JOURNAL OF E-LEARNING AND KNOWLEDGE SOCIETY
Vol. 21, No. 1 (2025), pp. 85-99

Teachers competencies in evaluating digital sources and tackling disinformation: implications for media literacy education

Nicola Bruno[1], Annamaria De Santis, Stefano Moriggi

University of Modena and Reggio Emilia – Reggio Emilia (Italy)

(submitted: 20/2/2025; accepted: 9/5/2025; published: 10/5/2025)

Abstract

This study examines teachers' competencies in evaluating digital content and tackling disinformation through analysis of pre-test data from 243 Italian primary and secondary school teachers participating in a media literacy training program. Drawing on the DigComp 2.2 framework, we assessed seven key digital literacy competencies, including source evaluation, social media verification, and visual literacy. Our findings reveal significant gaps between teachers' digital engagement patterns and their critical evaluation skills, particularly in visual content assessment. Using cluster analysis, we identified four distinct teacher profiles: Skeptical and Vulnerable Teachers, Traditional Trust-Based and Uncritical Teachers, Digitally Engaged and Trusting Teachers, and Balanced Critical Evaluators. The results show that teachers are moderately good at finding assertive signs of reliability, but they have trouble with more difficult "inferred context" tasks, especially when it comes to judging visual content. The study shows that different types of professional development are needed and suggests specific ways to help teachers improve their media literacy skills in a world where digital information is getting more complicated.

KEYWORDS: Information Literacy, Teachers, Digital Skills, Digital Content, Disinformation.

DOI
https://doi.org/10.20368/1971-8829/1136182

CITE AS
Bruno, N., De Santis, A., & Moriggi, S. (2025). Teachers competencies in evaluating digital sources and tackling disinformation: implications for media literacy education. *Journal of e-Learning and Knowledge Society*, *21*(1), 85-99. https://doi.org/10.20368/1971-8829/1136182

1. Introduction

Disinformation, defined as the deliberate dissemination of incorrect or misleading information, represents a growing threat to democratic processes, public health, and social trust (Pérez-Escolar et al., 2023; Bennet et al., 2018). The rapid digitalization of information sharing has intensified this challenge, with the COVID-19 pandemic highlighting how surges of misinformation can amplify societal discord and jeopardize public safety (Springer et al., 2022). Within this context, educational institutions face mounting pressure to develop students' capacity to navigate an increasingly complex information landscape (Nygren et al., 2024). A report by IDMO (2023) indicates that both educators and students perceive themselves as frequently encountering disinformation.

Recent research demonstrates that students often struggle to differentiate between credible and biased information sources (Breakstone et al., 2021; Martini et al., 2024), making them particularly vulnerable to manipulation in digital environments (Jones-Jang et al., 2021). This vulnerability has prompted academic, civil, and governmental entities to advocate for the integration of media literacy education into core curricula. Organizations such as the UNESCO (2018) and the European Union (2022a; 2022b) have identified media literacy – the ability to critically analyze, evaluate, and comprehend information sources – as a fundamental defense against disinformation (Bruno et al., 2023). The European Commission's DigComp 2.2 and DigCompEdu frameworks specifically emphasize digital and information literacy as essential competencies for contemporary education (European Commission, 2022a; 2022b).

[1] corresponding author - email: nicobruno@gmail.com

Evidence supporting the effectiveness of media literacy interventions against disinformation continues to emerge (Kozyreva et al., 2024; Roozenbeek et al., 2023; Bateman et al., 2024; Dame Adjin-Tettey, 2022). A comprehensive meta-analysis of 49 studies revealed that media literacy interventions significantly enhance resilience to misinformation (d = 0.60), reduce belief in false information (d = 0.27), and decrease the likelihood of sharing misinformation (d = 1.04) (Huang et al., 2024). Similarly, educational programs aligned with European Commission guidelines have demonstrated success in increasing perceived social media literacy and reducing conspiracy beliefs among young adults (Gross & Balaban, 2024).

However, the successful implementation of media literacy education depends critically on teacher preparedness. Current research indicates a substantial gap between institutional expectations and educators' readiness to deliver media literacy interventions effectively (Erdem et al., 2018; Tsankova et al. 2023; Dongxue & Nagappan, 2024; Zaçellari et al., 2024). While many teachers demonstrate proficiency in using digital resources for classroom instruction (McNelly, 2021), they often lack the specific competencies needed to teach critical evaluation skills (Ranieri et al., 2017; Ranieri, 2021). This disparity is reflected in broader European trends, with an Ipsos Mori (2021) survey revealing that only 9% of Europeans across 11 nations have received training in distinguishing between accurate and inaccurate online information, despite 58% expressing interest in such training.

The persistent gap between the recognized importance of media literacy education and its effective implementation underscores the need for systematic research into teacher preparedness.

This study addresses this need by examining the media literacy competencies of Italian primary and secondary school teachers through analysis of pre-test data from a professional development course designed and delivered within the media literacy programme Open the Box (www.openthebox.io). By identifying specific deficiencies in educators' media literacy abilities and their capacity to transmit these skills, this research aims to inform the systematic integration of media literacy into educational curricula. Our findings contribute to the growing body of research on comprehensive media literacy education (Livingstone, 2012; Greenhow & Lewin, 2016) while providing practical insights for educational policy and teacher training programs in the European context.

The study is guided by the following research questions:
Q1- To what extent are educators equipped to identify and evaluate disinformation in its different appearances, including manipulated images, sponsored content, and dubious news sources?
Q2- What behavioral patterns in teachers' skills and approaches to digital sources can be identified in order to propose customized training programs for enhancing information literacy?

A survey was administered to Italian teachers attending a series of courses on information literacy organized by the media literacy program Open the Box. The results are analyzed using descriptive statistics tools and a multivariate analysis technique, namely cluster analysis useful to create groups among statistical units according to their features.

After the description of Methods for data collection and analysis in Section 2, the authors provided the results (Section 3) and a discussion about the findings in Section 4.

2. Methods

This study seeks to evaluate the foundational competencies of primary and secondary school teachers in topics related to disinformation resistance.

