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Popularizing Science Literacy Among the Internet Users: An Empirical Study on Comprehension and Reception of Science Explainer Videos on Social Media

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Abstract

Social media platforms, like YouTube, have become essential resources for informal science education in today's digital learning environment. Earlier limited to textbooks and classroom instruction, science has now expanded to include short science explainer videos that simplify difficult concepts into interesting, approachable learning opportunities. This aids overall understanding of science and improves science literacy. This study examines how short science explainer videos work as educational tools that simplify complex concepts and engage diverse learners through storytelling, visuals, and influencer-led presentation. 202 college and university students in West Bengal, India, participated in pre- and post-surveys using a mixed-method design, viewed two-minute videos about astronomy, physics, chemistry, and geology. Many were motivated by curiosity and educational needs, according to the findings, and results showed strong comprehension and positive reception across genders and educational backgrounds. Influencers' narrative style, credibility, and visuals were seen as important in improving understanding and trust. The study highlights influencer-led science communication as an emerging form of media education that enhances learners' engagement, increases conceptual understanding, and contributes to the development of digital science communication. To expand the educational reach of science and media communication, the study recommends incorporating multilingual subtitles and research-based evidence for greater clarity and credibility.

Keywords: science literacy, science communication, social media, media education, explainer videos, influencers, audience comprehension, media richness theory, YouTube.

1. Introduction

Science communication has changed significantly with time. Earlier, it was limited to just academic journals and textbooks, and thus its reach was less among the broader audience. In case of media also, science stories and developments were covered less in newspapers and television channels which limited people's exposure to science and its understanding. Today, with digital tools like social media, podcasts and visual content, science has opened up to everyone, with allowing ideas to spread quickly and inviting people everywhere to join the conversation. Platforms such as YouTube, Instagram and Facebook feature short science videos that turn difficult concepts into easy-to-follow lessons, reaching wider audiences and encouraging public interactions.

Communicating science stories through visuals has become a key way to help people understand the complex concepts. In the ancient times, when the written languages were yet to be discovered, people used to communicate through various visuals. Today also, we can know and understand about past cultures through "prehistoric cave paintings" that "serves as a message for future generations" and they are still relevant (Landis, Duscher, 2022). They further state that

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“visual storytelling is a powerful way to establish step-by-step presentations, especially in the communication of scientific topics.” Methods like animations, graphics, data charts turn the information into interesting stories, helping people both grasp ideas and feel connected to them. This approach supports the goal of science literacy, that is, showing that science matters and making it easier and creating its importance in our lives.

Through various studies, it's proven recently that explanation of complex biological topics is done in a better way in the interactive media, instead of traditional media (Fedorov, Levitskaya, 2015; Horn et al., 2016; Tinák, Gálik, 2026). Social media has emerged as a dominant place for science communication, enabling creators to reach millions of viewers worldwide with crisp and informative content. If we take only one platform, that is, YouTube, we can say that it “alone has varied set of educational videos, of which a rapidly growing segment consists of science explainer content” and the contents are prepared in a way to “make complex topics accessible to everyone” (Bello-Bravo et al., 2021).

Although explainer videos are everywhere, there's still little research on how they affect viewer's understanding – especially while comparing people with different educational backgrounds, different genders and different age groups, all these through a pre-post testing method. Past studies show that people with formal science training tend to focus people's attention in a better way (Kulgemeyer et al., 2022). But most of this research looks at just one type of audience or one type of video, so not much is known about how diverse groups respond to different video contents.

Complexity or difficulty is how the science content is perceived by the viewers and a layer of difficulty is also being added by social media itself. Various videos on social media platforms might be popular but it's not necessary that it is accurate as well; and this “creates an issue of how trustworthy people think the science content is” (Welbourne, Grant, 2015). Here comes the role of the influencers, who have become a huge and unstoppable force on social media, “with brands and companies increasingly collaborating with these sources to leverage their relationships with their followers” (Jin et al., 2019; Nouri, 2018). The online media landscape has created access to the viewers to participate in science communication content, by creating the content or commenting, sharing or viewing “the content related to science” (Brossard 2013). Thus, the social media influencers creating the contents related to science and sharing those to their followers have a significant role in communicating scientific concepts and can be called as Science Influencers – ‘Scifluencers’. These scifluencers can range from trained scientists to enthusiastic educators, who can influence the views and preferences of the audiences related to scientific topics. Future research is needed to understand the learning outcomes related to science influencer content among different educational groups, age groups and genders.

Science literacy involves development of ability to comprehend scientific concepts. It is extremely important in present era as it may help understand a particular natural phenomenon in depth and aid people in making conclusions based on empirical evidence. With entry of science explainer videos, science has become easier and interesting for the Internet users which in turn is increasing their science literacy.

2. Materials and methods

The research questions are:

RQ1. How does different science explainer video affect the comprehension and reception among the diversified group of viewers?

RQ2. How effectively do science explainer videos communicate complex scientific concepts to a general audience?

RQ3. What role do visuals, narration and storytelling play in enhancing comprehension?

The objectives of the study are as follows:

- To compare pre-post learning outcomes between the science/non-science groups, age groups and male/ female groups.

- To assess how science explainer videos on social media influence users' understanding, trust and engagement with scientific content.

- Find out if the science influencers increase the efficiency and credibility of the videos.

This study uses the Qualitative and Quantitative approach where attempt is made to understand both descriptive and exploratory aspect of the research problem. This has been achieved through Pre-test and Post-test survey that was administered on the participants.

For conducting the pre-post survey, a Pre-test questionnaire was circulated among the respondents to assess their understanding and interest in science. Then the video links related to scientific concepts from YouTube were circulated and after watching those videos, a Post-test questionnaire was circulated for them to fill it up. The questions comprised of multiple-choice questions, 3-point Likert scale (Agree/Neutral/Disagree) statements and open-ended questions. The post-test questions were divided into sections such as 'Concepts depicted in the Video', 'Content of the video', 'Communicator/Influencer Effectiveness', 'Impact & Engagement' and 'Suggestions'.

Data collection has been done through pre-post survey which means conducting a survey before and after the intervention (i.e. watching the videos).

According to Roscoe's rule of thumb, sample size >30 and <500 is sufficient for most research and comparison groups should have at least 30 participants each (Praharaj, Ameen, 2024). For this study, a pre-post survey was conducted on the students of various colleges and universities of West Bengal who have a smartphone and use social media, through Purposive sampling. Only the participants who filled both pre and post questions have been taken as a valid sample for the study. The total number of valid samples for this study is 202.

Videos were chosen from various branches of science such as-astronomy video of influencer Cleo Abram (channel name: Cleo Abram, 60.6 Lakh subscribers), physics video of influencer Gaurav Thakur (channel name: GetsetflySCIENCE, 93.3 Lakh subscribers), chemistry video of influencer Ashu Ghai (channel name: Science & Fun, 84.5 Lakh subscribers) and geology video of Joe Hanson (channel name: Be Smart, 54.3 Lakh subscribers). These videos were shown to all the participants after pre-test and before post-test.

The following are the inclusion criteria for the videos:

- The science explainer videos chosen to conduct the study were from the different fields of science like astronomy, physics, chemistry and geology.
- The language of the videos chosen for the study were in English, an international language and Hindi, an Indian language (decision based on availability of content).
- The length of the videos was short and not longer than 2 minutes, as it is preferable to use shorter videos (less than or equal to 6 minutes) that can increase engagement and contribute to the retention of learning by the learners (Afify, 2020).

These are excluded while choosing the videos:

- Except for the four mentioned branches of science, no other field of science has been chosen for the study.
- Except two languages, no other languages have been chosen for the study.
- Longer videos of more than two minutes have been excluded from this study.

The data from various respondents was fed into MS Excel sheet and later utilized for further analysis in SPSS. Descriptive statistics was used to analyze the data on the basis of various demographic variables such as age, gender, and educational background. Later frequency tables were created and interpreted on the basis of the objectives of the study.

All participants were provided with detailed information about the study and then the survey was conducted. They were informed that the data will be used for academic purpose only. The participants' data are kept confidential and anonymous.

The study is grounded in communication and media education theories that explain how audiences learn and engage through mediated environments.

- Uses and Gratification theory has been used to frame a few questions of the study. The theory helps in understanding the various gratifications people get when consuming a certain media content. This theory suggests that individuals actively choose media to satisfy social and psychological needs. Blumler and Katz discussed five key categories of needs: cognitive, affective, personal integrative, social integrative and tension release. In the context of science explainer videos on social media, this theory denotes that viewers engage with the content to fulfill their psychological needs by understanding difficult concepts, affective needs through engaging visuals, personal integrative needs by becoming curious about the scientific facts and becoming interested in them and finally social integrative needs through discussing about it and passing their free time through casual learning.

- Models of Persuasion specifically Aristotle's rhetorical appeals (ethos, pathos, logos) provide a framework for understanding persuasion in communication. This can be utilized to understand how science explainer videos are able to convince and influence people. Ethos denotes the credibility of personality of the communicator. In science explainer videos, ethos can be found

out through expertise and authentic presentation of the facts. Pathos appeals to the audience's emotions. In explainer videos, pathos can be seen through narration and effective storytelling. Logos states logical and evidence-based reasoning. In case of science explainer videos, use of clear explanation and understanding of the scientific concepts can be related with this.

– Media Richness Theory is another framework that helps in understanding the multimodality of media content and how it leads to deeper understanding and retention of the embedded information. This theory states that communication in media uses various formats to convey information richly. It is being done through personalization, multiple cues, immediate feedback and variety of languages. Use of videos with animation, graphics, storytelling & narration and other interactive elements reduces ambiguity and increases understanding while plain texts can struggle with complex topics. Here, in science explainer videos, high media richness including storytelling elements, dynamic visuals, clear narration, pacing cues and also, on-screen texts help the viewers resolve uncertainty and makes it easier to grasp abstract concepts more effectively. When viewers face complex scientific concepts then the richer and interactive video formats make the science content more accessible and engaging.

3. Discussion

Today science communication focuses hugely on improving public science literacy and maintaining audience engagement with scientific knowledge. Science literacy is a multi-dimensional concept that includes digital skills, civic understanding and media-oriented competencies (Mede et al., 2025; Tinák, Gálik, 2026). Young adults rely more on social media platforms for scientific information instead of traditional media (Koechlin et al., 2025). With the digital platforms, people now encounter science largely through informal ways rather than formal education systems.

Media literacy and education are essential for understanding today's scientific environment. Media literacy is understanding how media messages are crafted to affect beliefs and behaviours (Austin et al., 2024) and this can be integrated with science communication goals as well. Researchers found that people with higher media literacy about science showed better knowledge gains and more readily adopted preventive behaviours in health situations like Covid-19 (Austin et al., 2021). This means that teaching people to critically evaluate scientific content, i.e. science media literacy, can enable them to apply scientific information properly. Now a days, media literacy training through workshops, are organised by various educators, to “strengthen science media literacy skills to counter misinformation and communicate emerging science” (Austin et al., 2024). All in all, combining media literacy with science literacy helps people to identify reliable sources, promote informed decision-making and prevents the spread of misleading scientific facts (Austin et al., 2021; Austin et al., 2024).

Social media has become a great part of our lives. With the advent of Facebook, Twitter, YouTube and many other social networking sites, the users can share and interact with online content and also connect with like-minded people. The ability of these platforms to rapid distribution and widely spreading the reach of the content makes it a highly powerful tool to use in a professional context (Osterrieder, 2013). Social media spreads scientific content to a wider audience than traditional methods, it reaches people of varied backgrounds (Parwani et al, 2019; Cabrera et al, 2018). As social media and other digital platforms are increasingly becoming important for science communication (Liang et al., 2014), one important question is that – who can communicate about scientific topics, and from this question, the influencers come into existence. Zhang and Lu (Zhang, Lu, 2023) stated that scientists are also influencers, they further explain that in science communication, authenticity means audience's perceptions of various attributes such as interpersonal warmth, integrity, dependability, competence, trustworthiness, credibility, benevolence, and inclusiveness. Expression of real 'self' or self-identity on social media is also linked to authenticity (Maares et al., 2021).

Visual storytelling and explainer videos on digital platforms are now central tools in science outreach. Stories are useful for persuasion as it can influence emotions, help audiences to imagine different situations and create relatable role models. In doing so, it can lead to changes in behaviour by encouraging people to believe in their ability to make a difference, especially when it comes to adopting environmentally friendly behaviours (Smith et al., 2023). The main aim in visual storytelling is to clearly communicate information to a target audience (Botsis et.al, 2020). They further state that visual storytelling combines many forms of media like photos, illustrations, video,

animation, 3D models and other graphics, with text and sound to create strong and compelling stories to the selected audiences. According to Marx and Konig (Marx, Konig, 2025), the explainer videos are using techniques like “2D and 3D animations to live-action talking head” formats, to understand the information in a visual form with the combination of verbal narration, which increases the comprehension and trust of the viewers. Explainer videos of 5 to 10 minutes explaining a topic in simple way, are everywhere on platforms like YouTube (Kulgemeyer, Wittwer, 2023). Research shows that these videos make the content more interesting and accessible, in one of the studies, the students rated science content as less difficult and more engaging after watching one explainer video (Krebs et al., 2024).

4. Results

This research used qualitative and quantitative approach to study how viewers understand and respond to science explainer videos. Information was gathered through pre-post surveys among 202 carefully chosen college and university students of West Bengal, India. These students watched selected science videos. Descriptive statistical tools in SPSS were used to examine group comparisons and frequency. Open-ended responses were thoroughly reviewed to identify common patterns in improvement suggestions and their preferred science influencers.

Among the 202 participants/respondents, the following is the demographic constitution:

Table 1. Demographic data of the participants

Variables	Categories of each variable		
	Female	Male	Other
Gender	57 % (116)	42 % (85)	1 % (1)
Age	18-20 56.93 % (115)	21-23 35.64 % (72)	24-26 7.42 % (15)
Educational Stream	Science 42 % (84)	Non-Science 58 % (118)	

From Table 1, it can be seen that the male participants are 42 %, female participants are 57 % and other gender participant is 1 %. As already stated, that only the students have been chosen as sample for this paper, the age group of 202 respondents comprises between 18 years to 26 years. Here, 56.93 % of the respondents are 18-20 years, 35.64 % are 21-23 years, 7.42 % are 24-26 years. Among 202 participants, two groups were found, i.e., Science group (comprising basic science subjects, engineering, nursing students, etc.) and Non-Science group (comprising Arts, Commerce, etc.). 58 % of the participants were from non-science streams and 42 % of the participants were from science stream.

Stage I: Pre-Test Findings & Analysis

Few questions were asked before viewing the videos to understand the respondents' viewership, reasons of watching the videos and their preferred science influencers. Following is the interpretation of the data collected from pre-test survey:

Table 2. Viewership of Science Explainer videos on social media among the respondents

Response	Frequency	Percent
Yes	181	90
Maybe	21	10
Total	202	100

90 % of the respondents responded 'yes' and 10 % of them responded 'may be' to a question, if the participants have watched Science explainer videos on social media, as shown in Table 2. This is to be noted that the results are analyzed among the 202 respondents and as visible majority responded positive to watching science videos.

Next the participants were asked about their reasons to watch science explainer videos on social media.

Table 3. Reasons for watching science explainer videos on social media

Responses	Frequency
Curiosity about science	51.49 % (104)
Educational needs	35.15 % (71)
Stay informed about scientific developments	34.16 % (69)
Entertainment	19.31 % (39)
Unintentional. It's merely a part of the feed.	10.40 % (21)

Table 3 depicts that the students chose multiple options that suited their reasons. The option 'Curiosity about science' was chosen by 51.49 % of the students, following 'educational needs' – 35.15 %, then students who watch these videos 'to stay informed about scientific developments' were around 34.16 %. Also, 'entertainment' and 'It's unintentional and it's merely part of the feed' were chosen by 19.31 % and 10.40 % respectively. Following the responses, it can be said that majority of the participants are eager to know about the scientific facts and for this reason they intentionally watch these videos primarily to fulfill their curiosity and educational needs which confirms the cognitive needs of the Uses and Gratifications theory.

The last question in the pre-test stage was asked to know about the names or the channels of the science influencers and communicators that the respondents watch and prefer on social media. To which they replied a variety of names – ISRO, NASA, Physics Girl (Diana Cowern), Science Max, Vsauce (Michael Stevens), Sick Science, Antariksh TV, Neil DeGrasse Tyson, Tech Burner, Kurzgesagt – In a Nutshell, Brian Greene, Mark Rober, Bill Nye, Marques Brownlee, Hank Green, V101 space (Rob), Science with fun, Fact Techz, minute physics, Everyday Astronaut (Tim Dodd), Rajib Makhni, Science is Dope, The AstroScriber, Nile Red, Veritasium, Trakin Tech (Arun Prabhu Desai). It might be noted here that the videos of the scifluencers chosen for the test were also among the preferred choices of the respondents, as they also responded that they watch the videos of Gaurav Thakur, Joe Hanson, Cleo Abram and Ashu Ghai.

Stage II: Post-Test Findings & Analysis

The questions asked in this stage was based on the videos that were shown to the respondents. This analysis discusses about the respondents' understanding, comprehension and reception of the science explainer videos. This part has been divided into five sections. In the first section, 'Concepts depicted in the Video' – four questions were asked. The questions were based on the concepts explained in the videos.

a) Concepts Depicted in the Videos:

For this study, the researcher wanted to find out the relation between gender groups, age groups and educational stream groups and its relation to the understanding and reception of the participants. As already mentioned, that 202 respondents were shown four videos and, in this section, the questions were asked based on the scientific concept explained in each of the videos. There was one distinct question per video. The answers given by the respondents were checked and given scores based on their correct/incorrect answers. Correct answer score was 1 and incorrect answer score was 0.

Table 4. Test Scores of the respondents

Variable	Category	Scores Average
Gender	Male (85)	3.37
	Female (116)	3.32
Age Group	18 – 20 (115)	3.32
	21 – 23 (72)	3.33
	24 – 26 (15)	3.2
Educational Stream	Science (84)	3.4
	Non-Science (118)	3.29

By adding up the scores that the respondents got, the total scores were prepared. Among which, total score got by male was 287 and female was 386, the total score got by the age groups

18–20 was 382, 21–23 was 237 and 24–26 was 48, the total score got by science group was 286 and non-science group was 389.

The average of the score was calculated by adding up all the scores got by a specific group like male group or female group and that was divided by their frequency and the same method was followed for all other groups. As seen in Table 4, among the four questions answered by male and female, male scored 3.37, female scored 3.32.

Though males' score was slightly better than the females, but still, it is a minute difference. Thus, by analyzing both the groups, it can be said that majority of the respondents both in male and female groups, gave the correct answer which confirms that they understood the concept explained in the videos.

Table 4 shows that the age group (18–20) secured an average score of 3.32. The group of (21-23) got an average score of 3.33. The final age group among the respondents, that is, (24–26) group secured an average score of 3.2.

It can be concluded that among the age groups also, majority of the students understood the concepts clearly as they got almost equal scores.

Table 4 also signify one of the most important things, because of the educational stream analysis. Since the videos were on scientific concepts, it was important to understand how science and non-science backgrounds can affect the understanding and reception of such videos. The important finding was that there were no such differences noticed in case of these groups as well. Hence, we can conclude that varied demographic groups doesn't affect the comprehension of the scientific concepts in the video, and the science explainer videos were uniformly understandable.

b) Content of the Video:

This section comprises of seven 3-point Likert scale statements where the statements analyzed the length, lucidity, visuals and other necessary aspects of the video.

Table 5. Responses for 'content of the video'

Statement	Agree	Neutral	Disagree
The videos were concise (short in duration).	84.65 % (171)	15.35 % (31)	0 % (0)
The videos were interesting.	90.01 % (182)	9.90 % (20)	0 % (0)
The videos were lucid (clear and easy to understand).	86.63 % (175)	12.38 % (25)	0.99 % (2)
Visuals (animation, infographics and diagrams) of the videos were appealing and self-explanatory.	87.13 % (176)	12.38 % (25)	0.495 % (1)
Complex concepts were simplified in the videos.	86.14 % (174)	12.87 % (26)	0.99 % (2)
The information in the videos seems credible and trustworthy.	86.14 % (174)	13.86 % (28)	0 % (0)
The usage of storytelling element increased my understanding of the videos.	88.61 % (179)	11.39 % (23)	0 % (0)

Table 5 provides the actual count of the 3-point (Agree/Neutral/Disagree) for all the seven statements with their percentage. It's important to note that 90 % of the respondents found the videos to be interesting. More than 86 % agreed that the videos were understandable, visuals were appealing, and complex concepts were simplified. Also, 86 % of the respondents found the information as trustworthy and 88 % of them agreed that the use of storytelling element increased their understanding. More than 84 % of the respondents agreed that the videos were in short duration.

c) Influencer/Communicator Effectiveness:

In this section, four 3-point Likert scale statements were provided to understand the effectiveness of the science influencers/communicators. The intention of the researcher was to find out about their narration and communicating style and its connection with the understanding of the videos. Also, it was found out if the presence of the communicator/influencer made the video credible and if the influencers were knowledgeable.

Table 6. Responses for 'communicator/influencer effectiveness'

Statement	Agree	Neutral	Disagree
The narration style of the communicator or influencer enhanced my understanding of the videos.	85.64 % (173)	14.36 % (29)	0 % (0)
The communicator or influencer's style of communicating was effective.	80.69 % (163)	19.31 % (39)	0 % (0)
The presence of communicator or influencer in the videos (rather than just background voice) made the video more interesting and credible.	73.27 % (148)	24.26 % (49)	2.48 % (5)
The communicator/influencer in the videos were knowledgeable.	84.16 % (170)	14.36 % (29)	1.49 % (3)

Table 6 indicates that in case of the communicator/influencer effectiveness, more than 85 % agreed on the effectiveness of the narration style of the influencers and 80 % of them agreed that influencer's style of communication was effective. Apart from this, more than 84 % agreed that the influencers were knowledgeable and 73.27 % of them responded that the presence of the influencer made the videos more credible. The research objective of this paper was to understand if the science influencers made any impact on the efficiency and credibility of the videos, through this section, this can be interpreted that the respondents agreed that the influencers' narration style, their presence and their knowledge were overall helpful in the comprehension and reception of the videos.

d) Impact & Engagement:

This is the fourth section of the post-test questionnaire. This section comprises of four 3-point Likert scale statements and one question was there to know what rating does the respondents give on a scale of 1 to 5 on their overall understanding of the videos. The four statements were asked to check the attitudes of the respondents after watching the videos.

Table 7. Responses for 'impact & engagement'

Statement	Agree	Neutral	Disagree
My knowledge about the scientific concepts got enhanced after watching the videos.	84.16 % (170)	13.86 % (28)	1.98 % (4)
I want to search and watch more such videos on scientific concepts.	80.12 % (162)	18.81 % (38)	0.99 % (2)
Watching the videos motivates me to discuss those scientific concepts with friends and family members.	80.12 % (162)	17.33 % (35)	2.48 % (5)
I would recommend these science related videos to my friends and family members.	81.12 % (164)	16.83 % (34)	1.98 % (4)

Through Table 7, it can be said that more than 80 % of the respondents agreed to all the statements. The respondents agreed that the videos on scientific concepts enhanced their knowledge and thus they will search more about such concepts. They will also discuss and recommend these concepts and videos with their families and friends.

