



# Disinformation and multiliteracy: A systematic review of the literature

Desinformación y multialfabetización:  
Una revisión sistemática de la literatura

- Dr. Jesús Valverde-Berrococo. Professor, Department of Educational Sciences, University of Extremadura, Cáceres (Spain) (jevabe@unex.es) (<https://orcid.org/0000-0003-2580-4067>)
- Alberto González-Fernández. Adjunct Professor, Department of Educational Sciences, University of Extremadura, Cáceres (Spain) (albertogf@unex.es) (<https://orcid.org/0000-0001-6277-9054>)
- Jesús Acevedo-Borrega. Adjunct Professor, Department of Educational Sciences, University of Extremadura, Cáceres (Spain) (jeacbo@unex.es) (<https://orcid.org/0000-0002-7234-8263>)

## 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 "informativa", así como la emergencia de la "alfabetización en noticias" y en "datos". Se evidencia la necesidad de adoptar enfoques interdisciplinarios. 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 informativa, 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).

| 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.<br>Education for citizens.<br>Content-Focused.<br>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.<br>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.

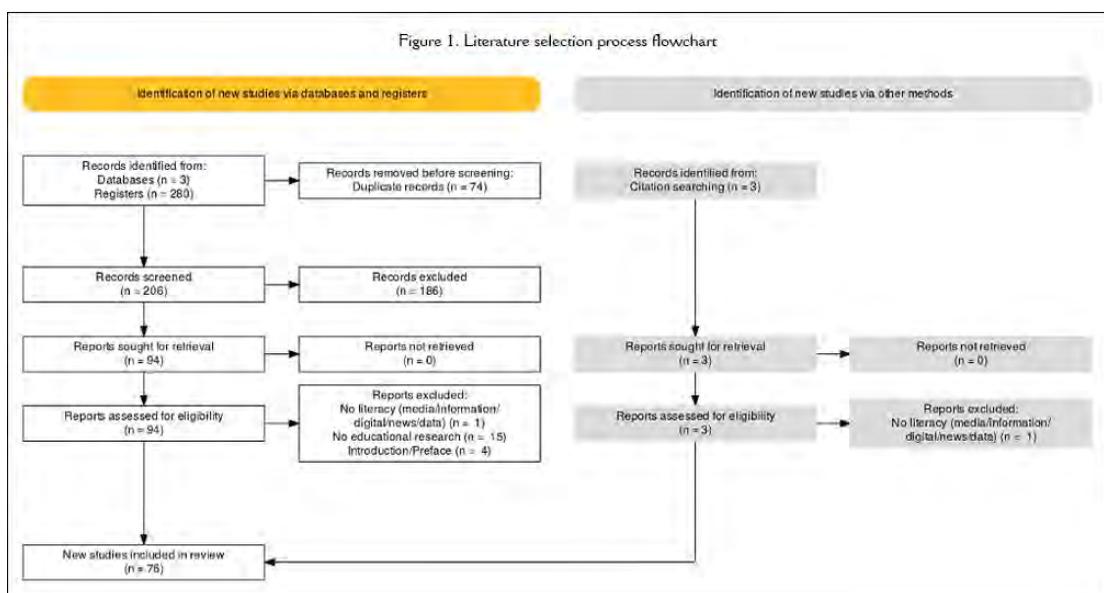
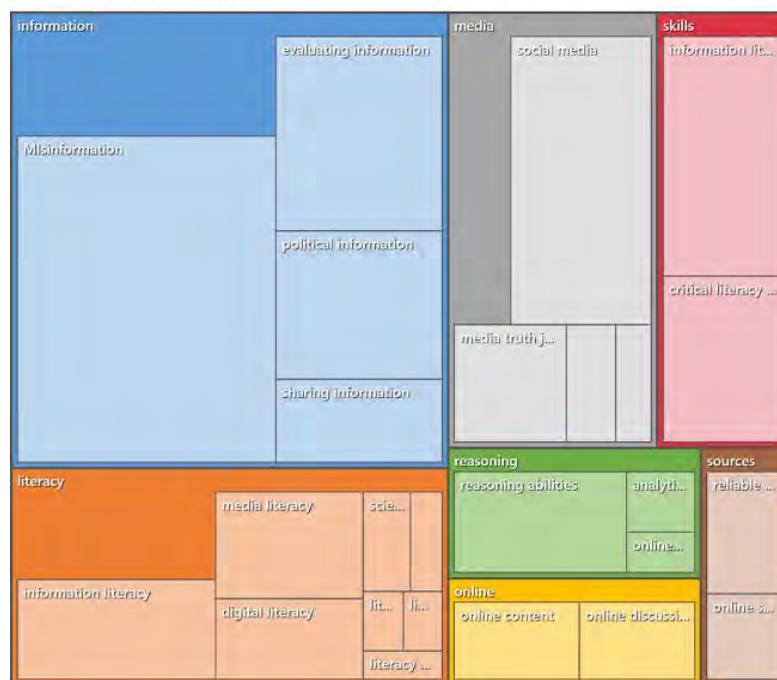