2.1 Sample and Variables

The data provided here originate from a pre-training evaluation aimed at assessing teachers' foundational abilities in identifying and appraising different forms of digital information. Table 1 lists the variables used in the analysis.

A total of 279 educators engaged in the pre-test, conducted across four separate teacher training programs held in Italy during the 2023-2024 school year. After deleting missing data, the final sample was made by 243 teachers. The sample taken has an average age of 51 years, in line with the average age (52 years) of Italian teachers (Svimez, 2024).

The pre-test questionnaire comprised four sections: (1) demographic data, (2) media consumption and trust patterns, (3) self-assessment of issues pertinent to digital literacy (including definitions of fake news, disinformation, and misinformation), and (4) the capacity to assess the reliability of digital content. In this last part, educators were introduced to seven distinct forms of digital content derived from real-world case studies (see Annex).

Participants were instructed to evaluate the trustworthiness of each item via a multiple-choice question (e.g., "Which of these two sites is more reliable?"; "Has this image been altered?") and to provide a concise written rationale for their selection.

Responses were assessed through both quantitative and qualitative methods. Quantitative responses were assigned a score of 1 (correct) or 0 (incorrect), whereas qualitative arguments were evaluated on a 1–5 scale, with 1 denoting insufficient and 5 signifying extremely good.

Table 1 - Variables list.

Group	*Variables*	*Description*	*Range/Options*
Social media	Facebook Whatsapp Telegram YouTube Instagram Twitter / X Pinterest TikTok	Binary variables attesting to the use of each social media	Yes/No
	social_n	Sum of social media used among the previous listed	Min: 0 Max: 8
	social_hours	Number of hours during which teachers used social media the day before the survey	Min: 0 Max: 7
Information sources	TV_info radio_info web_info social_info friends_info online_news_info family_info	Binary variables attesting to the use of each information source	Yes/No
	info_sum	Sum of information sources used among the previous listed	Min: 0 Max: 7
Confidence in information sources	TV_trust radio_trust newspaper_trust social_trust web_app_trust family_trust friend_trust	Ordinal variables describing the confidence levels of teachers in each source	Min: 0 (lower) Max: 5 (higher)
	sum_trust	Sum of the trust levels referred in the previous list	Min: 0 Max: 40
Assessment	Reliable	Assessment to question related to checking the ability to differentiate reliable from misleading sources	Min: 0 Max: 4
	Trustworthy	Assessment to question related to checking the ability to evaluate trustworthy versus deceptive news content	Min: 0 Max: 4
	Sponsored	Assessment to question related to checking the ability to recognize sponsored content	Min: 0 Max: 4
	Verified	Assessment to question related to checking the ability to identify verified profiles on social media	Min: 0 Max: 4
	Satirical	Assessment to question related to checking the ability to distinguish satirical material from factual content	Min: 0 Max: 4
	Decontextualized	Assessment to question related to checking the ability to detect decontextualized images	Min: 0 Max: 4
	Manipulated	Assessment to question related to checking the ability to identify manipulated photographs	Min: 0 Max: 4
	Assessment	Sum of the scores in all questions	Min: 0 Max: 28

The final score allocated 25% to quantitative responses, due to the potential for random accurate answers, and 75% to qualitative responses, as they offer greater insight into the teachers' critical thinking abilities.

This analysis centers on seven critical competencies vital for digital literacy, as highlighted in the DigComp 2.2 framework (European Commission, 2022a). These include:
(1) differentiating reliable from misleading sources,
(2) assessing trustworthy versus deceptive news content,
(3) recognizing sponsored content,
(4) identifying verified profiles on social media,
(5) distinguishing satirical material,
(6) detecting decontextualized images, and
(7) identifying manipulated photographs.

These competencies represent essential skills for educators in assessing the authenticity and reliability of various digital resource kinds within a progressively intricate information environment.

2.2 Analysis Methods

We used descriptive statistics tools to reply to Q1 and verify teachers' levels of information literacy.

To reply to Q2, we conducted a cluster analysis to differentiate the skills and habits of teachers in our sample. Cluster analysis is a multivariate analysis technique that, starting from the distance between statistical units, generates groups in which the units are most similar to each other and distant from those in the other clusters (Hair et al., 2014; Bartholomew et al., 2008).

We studied solutions with three and four clusters using different types of distance and agglomeration methods. Finally, we performed hierarchical clustering, calculating the Euclidean distance and using the Ward agglomeration method (Ward.D) that is the solution that give the possibility of better identifying multiple teachers' profiles. The variables used in the Cluster Analysis were the quantitative ones, namely social_n, social_hours, info_sum, sum_trust, and assessment. We chose a 4-cluster solution that better fits our data.

Analysis was conducted using R/R Studio and packages: `stats`, `psych`, `corrplot`.

3. Results

3.1 Competencies of teachers in evaluating digital content (Q1)

The findings from the pre-test reveal key insights into the foundational competencies of teachers in evaluating digital content. These results highlight the significant challenges educators face in navigating and assessing the reliability of information in the digital landscape, as well as their reliance on traditional media hierarchies and surface-level evaluation strategies.

Social Media Usage and Information Sources

Around half of the teachers interviewed declared to account for 3-5 social media; 77% of teachers stated to have spent 1-2 hours using social media the day before the survey (see Figure 1). Table 2 shows that teachers overwhelmingly favor traditional communication tools, with WhatsApp being the most used platform (97%), followed by Facebook (70%) and Instagram (64%). Usage of platforms popular among younger demographics, such as TikTok (14%) and Twitter/X (14%), remains minimal. This pattern suggests a potential disconnect between educators and the digital spaces their students frequently engage with, emphasizing the need for training to bridge this gap.

When it comes to sources of information, half of teachers declared consuming more than 4 sources (Figure 2). In Table 3 we found that traditional media dominate, with 75% of teachers relying on TV for news, followed by online newspapers (63%) and social media (59%). Family (57%) and friends (44%) are also significant sources, reflecting a strong dependence on close networks for information. This reliance highlights a lack of confidence in navigating broader digital ecosystems.