The following table shows the rating for the respondents' overall understanding of the videos:

Table 8. Rating for overall understanding of the videos

Rating	Frequency	Percent
5	110	54.46
4	70	34.65
3	22	10.89
2	0	0

Rating	Frequency	Percent
1	0	0
Total	202	100

A rating from a scale of 1 to 5 was provided for the respondents to choose for their overall understanding of the videos. From [Table 8](#), it can be seen that 89 % of them gave 5 or 4 to their overall understanding of the videos. This indicated that the respondents understood the concepts pretty well since they themselves gave higher ratings to their own understanding.

5. Conclusion

This study examined how science explainer videos on social media help different audiences understand complex topics, with showing relevant connections of presenter credibility, content design and audience characteristics. Beyond science communication, these results also contributed to the field of media education by illustrating how digital platforms serve as sites of informal and participatory learning. A pre-test showed almost all the participants already watch science explainer videos indicating wider reception, mainly due to their cognitive needs (curiosity) and educational needs. This also led to high post-test comprehension scores. The post-test scores were consistently high across all demographic groups indicating that these videos effectively transcend viewer differences. The overall findings and almost equal scores showed that well-designed videos level the viewer comprehension and indicating that rich media eases understanding and that validates the concept of Media Richness Theory.

Many found the video concepts interesting, which relates to the emotional appeal of storytelling. Most of them would recommend videos to others, turning private viewing to social sharing – confirming integrative needs of the Uses and Gratifications theory.

Respondents agreed that their knowledge enhanced after watching the videos while agreeing that the use of storytelling and visuals boosts understanding, confirming Aristotle's 'pathos'. Nearly all of them praised visuals with animations signifying dual coding (narration and visuals) as effective. Science influencers played a key role as majority respondents appreciated their narration style for clarity and the influencers were also called as 'knowledgeable'. They also found that the on-screen presence of the scifluencers highlighted credibility which also validated Zhang and Lu's ([Zhang, Lu, 2023](#)) 'authenticity' point and Aristotle's 'ethos'.

Most viewers reported heightened interest in scientific topics after watching the videos, with strong intent to seek similar content and discuss about these concepts socially. Nearly all the participants rated highest about their understanding of the videos pointing to higher comprehension rates. Many of them appreciated the video quality, saying they were 'perfect'. However, numerous others identified specific areas needing adjustment to enhance the effectiveness and broaden audience reach. A common request was incorporating real-life experiments to relate with the specific scientific concepts to strengthen understanding through practical examples. Several participants suggested that adding research papers or scientific evidence within the videos can boost credibility and trust. Others recommended adding brief summary of the concept or key point recaps at the end of the videos could help in the better understanding. To expand the reach and overcome language barriers, multiple respondents proposed including in-video subtitles in various languages. Few respondents noted that the background music occasionally interfered in the videos and thus advised reducing its volume or presence. Participants also recommended to use simpler words reducing complex terms, to aid viewers lacking prior knowledge of the concepts. Specific feedback about the narration included requests for the influencers to speak at a slightly slower pace throughout explanations. Additionally, the respondents mentioned that they wanted the increased screen time and visibility for all the influencers to improve influencer-viewer connection. Through these additional media education oriented inclusions, 'Scifluencers' can broaden their educational reach and contribute to the development of science literacy and prevent misinformation across digital platforms.

In this study, respondents were limited to the urban students of West Bengal colleges and universities, and also within the age limit of 18–26 years. Long format videos and other languages except English and Hindi were excluded. No other fields of science were included in the study except astronomy, geology, physics and chemistry. Immediate post-testing prevented long term studies of knowledge retention or behavioral changes. Only pre-post test was used to conduct this study. The study was limited to choosing science influencers only, the science educators and communicators

weren't included. Also, though some scifluencers upload the same videos to varied platforms but the videos for this study, were taken from just one social media platform, that is, YouTube.

In case of social media platforms, it's being recommended to create 'Science-Credibility Badges' for trusted influencers. And, through AI (artificial intelligence) algorithms, boost the videos with strong credibility and emotional appeal.

The suggestions for future research consist of the expansion of studies to rural population, older age and also studying other states of India or other countries. The researchers can also focus on multilingual contexts and longer video formats. For this study, pre-post survey has been used, other methodologies like eye-tracking behavior, content analysis and also longitudinal studies might be adopted for better understanding. Future studies can also focus on various social media platforms and compare their reception among people.

Science explainer videos can be integrated into classroom teaching for improved learning. Media education can also adopt explainer videos as examples of participatory and visual learning that bridges formal and informal education.

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Modern Media Education of Youth: the Media-Creative Aspect

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Abstract

This article examines the role of media creativity as a key component of contemporary media education in the context of rapid digital transformation. The increasing scale of media flows and user-generated content intensifies risks related to media safety, misinformation, and the impact of destructive content, which underscores the need for effective media education strategies. The purpose of the research is to identify the theoretical foundations, pedagogical potential, and socio-cultural significance of media creativity in modern media education. The findings demonstrate that media creativity should be understood as a multidimensional pedagogical and socio-cultural phenomenon that combines the development of youth's technical skills, creative abilities, critical thinking, and media culture. It is shown that media-creative practices (blogging, digital storytelling, etc.) serve not only as tools for developing skill but also as mechanisms for personal self-realization, social participation, and identity formation among adolescents. Particular attention is paid to the role of critical media literacy, which enables young people to analyse media content, resist misinformation, and engage responsibly in the digital environment. It is argued that effective media education should not treat creativity as a supplementary element but rather as an important mechanism for developing the competencies necessary for youth's active citizenship and meaningful participation in contemporary media culture.

Keywords: media text, media culture, media security, media education, media creativity, critical thinking, youth.

1. Introduction

The rapid development of media in the modern world entails significant transformations related to how the contemporary digital generation uses the media environment. The substantial expansion of media flows and the Internet media space bring to the forefront the issues of media use, including the latest developments in neural networks and artificial intelligence, in the processes of upbringing, education, and development of the younger generation. Moreover, the expansion of the capabilities of the modern media environment does not resolve the problem of potential risks and dangers associated with ensuring media security for the younger generation, nor the negative impact of destructive media content on mass audiences. In addressing these challenges, it seems important to define the possibilities of modern media education for young people, which in recent decades has become increasingly widespread.

At the present stage of development, media education is widely used in patriotic (Chelysheva, 2025), civic (Mikhaleva, 2021), moral (Kuptsova, Vladimirova, 2024), and aesthetic upbringing (Fedorov, 2015; Khilko, 2004, 2006). Media education, aimed at fostering the critical autonomy of the individual, developing analytical competencies, and expanding creative possibilities related to the media sphere, among other equally important tasks, is becoming increasingly essential for

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modern digital society. It is no coincidence that the full-scale use of media education has become the subject of interdisciplinary research and is being examined by philosophers, educators, psychologists, sociologists, and political scientists.

The development of media technologies today opens up increasingly broader opportunities for media creativity, which has become one of the key directions in media education. The creation of original media content, its analysis, and creative application in various spheres of life have drawn the attention of researchers to this issue. For example, “with the spread of the internet and social networks, media creativity is gaining new dimensions and becoming a socio-cultural phenomenon. The emergence of platforms for content sharing and the development of user-generated content (UGC) lead to the widespread distribution of media creativity” (Kulikovskaya, Brezhnev, 2025: 105).

2. Materials and methods

The material underlying this study includes scholarly works on contemporary media education of youth in the context of media creativity, including dissertations, monographs, research articles, etc. The research methods include theoretical analysis and synthesis; generalization and classification, content analysis, analogy, induction and deduction, abstraction and concretization, generalization. The methodological basis of the study is the research of L. Masterman (Masterman, 1985), C. Bazalgette (Bazalgette, 2009), D. Buckingham (Buckingham, 2004), A. Silverblatt (Silverblatt, 2016), and others.

3. Discussion

The modern world of culture is closely connected with the media environment, and the media space today encompasses a wide range of issues related to various aspects of human activity. At the same time, “the media environment provides additional opportunities in the fields of education and upbringing. The organic perception of media texts by the younger generation serves as a mechanism for transmitting the value-meaning complex of Russian culture. The most relevant forms and methods of media education aimed at shaping value orientations and the intellectual and creative development of the individual include online events, interactive live streams, festivals and competitions in virtual space, engaging and useful content on official social media accounts of educational institutions, and social networks as a creative platform for youth” (Kuptsova, Vladimirova, 2024: 63).

One of the fundamental concepts of modern media education is promoting a critical attitude towards media information of various types and genres. It is reasonable to agree with the view that “the critical component within the concept of media literacy is today regarded as a key factor in fostering civic responsibility and the ability to make thoughtful, well-reasoned decisions based on the critical processing of information received through various media channels. The ability to recognize and avoid spreading fake news and disinformation has become a defining characteristic of a high level of media literacy in contemporary society” (Chicherina, 2022: 74). It is no coincidence that many contemporary researchers emphasize the importance of a critical approach in media education (Fedorov, Levitskaya, 2015; Gálik et al., 2024; Tinák, Gálik, 2026).

It should also be noted that traditional methods of working with media texts aimed at developing critical thinking among children and young people are well established in media education practice. These include working with problem-based questions, studying professional reviews written by media critics, and engaging students in creative tasks and exercises related to analyzing the content of media texts, identifying typical stereotypes of main and secondary characters, and determining the sources of media information, among other approaches.

At the same time, in recent years, the tasks of developing critical thinking within media education have also been implemented through independent media creativity. In particular, this includes working with numerous blogs that are becoming more and more prevalent in the media space. According to the definition given by R. Bliznyak and I. Gerasimova, “blogging can be defined as a set of actions performed by an individual in maintaining an electronic diary (blog), carried out with a certain regularity and aimed at expressing their own opinion on particular topics, events, and actors, as well as attracting the attention of other participants in the blogosphere to this opinion” (Bliznyak, Gerasimov, 2017: 222).

In the study carried out by A. Shesterina, it is stated that “within the educational process, video blogs can perform the following functions: illustrative, modelling, communicative, utilitarian,

and others. These functions can be realized in different genres. The most common include video courses (specially prepared series in a unified style and format), vlogs (regular releases in which media experts or major researchers share their knowledge with a wide audience), streaming (live broadcasts of public lectures by specialists in the field of media education), entertainment films (complex aesthetically structured video material with a recognizable dramatic and audiovisual composition), and animation” (Shesterina, 2021: 375).

The rapid expansion of media environment capabilities opens new prospects for media creativity for present-day young people. It is reasonable to agree with the view of I. Kulikovskaya and G. Brezhnev that “in contemporary pedagogical science, media creativity is considered one of the key competencies for successful adaptation to the conditions of the digital economy and information society. Special attention is given to the development of creative thinking, critical analysis of information, and skills of communication and collaboration in the digital environment” (Kulikovskaya, Brezhnev, 2025: 105).

Modern formats of youth media education are closely connected with media-creative activities. For example, blogging has become one of the most widespread ways of rapidly reaching a mass Internet audience today and serves as a kind of platform for discussing a wide range of issues concerning users. Bloggers of various levels publish information in the form of short videos, posts on social networks, and so on. Among the many video materials and blogs presented, there are also educational ones. Examining their characteristics, D. Sterlikov identifies: “1) video content dominated by classical educational genres and formats; 2) video content dominated by genres and formats of video blogging. In the first case, such genres as video lectures, webinars, master classes, and workshops prevail. Educational excursions appear less frequently. The main format is classic horizontal video. In the second case, there is a much greater variability of genres and formats, which is driven by the need to adapt to the content distribution channel – the online network environment – and to audience demands. This includes educational genres such as documentaries, docudramas, mockumentaries, guides, reviews, commentaries, essays, life hacks” (Sterlikov, 2024: 1011).

4. Results

In contemporary media education, media creativity is viewed as a complex pedagogical and sociocultural phenomenon that integrates artistic self-expression, personal development, and media culture within the modern educational environment. Taken together, these dimensions make it possible to identify several key aspects that reveal the practical and theoretical significance of media creativity in work with children and adolescents. Some scholars highlight that young people are no longer simply audiences but creators who engage with media through remixing, storytelling, and networked interaction: Valerie Wee (Wee, 2017) captures this transformation by describing the intensification of multimedia engagement, where youth simultaneously consume and produce content across platforms. This participatory condition aligns with Henry Jenkins et al. (Jenkins et al., 2016) who conceptualize contemporary youth culture as a participatory culture in which creative expression is collaborative, socially embedded, and often tied to civic and political engagement. In this sense, creativity is not an isolated act but a networked practice shaped by interaction and feedback: Jenkins et al. (Jenkins et al., 2016) argue that participatory media practices can lower barriers to civic engagement, thus enabling young people to use creative outputs – such as videos, memes, and social media posts – as forms of their political voice. This highlights the potential of media creativity, which extends beyond one’s personal expression to collective action and public discourse.

Underlying all these perspectives are due to digital media that make such creativity possible. Low barriers to entry, multimodal tools, and networked distribution systems enable young people to create and share content with unprecedented ease. Yet, as David Buckingham (Buckingham, 2013) cautions, that access alone does not guarantee meaningful participation; creative engagement depends on the development of one’s critical skills, guidance, and opportunities. Inequalities in access and competence, along with the influence of institutional and commercial structures, continue to shape how and to what extent youth can participate creatively.

First and foremost, media creativity is interpreted as an activity-based, practice-oriented experience aimed at creating one’s own media products (video materials, audiovisual works, digital stories, etc.). For example, the study guide “Media Creativity: Practical Aspect” (Vidnaya, Kisileva, 2017), emphasizes the applied nature of this activity: it describes the stages of media production, methods for organizing university students’ work, and the mastery of technical and artistic tools.

Thus, media creativity serves as a tool for developing specific skills – from conceptualization to the realization of a media project.

N. Khilko considers media creativity from the perspectives of cultural studies and pedagogy (Khilko, 2004; Khilko, 2006) as part of audiovisual culture and socio-cultural activity, emphasizing its role in transmitting values, norms, and symbols. The author focuses on the pedagogical potential of screen-based creativity, associated with aesthetic perception, imaginative thinking, and the ability to interpret media texts. In this context, media creativity is understood not only as technical production but also as a culturally conditioned process that involves mastering the languages of screen arts.

Significant attention in a number of publications is given to the personal development of adolescents. For instance, T. Gorodilina (Gorodilina, 2018) substantiates media creativity as a space for creative self-realization, where adolescents can express their individuality, develop their creativity, and enhance their reflective abilities. Similarly, I. Voynya (Voynya, 2008) views the development of skills in creating artistic media products as a pedagogically organized process that includes cultivating students' artistic taste, compositional thinking, and skills in working with expressive means.

The works of M. Kuzmina (Kuzmina, 2014) and A. Machenin (Machenin, 2014) explore media creativity in the context of media culture and the educational environment. M. Kuzmina emphasizes the importance of students creating their own video materials for developing their critical attitude towards information, understanding media languages, and mastering communicative strategies. A. Machenin, in his turn, stresses the important role of the school media centre as an organizational form that facilitates the integration of media creativity into the educational process and enhances the pedagogical potential of media education.

The socio-cultural dimension of media creativity is revealed in studies devoted to adolescents' social activity and identity. For example, M. Moskvitina (Moskvitina, 2024) considers media creativity as a means of shaping adolescents' ethnocultural identity, thus emphasizing its potential in helping them reflect on cultural heritage and present themselves in the media space.

Within educational contexts, youth media creativity is often framed as something that can be cultivated through structured pedagogical approaches. For example, Kadi Bliss (Bliss, 2015) demonstrates how integrating social media into the classroom can create experiential learning environments in which students actively produce and share content. Likewise, Brian Gleason and Scott von Gillern (Gleason, von Gillern, 2018) emphasize the role of participatory practices in teaching digital citizenship, where creative engagement with social media becomes a means of learning collaboration, communication, and responsibility. Heidi A. Fuller and Amy M. Damico (Fuller, Damico, 2008) further argue that educators must adapt to the realities of teen media use by incorporating creative media practices into curricula. However, these perspectives also reveal some tension: while schools attempt to formalize and guide creativity, much of youth's most dynamic media production occurs informally outside institutional settings, where peer interaction are less constrained.

Overall, our analysis allows us to state that in the pedagogical discourse, media creativity is interpreted as a multidimensional process that combines the mastery of media technologies and languages, the development of artistic and creative abilities, promoting media culture and critical thinking, the support of young people's personal self-realization, and the inclusion of adolescents in socially and culturally significant activities. That is why media creativity functions not only as a teaching method but also as an important mechanism of socialization and cultural identification of the individual in the media environment.

Hence, it is not surprising that a key theme in international academic literature is youth's sociocultural participation. For example, B.J. Selznick (Selznick, 2008) emphasizes that children's engagement with media is connected to broader notions of citizenship, where young people are enabled to contribute to cultural and public life. Similarly, other scholars (Fields et al., 2014; Kafai et al., 2011) focus on "DIY" (do-it-yourself) practices in media education, proving that creative production – such as game design, programming, or the creation of digital artifacts – fosters such competencies in adolescents as collaboration, collective problem-solving, and communication.

Another contemporary direction is the empowerment of youth through media creativity. S.R. Poyntz (Poyntz, 2006) points out that media education should go beyond the development of purely technical skills and provide young people with opportunities to express their views and critically engage with society. K. Johnston-Goodstar et al. (Johnston-Goodstar et al., 2014) develop

this idea in the context of social work, demonstrating how critical media practice can support youth identity development and participation in social justice efforts by providing tools for representing their own life experiences.

In this respect, E. Camarero, A. Fedorov, and A. Levitskaya dwell upon promoting youth's audiovisual and media literacy for social change: "In linking audiovisual and/or media literacy, empowerment and social change, the participatory and civic use of digital tools (and especially when learning leads to the creation or management of such resources) minimizes the existing digital divide affecting vulnerable groups and those at risk of exclusion. Users can create digital content to communicate and to participate in society while achieving empowerment" (Camarero et al., 2019: 360).

David Buckingham (Buckingham, 2013) also argues that media education must extend beyond critical analysis to include opportunities for creative production, thus enabling young people to understand media systems by actively participating in them. Similarly, Jason Ohler (Ohler, 2009) frames new-media literacies as a combination of technical skills, storytelling ability, and ethical awareness, positioning creativity as a core competency in modern digital environments. This perspective is further reinforced by Kathy T. Anderson and Peter H. Chua (Anderson, Chua 2010), who highlight digital storytelling as a key practice through which youth develop their narrative skills and express personal experiences using multimedia. Together, these authors suggest that creativity is not merely an outcome of media use but a fundamental dimension of how young people learn and communicate.

Moreover, digital environments provide spaces where young people can construct identities through creative expression, whether by producing videos, creating images, or sharing personal narratives. Some researchers (Wee, 2017) point to the fluidity of these identity practices in multimedia contexts, while the other scholars (Anderson, Chua, 2010) show how digital storytelling enables youth to articulate one's personal experiences. Media creativity, in this sense, becomes a tool for self-exploration and social positioning, allowing young people to negotiate how they present themselves to others.

Modern research also emphasizes that new media literacy is a multidimensional construct. For instance, Tzu-Bin Lin et al. (Lin et al., 2013) propose a theoretical model that includes not only functional and technical skills but also critical understanding of media texts and individuals' capacity for creative production. This aligns with the position of K.C. Montgomery (Montgomery, 2000) who describes the evolution of the digital media space and underscores the importance of preparing young people to navigate complex media environments shaped by commercialization, interactivity, and convergence.

Creative media practices, such as digital storytelling, are also seen as effective educational tools. For example, H. Truong-White and L. McLean (Truong-White, McLean, 2015) emphasize that digital storytelling contributes to the development of global citizenship by combining personal self-expression with critical reflection on global issues. Such practices demonstrate how creativity in media education can connect personal life stories with broader social and cultural contexts (Camarero, Varona, 2016).

The importance of critical and analytical thinking is also highlighted by P.A. Alexander (Alexander, 2014) who substantiates the need for well-developed critical-analytical skills among learners, which underpin their ability to evaluate media messages, construct arguments, and participate meaningfully in media production. This cognitive dimension complements the creative component, ensuring awareness and reflexivity in the process of creating media texts.

Taken together, these studies demonstrate that effective media education should not treat creativity as an additional element but should recognize it as a key mechanism through which young people acquire the competencies necessary for cultural participation, civic engagement, and critical understanding in the digital world.

5. Conclusion

The current stage of media education opens up broad prospects for incorporating the capabilities of new media into education and upbringing. At the same time, the rapid advancement of media technologies intensifies the risks and challenges associated with society's interaction with the media environment. These include unresolved issues related to the use and expanding potential of neural networks and artificial intelligence, problems of media safety for the younger generation, and the influence of destructive media content on youth, among others.

Overall, the media-creative aspect of contemporary youth media education is characterized by the following features: active participation in media culture; the development of creative, technical, and communicative skills; the expansion of youth media opportunities through self-expression and critical engagement; and the integration of critical thinking with creative practice.

In this regard, identifying the main trends of contemporary media education becomes highly relevant and requires careful analysis and interpretation.

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Creative Industries in Russian Internet Media as a Platform for Russian-Indian Value-Based Communication

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Abstract

Since 2022 in the New Reality, for India and Russia, the innovative strategy of country interactions in all spheres becomes a significant research problem. Creative industries as a dual cultural-economic phenomenon is seen as a relevant research subject. These article analyses for the first time the creative industries in the public sphere in Russian internet media as a field of current interaction between the two countries. Publications from the emergence of the declared topic in the media space in 2014, with a focus on 2022–2024, were analyzed. The final sample consisted of 400 articles (2022–2024) discussing both Indian and Russian creative industries. The main indicators of analysis were: values; historical and regional context; core industries; thematic and contextual-thematic categorization; communication goals; subjects: enterprises, government bodies, international and Russian organizations, and the key persons. A comparative analysis of the quantitative results with the value matrix created at the study's initial stage showed that all official value-meaning constants inherent to creative industries were fully represented in publications on Indian and Russian creative industries, and in the New Reality the creative industries of Russia and India is the field of strategic interstate communication, based on historical and cultural traditions, traditional values, and parity communication.

Keywords: India, Russia, the New Reality, creative industries, media literacy, economic-cultural duality, value matrix, internet media, strategic communications.

1. Introduction

India and Russia are partners with a centuries-old history of relations in all spheres (Anand et al., 2022; Chenoy, 2008; Lunev, 2017). Since 2010, India is the only country maintaining a specially privileged strategic partnership with Russia.

Now India's and Russia's interests in world politics are changing (Kulik, Kalinin, 2022), including in the context of pressure from the collective West on countries that have economic, cultural, and other ties with Russia.

Currently, one of the main issues for study is the creative economy in terms of creative industries (Howkins, 2001). Today, creative industries in India and Russia demonstrate high and fairly stable growth rates (FICCI, 2025; Sharapova et al., 2025). Due to their dual, both economic and cultural nature, creative industries in interstate communication are aimed at economic-cultural interaction, contributing to the enhancement of cultural diversity, the development of traditional arts and crafts, museum and musical ties, contacts in fashion, youth, sports and tourism

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exchanges (Rustamova, 2024), cooperation in theater and cinema arts, architecture and urbanism, jewelry, advertising, PR and design, gastronomy, etc.

Recent scholarship broadens the understanding of creative industries beyond purely economic frameworks. While recent scholarship links creative industries to digital infrastructures and cultural diplomacy, existing approaches remain largely descriptive and under-theorised in terms of power. Creative industries are not merely sites of cultural exchange but are embedded within asymmetrical structures of global political economy, platform capitalism, and epistemic hierarchy. Creative industries operate within circuits of capital accumulation and regulatory regimes, while digital platforms increasingly mediate visibility, access, and value production (Flew, 2012; Hesmondhalgh, 2019). In this context, the study of Indo-Russian creative industries requires attention not only to values but to the politics of representation, inclusion, and narrative control.