Figure 3. Conceptual network of nodes and sub-nodes from full-text coding



- 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?

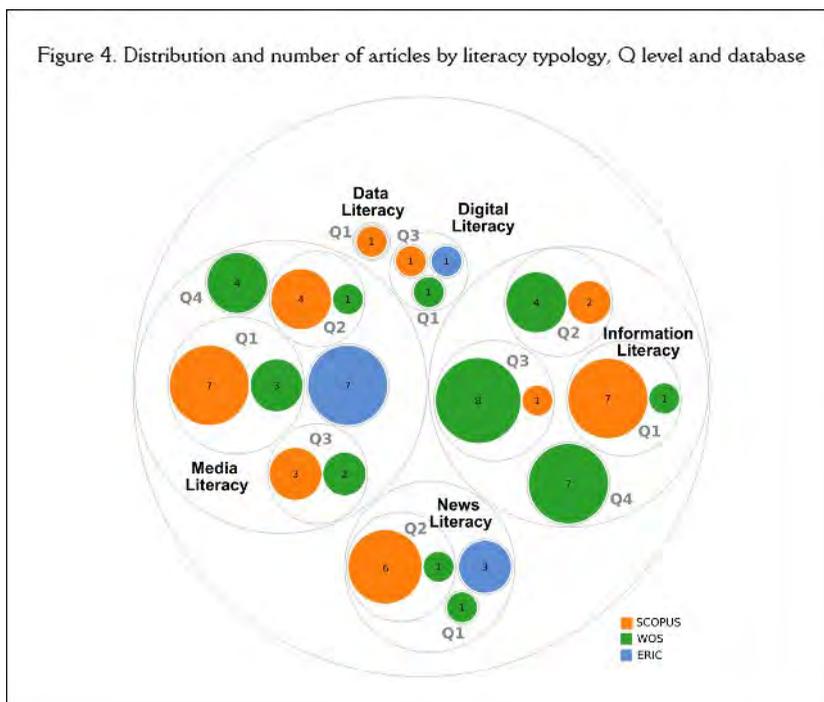
14 countries have been identified, from which the largest contribution is made by the United States (64.5%), followed in equal proportion by the United Kingdom and Spain (7.9%).

- 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%).

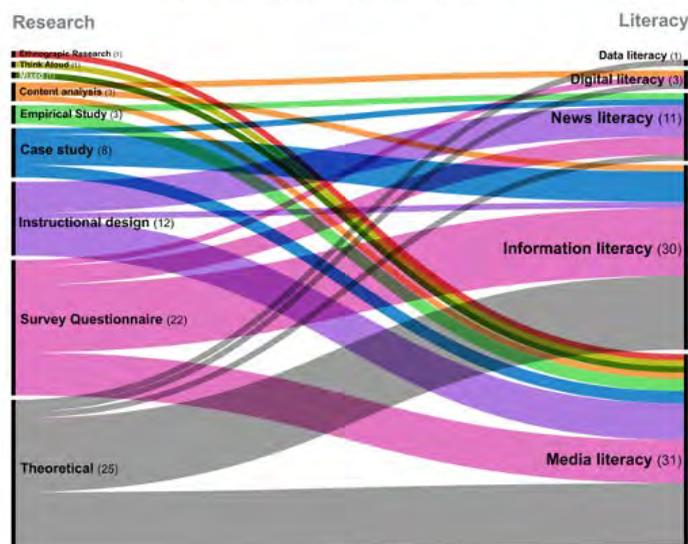
- RQ6. What educational levels are included in the research and what areas of knowledge are involved?

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%).



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" (Líterat 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) Saliency: 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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