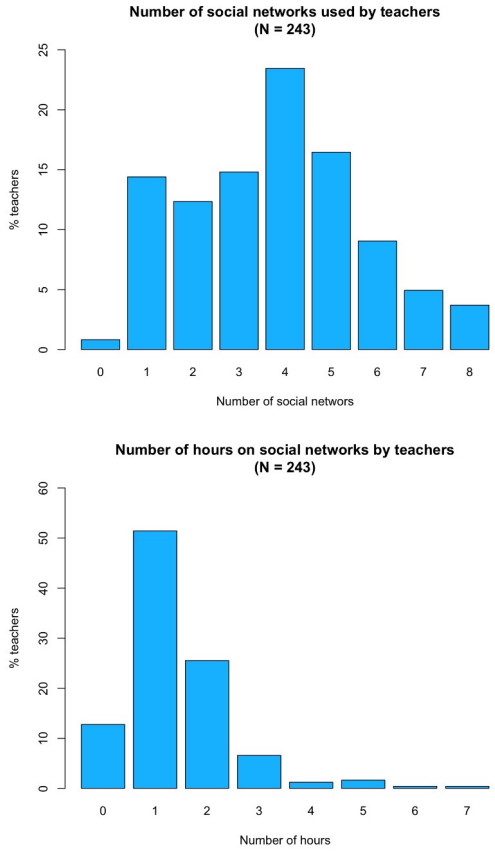


Figure 1 - Number and time spent on social media by teachers.

Table 2 - Social media use by teachers (N = 243).

Social Media	*Percentage*
WhatsApp	97%
Facebook	70%
Instagram	64%
YouTube	43%
Telegram	42%
Pinterest	34%
TikTok	14%
Twitter / X	14%

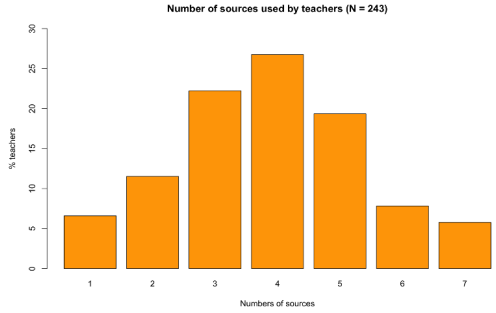


Figure 2 - Number of information sources by teachers.

Table 3 - Information source used by teachers (N = 243).

Information Sources	*Percentage*
TV	75%
Online Newspapers	63%
Social	59%
Family	57%
Radio	45%
Friends	44%
Web	43%

Trust Levels in Information Sources

Teachers exhibit a polarized trust dynamic, with high levels of trust in traditional media like TV and newspapers, while expressing skepticism towards digital platforms. Figure 3 indicates that the upper limit for the variables social_trust and web_app_trust is lower than for all other variables. The percentage of teachers expressing high trust levels (scoring 3, 4, or 5) was 77% for family, 72% for newspapers, 70% for friends, 65% for radio and 58% for TV compared to only 40% for web applications and 19% for social media.

This bias appears rooted in outdated hierarchies of trust rather than an evidence-based evaluation of reliability. Teachers' reluctance to engage critically with digital sources underscores their limited understanding of "post-mediality" (Eugeni, 2015; Moriggi, 2023), where traditional and digital media increasingly overlap and influence one another. This highlights the importance of fostering critical evaluation skills to address such biases.

Assessment of Digital Literacy Skills: challenges with Visual Sources

Teachers were assessed on their ability to evaluate seven key competencies identified in the DigComp 2.2 framework, including differentiating reliable from misleading sources, evaluating news content, and detecting manipulated images. Results in Figure 4 indicate moderate proficiency in identifying reliable websites and recognizing verified profiles on social media (e.g., blue checkmarks). With the minor exception of sponsored content, less than 25 percent of teachers scored 60 percent on the questions, i.e., sufficiency. Teachers struggled significantly with more "inferred context" tasks, such as distinguishing trustworthy content or manipulated photographs, "leveraging information available on the open web to infer where a piece of content came from, how old the content may be, what claims are being made about it and by whom, etc." (Hebbar et al., 2024).

Moderately better performance only occurs in the case of evaluating "assertive provenance" signals, such as recognising a social media profile from the blue checkmark. In opposition to "inferred context" activities, Hebbar et al. (2024) define assertive provenance as "techniques used at the creation or editing stage to provide a clear signal regarding the means of creation of a piece of content".

Visual literacy emerged as a critical area of weakness. Teachers had the most difficulty evaluating visual content, such as detecting manipulated images or identifying the original content of a photograph. This aligns with the text-centric nature of traditional schooling, which prioritizes textual analysis over visual and multimedia literacy (Rivoltella, 2020; Farné, 2021). The lack of an integrated aesthetic literacy framework, as discussed in Manovich's concept of post-medial aesthetics (2001), further emphasizes the need for systematic training that incorporates visual and multimedia evaluation skills.

Checking correlations (Figure 5), higher values were revealed among variables in the same groups. Correlations among variables belonging to different groups were generally low, between -0.24 and 0.31. They suggested weak connections among the number, time spent, and trust in social media, mistrust in family and friends, and higher scores on information literacy assessment. In particular, trust in newspapers corresponds to higher values in the assessment scores, contrary to trust in the family.

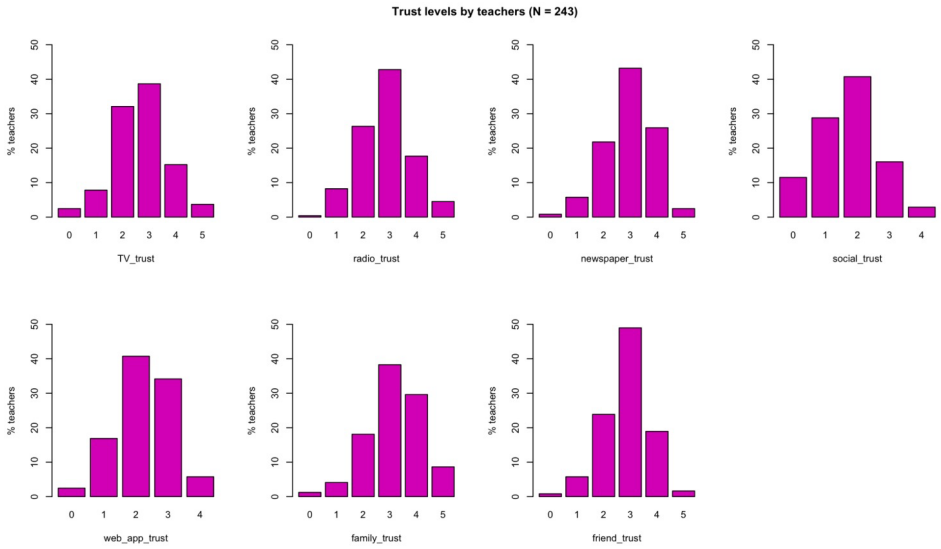


Figure 3 - Trust levels in sources by teachers.