Current studies link them to digital infrastructures, platformization, public and cultural diplomacy, and place branding. Studies in cultural policy emphasize the importance of sustainable cultural diplomacy (Faucher, Yu, 2025). At the same time, place-branding research shows that cultural-symbolic assets increasingly shape territorial promotion and public image (Aguilera-Cora et al., 2024; Kotecha, Moreva, 2025; Panasenko et al., 2025; Shilina, 2025; Shilina, 2026; Wirth et al., 2023).

Finally, BRICS-focused studies on digitalization confirm the structural role of internet penetration and R&D for the expansion of digitally mediated creative sectors (Audi et al., 2025).

For India and Russia, interstate interaction has always been declared as a significant element not only in the economic sphere but also in culture, and interrelations between countries and peoples (Kulik, Kalinin, 2022; Rustamova, 2024; Tabrintseva-Romanova, 2019), therefore, modern research into creative industries reveals the specifics of contacts between countries, which are reflected in Russian online media. At the same time, it is important to explain to the audience the features of the creative industries in the context of media literacy (e.g., Fedorov et al., 2022; Fedorov, Levitskaya, 2015; Tinák, Gálik, 2026; Urazova, 2023; Volkova et al., 2020).

Creative industries must be analyzed as sites where discursive, economic, and infrastructural power intersect. Barnett and Duvall (Barnett, Duvall, 2005) conceptualize power as productive and structural, enabling certain actors and narratives while marginalizing others. In the digital era, platform infrastructures (Srniczek, 2017; van Dijck et al., 2018) play a central role in shaping cultural visibility and exchange. Thus, Indo-Russian creative industries are not neutral spaces of interaction but are embedded within asymmetrical regimes of representation and mediation.

Research working hypothesis is: if culture is the driver of the Russia-India partnership, then in the New Reality creative industries as a dual cultural-economic phenomenon represent a strategic format of this partnership, which is reflected in Russian online media.

2. Materials and methods

What makes the present situation novel is the absence of both empirical and theoretical studies examining how the creative industries of India and Russia are represented in Russian online media under the New Reality. This gap necessitates a combination of quantitative methods to examine publications on the topic and qualitative analysis to assess how well they align with values that hold importance for both nations.

At the initial stage of the research, a semantic matrix of values inherent in the creative industries of India and Russia is created, since values are a significant factor in the relations between these countries and important for the development of creative industries in the interstate context, especially under the conditions of the New Reality and the dominance of Westernization.

To assess the specifics of the media presence of the issues related to the creative industries of India and Russia in the New Reality in Russian internet media, the research conducts a quantitative study of Russian internet media based on data from the Medialogia monitoring analytical system (about 100,000 Russian internet media). Queries were formed according to the parameters: “creative industries”, “India”, “Russian Federation”.

The chronological framework of the main study is from 01.01.2021 to 31.12.2024. To understand the dynamics of the development of the declared topic of creative industries of India and Russia in Russian internet media, the time period was extended: the information field from the moment the topic officially appeared in 2014 was analyzed (2014–2024).

The sample consisted of 400 articles (2022–2024) discussing Indian and Russian creative industries. The main areas of analysis were values in the historical context, goals and objects of communication, government organizations, and key figures.

While Medialogia provides extensive coverage of Russian internet media, it is important to acknowledge that media datasets are not neutral repositories of information. They are shaped by editorial practices, algorithmic visibility, and regulatory environments. Media metrics and analytics systems often reproduce existing hierarchies of attention and visibility, thereby influencing the construction of public discourse (Napoli, 2014).

3. Discussion

In the New Reality, creative industries play a larger role than simple cultural exchange. In the Russian-Indian case, they are becoming a tool of industrial and national image-building, public communication, and long-term symbolic partnership. Contemporary global research on cultural diplomacy, digital ecosystems, place branding, and digitalization within BRICS reinforces this view, indicating that this form of cooperation is poised to grow in significance moving forward.

The Russian-Indian cooperation in the field of creative industries is becoming more visible in Russian online media (Shilina, Usha, 2025; Volkova, Moreva, 2025). The growth in publications after 2022 shows that this topic is no longer peripheral. It is increasingly presented as an important part of bilateral communication and public dialogue.

Traditionally, media attention is focused mainly on intercultural interaction, cultural development, and value-based cooperation. This means that creative industries are represented not only as an economic sector, but also as a space where shared meanings, traditions, and mutual interest are communicated.

Another important point is the balance between innovation and traditions, and culture. It concerns the modern technological development with more traditional cultural forms combined in the discourse. This makes the idea of creative industries broader and more flexible. It is not limited to digital business or entertainment alone, but includes a wider cultural and communicative role.

Creative industries are not simply producers of goods or services, but a long-term image-building instruments. This brings the discussion close to international debates on place branding and public diplomacy. Recent scholarship argues that cultural and symbolic assets increasingly shape territorial competitiveness, sustainable development, and external perception.

Russian-Indian cooperation in creative industries is often interpreted as part of a wider international framework based on partnership, multipolarity, and cultural dialogue.

While the discourse of multipolarity suggests a move towards a more balanced global order, scholars have cautioned that such frameworks may reproduce alternative hierarchies rather than dismantle them (Acharya, 2014; Stuenkel, 2016). In this context, BRICS-mediated cultural cooperation may function as a reconfiguration of power, where new centres of influence emerge without necessarily transforming underlying asymmetries in global knowledge production and cultural circulation.

Therefore, the two states' cooperation is embedded in a wider friendly international framework with the predominance of BRICS among international organizations. This is important because BRICS here functions not only as an economic bloc, but also as a symbolic environment for cultural legitimacy and multilateral visibility. The Russian media agenda frames BRICS and Indo-Russian creative projects as part of a broader non-Western communicative space. In other words, the partnership is not wholly dependent on external institutional mediation. It can generate its own value-based discourse and its own communication logic. This combination of multilateral support and bilateral autonomy appears to be one of the main strengths for creative industries. This creates favorable conditions for using creative industries as a relatively stable channel of public diplomacy and international communication.

The future development of bilateral creative industries will depend on how successfully traditional cultural meanings are translated into digital, platform-based, and internationally legible forms.

4. Results

At the first stage of the study, a table of values was developed as a qualitative basis, taking into account the previous experience of interaction between states and cultures (Anand et al., 2021; Chenoy, 2008).

Examining Russia's regulatory and legal documents concerning creative industries, together with the main provisions of the 1993 Treaty with India, makes it possible to systematically identify the value orientations that form the basis of the country's cultural policy. The findings highlight several ideological positions: a commitment to a multipolar and equitable world order, the preservation of traditional principles, meaningful cross-cultural engagement, the unbroken and forward-moving evolution of culture, and its cohesion at the national level.

When constructing binary models, these attitudes form clear contrasting pairs, reflecting the struggle of value systems. Thus, the concept of a just world is contrasted with the hegemony of any one culture; adherence to traditions – with transhumanist transformations; and the idea of cultural synthesis and cooperation – with the phenomenon of "cancel culture." The restoration of the historical logic of cultural development blocks attempts at revision and distortion of this process, and the principle of the country's cultural unity acts as a counterbalance to any form of separatism in this sphere (Grishanin, 2025).

This semantic matrix within the study will serve as the basis for the final comparative analysis of publication reviews on the research topic in Russian internet media.

Historical context of the media agenda on the research topic see [Figure 1](#).

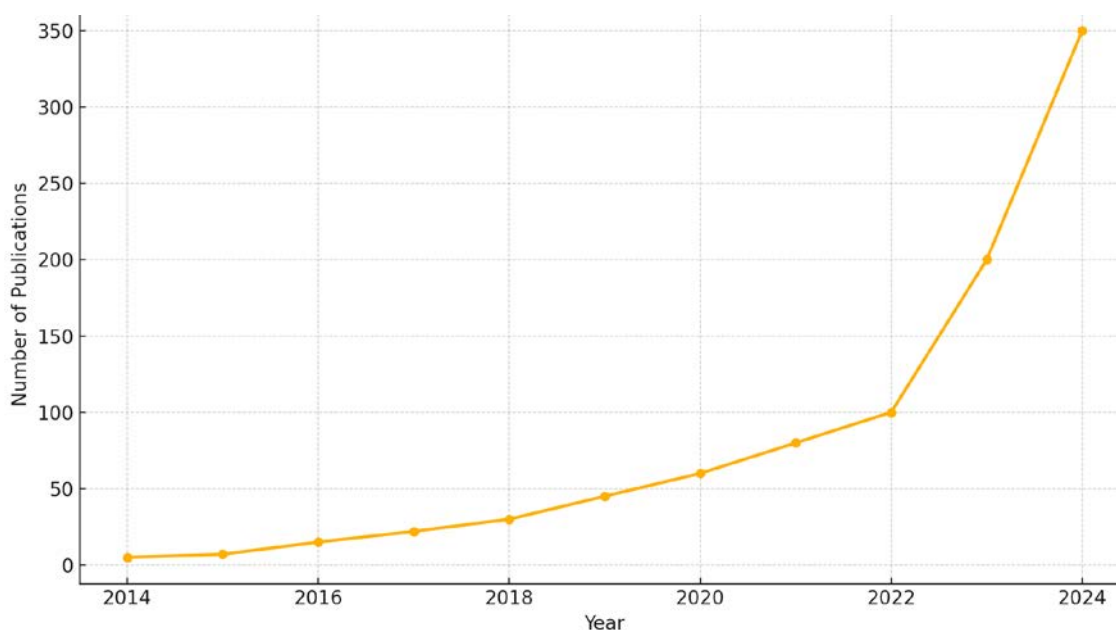


Fig. 1. Creative Industries of India and Russia: Growth Dynamics of Online Media Publication Activity in 2014–2024

Source: authors.

The first articles about creative industries in Russia and India appeared in 2017-2018. (Medialogia), though state-level promotion of this topic in the information field started actively in 2014. Since 2022, publication activity has grown exponentially, with a Media Index of 10,462.11 (based on analysis of 1,408 publications from 2014–2024). It can be hypothesized that the post-2022 geopolitical shifts acted as a catalyst for this surge, indirectly signaling the development of both Russian and Indian creative industries. Indian and Russian creative industries in regions see [Figure 2](#).

Quantitative analysis of publications on the stated topic across the federal districts of the Russian Federation reveals widespread media coverage of the subject throughout the country. The Central Federal District significantly outpaces other districts with 832 publications. The Volga Federal District (146 publications) slightly exceeds the Far Eastern (118 publications) and Ural (113 publications) Federal Districts in publication volume. These data on regional media activity indirectly but clearly demonstrate the potential for developing interaction between the creative industries of India and Russia at the regional level, especially considering the exponential growth in publications on this topic shown earlier. Frequency of mentions of creative industry sectors in India and Russia see [Figure 3](#).

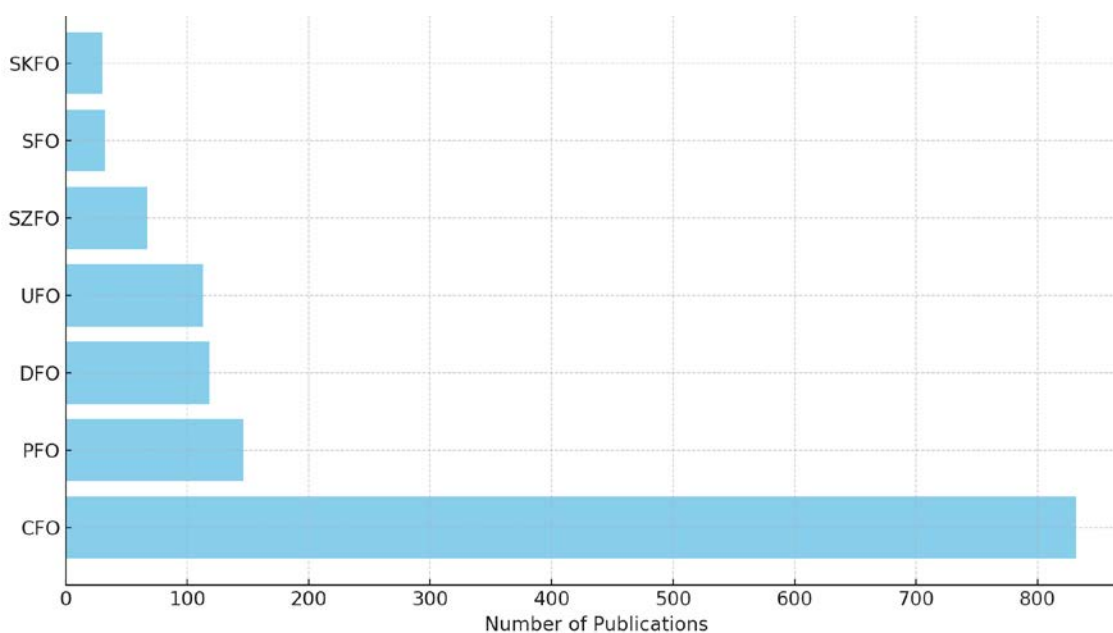


Fig. 2. Media Landscape of Regional Publications in 2014–2024
Source: authors.

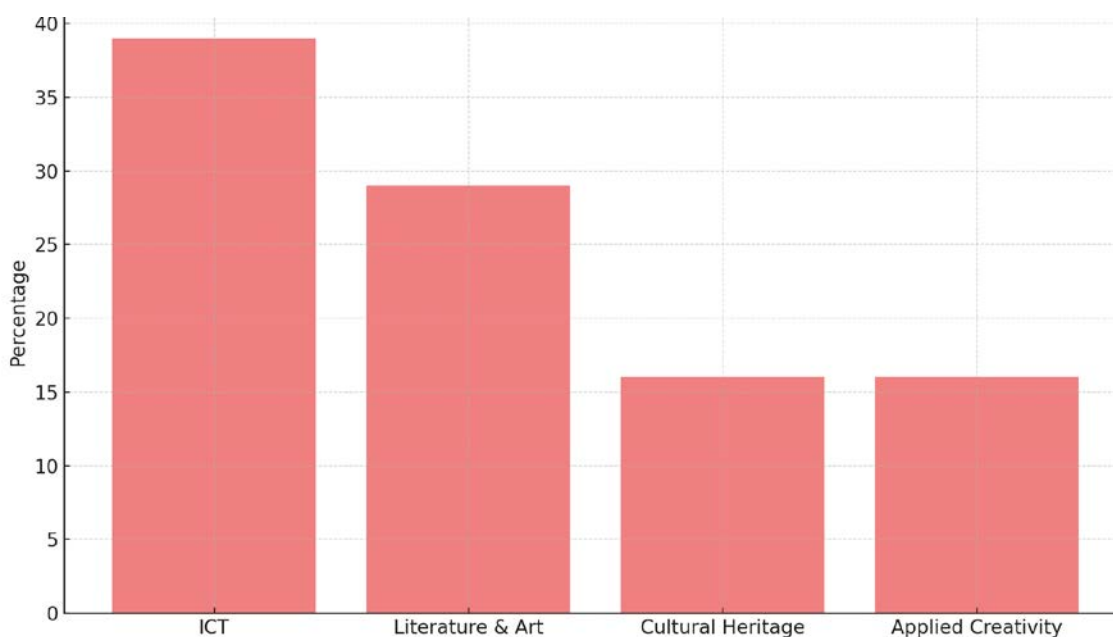


Fig. 3. Frequency of Mentions of Creative Industry Sectors of India and Russia in Russian Internet Media, 2022–2024
Source: authors.

Publications most frequently addressed topics related to information and communication technologies (39 %) and literature and art (29 %). Industries connected with historical and cultural heritage and applied creativity were mentioned equally (16 %). The leading development of ICT and literature and art topics demonstrates a harmonious balance between technological innovation and traditional vectors in the functioning of creative industries. The prominence of ICT-related themes reflects not only technological advancement but also the growing centrality of platform-based cultural production. Digital platforms increasingly structure the creation, distribution, and monetization of cultural goods, embedding creative industries within global data economies (Nieborg, Poell, 2018). This raises questions about ownership, control, and the uneven distribution of value within Indo-Russian digital cultural exchanges. It is noteworthy that in 400 articles, there were 496 mentions of various creative industries, meaning that more than one sector was described

in a single article. This indicates an expanding presence of Indo-Russian creative industry projects in Russia and supports the idea of comprehensive development in this field. Themes see [Figure 4](#).

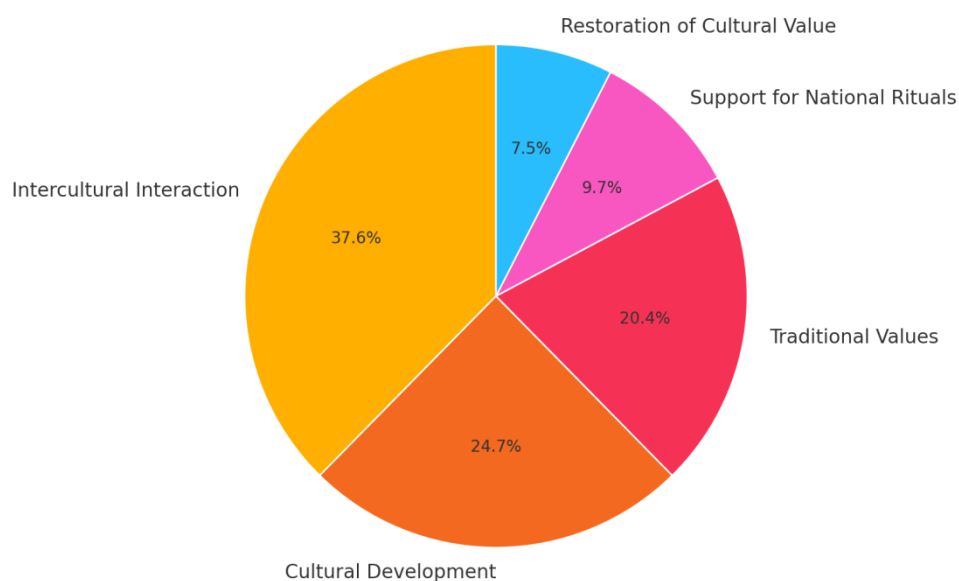


Fig. 4. Themes of Internet Publications on the Parameters “India,” “Russian Federation”, “creative industries”, 2022–2024

Source: authors.

The analysis of 400 internet media publications dedicated to India-Russia interaction in creative industries revealed a dominance of themes related to intercultural interaction (35 %) and the development of the cultures of the peoples of India and Russia (23 %), demonstrating strong foundations of historically established intercultural communication. The desire to uphold traditional values and a culture of fair world order (19 %) reflects an active stance by creative industry actors in the public sphere, who are ready to defend traditions and values. Publications addressing the support of national territorial rituals (9 %) indicate potential interest in the topic at the local level. Just 7 % of the materials addressed the restoration of culture's historical significance; in other words, this topic is not presently a pressing concern, as the historical value of culture is regarded as an established fact and therefore does not generate discussion.

Contextual thematic classifier of publications see [Figure 5](#).

The Medialogia analytical system classifies publications in its “Rubric” section according to its proprietary algorithm, which analyzes the publication’s category in internet media, its headline, and subheadline, taking context into account and potentially assigning the text to several relevant thematic and contextual categories. As a result, a single publication may be attributed not to one but to multiple contextual-thematic categories (in Medialogia, such a category is called a “Rubric”).

The majority of publications on the creative industries of India and Russia (47 %) are classified by Medialogia under the thematic category of authority, reflecting the broad scope of discourse involving the state and authorities in the creative industries sector. Coverage of the Indian and Russian creative industries has a significant international focus (accounting for 23% of publications), even though a relatively small share of these publications deal with companies' expansion into foreign markets (5 %, see [Figure 6](#)). This indicates potential for further development of this vector in Indian and Russian creative industry projects. The “Culture and Arts” category includes 19 % of publications, significantly higher than other themes. A small number of articles are devoted to high technology (2 %), media (1 %), and advertising and PR (1 %). This distribution may be considered indicative of the early stage of formation of the Russian online media agenda on India-Russia creative industries.

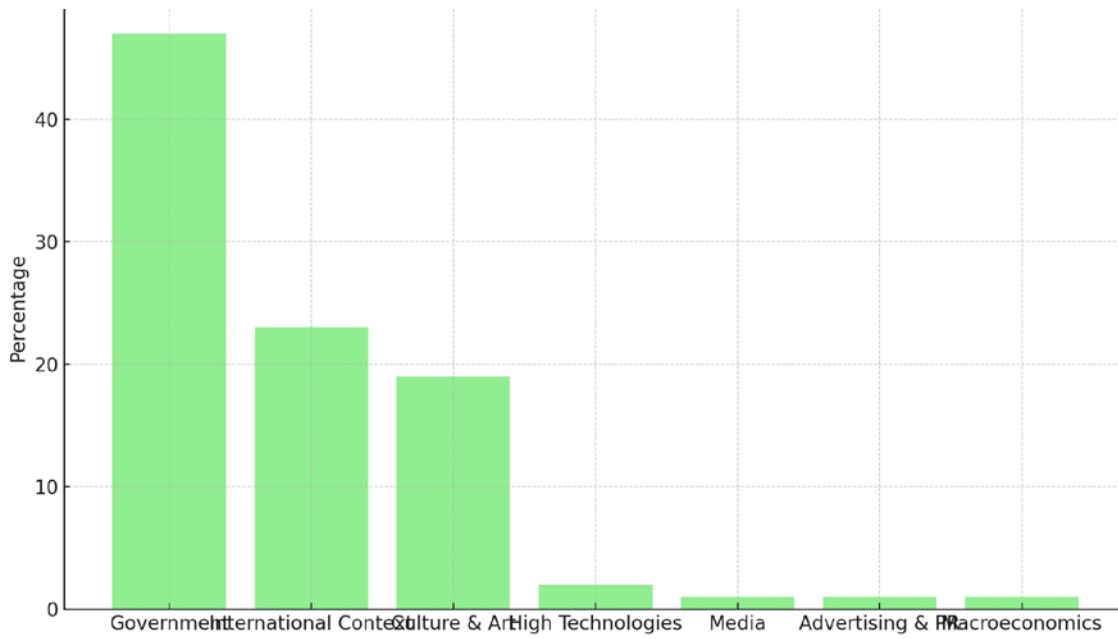


Fig. 5. Contextual Thematic Categories of Articles by Parameters: “India”, “Russian Federation”, “creative industries”, 2022–2024
Source: authors.

Only 1 % of articles fall under the “Macroeconomics” category, which is understandable given the current global political-economic reconfiguration and uncertainty. Communication goals stated in publications see [Figure 6](#).

