issues to be dealt with in MILCT.
- Challenges in the public understanding of science.
- Uneven use of MILCT tools despite exposure to identical education.
- Inefficiency of MILCT to develop competences at a deeper level.
- A greater level of MILCT in young people also makes them more averse to agreeing with institutional messages.
- Faculty teaching MILCT is also vulnerable to fallacies and fake news.
- Difficulties in understanding the political affiliations of the source.
- Difficulties in identifying manipulated videos.

Source: Prepared by the authors.

5. Discussion and Conclusions

This article offers a systematic review of scientific production on the confluence between media education and critical thinking. The magnitude of production reflects the growing concern about disinformation phenomena and their effects on society, showing how scientific and academic interest in understanding the interrelationship between media and information education and critical thinking has increased. In this sense, publications on MILCT have increased as of 2019, especially those that aim to present empirical evidence in favor of such relationship. Different disciplines attempt to conceptualize MILCT within their field of study, creating new measurement tools, applicable to the different social realities of their interest. The interest in this area seems particularly relevant in Spain, which has a very high scientific production when weighted in relation to its population size.

The profusion of conceptual articles, which make up about one third of the analyzed corpus, is highly significant. This high percentage indicates that the field of study has not reached a consensus on the elements that make up MILCT and their differential definitions with respect to other similar elements. In this sense, the multiplicity of conceptual approaches that do not seek to apply an empirical view but rather to establish a shared theoretical framework (Jacobson and Mackey, 2013; Molerov et al., 2020; Mateus, 2021) is noteworthy.

In general, the reviewed literature shows that media and information literacy helps to increase critical thinking (Kachkaeva et al., 2020; Novitasari et al., 2020; Šuminas and Jastramskis, 2020; Yasdin et al., 2021). This generic idea is materialized in multiple ways and has as a concrete consequence the appeal to the need to include this type of education in the training of citizens. In this context, MILCT in adolescents and young people is a central concern due to their greater vulnerability and lesser maturity for resisting disinformation and other media challenges. Research shows that MILCT is effective in this population group, with higher literacy rates today compared to the first decade of the 21st century (Pilgrim et al., 2019), and very good results in tasks such as reducing the abuse of alcohol and other substances in adolescents (Austin and Pinkleton, 2016). However, it is not without certain limits. Many adolescents seem to know how to identify false information or web pages, but have difficulty explaining and reasoning why (Bissonnette et al., 2021; Mata et al., 2021), which may indicate that MILCT is internalized at a superficial level (e.g., knowing how to identify the aesthetics of a false website), but not at a deep level (e.g., understanding the content of the information posted and its veracity).

A very important limitation of approaches through MILCT is their long-term effect. The vast majority of empirical studies assess at best the state of media literacy before and just after the intervention (e.g., Ling et al., 2019), generally finding results that demonstrate a statistically significant and positive impact of the intervention. In contrast, some of the few studies that measured longer-term efficacy reported results that did not invite optimism. Those subjected to MILCT stimulus had regressed to literacy levels similar to those of the control group 12 months later (Semakula et al., 2020). In this sense, more studies assessing the long-term impact of literacy programs seem necessary.

In conclusion, MILCT in itself seems to be an incomplete strategy. It needs other perspectives to complement it, such as digital tools, empowerment, gender policies or scientific knowledge. It should also be noted that the people in charge of training young people in MILCT are not exempt from biases either, and are also vulnerable to the various disinformation phenomena. Let us remember that biased and motivated thinking is part of our cognitive structure. MILCT seems to be effective, according to the reviewed literature, in counteracting the effects of motivated thinking, but its effectiveness requires other strategies that must also be implemented.

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