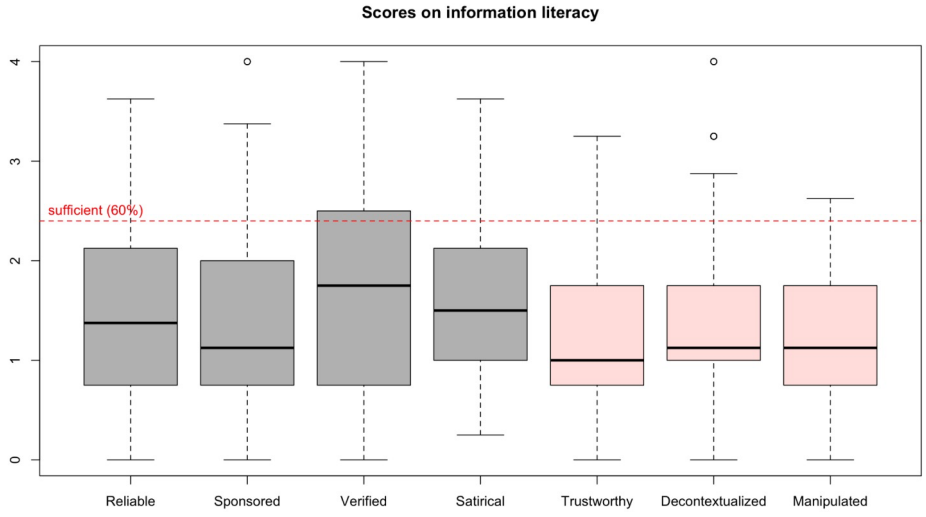


Figure 4 - Boxplots of the score on questions on information literacy.

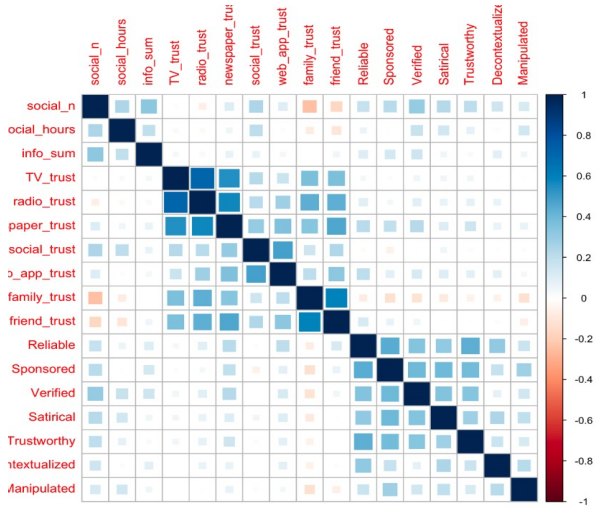


Figure 5 - Correlation matrix.

3.2 Behavioral patterns in teachers' skills and approaches to digital sources (Q2)

Our analysis revealed four clusters of different sizes as shown in the dendrogram in Figure 6.

The first cluster, the less numerous (N = 30, 12%), includes teachers who make fairly frequent use of social media and consult a good number of social and information-seeking tools. Compared to the others, they have the lowest levels of trust in information sources and perform poorly in the information literacy assessment questions. We define this cluster as *Skeptical and Vulnerable Teachers*.

The second cluster, on the contrary, is the most numerous (in fact, it gathers 40 percent of the teachers in the sample, N = 98). It is composed of teachers who, compared to the other clusters, use less social media and resources for a limited amount of time (usually one hour), have a strong reliance on familiar sources (particularly family, friends and radio), and have lower assessment results than the other clusters. We define this cluster *Traditional Trust-Based and Uncritical Teachers*.

Cluster 3 (N = 57, 24%) and Cluster 4 (N= 58, 24%) have similar sizes. Teachers in Cluster 3 have higher levels of use and trust than all other clusters except in the assessment, where instead, teachers in Cluster 4 have the best scores on the information literacy assessment while declaring moderate levels of use and trust in sources. We define cluster 3 *Digitally Engaged and Trusting Teachers* and cluster 4 *Balanced Critical Evaluators*.

Figure 7 shows the boxplots on variables used for clustering for each group.

The radar chart on the left in Figure 8 confirms the just-described different use of social media by teachers: high for cluster 3, moderate for cluster 1 and 4, low for cluster 2. Basically, the trends do not differ substantially from the order of preferences in the entire sample. Instead, the sources predominantly preferred by teachers vary in the four clusters (right side of Figure 8).

In cluster 1, the majority of teachers choose TV (73%), family (67%), and friends (63%), followed by web applications (60%), online newspapers (57%), and in last place radio (47%) and social media (47%).

In cluster 2, 82 percent chose TV. Family, online newspapers, social media, and radio have percentages between 40 and 52. Around a third of teachers in the cluster refer to web applications and friends to gain information.

As said, the number of sources in Cluster 3 is generally high. Among the most used are social media (91%), TV (86%), and online newspapers (79%), followed by family and friends, and finally web applications and radio, which, however, stand above 50 percent.

In the fourth cluster, 74 percent of teachers use online newspapers, followed by social media (59%) and TV (55%) which falls to third position. Friends are, after all, with 34% of preferences.