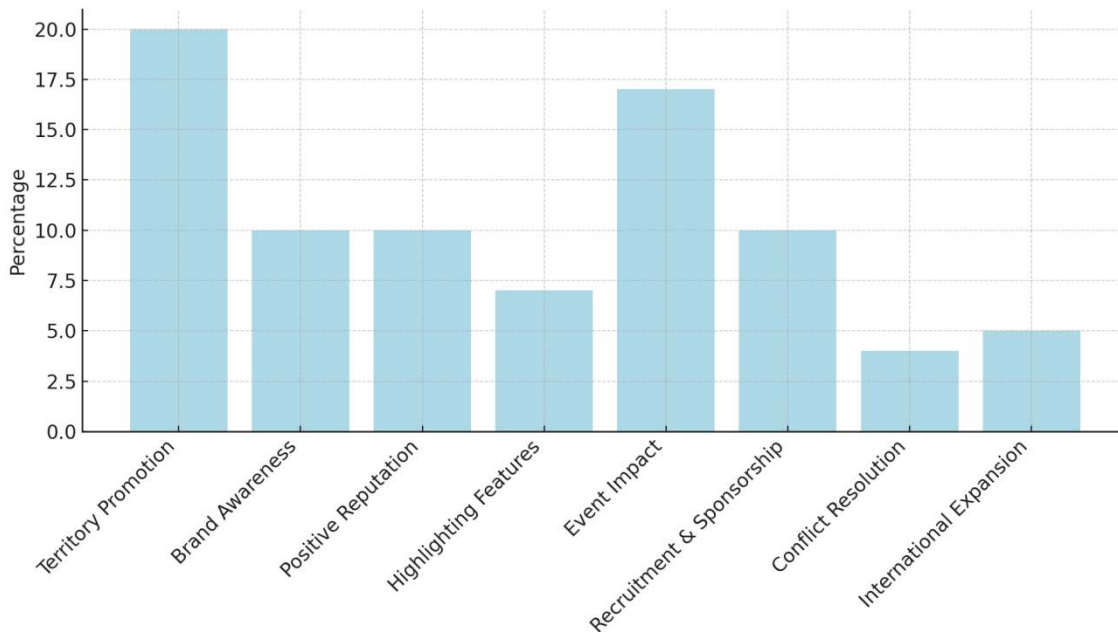


Fig. 6. Communication Goals of Publications 2022–2024
Source: authors

The analysis shows that the most in-demand goal in the creative industries is the promotion of territories (20 %). Supporting the long-term nature of interstate interaction is the maintenance of brand recognition of creative industry companies (10 %), creation of their positive reputation (10 %), and the creation and positioning of distinctive features (7 %). The identified specifics and set of communication goals indicate a sufficient maturity of creative industry projects, characterized by branding strategic thinking rather than product-focused thinking (product as a communication goal was recorded in only 8 % of publications). The strategic nature and activity

are confirmed by the reflected need in publications to attract valuable new employees and sponsors to the creative industries (10 %). The goal of enhancing the effect of conducted events (17 %) indicates a very active presence of the creative industries of India and Russia in the information field and public life.

The percentage of publications about social conflicts related to creative industries is minimal (4 %, categorized as “Resolution of conflicts and misunderstandings in society”), which suggests a stable situation in the creative industries and society.

It is worth noting that only 5 % of publications are devoted to the topic of companies entering international markets, despite the relatively high international vector in internet media discourse (23 %, see [Figure 5](#)). Russian public organizations in the context of Indian and Russian creative industries in domestic internet media see [Figure 7](#).

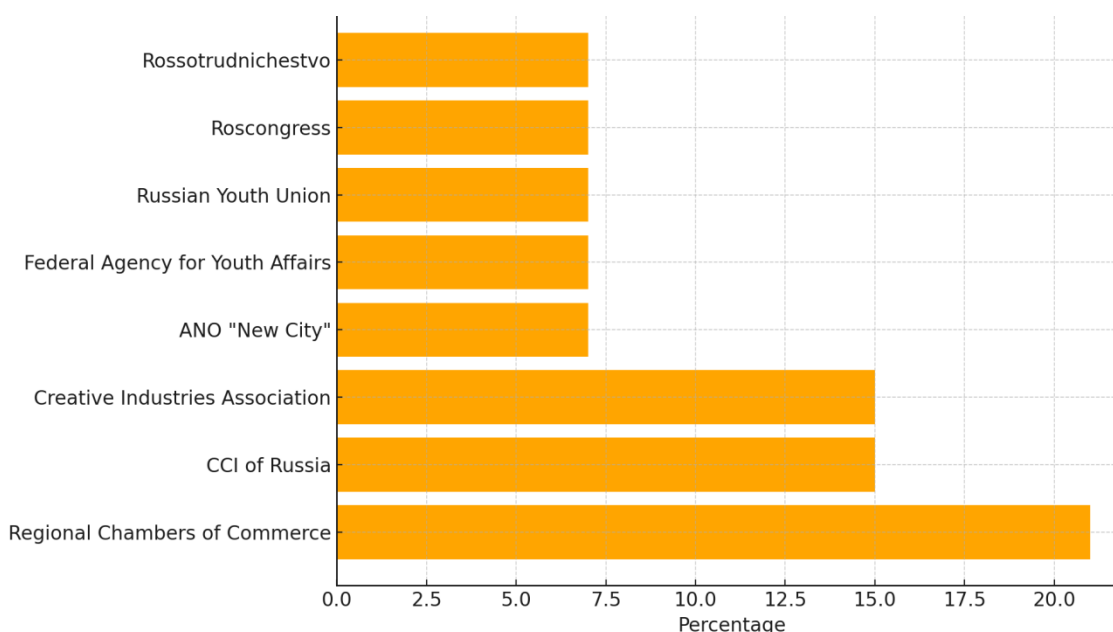


Fig. 7. Russian Public Organizations in the Context of Creative Industries of Russia and India in Domestic Internet Media, 2022–2024

Source: authors

The public organizations actively present in the studied media agenda are the regional Chambers of Commerce and Industry (CCI) (21 % of publications) and the Russian CCI (15 %), confirming the significance of creative industries for the economy, business, and society at both national and regional levels. The presence of the Creative Industries Association in the media space on par with the Russian CCI (each with 15 % of publications) demonstrates the equal demand for creative industries, which today operate as a distinct field of activity, and highlights their dual importance not only as an economic factor but also as a source of creativity and innovation.

Organizations mentioned in 7 % of publications each such as the Autonomous Nonprofit Organization “Creative Industries Center ‘New City’,” the Federal Agency for Youth Affairs (Rosmolodezh), the Russian Youth Union, Roscongress, Rossotrudnichestvo, and others are public organizations not related to creative industries directly. This suggests a fairly even distribution of the Indo-Russian creative industries theme among socially active Russians, including young people. International organizations in the media field of Russian and Indian creative industries see [Figure 8](#).

The leader in the number of publications in Russian internet media on the studied topic is the BRICS (55 % of publications). A small number of publications relate to the UN (7 %), the Shanghai Cooperation Organization (3 %), and the European Union (3 %), indicating that, overall, the creative industries of India and Russia operate in a friendly media environment within the BRICS context; the presence of unfriendly states in the discourse is minimal (EU, 3 %).

Media activity related to BRICS nations appears productive since Russia and India are founding members of BRICS. The development of BRICS+ enables scaling the real experience of Indo-Russian creative industries and their media coverage on a global scale.

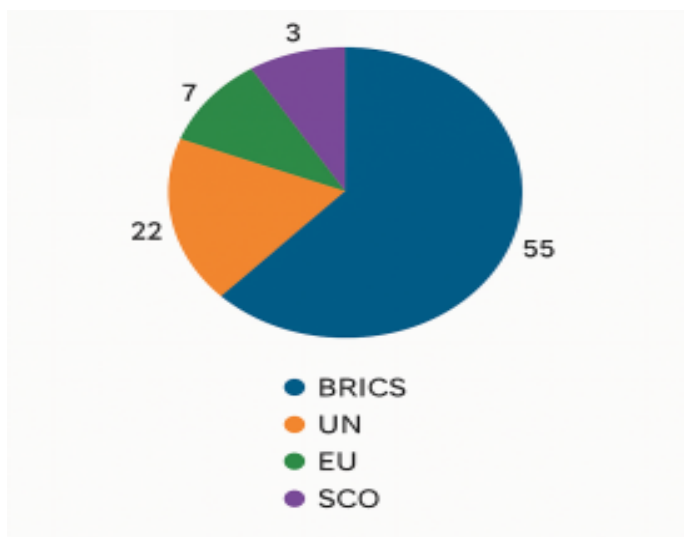


Fig. 8. International organizations in publications about creative industry projects of India and Russia in Russian internet media, 2022–2024

Source: authors.

Despite the international parameters of the search query, 22 % of publications do not mention any international organization, which indicates a high level of autonomy in India-Russia interaction in the creative industries sector. Official persons in internet publications on the creative industries of India and Russia [Figure 9](#).

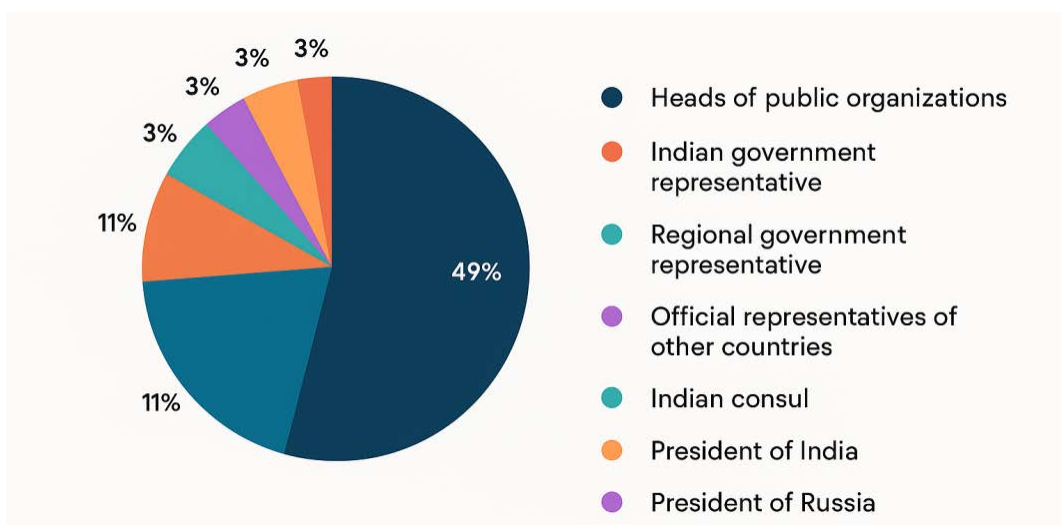


Fig. 9. Mentions of Official Persons in Internet Publications on the Topic of India-Russia Creative Industry Projects, 2022–2024

Source: authors.

Among the officials present in the media space, leaders of public organizations dominate, generating nearly half of the news events (49 %), which indicates the demand for and very active functioning of the creative industries. The current analysis focuses primarily on institutional actors, overlooking the role of creative labour, informal networks, and digital creators. Creative industries are characterised by precarious labour conditions and uneven access to resources, which shape participation in global cultural exchange ([Banks, Hesmondhalgh, 2009](#)). As noted earlier, the highest media activity is shown by public organizations such as regional Chambers of Commerce and Industry, the Russian CCI, and the Creative Industries Association, suggesting the demand for media personalities who are actively developing projects both regionally and nationally.

Official representatives of the Indian government and regional authorities are equally represented in the media field (11 % each), reflecting an equal level of attention to the issues by the

official authorities of India and Russia. On the other hand, compared to the high percentage of news generated by public organizations and their representatives, these data reveal significant potential for the development of the official discourse. This situation appears somewhat paradoxical since a large number of analyzed publications (47 %) were classified under the power discourse according to Medialogia's thematic contextual classifier. However, this can be explained by the specifics of official protocols involving personal participation of representatives from both countries in the public discourse.

It is worth noting that representatives of other countries also generate 11 % of news events in the media space, indicating an expansion of partnership communications between Russia and India in the creative industries.

Leaders from India and Russia are equally represented (3 %), demonstrating their equal participation in the creative industries of both countries. Similarly, representatives of the Russian government and the Indian consul each hold 3 % presence in the media space. Thus, representatives from all levels of government are involved in these processes overall.

5. Conclusion

Since 2022, in the New Reality, India and Russia creative industries have begun to be actively covered in Russian internet media (2022–2024, n = 400 publications). Creative industry projects are primarily covered in connection with the BRICS countries' agenda, developing communications with other friendly countries, and are almost unaffected by the influence of unfriendly states. Media publication activity records the spread of projects across all federal districts of the Russian Federation, involving officials at all levels within an active discourse of government structures. The regional and All-Russia Chambers of Commerce and Industry, and the Creative Industries Association play a leading role in shaping public discourse on the topic.

Indo-Russian creative industry projects demonstrate sufficient autonomy in the internet media space. The dominance of ICT and literature and arts topics reflects a harmonious balance between technological innovation and traditional vectors in the functioning of creative industries. Moreover, in the 400 articles analyzed, there were 496 mentions of various creative industries, meaning that more than one sector was described in a single article. This indicates an expanding presence of Indian and Russian creative industries agenda in Russia and supports the comprehensive development of this field.

The communication goals stated in the publications, such as territorial promotion, are strategic because they relate not only to forming an attractive territorial brand and developing tourism as one of the creative industries but also aim at long-term strategies for interaction and good-neighborly relations between India and Russia. Supporting the long-term nature of interstate interaction is the maintenance of brand recognition of creative industry companies (10 %), creation of their positive reputation (10 %), and creation and positioning of distinctive features (7 %). Product as a communication goal was recorded in only 8 % of publications).

A comparative analysis of the quantitative results with the value matrix created at the study's initial stage (based on an analysis of relevant current normative documents of Russia and India) showed that all the main values and parameters of the creative industries were presented in the publications. In particular, the analysis revealed the dominance of intercultural interaction themes (35 %) and the development of the cultures of the peoples of India and Russia (23 %), demonstrating strong foundations of historically established intercultural communication. The desire to uphold traditional values and a culture of just world order (19 %) reflects an active position of creative industry actors in the public sphere, ready to defend traditions and values. Only 7 % of publications were related to restoring the historical value of culture; in other words, this issue is not topical since the historical value of culture is considered a given and does not provoke debate.

The minimal percentage of publications about social conflicts related to creative industries (4 %) suggests a stable situation in the creative industries and society overall. The limited visibility of conflict in media narratives should be interpreted with caution. As Hallin and Mancini (Hallin, Mancini, 2004), suggests, media systems often reflect dominant political and institutional alignments, which may marginalize dissenting perspectives. Thus, the absence of conflict may indicate discursive filtering or narrative alignment, rather than an absence of underlying tensions.

Thus, the working hypothesis of the research is confirmed: analysis of Russian internet media (2022–2024) shows that in the New Reality, creative industries as a cultural-economic dual

phenomenon represent a sphere of strategic communication of India and Russia, based on historical and cultural values, traditions and parity interaction.

While the study confirms the growing importance of creative industries in Indo-Russian relations, it is equally important to recognize that these industries operate within broader structures of power, mediation, and epistemic hierarchy. Future research should move beyond descriptive analyses of values and explore how narratives are produced, circulated, and contested within global and regional media ecosystems

The present study opens prospects for further value-based research into creative industries, comparative media narratives, and digital diplomacy within BRICS and beyond.

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Integration of Digital Education, Critical Thinking and Media and Information Literacy in School Education Programs of General Upper Secondary Schools in Slovakia

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Abstract

Digital and media environments have become an integral part of young people's everyday lives, which increases the importance of developing digital competences, critical thinking, and media and information literacy within formal education. This study focuses on analysing how these areas are integrated into school education programs of general upper secondary schools in Slovakia. The research is based on a qualitative content analysis of 82 school-level curricular documents from all regions of the Slovak Republic. The findings indicate that digital education is addressed more frequently than media and information literacy, with the emphasis placed mainly on basic user skills and the technical use of digital tools. Critical thinking appears relatively often in curricular documents, particularly within general educational aims; however, it is commonly formulated at a declarative level without clear methodological guidance or evaluation criteria. Media and information literacy is integrated mostly implicitly or marginally, which results in uneven conditions for the development of these competences among students. The study highlights the need for more explicit curricular anchoring of cross-curricular competences, stronger coordination at the school level, and clearer frameworks for their systematic development and assessment in general upper secondary education.

Keywords: digital education, critical thinking, media and information literacy, curricula, school education programs, general upper secondary schools.

1. Introduction

The digital technology proliferation has gradually changed the way in which education works on a daily basis. Learning is not restricted to the walls of institutions and learners come across information all the time, often not in some formal way of education. Access to online material is now a lot easier, and immediate, but trustworthiness ranges widely and isn't always simple to gauge. Thus, students work in an environment in which there is plenty of information, but it's of mixed quality and value. Education is thus being increasingly challenged not only to deliver the substance of cognate subjects. The ability to critically question media messages; evaluate the reliability of sources; detect persuasive or manipulative aspects and use digital tools thoughtfully has increasingly become associated with civic responsibility and participation in modern society (Head, Eisenberg, 2010; Lewandowsky et al., 2012; Lewandowsky, van der Linden, 2021; OECD, 2021; Tinák, Gálik, 2026).

From a theoretical and curricular perspective, these challenges are closely linked to the way digital education and cross-curricular competences are conceptualised within formal schooling. The digital continuum has become an essential component in the training of students for life in a

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society which is strongly influenced by technological development, digitalization of everyday lives operations, automation and dissemination of online communication means. Within the school context, digital education is frequently confined to learning basic user skills and using information and communication technologies, whereas in a wider framework it also covers training students for more advanced competences such as critical processing of information online, ensuring their own digital security or the ability to produce content, solving problems digitally, reflecting on social impact of technology use (Vuorikari et al., 2022).

It is this broader concept of digital education that is important for the development of digital literacy as a cross-curricular competence that goes beyond the scope of a single subject and should be applied in various areas of the educational process.

In the analysed school curricula, digital education often appears mainly in connection with subjects such as computer science or the technical support of teaching, with less attention paid to the systematic development of advanced digital competencies. In practice, this means that although schools in Slovakia use digital tools in teaching, there is only limited mention in the documents of how digital competences should be developed, coordinated, and assessed. This approach can lead to uneven development of digital competences among students, as the quality and intensity of digital education becomes dependent on the individual approach of teachers, the material equipment of the school, or its internal strategies.

The educational process in general upper secondary schools plays an important role in the students acquiring digital skills, develop critical thinking mindset, and gain media and information literacy. School education programs are fundamental curricular documents that reflect the pedagogical intentions of the school, its values and conceptual foundations, as well as the way in which educational goals are translated into individual subjects, content units, methods, and assessment methods. An analysis of these curricular documents therefore makes it possible to identify whether the cross-curricular competencies are embedded explicitly, implicitly, or not at all.

The aim of this study is to examine the extent and manner of integration of digital education, critical thinking, and media and information literacy into school education programs at general upper secondary schools in Slovakia. The research is based on a qualitative content analysis of 82 school curricula and examines several dimensions of curricular integration – from the content anchoring of competences, through teaching and assessment methods, to personnel and technical resources and mechanisms for coordination between subjects.

The contribution of the study lies in the systematic mapping of the current state of implementation of key competences in school curriculum documents and in the identification of risks associated with a predominantly declarative and unsystematic approach to media education. At the same time, it provides recommendations for the creation of school concepts, methodological support for teachers, and the anchoring of the assessment of these competencies within curricular documents.

2. Materials and methods

The data source for this study was a dataset created as part of a comprehensive research project focused on content analysis of general upper secondary school curricula in Slovakia. This research covered a representative sample of general upper secondary schools and secondary vocational schools (Vrabec, Hladiková, 2025). Our study focuses exclusively on the general upper secondary school's segment.

The aim of the research strategy is to systematically map the presence, extent, and manner of integration of selected cross-curricular competencies in curricular documents and to identify patterns that recur in the analysed materials. The analysis focused on the integration of three key areas: digital education, critical thinking, and media and information literacy. Emphasis was placed not only on whether these areas appear in the documents, but especially on their explicitness, conceptual anchoring, methodological elaboration, evaluation strategies, and organizational conditions for their implementation.

The methodology is based on the assumption that curriculum documents reflect the pedagogical intentions of the school, its internal strategies, and values, while also providing a suitable basis for comparative reasoning and identifying differences between different types of schools. At the same time, school education programs do not provide direct evidence of the actual implementation of competencies in teaching, but they are an important indicator of school concepts, planning, and declared goals.

The analysed sample consisted of 82 school curricula from general upper secondary schools in all regions of the Slovak Republic. The process of content analysis of curricular documents took place during May and June 2025. The selection was carried out as purposive sampling, with the aim of covering regional diversity and minimizing the risk of geographical bias. The original research sample on which this study is based also included secondary vocational school curricula, allowing for a broader comparative analysis of the two basic types of secondary education. However, this article presents and interprets only the findings relating to general upper secondary schools. The reason for this is to provide a more detailed analysis of one type of school, as general upper secondary schools represent a specific curricular context with a different subject structure, graduate profile, and pedagogical expectations in relation to cross-curricular competencies. The sample designed in this way provides sufficient scope for identifying differences in the curricular integration of the competencies examined between general upper secondary schools with different educational concepts, internal subject structures, and pedagogical goals.

From a methodological point of view, the nature of the sample is also relevant in that it includes schools from different regions and contexts, thereby minimizing the risk of regional bias and increasing the validity of the conclusions in terms of the overall picture of the integration of the examined areas in general upper secondary education in Slovakia.

The analytical framework was based on the concept of cross-cutting competencies and the need to distinguish between formal declarations and actual curricular integration. For the purposes of content analysis, several dimensions were identified that enable the assessment of the quality of the integration of digital education, critical thinking, and media and information literacy in school education programs:

Content integration of competencies – the presence and specific anchoring of the areas examined in the objectives, thematic units, subjects, and graduate profiles.

Explicit and implicit integration – distinguishing whether competencies are named and methodically operationalized or whether they appear only indirectly in activities and general formulations.

Methods and didactic strategies – identification of pedagogical procedures through which competencies are to be developed (e.g., project-based teaching, discussion, teamwork, working with information sources).

Assessment and feedback – methods of assessing student performance in cross-curricular competencies and the existence of assessment criteria.

Staff and material resources – availability of specialist staff, IT infrastructure, digital support for teaching and learning.

Coordination and continuity – presence of mechanisms for linking cross-curricular competences development in subjects and grade levels (e.g., school strategy documents, methodological teams, school policy documents).

Risk and recommendation profiles – problems and deficits from the perspective of curricular anchoring, measures to be taken towards the systematic implementation of competencies.

This analytical framework enabled not only a descriptive analysis of the occurrence of competencies in documents, but also an interpretation of the quality of their integration in broader pedagogical and organizational contexts.

The content analysis was carried out through systematic study and analytical evaluation of relevant parts of school education programs (school objectives, graduate profile, subject characteristics, thematic plans, forms and methods of teaching, assessment, cross-curricular themes, school projects, and material and technical support). The identified statements and curricular formulations were interpreted in accordance with an analytical framework focused on the degree of explicit and implicit integration of digital education, critical thinking, and media and information literacy, as well as their methodological elaboration, assessability, and coordination at the school level.

Data processing took place in several steps. In the first phase, individual school education programs of general upper secondary schools were analysed and elements related to the examined competencies were identified in terms of content integration, didactic strategies, evaluation, and organizational conditions of implementation. In the second phase, the findings were synthesized into thematic areas according to the dimensions under study, with an emphasis on identifying recurring patterns of competence integration and capturing differences in the degree of their explicitness and conceptual anchoring. In the third phase, a qualitative interpretation of the

findings was carried out, with the aim of identifying the dominant trends in the curricular treatment of the areas studied and formulating implications for the development of school concepts and curricular documents.

The interpretation of the findings was based on the qualitative logic of analysis, in which it is essential not only to record the occurrence of certain elements in the documents, but also to identify their meaning, context, and degree of methodological elaboration. The conclusions therefore aim to identify the most significant patterns of integration of the areas examined in general upper secondary school's curriculum documents and to formulate recommendations for a more direct anchoring of cross-curricular competences, their coordination and evaluation within the school curriculum.