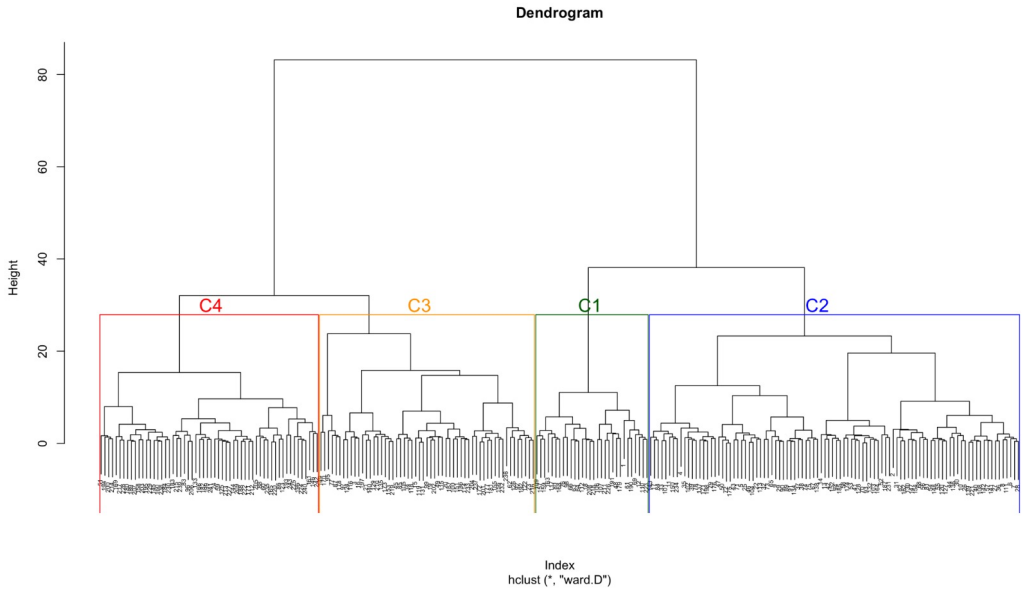


Figure 6 - Dendrogram.

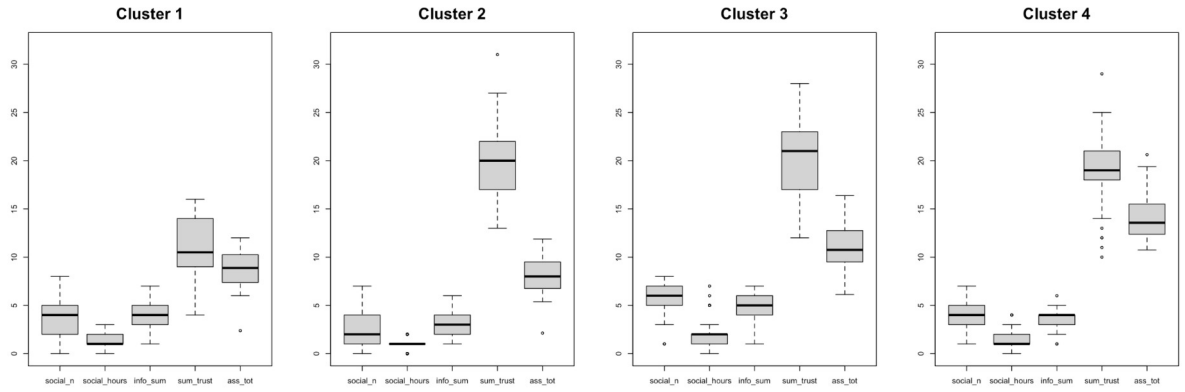


Figure 7 - Variables distribution in clusters (social_n, social_hours, info_sum, sum_trust, and assessment).

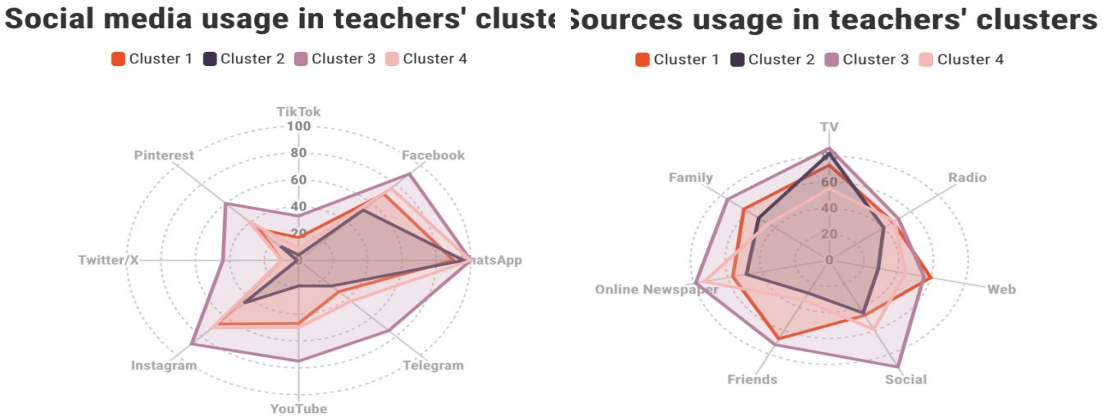


Figure 8 - Use of Social media (left) and Sources (right) in teachers' clusters (radar charts were made with Flourish).

4. Discussion

This study provides critical insights into teachers' competencies in evaluating digital content and their readiness to implement media literacy interventions, contributing to the growing body of research on educational responses to disinformation (Dame Adjin-Tettey et al., 2022; Bak-Coleman et al., 2021; Nygren et al., 2024). Our analysis reveals several key patterns that have important implications for teacher training and educational policy within the European context.

An initial result of this contribution – obtained through descriptive statistics – has allowed us to measure the level of digital competence of primary and secondary school teachers. Despite frequently being invited by educational institutions to address the topic of disinformation in the classroom, only 1 in 4 teachers (25%) manage to achieve a sufficient level of media and information literacy competencies. 3 out of 4 teachers (75%) register moderately low or insufficient competencies, which certainly makes them unprepared to deal with the issues of verifying digital sources and addressing disinformation in the classroom.

These insights underline the need to promote training campaigns that can reach as many teachers as possible to improve their media and information literacy skills and equip them with the content and methodologies to be able to carry out classroom activities independently with their students.