3. Discussion

From a curriculum standpoint, it is therefore important that digital education not be seen only as a technology skill or as an aid to teaching, but rather as both a package of knowledge, competencies and attitudes which enable people to operate in the digital environment critically, securely and responsibly (Castañeda, Villar-Onrubia, 2023; Martínez-Bravo, et al., 2022). Meanwhile, digital education provides the opportunity to promote the development of other important skills, especially critical thinking and media literacy – increasingly significant in a world of media (European Commission, 2022). Critical thinking is referred to as one of the most common crosscutting skills in strategy and curriculum documents adopted by the educational field.

In general, it is associated with the ability to analyse information, argue logically, identify biases, assess the credibility of sources, and reflect on one's own cognitive processes (McGrew et al., 2018). In the school context, critical thinking is often formulated as an intention to develop independent and analytical thinking in students, to encourage discussion, creative problem solving, and the ability to verify information (Ilomäki, et al., 2023; Wineburg, McGrew, 2019).

The findings of the content analysis show that critical thinking appears relatively often in the analysed school documents, but its curricular anchoring is mainly declarative in nature. The analyzed documents often mention critical thinking as a goal or value that is part of the graduate profile, while specific methodological procedures, forms of assessment, or descriptions of teaching activities that would systematically develop critical thinking are less common. Such "implicit integration" poses a significant risk because it leaves the implementation of critical thinking to the individual decisions of teachers, thereby reducing the chance of its consistent development across subjects (Ballaera et al., 2021; Lombardi et al., 2021; Murphy et al., 2025). Both the professional literature and the practice of curriculum design repeatedly point out that the development of critical thinking requires not only its declarative inclusion in educational goals, but also its operationalization into specific performance standards, learning tasks, and assessment criteria. If critical thinking remains only a general goal, there is no mechanism to verify whether it is actually developing in students. It is important to examine how teachers integrate critical thinking skills into existing instruction across subjects and grades, and the effectiveness of these educational strategies may be weakened if students are only provided with a single course or one-time workshop (Breakstone et al., 2021).

We thus call for a shift of critical thinking from being an idea to the activities around its teaching and learning, which ought to be included in curricular documents and school development plans. Media and information literacy is a constellation of competencies that people need in order to explore the media and information environment effectively, understand and critically evaluate the content they receive, comprehend how it is created, decipher the complex means by which it can be manipulated, used in creating messages or information (UNESCO 2013; UNESCO 2021). In the context of digital communication and algorithmic content provision as it is prevalent today, media and information literacy is bound up with critical thinking; the two competences reinforce one another in terms of being able to act with regard to information, and in terms of opposing informational risks such as disinformation, propaganda, hoaxes or commercial manipulation (Wuyckens et al., 2022).

Media and information literacy often appears only indirectly in the analysed school curricula, or in connection with individual activities (e.g., working with sources, using media as a teaching aid), without clear naming and systematic anchoring. This situation can lead to media education not being planned as a strategic part of the educational process but remaining a marginal activity dependent on the individual abilities and interests of teachers.

In the curricular and pedagogical context, media and information literacy should be understood as a cross-cutting competence that can be developed in various subjects (e.g., language education, social sciences, history, civics, computer science), but it requires coordination and conceptual management (Rojas-Estrada et al., 2024). Shortcomings have been identified precisely in the area of systematization, as the explicit inclusion of media and information literacy in the content and objectives of several subjects is not common. The absence of a clear anchor also weakens the possibilities for assessment, as there are no defined expected outcomes or criteria by which to monitor the development of competencies.

One of the key problems in the development of cross-curricular competencies in the school environment is the issue of their curricular integration (López-Rocha, 2020; Sagardia et al., 2018). Transversal competences such as digital education, critical thinking, and media and information literacy are transdisciplinary in nature – they do not belong exclusively to one area of education and cannot be developed in isolation. Effective integration therefore requires a clear definition of competences in curricular documents, their interconnection with the curriculum and activities in several subjects, methodological support for teachers, and coordination mechanisms at the school level (Eyal, Te'eni-Harari, 2023).

The research makes an important distinction between explicit and implicit integration of the competencies under study. Explicit integration means that competencies are named in documents, assigned to specific subjects or activities, and accompanied by indicators that allow their fulfilment to be monitored. Implicit integration is characterized by the fact that the competencies are present in activities or general formulations but are not directly identified and operationalized. It is precisely the dominance of implicit integration that is interpreted as a risk factor, as it weakens the possibilities for systematic development of competencies and contributes to their fragmentation.

Coordination across subjects and levels of education is also a key aspect (Cohen et al., 2024; Tonse, 2025). If cross-curricular competencies are developed in individual subjects without mutual coordination, there is a risk of redundancy (the same simple activities are repeated) or, conversely, gaps (some competencies are not covered at all). We therefore consider it important to recognize the need to create school strategies and conceptual frameworks that would unify the development of digital and media education and ensure its continuity. Evaluation is also part of such a framework – without defined criteria and evaluation tools, the development of competencies remains at the level of formulations.

It follows from the above that the quality of the integration of digital education, critical thinking, and media and information literacy into school curricula is not determined solely by the presence of these concepts in documents, but above all by the degree of their explicitness, methodological elaboration, coordination, and the possibility of evaluation. It is precisely these dimensions that form the analytical core of this scientific study and at the same time provide a framework for interpreting the findings in its other parts.

The results of the content analysis suggest that the competencies examined – digital education, critical thinking, and media and information literacy – are unevenly represented in school curricula and often mainly at a declarative level. This trend is particularly pronounced in the case of critical thinking and media and information literacy, which are often mentioned as general school objectives or as part of the graduate profile, but without clear methodological elaboration and evaluation. The findings thus point to a persistent curricular problem: although the competencies have been given "key" status, their translation into specific learning outcomes and pedagogical practices remains limited.

From a curriculum design perspective, the difference between declaration and operationalization is fundamental. Skills, if not explicitly related to the content and practices of subject areas individually, risk becoming disconnected objects of knowledge with their expend development the burden of individual stances (Fosco, Schussler, 2025; Marcotte, Gruppen, 2022). In practical terms, this means that the same learning targets may be met in wildly diverging ways from one school, department or classroom to another. It seems evident, consequently, that cross-curricular competences need to be addressed in a more systematic manner, with planning that is clear and coherent and closely associated with the assessment process (Okojie, et al., 2022; Højgaard, Solberg, 2023).

Digital education is most prominent in the analysed curriculum documents, but its content is often limited to technological aspects. High schools in particular mention digital technologies as a means of supporting teaching and as a domain of the subject of computer science. At the same time, the broader research sample of the original analysis showed that in vocational education,

digital education is more often linked to a practical context, which represents an important contrast to the general upper secondary school's environment. However, even in the case of vocational schools, digitization may remain limited to adaptation to work processes without more thorough development of broader digital competencies.

The findings thus point to the need to shift digital education from the technical use of tools to competence-oriented development, which also includes critical work with information, digital security, digital ethics, the ability to navigate the digital information environment, and developing students' abilities to evaluate online information (Yang, 2021). Without such a shift, schools may promote technological skills, but they will not sufficiently develop digital responsibility and critical digital participation.

Media and information literacy appears to be the most undervalued competency area in the analysed school curricula. Its weak presence can be interpreted as the result of several factors, primarily the absence of explicit curricular requirements, the traditional understanding of media as a supplement to teaching rather than as a separate subject of education, as well as the lack of methodological frameworks and teacher preparedness (European Commission, 2023; Goodman, 2021).

This may indirectly point to the risk that without systematic media education, schools are giving up one of their key functions in a digital society. Today, the media environment is the primary channel for socialization, the formation of values and political attitudes, while algorithmic content selection mechanisms can reinforce polarization and cognitive biases (Lebid et al., 2021). If media literacy is not an integral part of curriculum documents, students may be left to learn spontaneously "from the internet," which increases the likelihood of accepting manipulative narratives and misinterpretations (Novikov, Fedorov, 2022; Shevchenko et al., 2021; Luo et al., 2022).

A key common finding of the analysis is the dominance of implicit integration of cross-curricular competencies. Although competencies appear in documents, they are rarely clearly elaborated in such a way as to enable monitoring of their development and ensure continuity and coordination across subjects. This fact has practical implications: if a competency is not precisely planned, its development is random; if it is not coordinated, gaps arise; if it is not evaluated, it loses priority.

In light of the above, three related areas have been identified that need to be strengthened: (1) explicit curricular anchoring, (2) school coordination, (3) evaluation and feedback. These areas are a prerequisite for ensuring that digital education, critical thinking, and media literacy do not remain merely "ideals" of educational goals but are actually reflected in pedagogical practice.

Although the presented study focuses exclusively on general upper secondary schools, the interpretation of the findings can be supplemented by a contextual framework resulting from a broader research sample analysed in the original review (Vrabec, Hladiková, 2025). This also included secondary vocational schools, which allows some of the findings to be perceived as part of broader systemic trends in secondary education. The broader sample shows that the differences between school types are not primarily reflected in the declared importance of the competencies under investigation, but rather in the degree of their clarity, coordination, and assessment. While vocational schools have greater potential to link digital competences to a practical context, general upper secondary schools have favourable conditions for the interdisciplinary development of critical thinking and working with resources. However, both types of schools continue to face a common curricular problem: the dominance of implicit integration, the absence of assessment tools, and limited mechanisms for coordinating cross-curricular competencies at the school level.

4. Results

In the Slovak general upper secondary education system, general upper secondary schools are profiled as schools providing general education with an emphasis on preparing students for university studies. In terms of the competencies examined (digital education, critical thinking, and media and information literacy), this type of school appears to be naturally suited to their systematic development, as the general educational nature of general upper secondary schools allows for the expansion of cross-curricular topics across subjects, the promotion of analytical thinking, and the development of argumentation in various disciplines.

However, content analysis shows that the integration of the examined competencies in general upper secondary school's curriculum documents is often uneven and, in many cases, based on declarative formulations rather than clearly operationalized curriculum goals. Digital education appears in the documents mainly through the subject of computer science or through general

statements about the use of digital technologies in teaching. Critical thinking is relatively common in these documents, but mainly as part of the graduate profile or general school objectives. Media and information literacy is the least visible compared to digital education and critical thinking, and in many documents, it is not clearly named.

These trends imply that although there is consensus about the importance of these competences, their curricular embedding in secondary education is often very scattered. This may lead to competencies being learner-dependent (on certain teachers or subject committees) and that a lack of coherence can exist on the school level.

Digital education in general upper secondary school curricula

Digital education is overwhelmingly discussed in relation to computer studies, or the use of digital tools for teaching. In documents, there is often a reference to the equipment (computer classrooms, interactive white boards, internet access) that are made available as well as efforts to integrate digital technologies into teaching. Nevertheless: what this typically entails is the provision of equipment and organisational possibilities, only rarely with explicit commitments as to which digital competences pupils should acquire beyond learning basic computer skills.

In some curriculum documents, digital education is also linked to the development of working with information sources, searching for information, creating presentations, or using digital tools to support project-based teaching. Nevertheless, we consider it important to point out that higher levels of digital competences (e.g., digital security, the ability to critically evaluate online content, problem solving in the digital environment, digital ethics) appear only rarely or implicitly in general upper secondary schools' documents. In terms of curricular quality, the prevailing model is one in which digital education represents a "supporting infrastructure" for teaching, rather than a clearly structured area of competence with defined goals and assessment.

Critical thinking as part of the graduate profile and school objectives

Critical thinking is a frequent concept in the analysed curricula, especially in the graduate profile section or in the school's objectives. The documents enshrine support for analytical thinking, independence, argumentation, and problem-solving skills. Such formulations may indicate that high schools perceive critical thinking as an integral part of general education.

However, the analysis shows that critical thinking is often defined only in general terms in the documents, without being assigned to specific subjects or thematic areas and without a formal description of methodological procedures that would ensure its systematic development. As a result, critical thinking appears in general upper secondary school's curriculum documents more as a value statement than as a pedagogically planned competence. The research therefore points to the need for its operationalization, for example through the specification of teaching tasks focused on argumentation, source analysis, or working with different interpretations.

Media and information literacy: marginal and implicit integration

Media and information literacy is the least explicit in high school curricula. It appears rather indirectly in documents – for example, in connection with working with information sources, using teaching materials from the online environment, or research tasks. However, the concept of media literacy or media education is absent in many cases or appears only sporadically.

This situation is problematic in terms of the current information environment, as high school students – as a target group that intensively uses digital and social media – are exposed to an increased risk of manipulation, misinformation, and information overload. If media and information literacy is not explicitly anchored in documents, there is also no framework for its systematic development and evaluation. The findings therefore suggest that media and information literacy is the "weakest link" in the triad of competencies examined.

Teaching methods and didactic strategies

In terms of didactic approaches, the analysed school education programs often emphasize the effort to apply activating methods and develop competence-oriented teaching. The documents mention the use of discussion, group work, project tasks, and problem solving, which are considered appropriate tools for developing critical thinking in pedagogical theory and practice. In the context of general upper secondary schools, such methods are naturally associated with social science subjects, language education, and natural science disciplines, where the interpretation of knowledge, argumentation, and analytical work with sources are expected.

Although the methods mentioned are referred to quite often in the documents, their inclusion is in many cases mainly descriptive and declarative in nature. The methods are articulated in the general didactic principles of the school; however, this is seldom connected to

explicit learning-goals or an operationalisation of trans-disciplinary competencies. This resonates because school curricula tend to project the image of "school" as a setting conducive for active learning, however, no detailed methodological guidelines on how to systematically implement such strategies are provided empirically. Of special importance is the topic of media and information literacy, for which concrete didactic tools would need to be developed (e.g. analysis of media texts, source checking, comparison of frameworks and reflection on persuasive means). But the studies indicate that such practices are not well enough articulated and integrated in a systemic way within general upper secondary school curricula. Media education thus remains largely implicit and scattered across individual activities, without a clear didactic concept.

Assessment and feedback in the area of cross-curricular competences

Assessment is a key element of the curricular implementation of competences, as it allows for verification of whether the set educational goals are being met and provides both students and teachers with feedback on the level of outcomes achieved. In the context of cross-curricular competences, however, assessment is methodologically more demanding than the assessment of factual knowledge, as it requires a clear definition of performance standards, criteria, and appropriate tools.

Research results indicate that in high school curriculum documents, assessment is most often presented in the traditional framework of subject performance assessment (e.g., written assignments, oral examinations, testing). Transversal competences, like critical thinking or media and information literacy, are only indirectly tested – for instance by reference in general objectives the independent individual work activity argue skills working with sources. Explicit references to tools for assessment mentioned within the documents aren't so frequent, initially related to critically analysing information and media to safe use in digital environment. This scenario indicates that, albeit the relevance to develop dimensions across domains, assessment has not explicitly been structured in a systematic manner to support them. If competences are not unambiguously evaluated, it contributes to their underestimation in practical training. In this context, it is possible to implicitly point to the need to expand assessment frameworks to include forms that would allow the development of cross-curricular competences to be captured, for example through portfolios, project outputs, rubrics, and formative assessment.

Material, technical, and personnel conditions

The integration of digital education and media literacy is significantly influenced by the material and technical equipment of the school and its personnel capacities. School education programs at the general upper secondary schools often mention the existence of technical facilities such as computer classrooms, interactive whiteboards, multimedia aids, and internet access. From the perspective of the formal curriculum framework, digital technologies are presented as a natural part of teaching, with their use in various subjects being declared.

Findings suggest that technical equipment alone is not sufficient unless it is accompanied by a systematic pedagogical concept, methodological support for teachers, and well-thought-out development of digital competences. The documents rarely contain specific information on the professional development of teachers in the field of digital and media literacy, on training, workshops, or systematic capacity building. This again reinforces the risk that the integration of cross-curricular competencies will depend on the individual abilities and motivation of specific teachers.

At the same time, a trend can be identified whereby the staffing of digital education is often associated primarily with IT teachers or internal ICT coordinators, while media literacy is less frequently considered an area requiring specialized competences and methodological guidance. Such a narrow understanding can lead to media and information literacy remaining outside the systematic focus of the school.

Coordination and continuity of competence development within the school

The coherence and continuation of cross-curricular competence integration are quality-absorbing features. If digital education and critical and media literacy are consolidated without horizontal coordination among different subjects, there is a complex possibility that the students are exposed to an isolated set of activities, with no gradual development of their competence. School strategies, methodological plans, and responsibilities are hardly defined or coordinated explicitly through high school curriculums. Some documents refer to project days, theme weeks or interdisciplinary activities but not always in relation to clearly articulated goals in the field of developing media, information and digital literacy. Coordination is often implicit, relying on the

presumption that single subject teachers will acquire interdisciplinary skills "naturally" in their own subjects. But this method won't necessarily maintain evenness or quality.

5. Conclusion

The aim of this study was to analyse the extent and manner of integration of digital education, critical thinking, and media and information literacy into school curricula at general upper secondary schools in Slovakia. Research conducted through qualitative content analysis of 82 school curricula shows that the integration of the examined competencies is uneven and often predominantly indirect.

Based on the results of the content analysis of school education programs, several recommendations can be formulated for the more systematic integration of digital education, critical thinking, and media and information literacy into curricular documents and subsequently into teaching practice. The key problem is primarily the lack of methodological development and the absence of coordination and evaluation mechanisms relating to competencies. For this reason, our recommendations are primarily aimed at strengthening explicit integration, creating school strategies, and supporting the professional development of teachers:

Strengthening the explicit integration of competencies within curricular documents. The first recommendation is to move from predominantly declarative and mediated formulations to the explicit curricular anchoring of the competencies under review. This means, in particular:

- Clearly identifying digital education, critical thinking, and media and information literacy as cross-cutting competencies at the level of school goals and graduate profiles,
- Linking these competencies to specific subjects, thematic units, and learning outcomes,
- Providing examples of activities that are designed to develop these competencies.

Implicit integration creates room for flexibility, but at the same time weakens systematicity and assessability. The clear anchoring of competencies provides the basis for a coordinated approach and reduces the risk that the development of competencies will remain a matter of random individual initiatives.

Develop policies and coordination methods for schools. The second guideline focuses on the reinforcement of school-based coordination of cross-curricular competence development. The study found no provision in the reviewed documents for mechanisms to ensure continuation and systemic foundation of competency development from one grade/subject area to another. In a practical way, this means:

- Establishing an internal school development plan with regard to digital and media education;
- Defining competency targets for each grade (principle of progression);
- Initiating collaborative work between subjects (e. g. joint projects and interdisciplinary tasks);
- Setting up a post/collaborative team responsible for the coordination of cross-curricular competencies.

These are the steps that can be taken to prevent competencies from being treated as single entities and taught separately.

Expanding didactic approaches and methodological support for teachers. The analysis shows that although schools often declare the use of activating methods (projects, discussion, group work), these methods are less often linked to specific competence outcomes. From a practical viewpoint, therefore, it would be recommendable to:

- Define methodologically how individual subjects can acquire digital competences, critical mind and media education,
- Support teachers in working with media content (analysis of media texts, verification of information, critical reading),
- Develop the ability of teachers to implement activities focused on detecting manipulation, argumentation, and critical evaluation of sources.

An important aspect is also methodological support for teachers in the area of media and information literacy, which appears to be the least developed in the documents. Without systematic methodological guidance, media literacy may remain a marginal and underdeveloped area.

Visibility and expansion of the assessment of cross-curricular competences. One of the main problems with the integration of competences is the absence of their assessment. If competences are not directly assessed, the motivation to develop them systematically is weakened.

In practice, this means providing:

- Assessment criteria and benchmarks on cross-curricular competences to be added to curricular documents,
- Greater application of formative assessment (assessment for learning), portfolios, project outcomes and self-assessment,
- Rubrics/assessment grids allowing students' critical thinking or media literacy to be assessed.

Evaluation, in our view, is a critical aspect of media literacy as it enables us to know whether students can differentiate between fact and opinion, judge the credibility of sources, and spot errors of logic and manipulation.

Step by step enhancement of media and information literacy. Given that media and information literacy appears to be the most marginalized area in the analysed curricula, it needs to be given special attention. Research suggests that media education should be understood as both a protective and a developmental competence. Practical recommendations include:

- Explicit integration of media and information literacy into multiple subjects (language subjects, social science subjects, computer science) (UNESCO, 2021),
- Implementation of projects focused on critical evaluation of information, factchecking, and media analysis,
- Development of digital safety and responsible behaviour in the online space.

The findings of the authors support the view that media literacy should not be just a supplementary topic, but part of systematic curriculum planning.

Overall, the findings of the analysis point to several recurring patterns in the curricular integration of the examined competencies. Digital education is most visible in general upper secondary school curricula, but it often remains limited to the technical provision of teaching, the use of digital tools as teaching aids, and the development of basic user skills. More advanced dimensions of digital competencies – especially digital security, digital ethics, and critical work with information in the online environment – are less prominently anchored in the documents. Critical thinking is relatively frequent in curricular documents, but it most often appears in the context of general school objectives or graduate profiles, while its methodological operationalization and assessment frameworks remain limited. Media and information literacy is the least formally integrated area of competence, which signals a risk of insufficient preparation of students to navigate a complex and often information-risky digital environment.

The results also indicate a more general curricular problem: the systematic development of cross-curricular competences is not well served, because subject coordination was limited, progressive planning had not been developed over each academic year and there were hardly any assessment opportunities. Therefore, the implementation of digital education and the development of students' critical thinking and media literacy in practice can rely on a teacher's individual ways which undermines the uniformity and equity of educational opportunities across schools.

In the context of the broader research framework of the original analysis of general upper secondary schools (Vrabec, Hladíková, 2025), it can also be stated that the identified weaknesses – the dominance of implicit integration, the absence of assessment tools, and limited coordination – are potentially systemic in nature and likely extend beyond the scope of a single type of school. This points to the need to strengthen strategic planning of cross-curricular competences at the school level, expand methodological support for teachers, and supplement curricular documents with explicit outcomes and assessment criteria that will enable effective monitoring of the development of students' digital, media, and critical competences.

Although content analysis of school education programs provides a relevant picture of the curricular anchoring of the competencies under investigation, several limitations need to be considered.

First, school education programs are formal curricular documents that may not directly reflect actual implementation in teaching. There may be a difference between the declared goals of the school and everyday teaching practice, which may vary depending on the quality of school management, the professional competencies of teachers, or material conditions.

Second, qualitative content analysis is an interpretive method that, despite its systematic analytical framework, involves a certain degree of research judgment. Although the research worked with clear dimensions (explicitness/implicitness, methods, evaluation, coordination), it is

possible that some elements of competencies may be embedded in documents with non-standard formulations or in sections that are not always directly comparable.

Third, the study is centred on documents circulating during a certain time frame and fails to capture any schools' dynamic strategy developments or innovative practices. The future research thus needs to concentrate on triangulation such as interviews with teachers, in lesson observation, teaching materials analysis, or the measurement of learner outcomes.

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Digital Literacy and Information Seeking Behavior in Specialized Higher Education: A Data-Driven Study of Maritime University Students

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Abstract

This study investigates the connection between information seeking behavior and digital literacy among maritime university students. Despite the recognized importance of digital competencies, empirical research in specialized academic fields remains limited. A cross-sectional survey of 235 Greek maritime students was conducted, integrating Wilson's information-seeking model with the DigComp 2.2 framework. Data were analyzed using descriptive statistics and Exploratory Factor Analysis (EFA).

The results show that while students possess strong basic digital skills, such as using general search engines, their advanced competencies in retrieving and evaluating scholarly literacy strongly correlates with the use of specialized maritime sources. Furthermore, digital competencies, including ICT use and problem solving, operate as an interconnected skill set.

While limited by its cross-sectional nature and specific geographic sample, the study provides valuable empirical evidence. It highlights the urgent need to integrate structured digital literacy training into maritime curricula, focusing on advanced scholarly research skills. Ultimately, this research extends existing information behavior models into domain-specific education, offering practical insights to better prepare maritime students for digitally intensive professional environments.

Keywords: information seeking behavior, information literacy, digital competencies, maritime students, DigComp 2.2, maritime education, domain-specific information.

1. Introduction

The maritime industry is considered one of the cornerstones of global trade and world economy. As The Economist notes If trade is the lifeblood of the world economy, then the ships... are the red corpuscles ([The Economist, 2005](#)). It has a great impact on millions of lives and professions, and it faces several challenges and uncertainty. The basic characteristics of maritime sector are the complexity of operations and vulnerability ([Stopford, 2009](#)). According to UNCTAD Review of Maritime Transport (2022) and Clarkson's PLC 2022 Annual Report, ships deliver over 80-85 % of world trade, approximately 12 billion tons of global seaborne trade with an estimated growth of 3,2 % since 2021 ([Clarksons PLC, 2023](#); [Donepudi, 2014](#); [UNCTAD, 2022](#); [Zaman et al., 2017](#)). In addition, it is a dynamic industry that changes rapidly and reshapes through digitalization. The application of Industry 4.0 introduces the transition from traditional shipping to smart shipping requiring skilled workforce with digital competencies to contribute greatly to the sustainability of maritime sector ([Nguyen et al., 2014](#); [Shahbakhsh et al., 2022](#)).

The advent of Maritime 4.0 marked by the integration of automation, data analytics and smart technologies across shipping and logistic industries has amplified the demand for digitally

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competent maritime professionals. Digital competencies are no longer auxiliary skills but core enablers of operational efficiency, regulatory compliance and maritime safety. From real-time data flows to adhering to cybersecurity protocols and ethical digital conduct, maritime workforce must be equipped with a broad spectrum of digital literacies (Fedorov, Levitskaya, 2015; Koh, Yuen, 2022; Shahbakhsh et al., 2022).

Within the novel maritime ecosystem, the role of information and the information-seeking behaviors of all involved actors become crucial. Awareness of information needs, as well as the use of high-quality information resources to meet those needs and effectively utilize information, is essential. According to Case and Givens (Case, Givens, 2016) there is a plethora of models and theories to explain information seeking behavior depending on the work/social roles. The methodology adopted here for capturing the information seeking behavior of maritime students is based on an adaptation of the well-known Wilson's macro-model (Wilson, 1997; Wilson, 2006; Wilson, 2020). According to this conceptual approach, information-seeking behaviours are closely linked to the fulfilment of individuals' information needs (Bawden, Robinson, 2013). Moreover, European Union recently provided a framework of digital literacy in DigComp 2.2 Report (2022) by identifying five main areas of important competencies (Vuorikari et al., 2022): i) information and data literacy, ii) communication and collaboration, iii) digital content creation, iv) safety and v) problem solving. These competencies are essential to utilize information, utilize online resources, employ Artificial Intelligent and analyze dig data (Chlomoudis, Kostagiolas, 2011; Karanikola, Panagiotopoulos, 2018).

By aligning our research with DigComp 2.2 our work attempts to capture the nuanced digital behavior of maritime students in a way that reflects real-world expectations. In the context of Maritime 4.0 where digital operations are integral to safety, logistics and communication, the DigComp 2.2 framework offers a valuable tool to evaluate the preparedness of future maritime professionals.

A survey was administered between March and April 2023, to assess digital competencies, involving 235 students enrolled in maritime studies programs at three Greek Universities. Both descriptive and inferential statistical analyses were employed, and Exploratory Factor Analysis (EFA) was applied to identify underlying constructs among the original survey items. The findings underscore the significant impact of digital competencies and the fulfilment of information needs on students' academic success and readiness for professional engagement in the maritime sector. Concisely, the findings highlight a strong link between literacy and source quality, meaning that maritime students with higher information literacy skills are significantly more likely to access and use specialized maritime information content. Furthermore, the integration of advanced digital competencies is closely tied to socially responsible ICT use and another key takeaway is that foundational and advanced digital skills, collaborative ICT use, problem solving and online safety awareness form a mutually strong competence set. This fact indicates that one domain can have positive effects on maritime students' digital skills.

2. Materials and methods

The importance of information needs and information seeking behavior of students of maritime studies was highlighted by Udayangani de Silva and Chandrawamsa (Udayangani de Silva, Chandrawamsa 2016). They suggest that academic library is important in assisting students to retrieve information and cover their academic needs. Abarquez et al. (Abarquez et al., 2015) demonstrated that maritime students are aware that using library tools enhances their information searching and the satisfaction of their information needs. In the same context, Colar (Colar, 2021) suggests the need for programs aiming at further expanding library services for the benefit of students. These may include maritime data centres as well as special maritime databases and libraries.

Head (Head, 2012) and Head et al. (Head et al., 2013) summarized findings from six studies showing that students use digital skills to manage large volumes of maritime information, while also highlighting that employers seek graduates with digital competencies developed through higher education studies. More recently, Topal and Süner (Topal, Süner, 2021) studied the search strategies of students at a Turkish state maritime university, concluding that advanced information seeking behaviors require higher levels of digital skills, while Kovačević (Kovačević, 2014) investigated the relationship between maritime companies and the role universities in the development of digital skills. Furthermore, there are many reports published by global maritime organizations and maritime corporations as well, suggesting the essential digital competencies of the future workforce in making the shift to digital transformation in maritime industry (DNV,

2023; IAMU, 2019; IMO, 2010; OECD, 2018; Oksavik et al., 2020; UNCTAD, 2022). Notably, the IMO emphasizes that specific digital competencies should be integrated into its regulatory instruments (Hopcraft, 2021).

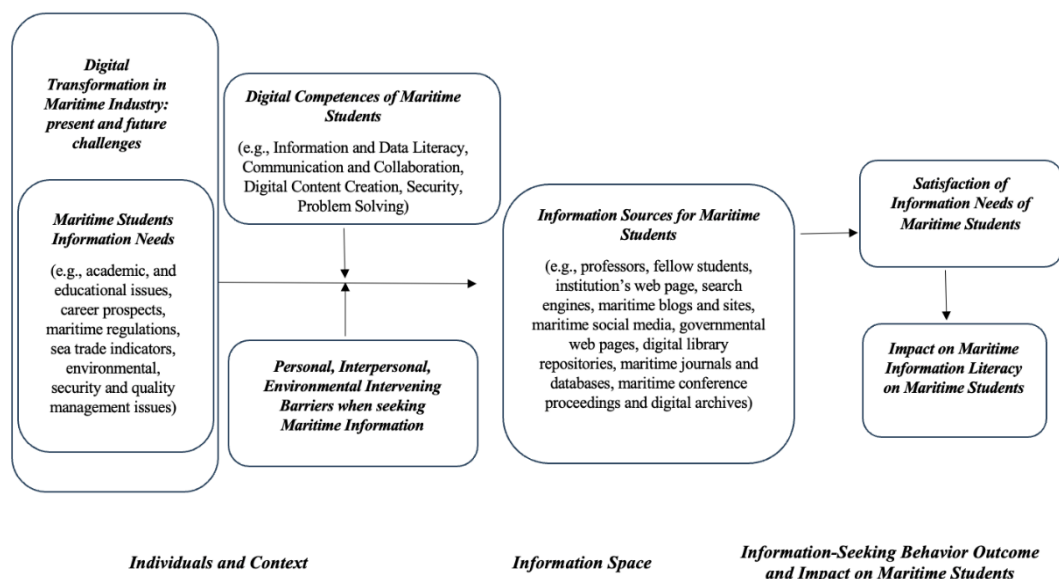


Fig. 1. Adoption of Wilson's macro-model (1981) of information seeking behavior for maritime professionals/students, based on Kostagiolas et al. (Kostagiolas et al., 2018)

This study focuses on Wilson's model (Wilson, 1981) as the theoretical framework, emphasizing the distinct role of maritime professionals and students (Chlomoudis et al., 2022). Figure 1 presents Wilson's macro-model for information seeking as applied to maritime students. Wilson's macro-model, as depicted, highlights that information needs are generated within the maritime academic environment. Thereafter, students are employing various information resources to satisfy their information needs. Moreover, Wilson suggests that intervening variables play a crucial role in identifying potential hindrances and facilitators in the information-seeking process. These variables include, among others, psychological, demographic, interpersonal, socio-economic, and environmental factors. Notably, individuals' digital competencies are recognized as key intervening variables that support information seeking among both maritime students and professionals (Chlomoudis et al., 2022; Kostagiolas et al., 2018; Wilson, 2020).

In the same context, Hopcraft (Hopcraft, 2021) highlights the importance of providing appropriate training for seafarers to develop standardized digital competencies, with a focus on cybersecurity in the maritime sector. Hopcraft (Hopcraft, 2021) also discusses IMO's efforts to standardize maritime digital skills related specifically to cybersecurity, introducing the International Convention on Standards of Training, Certification and Watchkeeping (STCW) and the International Safety Management (ISM) Code. Additionally, the author identifies the application of five core functions according to National Institute of Standards and Technology (NIST)-Identify, Protect, Detect, Respond, and Recover-across three levels: support, operational, and management (Hopcraft, 2021). This framework can be embedded in information-seeking behavior. Furthermore, Cabaron (Cabaron, 2023) conducted a survey at the Maritime Education Faculty in the Philippines, concluding that digital competencies are crucial for managing safety and security risks in the future. Cabaron (Cabaron, 2023) also employed the five dimensions of DigComp 2.0-information and data literacy, communication and collaboration, digital content creation, safety, and problem solving-to assess the digital literacy competence of faculty members and identify areas for improvement.

The need for digital competencies in maritime education is also emphasized by Bartusevičienė and Valionienė (Bartusevičienė, Valionienė, 2020). They categorize skills into three groups-general, professional, and research-referring to maritime students' abilities such as collecting data from open-source databases, processing data, using machine learning algorithms, and applying data analysis methodologies in practice. Similarly, Cicek et al. (Cicek et al., 2019) classify digital competencies in maritime education into four categories: technical, social,

methodological, and personal, identifying 33 competencies essential for the future skills of seafarers. Moreover, Sullivan et al. (Sullivan et al., 2021) provide a descriptive definition of Maritime 4.0, highlighting the key elements of digital transformation and the need for highly skilled and educated personnel to manage rapid technological changes in vessels and port administration, noting that the amount of data has grown exponentially over the past five years. Zapalska and McCarty (Zapalska, McCarty, 2017) highlight the urgent need for strategies to develop digital competencies aligned with the digital information literacy framework at the U.S. Coast Guard Academy (USCGA). Educators are expected to equip cadets with business competencies, communication, self-leadership, critical thinking, and information literacy skills. The authors emphasize that USCGA recognizes that IL skills are critical to the success of the Coast Guard as an organization, detailing the stages of the information literacy process.

As far as the survey is concerned, it was conducted between March and April 2023 and designed to examine how digital information literacy and digital competencies influence the academic and professional preparedness of maritime students. It was approved by the Research Ethics and Deontology Committee of Ionian University (2nd Assembly, 28/02/2023). The study complied with the General Data Protection Regulation (GDPR) and institutional research policies.

Participation was voluntary, anonymous and online, with clear instructions regarding confidentiality, privacy, the right to withdraw at any time, the purpose of data collection. Informed consent was obtained from all respondents prior to participation.

The target population consisted of undergraduate and postgraduate students from three Greek maritime university departments:

- Department of Maritime Studies, University of Piraeus.
- Department of Shipping Trade and Transport, University of the Aegean.
- Ports Management and Shipping Department in National and Kapodistrian University of Athens.
- MSc students on Sea Transport and Shipping along with the Department of International and European Studies and the Department of Economics of the University of Macedonia.

The development of the survey was informed by Wilson's model (1981) information seeking behavior and the *European Digital Competence Framework, DigComp 2.2* concerning digital competencies. Table 1 presents all questionnaire dimensions based on the above theoretical models, as follows:

- Maritime-related information needs (13 items) frequency of specific information needs
- Maritime-related information sources (15 items) frequency of use of sources
- Digital competencies (26 items) extend to which the five DigComp 2.2 domains (e.g. information and data literacy, communication and collaboration, digital content creation, safety, problem solving)
- Informational attitudes (4 items) perceptions of the usefulness of internet and social media, as well as information literacy seminars during maritime studies.

Table 1. Questionnaire dimensions based on Wilson model adaptation and DigComp 2.2

Questionnaire Dimensions	Definition/measurement items
B. Maritime related information needs (Items N = 13)	Measures the frequency of using specific maritime information needs: academic and student issues, lifelong learning programs, maritime conferences/workshops, career prospects, shipping finance, maritime law, maritime indicators, environmental issues, maritime security issues, quality management issues, human resources management, culture, and maritime issues
C. Maritime related information sources (Items N = 15)	Measures the frequency at which maritime students employ specific information resources when seeking maritime information: professors, fellow students, department's web page, e-class platforms, search engines (Google), maritime blogs and social media, governmental web pages, library repositories, online maritime portals and websites, specific maritime e-journals and databases, digital maritime proceedings and archives, online maritime news websites

Questionnaire Dimensions	Definition/measurement items
D. Digital Competencies of maritime students (Items N = 26)	Measures the extent to which the five areas of digital competence framework (DigComp 2.2) contribute to maritime studies: information literacy, communication, and collaboration, developing digital content, safety and problem solving
E. Informational attitudes of maritime students (Items N = 4)	Measures the informational attitudes of maritime students: the usefulness of internet and social media during maritime studies and the usefulness of digital behavior and digital skills seminars for maritime students

In addition to the above, sociodemographic variables are recorded (age, sex, English language proficiency, employment status). All items were measured on a five-point Likert scale (1 = not at all to 5 = very much). The internal consistency of each section of the questionnaire is tested with Cronbach's alpha with values above 0,70 considered satisfactory. As Table 2 shows, reliability coefficients ranged from 0.73 to 0.89, confirming acceptable levels of consistency across all dimensions.

Table 2. Reliability statistics for each section of the questionnaire

	Cronbach's Alpha	N of Items
Section B Information needs	.885	13
Section C Information sources	.857	15
Subsection D.1 Information and data literacy	.743	5
Subsection D.2 Communication and	.795	8
Subsection D.3 Digital content creation	.802	5
Subsection D.4 Safety	.814	4
Subsection D.5 Problem solving	.730	4

The statistical analysis of the survey data was conducted using IBM SPSS Statistics (v.23). Internal consistency reliability was assessed with Cronbach's alpha, confirming that all constructs were reliable. The Kolmogorov-Smirnov and Shapiro-Wilk tests were applied to assess normality. The results that did not follow a normal distribution ($p < 0.5$) were subsequently analyzed with non-parametric analysis. Specifically, the Mann-Whitney U test was employed to identify significant differences between two independent subgroups, while the Kruskal-Wallis H test was used for comparisons involving more than two independent subgroups (results are shown in the Appendix tables). Descriptive statistical analysis excluded subgroup categories with fewer than 20 responses from the non-parametric tests (e.g. in the Sex category, the subgroup Prefer not to say [N = 11]).

Exploratory Factor Analysis (EFA) was conducted using Kaiser's criterion (eigenvalue ≥ 1) as the factor extraction method. Principal Component Analysis (PCA) with varimax rotation was also applied to identify clusters of maritime information needs, sources, and digital competencies. Items with low factor loadings (< 0.40) were removed from the process to retain only those strongly associated with the factor. The reliability of each factor was further examined by using Cronbach's alpha. Although, in some cases factors exhibit poor internal consistency ($0.6 > \alpha \geq 0.5$), they demonstrated strong loadings and theoretical coherence. Therefore, they were retained and considered scientifically justified due to the limited number of items (Pallant, 2020).

The suitability of the data for factor analysis was confirmed by Kaiser-Meyer-Olkin KMO measures ranging from middling to marvelous and Bartlett's Test of Sphericity ($p < .000$). Finally, bivariate correlation analysis was used to examine associations between the identified factors and other variables of interest.

3. Discussion

The findings of this survey underscore a transformative shift in maritime education, where digital competencies and information literacy emerge as foundational pillars for both academic and professional success. The analysis confirms that maritime students not only rely heavily on digital tools to fulfill their academic needs, but they also display an understanding of broader implications

of digital engagement, based on their answers for ethical considerations to digital well-being and cybersecurity awareness.

Most shipping organizations and operators have complied with the structured training in digital maritime information literacy, ensuring that graduates can critically engage with complex digital environments of maritime sector. In this context, DNV Study, digitalization is identified as one of the fundamental factors for the transformation of the maritime industry by 2030. The study, co-sponsored by the Singapore Maritime Foundation (SMF), reveals that approximately 81 % of seafarers expressed the need for advanced training in digital technologies. However, only 13 % of them believe that they are adequately trained in this area (DNV, 2023). The integration and acceptance of digital technologies, such as blockchain, Machine Learning (ML), Artificial Intelligence (AI), Internet of Things (IoT), big data, cloud computing, and automation technologies, contribute to transparency and facilitate more responsive and agile processes (Shahbakhsh et al., 2022; UNCTAD, 2022). Consequently, this necessitates a transformation in the traditional skills and competencies of maritime professionals, offering improved career prospects (DNV, 2023; Nguyen et al., 2014).

The digital transformation demands knowledge and competencies that promote sustainable careers for employees in the maritime sector, extending beyond a mere understanding of hardware and software devices (Ferrari, 2012). The rapidly evolving maritime industry also requires well-trained and educated university graduates who possess the ability to adapt to the changes brought about by the digital era and exhibit flexibility in their career paths (Caesar et al., 2014). As emphasized by the OECD, digital literacy and data literacy are increasingly crucial, alongside physical health and mental well-being (OECD, 2018).

The realm of new knowledge and digital abilities effectively encapsulates the fundamental technical attributes of a global maritime professional. These attributes include: i) possessing all the necessary technical competencies required for their operational responsibilities, ii) possessing advanced academic skills that encompass logical and critical thinking, iii) exhibiting a high level of professionalism and ethical conduct, iv) demonstrating strong interpersonal skills, v) displaying emotional intelligence and an awareness of multiculturalism and diversity, vi) possessing leadership abilities, the capacity to work in a team, and the initiative to take personal responsibility, vii) exhibiting environmental consciousness, and viii) possessing a comprehensive understanding of contemporary maritime issues (Cicek et al., 2019; IAMU, 2019; Kaspersen et al., 2022; van Laar et al., 2017). As a result, combining technical skills with digital literacy competencies, which became both a requirement and a right, as mentioned by European Commission Joint Research Centre (2001) (Ferrari, 2012), education is the only solution to keep up with the new challenges and embrace them thoroughly (OECD, 2018).

Notably, the primary objective is to present proof and elucidate a crucial inquiry, which is whether information aids maritime scholars in achieving their academic pursuits. With the advent of the digital age, the use of the internet has become indispensable, resulting in a disparity among people worldwide, commonly known as the digital divide, as stated by Wilson, particularly after the outbreak of the Covid-19 pandemic in 2020 (Wilson 2020). Numerous studies expound on competencies as a compilation of individual and organizational outcomes (Cicek et al., 2019), specifically digital competencies that are vital in all aspects and roles of daily life. Consequently, even in maritime sector there is a tendency to develop courses specially designed to advance information literacy skills in academic and professional fields (Zapalska, McCarty, 2017). Cabaron's study (2023) based on the previous European framework DigComp 2.0 also proved that the five pillars of digital competence need to be improved. referring to maritime students (Cabaron. 2023). European Commission's Report (2012) states that if citizens want to be functional today, digital competence is a requirement and a right (Ferrari, 2012).

Generally, the findings reveal a distinct hierarchy in maritime students' information seeking preferences and competencies. Informal sources, such as search engines and e-class platforms are the most frequently used and highly valued, while specialized and professional maritime resources are underutilized. This fact shows a gap between academic or professional information sources, potentially reflecting both accessibility barriers and a lack of familiarity with specialized tools. Similarly, maritime students demonstrate strong basic literacy skills, including effective search engine use (e.g. Google) and software proficiency, their advanced information literacy skills, such as navigating in scholarly databases and evaluating academic sources, remains comparatively underdeveloped. For instance, the overall high percentage (52.3 %) of the respondents that believe

the use of artificial intelligence tools (e.g. ChatGPT) contributes A little to their studies or Not at all, could be attributed that the tool was not widely adopted by students during the study and started to gain traction slowly. Another explanation is the insufficient awareness or lack of integration into the curriculum. However, the strong positive correlation between information literacy and the use of specialized sources underlines the potential for targeted training to shift maritime students' preferences toward higher-value resources.

Besides, the influence of demographic variables, such as age and gender on digital tool adoption and information behavior is another important insight. For instance, younger students (Gen Z), postgraduates and those with higher English proficiency exhibit stronger engagement with scholarly maritime digital archives. Conversely, foundational tools such as videoconferencing software or management platforms showed higher relevance for early-year students, indicating evolving digital needs across the academic lifecycle.

Digital competencies show uneven development too. Collaborative and managerial ICT tool proficiency, problem solving skills with digital technologies are relatively strong, while creative and ethical digital content creation and advanced ICT use for professional networking are less established. In the same context, safety related competencies, especially awareness of the health impacts of digital overuse are recognized but not uniformly practiced. At the same time, the high values of importance of internet use for completing maritime studies along with positive satisfaction levels regarding maritime information, reflect a generally supportive digital environment. Noteworthy, maritime students recognize the need to participate in digital information literacy programs/seminars to fill the gaps in this area and build an integrated curriculum based on digital competencies according to EU standards, although they did not participate in the past. Maritime digital information literacy programs/seminars could align student practices with professional maritime standards, fostering readiness for the demands of Maritime 4.0 or even further, ensuring a workforce adept at navigating both general and specialized information landscapes.

Moreover, the findings related to students' ability to recognize false or misleading information (D.5.4) highlight the pivotal role of digital competencies in navigating contemporary media environments characterized by pervasive misinformation. Recent research demonstrates that digital literacy, particularly its cognitive and critical dimensions, enhances individual's capacity to evaluate information credibility, verify sources, and resist misleading content circulating on social media. However, this competence operates within complex media ecosystems where news consumption is increasingly shaped by platform logistics and social practices. As Swart (2023) shows, news literacy is not merely a set of technical skills, but a situated practice embedded in everyday social media use, where users must actively negotiate platform norms and mixed information genres (Jacob et al., 2025; Swart, 2023). In this context, the relatively strong awareness among students regarding misinformation aligns with evidence that critical attitudes toward media and active verification behaviors (e.g. cross-checking sources) are key predictors of misinformation recognition (Anthonysamy, Sivakumar, 2024; Jacob et al., 2025; Swart, 2023; Zhang et al., 2026).

At the same time, emerging AI-driven information environments introduce new challenges that require more advanced forms of digital and AI literacy. Studies show that while digital competencies can support academic and information-seeking outcomes, they do not automatically translate into critical engagement, particularly when users develop trust in systems such as ChatGPT (Barisone et al., 2025; Shrivastava, 2024; Swart, 2023). This is even more complicated by phenomena such as AI hallucinations where users may accept inaccurate but persuasive information without verification, reinforcing pre-existing beliefs (Jacob et al., 2025). In addition, the power of AI blurs the boundaries between authentic and synthetic content, making the identification of misinformation increasingly difficult and dependent on users' technological familiarity and critical awareness (Barisone et al., 2025; Shrivastava, 2024). Therefore, the present findings support the argument that combating misinformation in higher education requires not only foundational digital competencies but also the development of advanced critical, reflective, and AI-related literacies, enabling students to engage more effectively with the evolving media landscape (Lee et al., 2025; Swart, 2023; Zhang et al., 2026).