Secondly, in order to better understand the digital behavior and attitudes of the teachers in our sample, we carried out a cluster analysis that allowed us to distinguish four distinct teachers' profiles, each representing different combinations of digital engagement, trust patterns, and media literacy competencies:

1. *Skeptical and Vulnerable Teachers* (12% of sample): these teachers show moderate social media usage (3-4 platforms) and consume multiple information sources, particularly TV (73%) and interpersonal networks (family 67%, friends 63%). Despite their skepticism toward information sources, they paradoxically demonstrate poor performance in information literacy assessments, particularly struggling with visual content verification. This combination suggests that their skepticism may arise from uncertainty rather than critical evaluation skills.

2. *Traditional Trust-Based and Uncritical Teachers* (40% of sample): the largest cluster comprises teachers with limited digital engagement (1-2 platforms, typically one hour daily) but high trust in traditional sources, especially TV (82%) and mainstream media. Their below-average performance in media literacy assessments, particularly in identifying sponsored content and manipulated images, coupled with strong reliance on family networks, suggests a traditional approach to information consumption that may leave them exposed to digital misinformation.

3. *Digitally Engaged and Trusting Teachers* (24% of sample): these teachers demonstrate the highest digital platform engagement (5-6 platforms) and diverse information source usage (social media 91%, TV 86%, online newspapers 79%). While they show high trust levels across sources, their media literacy assessment scores remain moderate, indicating a gap between digital participation and critical evaluation skills. Their broad and trusting engagement suggests a need for focused training in analytical skills.

4. *Balanced Critical Evaluators* (24% of sample): this group shows the most promising profile, combining moderate digital engagement with measured trust levels and the highest scores in information literacy assessments. They prioritize online newspapers (74%) over traditional TV (55%) and show particular strength in identifying manipulated content and evaluating source reliability. Their balanced approach to digital media consumption aligns with stronger critical evaluation skills.

These profiles emphasize the heterogeneity of teachers' digital competencies and the necessity for diversified professional development approaches. Varying configurations of digital interaction, trust dynamics, and media literacy skills require the design of educational interventions other than one-size-fits-all, as is often done at the institutional level. An initial assessment of teachers' skills, knowledge, and attitudes would make it possible to tailor the needs of different groups of teachers.

Third, when we look more closely at the profiles of the different types of teachers, it's clear that most of them have a strong preference for traditional media information sources (especially clusters 1 and 2). This attitude manifests in high confidence in mainstream sources like television and newspapers, while maintaining persistent skepticism toward digital platforms. The reliance on family and friends as information sources, observed mostly in clusters 1 and 2, reflects what McLuhan (1970) conceptualized as "tribal media" behavior. This behavior points to a larger issue with finding your way around complicated digital spaces, which makes teachers turn to comfortable social networks to check information. Such behavior may limit educators' ability to model effective digital literacy practices for their students, who increasingly engage with diverse online information ecosystems (Common Sense Media, 2022).

Moreover, another piece of evidence concerns teachers' struggle across all clusters with "inferred context" evaluation tasks, especially regarding visual content. The participants showed moderate ability at finding "assertive provenance", like verified social media profiles, but they had a lot of trouble using argumentation and "inferred context" to assess untrusted websites or visual content that had been taken out of its original context. This failure is confirmed in the broader research conducted by McGowan-Kirsch et al. (2023) on the importance of image-based misinformation literacy.

Many media literacy interventions focus on an approach that is sometimes excessively prescriptive and solution-based, paying attention only to the more technical and operational aspects of content evaluation. The results of this study, on the other hand, underline – confirming Manovich's (2021) intuition – the need for a post-media aesthetic education, that is to say, training courses that enable teachers (and consequently students) to read and write the 'new alphabets' of the contemporary world (Rivoltella, 2020; Gee, 2007).

While comprehensive research on students' susceptibility to misinformation is well established, empirical studies specifically investigating teachers' competencies in evaluating digital sources and resisting disinformation remain relatively limited. Findings from the Czech Republic and Slovakia (Kopecký et al., 2023) confirm the presence of critical gaps among educators, with a significant proportion of teachers either misidentifying disinformation or recommending unreliable sources. These results align with our study's identification of widespread difficulties in "inferred context" tasks and visual verification. More broadly, international assessments such as ICILS (IEA, 2018) and TALIS (OECD, 2018) highlight persistent training needs among teachers in ICT and digital content evaluation, corroborating our observation that technical familiarity does not equate to critical digital literacy. The cluster profiles we identified further echo qualitative findings from pan-European studies (TeaMLit, 2023), which emphasize the heterogeneity of teachers' digital confidence and resilience to misinformation, reinforcing the need for differentiated and targeted professional development programs.

The results of this study should be considered within certain limitations. The study's focus on Italian teachers may limit its generalizability to other educational contexts, though the alignment with broader European trends suggests similar patterns may exist across the region. Additionally, the pre-test nature of our data provides a snapshot of initial competencies but does not capture the potential impact of subsequent training interventions. Future research could benefit from longitudinal studies examining how teachers' digital literacy competencies evolve through

professional development programs and their impact on classroom practices, particularly in light of the rapidly evolving nature of digital disinformation.

5. Conclusions

This study provides insights into the current state of teachers' digital literacy competencies and their readiness to address disinformation in educational contexts. Our findings reveal a complex landscape where technical familiarity with digital platforms does not necessarily translate into critical evaluation skills. The identification of four distinct teacher profiles highlights the need for nuanced, targeted approaches to professional development in media literacy education.

The persistent gap between surface-level evaluation skills and deeper analytical capabilities, particularly in visual content assessment, suggests that current approaches to teacher training may need significant revision. Our results indicate that while teachers can often identify basic reliability indicators (based on "assertive provenance" signals), many struggle with the "inferred context" techniques needed to evaluate complex digital content effectively. This challenge is particularly acute in the evaluation of visual materials, where less than 25% of teachers achieved sufficient proficiency scores.

These findings have immediate implications for educational policy and teacher training programs. They highlight the urgent need for enhanced training in information and visual literacy, particularly given the increasing prevalence of image-based misinformation in digital environments.