Educational institutions should address both dimensions informal/professional and formal/institutional digital learning tools to support comprehensive digital literacy among maritime students. Maritime students also appear to engage with both technical and ethical

components of digital literacy in a holistic manner, they perceive importance of cybersecurity and digital health and finally the survey revealed their ability to navigate digital and technical challenges, maintaining a critical approach to information accuracy and inclusivity. For that reason, educational programs should integrate both tool-oriented training and media literacy for a comprehensive approach to digital competence.

Regarding the limitations of the survey, the research utilized a cross-sectional survey design which captured data on the information-seeking behaviors and digital competencies of maritime students at a specific period, just prior to the widely spread AI tools (e.g. ChatGPT). Consequently, it is possible that the study does not reflect any changes that may have occurred following the widespread adoption of AI tools and their implications. Moreover, some factors, although exhibiting strong loadings yielded low Cronbach's alpha values, a fact that warrants cautious interpretation of results. Nonetheless, their inclusion is scientifically justified.

Beyond the academic context, these findings carry significant implications for curriculum design, industry collaboration and policy development. Maritime education institutions should not only embed digital information literacy into maritime curricula, but also establish stronger partnerships with shipping companies, professional associations and regulatory organizations to ensure alignment with evolving industry standards and practices, as Maritime 4.0. Therefore, continuous professional development opportunities could help bridge the gap between maritime students' competencies and the advanced digital skills in an increasingly demanded industry.

4. Results

The following section presents the descriptive statistics of the survey participants, providing an overview of their socio-demographic characteristics. [Table 3](#) summarizes the socio-demographic characteristics of the participants. According to the results, most participants were female (54.9 %, $n = 129$), belonged to the Gen Z age group (as categorized by Dimock (Dimock, 2019) (91.9 %, $n = 216$), had excellent knowledge of the English language (74 %, $n = 174$), were undergraduate students (88.5 %, $n = 208$) at the University of Piraeus (69.8 %, $n = 164$), and were unemployed (59.1 %, $n = 139$). Among the working students (40.9 %, $n = 96$), the majority reported that their jobs were not related to their field of study (78.1 %, $n = 75$) and were part-time (57.3 %, $n = 55$). Additionally, the data show that most respondents were in their second year of study (40.4 %, $n = 95$), and only 8 % ($n = 19$) had attended information literacy programs or seminars in the past five years.

Table 3. Survey participants' demographics and students' characteristics

Demographic characteristics	Respondents	Percentage
A.1. Sex (valid N = 235)		
Male	101	43.9
Female	129	54.9
Prefer not to say	5	2.1
A.2. Age (valid N = 235)		
Gen Z	216	91.9
Millennials	12	5.1
Gen X	7	3
A.3. English degree (valid N = 235)		
No degree/A1-A2-B1	10	4.3
Lower B2	39	16.6
Advanced C1	12	5.1
Proficiency C2	174	74
A.4. Institution (valid N = 235)		
University of Piraeus	164	69.8
University of Aegean	59	25.1
National and Kapodistrian University of Athens	9	3.8
University of Macedonia	3	1.3
A.5. Studies (valid N = 235)		

Demographic characteristics	Respondents	Percentage
Undergraduate	208	88.5
Postgraduate	27	11.5
A.6. Work (valid N = 235)		
Yes	96	40.9
No	139	59.1
A.6.1. Work relevant to studies (valid N = 235)		
Yes	21	21.9
No	75	78.1
A.6.2. Work full time/part time (valid N = 235)		
Full time	41	42.7
Part time	55	57.3
Students' characteristics		
A.7. Year of studies (valid N = 235)		
1 st year	39	16.6
2 nd year	95	40.4
3 rd year	57	24.3
4 th year	33	14
>5 year	11	4.7
A.8. Attending information literacy		
Yes	19	8
No	32	13.6

In the Appendix, distinct tables present descriptive results and subgroup statistics for all dimensions of the questionnaire. It should be noted that, while Appendix identifies significant subgroup statistics through superscripts in the result tables, only a selection of these demographic differences is discussed in the main text.

As is illustrated in [Table I](#) of the Appendix, maritime students report a higher frequency of information needs related to academic issues (median = 4) and career prospects (median = 4). Specifically, undergraduate maritime students express greater interest in students' issues than postgraduate students ($p < 0.05$, with mean rank = 121.31 and 92.52 respectively). Furthermore, [Table II](#) indicates that search engines (e.g. Google) and e-class platform (median = 5) are utilized by maritime students more frequently, followed by department's webpage (median = 4).

[Table III](#) reveals that the most valued digital competency related to information and data literacy is the ability to find/evaluate maritime information through search engines (median = 5), followed by the proficiency to use software (median = 4) and the ability to find/evaluate scholarly documents within scientific databases (median = 4). In the same context, [Table IV](#) reports that collaboration through open platforms (median = 5) is the most valuable digital competency related to communication and collaboration, followed by use of management software (median = 4) and videoconference software (median = 4).

[Table V](#) indicates that most important digital competency related to digital content creation is creating maritime content/posts on social networks (median = 3) and the understanding of ethics in sharing maritime information (median = 3). Notably, 1st year maritime students regarded knowledge of programming languages as a more significant digital competence than students in later semesters (mean rank = 129.7, compared with 120.26 for 2nd year, 96.58 for 3rd year and 125.37 for 4th year students). In addition, the most important digital competency referring to safety, according to maritime students, is the understanding that excessive use of digital technology may affect health (median = 4), as it is revealed in [Table VI](#).

Moreover, Appendix [Table VII](#) demonstrates that the most valuable digital competency related to problem solving is the use of technological devices (median = 5), followed by knowledge of digital tools for solving technological problems (median = 4) and the ability to use assistive tools improving access to information (median = 4), equally.

In Appendix [Table VIII](#), maritime students highlight the importance of internet use to complete their studies (median = 5). Furthermore, within the context of informational attitudes of maritime

students, overall satisfaction of maritime information (median = 4), importance of using social media for maritime information (median = 4) and importance of digital behavior/digital competencies seminars for maritime studies (median = 4) are considered fundamental for their studies. Especially, overall satisfaction with maritime information currently available is high, with more than half of the students (57 %) expressing strong or very strong satisfaction. This percentage indicates that most maritime students feel that their current information needs are met to a considerable extent, reflecting generally a positive attitude towards the adequacy and relevance of the maritime information sources and their ability to access. It is interesting also, that 1st year maritime students reported higher satisfaction with maritime information compared to students in later semesters (mean rank = 131.47 versus 121.93 for 2nd year, 99.37 for 3rd year and 114.65 for 4th year students).

In addition, these findings demonstrate the central role of internet use in academic success, the recognized value of targeted digital skills training and the appreciation of social media as an information source.

Results from Exploratory Factor Analysis (EFA) revealed one category (factor) of information needs that collectively explained 43.14 % of the total variance, as it is depicted in Table 4. The factor named Maritime information literacy demonstrated high internal consistency (Cronbach's alpha = 0.890), indicating strong reliability. In addition, this factor (mean = 2.80 and std. dev. = 0.794), suggests a moderate overall engagement with maritime quality management, maritime security issues, maritime market indicators/global trade indicators and maritime economics among information needs. This fact highlights that maritime students' information literacy priorities extend across both operational and strategic maritime domains.

Table 4. EFA results for frequency of information needs of maritime students

Information Needs	Factor
	1
B.11 Maritime quality management	0.777
B.10 Maritime security issues	0.762
B.8 Maritime market indicators/global trade indicators	0.75
B.6 Maritime economics	0.735
B.12 Maritime human resources management	0.674
B.5 Maritime conferences/workshops	0.669
B.3 Career prospects	0.658
B.4 Maritime lifelong educational programs	0.651
B.7 Maritime law/commercial maritime law	0.631
B.13 Maritime culture issues	0.616
B.9 Maritime environmental issues	0.611
B.1 Academic issues	0.527
Cronbach's alpha	0.890
Mean value	2.80
Standard dev	0.794
Notes: (1) Maritime information literacy. Extraction method: Principal Component Analysis. a. 2 components extracted.	

In Table 5, EFA results for information sources revealed three factors collectively explained 56.74 % of the total variance. The first factor Specialized and professional maritime information sources (10 items, Cronbach's alpha = 0.909), the second is Academic information sources (4 items, Cronbach's alpha = 0.507) and the third one is Informal maritime information sources (1 item) emerged from the analysis. Although the second factor demonstrated low Cronbach's alpha (0.507), this value is acceptable within the context of exploration search and the limited number of items. Table 5 also presents the descriptive statistics (mean values and standard deviation) for identified factors. The results indicate that maritime students rated informal maritime sources (mean = 4.56) as more important than academic information sources (mean = 3.41) and

specialized and professional maritime sources (mean = 2.34). This observation indicates a significant inclination to well-known digital tools that facilitate both academic and everyday activities, in antithesis to institutional and specialized maritime resources with low median scores, highlighting a potential gap in students' engagement with academic resources.

Table 5. EFA results on maritime students' information source frequency of use

Information Sources	Factor	Factor	Factor
	1	2	3
C.12 Maritime databases	0.824		
C.11 Maritime scientific e-journals	0.809		
C.10 Maritime web portals	0.794		
C.8 Government webpages	0.767		
C.13 Maritime e-proceedings	0.763		
C.14 Maritime digital archives	0.741		
C.9 Academic library repositories	0.705		
C.6 Maritime blogs	0.644		
C.15 Maritime press online/maritime website news	0.618		
C.7 Maritime social media	0.571		
C.4 E-class platform		0.755	
C.3 Department's webpage		0.669	
C.1 Professors		0.603	
C.2 Fellow students		0.506	
C.5 Search engines			0.84
Cronbach's alpha	0.909	0.507	-
Mean value	2.34	3.41	4.56
Standard dev	0.88	0.71	0.74

Notes: (1) Specialized and professional maritime information sources, (2) Academic information

EFA results for digital competency in information and data literacy identified two distinct factors, explaining 70.39 % of the total variance, in Table 6. The first factor Advanced information literacy (3 items, Cronbach's alpha = 0.64), including skills such as finding and evaluating scholarly files in professional hosting services, maritime information in social media/webpages/blogs and scholarly documents in scientific databases. The second factor, Basic digital literacy (2 items, Cronbach's alpha = 0.59) comprises software use and the ability to use and evaluate maritime information by using search engines. The results indicate that maritime students rate their basic digital literacy skills highly (mean = 4.23), in antithesis to their advanced information literacy competencies (mean = 3.14) that are comparatively less developed. This outcome highlights that the basic digital literacy skills contribute greatly to completing their studies.

Table 6. EFA results for Subgroup D.1 Information and Data literacy for digital competencies of maritime students

D.1 Information & Data literacy	Factor	Factor
	1	2
D.1.4 Finding/evaluating scholarly files on online professional content	0.864	
D.1.3 Finding/evaluating maritime information in social	0.827	
D.1.5 Finding/evaluating scholarly documents in scientific databases	0.630	
D.1.1 Software use		0.880
D.1.2 Finding/evaluating maritime information using search engines		0.814
Cronbach's alpha	0.64	0.59

D.1 Information & Data literacy	Factor	Factor
	1	2
Mean value	3.14	4.23
Standard dev	1.05	0.80
Notes: (1) Advanced information literacy, (2) Basic digital literacy. Extraction method: Principal		

EFA results for digital competency in communication and collaboration grouped in two distinct factors also, explaining 56.79 % of the total variance. As a result, in [Table 7](#) the first factor Advanced and Socially Responsible ICT use (4 items, Cronbach's alpha = 0.75) reflect modern and interactive approaches to maritime education and the second factor Collaborative and managerial ICT tools (4 items, Cronbach's alpha = 0.70) emphasizes in formal collaboration systems, such as institutional file-sharing and open-access educational platforms, reflecting structured support for academic learning. The results indicate that maritime students report stronger competence in collaborative and managerial ICT tools (mean = 3.64), their skills in advanced and socially responsible ICT use are comparatively less developed (mean = 2.81).

Table 7. EFA results for Subgroup D.2 Communication and collaboration for digital competencies of maritime students

D.2 Communication and collaboration	Factor 1	Factor 2
D.2.7 Use of artificial intelligence	0.767	
D.2.8 Identifying hostile online messages/activities	0.726	
D.2.5 Participation in professional/scientific digital networks for sharing ideas	0.714	
D.2.6 Participation in seminars/workshops/access to educational resources	0.688	
D.2.2 Collaboration through open platforms		0.809
D.2.1 Use of file management software		0.747
D.2.3 Use of videoconference software		0.596
D.2.4 Use of daily task management software		0.594
Cronbach's alpha	0.75	0.70
Mean value	2.81	3.64
Standard dev	1.01	0.85
Notes: (1) Advanced and Socially Responsible ICT use, (2) Collaborative and Managerial ICT Tools. Extraction method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 3 iterations.		

The EFA conducted for the digital competencies subcategory digital content creation extracted a single factor, labeled Creative and ethical digital competency (1 item, Cronbach's alpha = 0.802), explaining 56.06 % of the total variance. As presented in [Table 8](#), the findings indicate that maritime students demonstrate competencies in creative and ethical digital content creation. However, the mean scores (mean = 2.63) indicate that these skills are perceived to be developed to a moderate extent.

Table 8. EFA results for Subgroup D.3 Digital content creation for digital competencies of maritime students

D.3 Digital Content Creation	Factor
	1
D.3.2 Creating maritime audiovisual content	0.810
D.3.3 Creating infographics using applications/software	0.810

D.3.5 Knowledge of programming languages	0.729
D.3.4 Understanding of ethics in sharing maritime information	0.726
D.3.1 Creating maritime content/posts on social networks	0.658
Cronbach's Alpha	0.802
Mean	2.63
Standard dev	1.27
Note(s): (1) Creative and ethical digital competency. Extraction method: Principal Component Analysis a. 1 components extracted.	

In [Table 9](#), the results from EFA analysis in digital competencies' subcategory safety extracted one factor Digital protection and well-being awareness (1 item, Cronbach's alpha = 0.814), explaining 64.42 % of the total variance. The factor loadings reflect strong relationship among safety skills and indicate that maritime students generally report moderate proficiency in digital safety practices and awareness of well-being in online environments, as well as digital overuse (mean = 3.39).

Table 9. EFA results for Subgroup D.4 Safety for digital competencies of maritime students

D.4 Safety	Factor 1
D.4.2 Knowledge of installing and use of protection services	0.859
D.4.1 Creating strong passwords and secure data management	0.832
D.4.3 Detecting suspicious emails (phising)	0.819
D.4.4 Understanding excessive use of digital technology may affect health	0.69
Cronbach's Alpha	0.814
Mean	3.39
Standard dev	1.29
Note(s): (1) Digital protection and well-being awareness. Extraction method: Principal Component Analysis. a. 1 components extracted.	

EFA results in digital competencies' subcategory problem solving extracted a single factor Digital resourcefulness and critical evaluation (1 item, Cronbach's alpha = 0.73). As it is depicted in [Table 10](#), all items loaded strongly, indicating strong relationships among problem solving skills, suggesting also that maritime students generally possess well-developed competencies in applying digital solutions and critically evaluating information sources (mean = 3.98).

Table 10. EFA results for Subgroup D.5 Problem solving for digital competencies of maritime students

D.5 Problem solving	Factors 1
D.5.2 Knowledge of digital tools for solving technological problems	0.807
D.5.4 Understanding the importance of identifying false/misleading news	0.769
D.5.1 Use of technological devices	0.756
D.5.3 Ability to use assistive tools improving access to information	0.685
Cronbach's Alpha	0.73
Mean	3.98
Standard dev	1.08
Note(s): (1) Digital resourcefulness and critical evaluation. Extraction method: Principal Component Analysis. a. 1 components extracted.	

Table 11 shows the bivariate correlations of the factors developed by EFA analysis of each section of the survey. Pearson correlation was performed to determine the relationship between each factor separately. Subsequently, the correlation analysis revealed several noteworthy relationships among the extracted factors.

Maritime information literacy showed a very strong positive correlation with specialized and professional maritime information sources ($r = 0.806^{**}$), indicating that students with higher literacy skills tend to utilize more specialized sources. In addition, advanced information literacy is strongly correlated with both advanced and socially responsible ICT use ($r = 0.623^{**}$) and creative and ethical digital competency ($r = 0.619^{**}$), suggesting that higher-level digital skills are interconnected with ethical creation practices. Moreover, advanced and socially responsible ICT use is strongly related to creative and ethical digital competency ($r = 0.653^{**}$) and digital protection and well-being awareness ($r = 0.478^{**}$), underlining the connection between responsible ICT engagement, creativity and online safety.

Table 11. Bivariate correlations of the survey factors

Correlations											
Factors/Variables	1	2	3	4	5	6	7	8	9	10	11
1	1										
2	.806**	1									
3	.232**	.186**	1								
4	.164*	.189**	.156*	1							
5	.462**	.498*	.152*	.203*	1						
6	.268**	.254*	.172**	.292*	.421**	1					
7	.384**	.392*	.168**	.131*	.623*	.237**	1				
8	.315**	.332*	.218**	.194**	.474*	.408*	.477**	1			
9	.353**	.381**	.113	.086	.619**	.207*	.653*	.519**	1		
10	.198**	.191**	.299*	.142*	.377**	.265**	.478*	.399*	.558*	1	
11	.133*	.162*	.243*	.212**	.381*	.463*	.460*	.478*	.396*	.488*	1

Notes: 1. Mean 2.80. std deviation 0.794; 2. M 2.34. std 0.88; 3. Mean 3.41. std 0.71; 4. M 4.56. std 0.74; 5. M 3.14. std 1.05; 6. M 4.23. std 0.80; 7. M 2.81. std 1.01; 8. M 3.64. std 0.85; 9. M 2.63. std 1.27; 10. M 3.39. std 1.29; 11. M 3.98. std 1.08.
*p < 0.05 and **p < 0.001, 1. Maritime information literacy; 2. Specialized and professional maritime information sources; 3. Academic information sources; 4. Informal maritime information sources; 5. Advanced information literacy; 6. Basic digital literacy; 7. Advanced and Socially Responsible ICT use; 8. Collaborative and managerial ICT tools; 9. Creative and ethical digital competency; 10. Digital protection and well-being awareness; 11. Digital resourcefulness and critical evaluation

Collectively, these findings indicate that maritime students' information literacy, digital competencies and ICT use form an interdependent skill set that supports both academic and professional digital practices.

5. Conclusion

The importance of acquiring digital competencies in various aspects of life has been widely acknowledged in literature review. In the digital era, where a vast amount of information is readily available for educational and professional purposes, there is a growing need for individuals to possess digital literacy skills. While the results revealed that students exhibit high engagement with general digital tools, such as search engines and management software, their interaction with specialized

maritime databases and scholarly repositories remains limited. This digital behavior suggests an ongoing reliance on informal information channels, highlighting a key area for curricular enhancement.

The advent of Maritime 4.0 marked the integration of automation and led to the implementation of governmental policy initiatives worldwide aimed at enhancing digital competencies. In this regard, the European Union has adopted the Digital Competence Framework (DigComp) to improve citizens' digital competence and assist policymakers in developing education and training programs to address this issue (Vuorikari et al., 2022). Moreover, maritime students recognize the importance of digital competence seminars and the necessity to familiarize themselves with digital scientific research. In this context, we suggest MarDigiComp. information literacy educational programs, specifically for maritime studies.

The objective of these seminars is twofold; either maritime students are assisted during their studies or in their future profession. Researchers in literature review the necessity of adopting contemporary digital information literacy programs based on ACRL and EU's digital agenda (i.e., DigiComp 2.2). The primary objective is to motivate maritime students to adapt to novel information sources, innovative techniques for searching and assessing maritime information, and particularly to acquire the skills to effectively utilize information for their maximum benefit.

This study confirms that:

- Maritime related information needs' satisfaction is extremely important for students to complete their studies and to build a professional profile for the future.
- Maritime students recognize the importance of finding, evaluating, and using maritime information in digital era and in more specific scientific sources.
- Artificial intelligence (AI) tools are not so widespread among maritime students yet, whereas it's not considered crucial by the maritime students for completing their studies.

However, more research and the repetition of the survey in maritime universities in the future is significant to confirm the results and to update the data of some variables, such as AI use. It is crucial for the students in maritime studies to be familiar with digital competencies especially in such demanding sectors, such as maritime industry. Consequently, the outcome of this survey is to target more precise interventions in maritime information satisfaction, concluding the overall satisfaction during their studies and as future maritime professionals.