Authors contributions

According to CRediT system: *Nicola Bruno*: Conceptualization, Methodology, Investigation, Project Administration, Supervision, Writing - Original Draft, Writing - Review & Editing; *Annamaria De Santis*: Methodology, Formal analysis, Data Curation, Visualization; *Stefano Moriggi*: Conceptualization, Methodology, Investigation, Writing - Review & Editing.

Acknowledgements

We would like to thank the Open the Box team and in particular Eleonora Rossi for supporting the data management and coding activities.

References

Bak-Coleman, J.B., Kennedy, I., Wack, M. et al. (2022). Combining interventions to reduce the spread of viral misinformation. Nature Human Behaviour, 5(5), 706-715.

Bartholomew, D.J., Steele, F., Moustaki, I., & Galbraith, J.I. (2008). Analysis of multivariate social science data (2nd ed.). Boca Raton (FL): CRC press, Taylor & Francis Group.

Bateman, J., & Jackson, D. (2024). Countering disinformation effectively: An evidence-based policy guide. Carnegie Endowment for International Peace. Available here: https://carnegieendowment.org/2024/01/31/countering-disinformation-effectively-evidence-based-policy-guide-pub-91476.

Bennett, W. L., Livingston, S., & Segerberg, A. (2018). The disinformation order: Disruptive communication and the decline of democratic institutions. European Journal of Communication, 33(2), 122-139.

Breakstone, J., Smith, M., Wineburg, S., Rapaport, A., Carle, J., Garland, M., & Saavedra, A. (2021). Students' Civic Online Reasoning: A National Portrait. Educational Researcher, 50(8), 505-515.

Bruno, N., Bellini, C. (2023). La disinformazione nell'era digitale: le iniziative dell'Unione Europea per la formazione dei docenti. New literacies – nuovi linguaggi e nuove competenze - Atti del Convegno SIREM 2023. Scholé (in the process of being published).

Common Sense Media. (2022). The Common Sense Census: Media use by tweens and teens. Common Sense Media. Available here: https://www.commonsensemedia.org/research.

Dame Adjin-Tettey, T. (2022). Combating fake news, disinformation, and misinformation: Experimental evidence for media literacy education. Cogent arts & humanities, 9(1), 2037229.

Dongxue, T., & Nagappan, R. (2024). Pedagogical Strategies in Media Literacy Education and their Alignment with Student-Centered Learning. International Journal of Academic Research in Business and Social Sciences. http://dx.doi.org/10.6007/IJARBSS/v14-i9/22806

Erdem, Cahit & Eristi, Bahadır. (2018). Paving the Way for Media Literacy Instruction in Preservice Teacher Education: Prospective Teachers' Levels of Media Literacy Skills. International Journal of Instruction. 11. 795-810.

Eugeni, R. (2015). La condizione postmediale. ELS La Scuola.

European Commission. (2022a). DigComp 2.2: The Digital Competence Framework for Citizens.

European Commission. (2022b). Final report of the Commission expert group on tackling disinformation and promoting digital literacy through education and training. Available here: https://data.europa.eu/doi/10.2766/283100.

European Commission. (2022c). Guidelines for teachers and educators on tackling disinformation and promoting digital literacy through education and training. Available here: https://op.europa.eu/en/publication-detail/-/publication/a224c235-4843-11ed-92ed-01aa75ed71a1/language-en.

Farné, R. (2021). Pedagogia visuale. Un'introduzione. Raffaello Cortina.

Gee, J. P. (2007). What Video Games Have to Teach Us about Learning and Literacy. St. Martin's Press, LLC.

Greenhow, C., & Lewin, C. (2016). Social media and education: Reconceptualizing the boundaries of formal and informal learning. Learning, Media and Technology, 41(1), 6-30.

Gross, E.-C., & Balaban, D. C. (2024). The Effectiveness of an Educational Intervention on Countering Disinformation Moderated by Intellectual Humility. Media and Communication, 13.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., & Tatham, R.L. (2014). Multivariate data analysis (7th ed.). Edinburgh Gate, Harlow, Essex (GB): Pearson.

Hebbar, N., Wolf, C. (2024). Determining trustworthiness through provenance and context. Google Policy Paper. Available here: https://static.googleusercontent.com/media/publicpolicy.google/it//resources/determining_trustworthiness_en.pdf.

Huang, G., Jia, W., & Yu, W. (2024). Media Literacy Interventions Improve Resilience to Misinformation: A Meta-Analytic Investigation of Overall Effect and Moderating Factors. Communication Research, 0(0).

ICILS (2018). International Computer and Information Literacy Study 2018. Iea website. Available here: https://www.iea.nl/studies/iea/icils/2018

IDMO (2023). Digital Media Literacy Gaps and Needs. Available here: https://www.idmo.it/wp-content/uploads/2023/12/IDMO-Digital-Media-Literacy-Gaps-and-Needs_EN_final_compressed.pdf.

Ipsos Mori (2021). Online media literacy: Across the world, demand for training is going unmet. Ipsos website. Available here: https://www.ipsos.com/en-uk/online-media-literacy-across-world-demand-training-going-unmet.

Jones-Jang, S. M., Mortensen, T., & Liu, J. (2021). Does media literacy help identification of fake news? Information literacy helps, but other literacies don't. American Behavioral Scientist, 65(2), 371-388.

Kopecký, K., Voráč, D., Szotkowski, R., Krejčí, V., Mackenzie, K., & Ramos-Navas-Parejo, M. (2023). Teachers in a world of information: Detecting false information. Profesional de la Informacion, 32(5).

Kozyreva, A., Lorenz-Spreen, P., Herzog, S. M., Ecker, U. K., Lewandowsky, S., Hertwig, R., ... & Wineburg, S. (2024). Toolbox of individual-level interventions against online misinformation. Nature Human Behaviour, 1-9.

Livingstone, S. (2012). Media literacy and the challenge of new information and communication technologies. Communication and Society, 14(3), 1-17.

Manovich, L. (2001). Post-media Aesthetics. Available here: https://manovich.net/index.php/projects/post-media-aesthetics.

Martini, C. et al (2024). Disinformazione a scuola. Report 2024. Available here: https://www.unisr.it/attachments/Disinformazione-a-scuola---Report-/1ad3ac0a-e713-4d6c-a8f6-45dd3b421e86/6467a213-0ae0-4dea-8e5f-762e00738f22.pdf.

McGowan-Kirsch, A. M., Palacios, A., & Rissman, M. (2023). Educating emerging citizens: Media literacy as a tool for combating the spread of image-based misinformation. Communication Teacher, 37(1), 27-38.

McLuhan, M. (1970). Education in the electronic age. Interchange 1, 1–12 (1970). https://doi.org/10.1007/BF02214876

McNelly, T. A., & Harvey, J. (2021). Media literacy instruction in today's classrooms: A study of teachers' knowledge, confidence, and integration. Journal of Media Literacy Education, 13(1), 108-130.

Moriggi, S. (2023) (a cura di). Postmedialità. Società ed Educazione. Raffaello Cortina.

Nygren, T., & Ecker, U. K. (2024). Education as a countermeasure against disinformation. Available here: https://www.psychologicaldefence.lu.se/sites/psychologicaldefence.lu.se/files/2024-11/Education%20as%20a%20countermeasure%20against%20disinformation_Eng.pdf.

OECD (2018). Teaching in Focus #28. How teachers update their teaching skills to cope with the rapidly

changing world, OECD website. Available here: https://www.oecd.org/content/dam/oecd/en/publications/reports/2019/09/how-teachers-update-their-teaching-skills-to-cope-with-the-rapidly-changing-world_77422986/282b9edd-en.pd

Pérez-Escolar, M., Lilleker, D., & Tapia-Frade, A. (2023). A systematic literature review of the phenomenon of disinformation and misinformation. Media and communication, 11(2), 76-87.

Ranieri, M., Bruni, I., & Orban de Xivry, A. C. (2017). Teachers' professional development on digital and media literacy. Research on Education and Media, 9(2), 10-19.

Ranieri, M. (2021). Cittadinanza digitale e sviluppo professionale. Quali dimensioni concettuali, quali approcci formativi?. Essere a scuola 6, 12-16

Rivoltella, P. C. (2020). Nuovi alfabeti. Educazione e culture nella società post-mediale. Scholé.

Roozenbeek, J., Culloty, E., & Suiter, J. (2023). Countering misinformation. European Psychologist, Vol 28(3).

Springer, S., & Özdemir, V. (2022). Disinformation as COVID-19's twin pandemic: False equivalences, entrenched epistemologies, and causes-of-causes. OMICS: A Journal of Integrative Biology, 26(2), 82-87.

Svimez (2024). Rapporto Svimez 2024. L'Economia e la Società del Mezzogiorno. Svimez website. Available here https://www.svimez.it/rapporto-svimez-2024/.

TeaMLit Project. (2023). Media Literacy in Teacher Education: Comparative Report. Available here: https://teamlit.eu/publications/

Tsankova, S., Angova, S., Nikolova, M., Valchanov, I., Valkov, I., & Minev, G. (2023). The Media Literacy and the Teachers. Pedagogika-Pedagogy.

UNESCO (2018). Journalism, fake news & disinformation: Handbook for journalism education and training. Available here: https://unesdoc.unesco.org/ark:/48223/pf0000265552.

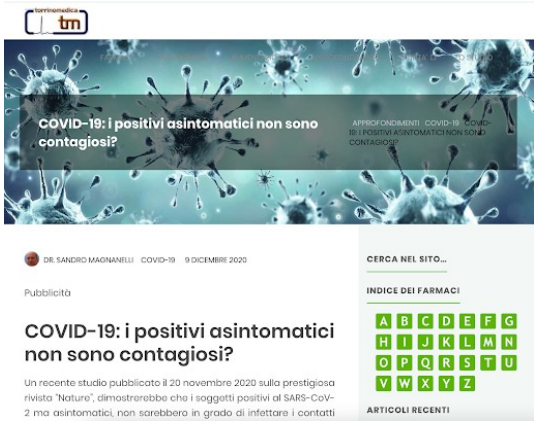
Zaçellari, M., & Reçi, L. (2024). Empowering Future Teachers with Media and Literacy Skills. Interdisciplinary Journal of Research and Development.

Annex

01 Reliable Sources

Immagina di essere alla ricerca di informazioni sul Covid-19. Ti imbatti in queste due fonti:
Il Primato Nazionale: https://archive.vn/MSa6f
Torrino Medica: https://archive.vn/uQcP6

Quale consideri più affidabile?
Per quale motivo?



02 Sponsored contents

Dopo aver letto questo articolo su La Repubblica, come valuti i contenuti?

- ☐ Attendibile
- ☐ Non attendibile
- ☐ Non so

Per quale motivo?

03 Verified profiles

Quale di questi due profili è più attendibile?

- ☐ Checco Zalone
- ☐ Alessandro Cattelan

Per quale motivo?

04 Satirical content

Come valuti questa notizia del Comune di Bugliano?

- ☐ Attendibile
- ☐ Non attendibile

Per quale motivo?

05 Clickbaiting news

Quale titolo di queste due notizie ti sembra poco attendibile?

- ☐ TPI https://perma.cc/CM6X-LVME
- ☐ Viral Magazine https://perma.cc/59BM-G3VA

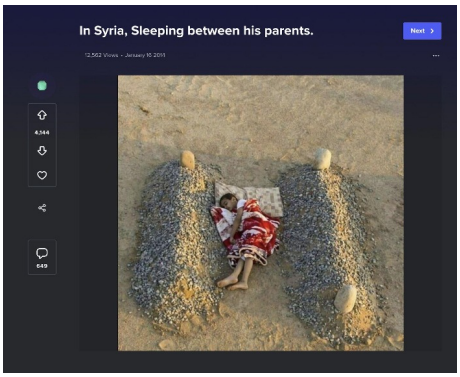
Per quale motivo?

06 Decontextualized images

Mentre navighi online, ti imbatti in questa foto con il titolo "In Siria, dormendo tra i propri genitori". Come la consideri?

- ☐ Attendibile
- ☐ Non attendibile

Per quale motivo?



07 Manipulated photos

Come valuti questa foto condivisa su Twitter?

- ☐ Attendibile
- ☐ Non attendibile

Per quale motivo?