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Appendix

Table I. Frequency of information needs of maritime students

Valid Responses N = 235	Measurement scale (1 Not at all, 2 A little, 3 Quite a bit, 4 A lot, 5 Very much)					Median
	1	2	3	4	5	
B.1 Academic issues $\varphi, \sigma, \varepsilon$	6 (2.6 %)	20 (8.5 %)	82 (34.9 %)	89 (37.9 %)	38 (16.2 %)	4
B.2 Student issues σ	50 (21.3 %)	58 (24.7 %)	62 (26.4 %)	44 (18.7 %)	21 (8.9 %)	3
B.3 Career prospects	9 (3.8 %)	31 (13.2 %)	57 (24.3 %)	66 (28.1 %)	72 (30.6 %)	4
B.4 Maritime lifelong educational programs	28 (11.9 %)	49 (20.9 %)	58 (24.7 %)	46 (19.6 %)	54 (23 %)	3
B.5 Maritime conferences/workshop φ	40 (17 %)	64 (27.2 %)	50 (21.3 %)	39 (16.6 %)	42 (17.9 %)	3
B.6 Maritime economics $\sigma, \eta, \varepsilon$	40 (17 %)	54 (23 %)	72 (30.6 %)	39 (16.6 %)	30 (12.8 %)	3
B.7 Maritime law/commercial maritime law α	69 (29.4 %)	69 (29.4 %)	62 (26.4 %)	24 (10.2 %)	11 (4.7 %)	2
B.8 Maritime market indicators/global trade indicators σ	52 (22.1 %)	64 (27.2 %)	66 (28.1 %)	34 (14.5 %)	19 (8.1 %)	3
B.9 Maritime environmental issues	33 (14 %)	69 (29.4 %)	65 (27.7 %)	54 (23 %)	14 (6 %)	3
B.10 Maritime security issues ε, η	48 (20.4 %)	72 (30.6 %)	59 (25.1 %)	39 (16.6 %)	17 (7.2 %)	2
B.11 Maritime quality management $\sigma, \varepsilon, \eta$	61 (26 %)	81 (34.5 %)	62 (26.4 %)	22 (9.4 %)	9 (3.8 %)	2
B.12 Maritime human resources management	49 (20.9 %)	63 (26.8 %)	78 (33.2 %)	30 (12.8 %)	15 (6.4 %)	3
B.13 Maritime culture issues	70 (29.8 %)	70 (29.8 %)	52 (22.1 %)	31 (13.2 %)	12 (5.1 %)	2

Notes: Mann-Whitney U test and Kruskal-Wallis H-test (φ : $p < 0.05$ sex; η : $p < 0.05$ age; α : $p < 0.05$ English level; σ : $p < 0.05$ level of studies; δ : $p < 0.05$ work. ε : $p < 0.05$ year of studies)

Table II. Frequency of use of information resources for maritime students

Valid Responses N = 235	Measurement scale (1 Not at all, 2 A little, 3 Quite a bit, 4 A lot, 5 Very much)					Median
	1	2	3	4	5	
C.1 Professors	29 (12.3 %)	68 (28.9 %)	71 (30.2 %)	53 (22.6 %)	14 (6 %)	3
C.2 Fellow students φ	33 (14 %)	52 (22.1 %)	59 (25.1 %)	58 (24.7 %)	33 (14 %)	3

	Measurement scale (1 Not at all, 2 A little, 3 Quite a bit, 4 A lot, 5 Very much)					
C.3 Department's webpage ^φ	19 (8.1 %)	25 (10.6 %)	59 (25.1 %)	72 (30.6 %)	60 (25.5 %)	4
C.4 E-class platform ^α	1 (0.4 %)	10 (4.3 %)	32 (13.6 %)	68 (28.9 %)	124 (52.8 %)	5
C.5 Search engines ^α	0 (0.0 %)	7 (3 %)	15 (6.4 %)	52 (22.1 %)	161 (68.5 %)	5
C.6 Maritime blogs ^{η, α}	20 (8.5 %)	42 (17.9 %)	62 (26.4 %)	56 (23.8 %)	55 (23.4 %)	3
C.7 Maritime social media ^{σ, ε, η}	55 (23.4 %)	54 (23 %)	43 (18.3 %)	43 (18.3 %)	40 (17 %)	3
C.8 Government webpages ^{σ, ε, η}	92 (39.1 %)	68 (28.9 %)	41 (17.4 %)	24 (10.2 %)	10 (4.3 %)	2
C.9 Library's digital repository ^{σ, ε, η}	127 (54 %)	53 (22.6 %)	35 (14.9 %)	17 (7.2 %)	3 (1.3 %)	1
C.10 Maritime web portals ^{σ, ε}	85 (36.2 %)	74 (31.5 %)	46 (19.6 %)	19 (8.1 %)	11 (4.7 %)	2
C.11 Maritime scientific e-journals ^{σ, ε, η}	85 (36.2 %)	62 (26.4 %)	63 (26.8 %)	12 (5.1 %)	13 (5.5 %)	2
C.12 Maritime databases ^{σ, ε, η}	86 (36.6 %)	67 (28.5 %)	46 (19.6 %)	20 (8.5 %)	16 (6.8 %)	2
C.13 Maritime e-proceedings ^σ	116 (49.4 %)	57 (24.3 %)	38 (16.2 %)	13 (5.5 %)	11 (4.7 %)	2
C.14 Maritime digital archives ^{σ, ε, α}	121 (51.5 %)	61 (26 %)	35 (14.9 %)	13 (5.5 %)	5 (2.1 %)	1
C.15 Maritime e-news ^η	35 (14.9 %)	44 (18.7 %)	64 (27.2 %)	42 (17.9 %)	50 (21.3 %)	3

Notes: Mann-Whitney U test and Kruskal-Wallis H-test (φ: p < 0.05 sex; η: p < 0.05 age; α: p < 0.05 English level; σ: p < 0.05 level of studies; δ: p < 0.05 work. ε: p < 0.05 year of studies)

Table III. Importance of digital competencies of maritime students – D.1 Information and data literacy

Valid Responses N = 235	Measurement scale (1 Not at all, 2 A little, 3 Quite a bit, 4 A lot, 5 Very much)					
	1	2	3	4	5	Median
D.1 Information and data literacy						
D.1.1 Software use ^σ	4 (1.7 %)	19 (8.1 %)	34 (14.5 %)	67 (28.5 %)	111 (47.2 %)	4
D.1.2 Finding/Evaluating maritime information using search engines ^{σ, η}	0 (0.0 %)	6 (2.6 %)	31 (13.2 %)	72 (30.6 %)	126 (53.6 %)	5
D.1.3 Finding/evaluating maritime information in social media/webpages/blogs ^σ	30 (12.8 %)	45 (19.1 %)	57 (24.3 %)	59 (25.1 %)	44 (18.7 %)	3
D.1.4 Finding/evaluating scholarly files on online professional content hosting services ^φ	45 (19.1 %)	59 (25.1 %)	51 (21.7 %)	49 (20.9 %)	31 (13.2 %)	3
D.1.5 Finding/evaluating scholarly documents in scientific databases ^σ	23 (9.8 %)	44 (18.7 %)	48 (20.4 %)	55 (23.4 %)	65 (27.7 %)	4

Notes: Mann-Whitney U test and Kruskal-Wallis H-test (φ: p < 0.05 sex; η: p < 0.05 age; α: p < 0.05 English level; σ: p < 0.05 level of studies; δ: p < 0.05 work. ε: p < 0.05 year of studies)

Table IV. Importance of digital competencies of maritime students – D.2 Communication and collaboration

Valid Responses N = 235	Measurement scale (1 Not at all, 2 A little, 3 Quite a bit, 4 A lot, 5 Very much)					
	1	2	3	4	5	Median
D.2 Communication and collaboration						
D.2.1 Use of management software	13 (5.5 %)	35 (14.9 %)	58 (24.7 %)	68 (28.9 %)	61 (26 %)	4
D.2.2 Collaboration through open platforms	4 (1.7 %)	5 (2.1 %)	30 (12.8 %)	64 (27.2 %)	132 (56.2 %)	5
D.2.3 Use of videoconference software φ , α , ϵ , η	14 (6 %)	37 (15.7 %)	54 (23 %)	60 (25.5 %)	70 (29.8 %)	4
D.2.4 Use of daily task management software φ , δ	36 (15.3 %)	42 (17.9 %)	62 (26.4 %)	50 (21.3 %)	45 (19.1 %)	3
D.2.5 Participation in professional/scientific digital networks for sharing ideas	44 (18.7 %)	49 (20.9 %)	67 (28.5 %)	41 (17.4 %)	34 (14.5 %)	3
D.2.6 Participation in seminars/workshops	18 (7.7 %)	43 (18.3 %)	65 (27.7 %)	53 (22.6 %)	56 (23.8 %)	3
D.2.7 Use of AI technology σ	72 (30.6 %)	51 (21.7 %)	47 (20 %)	26 (11.1 %)	39 (16.6 %)	2
D.2.8 Identifying hostile online messages/activities	82 (34.9 %)	55 (23.4 %)	45 (19.1 %)	24 (10.2 %)	29 (12.3 %)	2

Notes: Mann-Whitney U test and Kruskal-Wallis H-test (φ : $p < 0.05$ sex; η : $p < 0.05$ age; α : $p < 0.05$ English level; σ : $p < 0.05$ level of studies; δ : $p < 0.05$ work. ϵ : $p < 0.05$ year of studies)

Table V. Importance of digital competencies of maritime students – D.3 Digital content creation

Valid Responses N = 235	Measurement scale (1 Not at all, 2 A little, 3 Quite a bit, 4 A lot, 5 Very much)					
	1	2	3	4	5	Median
D.3 Digital content creation						
D.3.1 Creating maritime content/posts on social networks φ	38 (16.2 %)	50 (21.3 %)	46 (19.6 %)	67 (28.5 %)	34 (14.5 %)	3
D.3.2 Creating maritime audiovisual content φ	60 (25.5 %)	63 (26.8 %)	55 (23.4 %)	34 (14.5 %)	23 (9.8 %)	2
D.3.3 Creating infographics using applications/software	68 (28.9 %)	58 (24.7 %)	62 (26.4 %)	20 (8.5 %)	27 (11.5 %)	2
D.3.4 Understanding of ethics in sharing maritime information	47 (20 %)	43 (18.3 %)	76 (32.3 %)	45 (19.1 %)	24 (10.2 %)	3
D.3.5 Knowledge of programming languages ϵ	84 (35.7 %)	62 (26.4 %)	51 (21.7 %)	20 (8.5 %)	18 (7.7 %)	2

Notes: Mann-Whitney U test and Kruskal-Wallis H-test (φ : $p < 0.05$ sex; η : $p < 0.05$ age; α : $p < 0.05$ English level; σ : $p < 0.05$ level of studies; δ : $p < 0.05$ work. ϵ : $p < 0.05$ year of studies)

Table VI. Importance of digital competencies of maritime students – D.4 Safety

Valid Responses N = 235	Measurement scale (1 Not at all, 2 A little, 3 Quite a bit, 4 A lot, 5 Very much)					
	1	2	3	4	5	Median
D.4 Safety						
D.4.1 Creating strong passwords and secure data management φ, α	19 (8.1 %)	40 (17 %)	64 (27.2 %)	52 (22.1 %)	60 (25.5 %)	3
D.4.2 Knowledge of installing and use of protection services φ, α	30 (12.8 %)	37 (15.7 %)	63 (26.8 %)	53 (22.6 %)	52 (22.1 %)	3
D.4.3 Detecting suspicious emails (phishing) φ	30 (12.8 %)	31 (13.2 %)	61 (26 %)	49 (20.9 %)	64 (27.2 %)	3
D.4.4 Understanding excessive use of digital technology may affect health δ	20 (8.5 %)	27 (11.5 %)	67 (28.5 %)	51 (21.7 %)	70 (29.8 %)	4

Notes: Mann-Whitney U test and Kruskal-Wallis H-test (φ : $p < 0.05$ sex; η : $p < 0.05$ age; α : $p < 0.05$ English level; σ : $p < 0.05$ level of studies; δ : $p < 0.05$ work. ϵ : $p < 0.05$ year of studies)

Table VII. Importance of digital competencies of maritime students – D.5 Problem solving

Valid Responses N = 235	Measurement scale (1 Not at all, 2 A little, 3 Quite a bit, 4 A lot, 5 Very much)					
	1	2	3	4	5	Median
D.5 Problem solving						
D.5.1 Use of technological devices	1 (0.4 %)	10 (4.3 %)	20 (8.5 %)	40 (17 %)	164 (69.8 %)	5
D.5.2 Knowledge of digital tools for solving technological problems	4 (1.7 %)	16 (6.8 %)	44 (18.7 %)	71 (30.2 %)	100 (42.6 %)	4
D.5.3 Ability to use assistive tools improving access to information φ	31 (13.2 %)	37 (15.7 %)	45 (19.1 %)	56 (23.8 %)	66 (28.1 %)	4
D.5.4 Understanding the importance of identifying false/misleading news	7 (3 %)	18 (7.7 %)	44 (18.7 %)	65 (27.7 %)	101 (43 %)	4

Notes: Mann-Whitney U test and Kruskal-Wallis H-test (φ : $p < 0.05$ sex; η : $p < 0.05$ age; α : $p < 0.05$ English level; σ : $p < 0.05$ level of studies; δ : $p < 0.05$ work. ϵ : $p < 0.05$ year of studies)

Table VIII. Informational attitudes of maritime students

Valid Responses N = 235	Measurement scale (1 Not at all, 2 A little, 3 Quite a bit, 4 A lot, 5 Very much)					
	1	2	3	4	5	Median
E.1 Overall satisfaction of maritime information ϵ	4 (1.7 %)	25 (10.6 %)	72 (30.6 %)	102 (43.4 %)	32 (13.6 %)	4
E.2 Importance of internet use for completing studies σ	0 (0.0 %)	6 (2.6 %)	20 (8.5 %)	61 (26 %)	148 (63 %)	5
E.3 Importance of using social media for maritime information φ	16 (6.8 %)	32 (13.6 %)	67 (28.5 %)	63 (26.8 %)	57 (24.3 %)	4
E.4 Importance of digital behavior/digital competencies seminars for maritime studies φ	9 (3.8 %)	19 (8.1 %)	71 (30.2 %)	67 (28.5 %)	69 (29.4 %)	4

Notes: Mann-Whitney U test and Kruskal-Wallis H-test (φ : $p < 0.05$ sex; η : $p < 0.05$ age; α : $p < 0.05$ English level; σ : $p < 0.05$ level of studies; δ : $p < 0.05$ work. ϵ : $p < 0.05$ year of studies)

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My Professor: the Personality of a Teacher through the Eyes of Students

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Abstract

The article examines students' essay portraits of their favorite higher school teachers. These essays were submitted as a credit assignment in the course “Methods of Teaching Journalism in Higher Education” at the master's program at St. Petersburg State University. The essays were written in a free form. The research includes portraits written during the period 2021–2024. The texts were subjected to quantitative analysis according to a set of parameters, and the results were summarized in a table. Unlike typical studies of students' opinions about teachers, this research is based not on answers to standardized questionnaire, but on students' personal impressions. The aim of the study was to identify which qualities of a teacher make the strongest impression on learners, and to outline the optimal (from a student's perspective) style of communication between teachers and students. It turned out that ideally, students would like to see their professors as harmoniously developed individuals with high professional qualifications and bright personal features.

Keywords: journalism education, professor, student, essay portraits, impression, evaluation.

1. Introduction

The authoritative observers argue that currently journalism education “has become one of the fastest growing academic fields in the world” (Goodman, Steyn, 2017: 254). It is clear that researchers seek to identify opinions about its quality and effectiveness. In particular, surveys of media professionals are conducted to determine views and suggestions of the main consumers of journalism school productions (Gavrilov, 2025: 190-194; Shesterkina, Marfityna, 2017; Tinák, Gálik, 2026, etc.). As one might expect, their main focus is on strengthening the application aspect of the program. For example, to the anniversary of the Faculty of Journalism of St. Petersburg University an information portal Lenizdat.ru published a series of interviews with experienced media professionals – they talked mainly about the need to bring training closer to the practice of news industry (Korkonosenko, 2016: 48).

Logically, it may be assumed that attention is also focused on those people who are the recipients of teachers' efforts, namely students in specialized fields. Of course, such surveys are conducted in different countries and cover various thematic aspects. According to the observations of some authors, “most of the research is quantitative and survey-based and mainly focuses on students' vocational motivations, their perceptions of the role of journalism, the ideals of journalism, students' views on ethical and professional standards, and the influence of education on journalism cultures” (Milojevic et al., 2016: 84). This conclusion is supported by the thematic focus of several major projects. For example, a comparative study based on material from eight countries explored the impact of motivations, education, and gender on the journalism students'

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professional views (Hanusch, Mellado, 2014). Another large-scale international project was aimed at students' appreciation of journalists' roles (Arcila Calderón et al., 2021). In other words, the perception of the educational process as well as interaction between students and teachers (which is particularly relevant to our paper) are not the main focus of the study.

Therefore, there are strong arguments in favor of the following conclusion: "The insights of journalism students matter in journalism education and pedagogy but their views have not been heard much in the scholarly literature. Scholars, educators, and professional journalists have flooded the discourse on how journalism is best taught and learned. Yet the study of journalism pedagogy relegates journalism students to mere subjects or recipients of certain pedagogical approaches" (Macasiray, Opiniano, 2022: 167). Perhaps the quoted statement is too categorical, but in general, it is clear that there is an imbalance in how the two sides of the educational process are studied, and this imbalance needs to be addressed. Our research aims to contribute to resolving this issue to some extent.

2. Materials and methods

As noted above, the survey method is widely used in research on the topic we are studying. With the obvious advantages of this toolkit, it is able to reflect mainly average representations on the educational process, primarily because the interviewer formulates the questions and thereby defines the evaluation vectors. The said also relates to the study of students' opinions about teachers: the survey is able to present assessments of the teaching staff as a whole, but not the effects of interpersonal relationships between specific students and their specific mentors. The survey results can paint a picture that is both favorable and very unpleasant and disturbing. For example, in one educational institution, it was found that the students' confidence in the teachers' competence was 5.9 out of 10 points possible; the teacher's ability to demonstrate the connection between their academic discipline and future profession was also 6.1; the teacher's passion for their subject was also 6.1, and the teacher's willingness to help students was rated only at 5.6 (Sukhova, 2022: 37). Undoubtedly, this data is useful for the teaching body. However, it rather reflects the current situation in a pessimistic way than provides models for improving teacher-student relationships. To create models, we need real-life examples of pedagogical excellence that can be imitated.

Our analysis was aimed at personalizing the information received, both about the teacher and the student. It was conducted as part of a course on the subject "Methods of Teaching Journalism in Higher Education" at the master program of St. Petersburg State University, which detailed description of the purpose and methodology of teaching can be found in the corresponding publication (Korkonosenko, 2018). The long experience shows, that many graduates from our master's programs later begin teaching communication or journalism-related subjects in formal or informal educational settings, and in fact, they become media educators. The final task for each student was to write a portrait essay titled "My Professor". Master's students were asked to choose a teacher with whom they had worked in higher education and describe their professional and personal qualities based on their impressions. In total, we analyzed 37 essays for the period 2021–2024, with a variety of universities, specialties and regions where the authors came from with bachelor's degree. The manuscripts were quantified, and the numbers obtained were tabulated. However, the frequency of mentioning certain characteristics has no statistical value, but reflects their distribution in terms of the brightness of students' perception.

The goal of the study was to identify which qualities of a teacher make the strongest impression on learners, and to outline the optimal (from a student's perspective) style of communication between teachers and students based on this information. We hypothesized that bachelor's degree students prefer to interact with teachers who are harmoniously developed individuals with high professional qualifications and bright personal features.

3. Discussion

The discussion of the impact of a teacher's personality on students is directly linked to the endless debate about the purpose and content of education. Characteristic comments on this topic were made in connection with the updating of education legislation in Russia: according to the legislation, "education is understood as a task-oriented process of upbringing and teaching ... However, development still remains an 'educational component' of teaching" (Khovov, 2009: 76). For the training of journalists, the questions of personality development and the realization of his

potential have the greatest methodological significance and practical importance. His future professional activities will involve mental interaction with audiences and the expression of personal opinions, intentions, and emotions. As experienced teachers emphasize, in the Russian system of journalism education “the teacher has always played a significant role as the main driver of the educational process. His status as a pedagogue, mentor, and role model, whose personality impacts both the acquisition of knowledge and the development of students, was being emphasized” (Saenkova-Melnitskaya, 2023: 452). Here, the emphasis on national tradition is not accidental. The expert recalls the stylistic originality of Russian journalism, where ideological and spiritual characteristics are an integral part of reality coverage. Reputable American observers talk about “morally uplifting ‘literature’ as journalism, which is the foundational ethic in Russian journalism” (Erzikova, Lowrey, 2017: 935). Naturally, the properties of the press should be reflected in the training of workers for it.

It is worth noting that in other cultural and national contexts, the importance of moral values may not be as apparent. In the memoirs of the alumni of the American journalism school, there is a series of portraits of his best professors. Let's take a look at the impressions of a former student about his mentors:

“He also circled misleading headlines and inaccurate photo captions. He didn't miss much. It proved to be an irritating but effective teaching tool.”

“Do your research. Get the story and get it right, he said. Assignment editors don't want excuses.”

“He had a military bearing about himself, ramrod straight with a deep voice. He distributed a sheet with approximately 20 instructions. ‘Follow directions.’ he said.”

“He wanted us to be thinking about story ideas, angles and leads before we sat down to type our stories in class under deadline” (Caraher, 2009).

It is easy to see that the main impressions are related to the labor technologies that the professor introduces to students. Of course, this methodology cannot be considered wrong or ineffective, but it has qualitatively different priorities compared to Russian pedagogical attitudes.

At the same time, despite existing and possible differences in pedagogical approaches, there are threats that are common to different cultures, threats to education in its very essence, not just in details. Acting journalism professors describe the dangers as follows: “An instrumental approach has been actively promoted in professional education, and discussions about technologies and formats have pushed the problems of meaning and content into the background. We seemed to understand that the pedagogical process is a close fusion of learning and upbringing, but in fact we forgot about the latter” (Yerofeeva, 2023: 443). The upbringing process requires interpersonal contacts; this is an axiom. However, effective technology-based learning is also difficult to achieve without direct interaction. The experience of enforced isolation during the COVID-19 Pandemic has provided an expressive demonstration of this. For example, students from one of the Russian universities wrote a letter to the rector, expressing their concerns about the disadvantages of distance education during the quarantine and asking for a reconsideration of the concept of digitalization, with a focus on reducing the online component. This position is also shared by journalism educators, who advocate for a direct dialogue between all participants in educational activities (Grabelnikov et al., 2020: 719).

The discussion provides material for the conclusion that in journalism school, the upbringing impact on a student's personality is an essential component of the educational experience. As researchers say: “The formation of a holistic media personality is, in our deep conviction, the main goal of university media education” (Gavrilov, 2025: 180). In turn, this implies that the teacher plays a crucial role in the organization of education. The diminution of this role cannot be compensated for by using technological, administrative, or commercial resources. Therefore, it would be appropriate to emphasize the importance of the teacher's individuality and the need to grant him relative freedom and autonomy in the academic setting.

4. Results

At the same time, it should be noted that the personality of the teacher often receives priority attention when considering interpersonal relationships. The interaction between personalities implies an equal interest in the other person, namely the student, not as a member of the masses but as a sovereign individual. Researchers rightly draw attention to misconceptions of those university actors who “do not take into account the level of autonomy of the student's personality ...

individuals with a specific motivation and a well-developed value system often choose to study journalism, which the teacher cannot (and probably should not) change” (Khubetsova, 2022: 203). Accordingly, the student is guided by his representation of what a journalism teacher should be in order to meet his value orientations. For our research, it is important that, choosing a character for a portrait – from a large set of candidates, – the author is finding the living embodiment of his ideal (My Best Professor). On the other hand, the portrait itself serves as a short essay on the desirable features of a teacher.

The characteristics noted by students are summarized in a table, as far as it was possible to identify certain attribute in the texts (see Table 1).

Table 1. Teacher characteristics (number of mentions)

Post					
Professor, Associate Professor			Lecturer		
28			10		
Type of training lessons					
Lecture			Seminars, practical training		
11			20		
Professional teaching qualities					
Competence, scientific qualification		Clarity of presentation, fascination		Applied usefulness	Innovation, originality
25		19		18	12
Personal qualities					
Communicability	Demanding/gentleness	Empathy, responsiveness	Range of interests, off-duty activity	Appearance, manners	
21	11	19	18	10	

Of course, a small sample size does not provide reliable quantitative results. However, it does reflect those distributions of quantities that a qualified analyst could predict based on their pedagogical experience. Thus, in portraits, professors and associate professors (28) noticeably prevail over colleagues of below post ranks (10). Apparently, the perception of students is influenced by the age and qualification level of the first group's representatives, although this general rule is not absolute. At the same time, it is predictable that stronger impressions are not left by lectures, but rather by seminars and practical exercises (11 vs. 20). It seems that a professor is remembered as an outstanding lecturer, but seminars with a smaller audience allow for individual, face-to-face communication, and better revelation of the teacher's personal qualities.

The position and kind of lessons relate to organizational, rather than human, factors of interaction in the university classroom. The main interest arises from those traits that allow students to keep warm memories of their teachers. Competence and erudition are among the most important qualifications (25):

“His knowledge of the history of Russian journalism makes my head spin.”

“She is completely, almost fanatically immersed in her field.”

“Despite the fact that his main research area is the history of ancient Greece ... in parallel, he has always been interested in the history of medieval Europe, the ancient and medieval East, the history of the state and law.”

“A very good teacher, competent and well-versed in his subject.”

High evaluations of academic knowledge and erudition raise doubts about the validity of students' accusations of laziness and lack of interest in cognitive activities. Targeted pedagogical research reveals more complex interdependencies that we consider to be true: “Currently, demotivation, lack of cognitive interest, worldview and existential indifference of the students are perceived as a matter of course. One of the reasons consists in how the school and university pedagogues deliver the material” (Gusev et al., 2021: 13). The impressions of undergraduate students about the skills of teachers are formed in accordance with the latter thesis. There are many mentions of clarity and fascination of presentations (19), which is actually about the ability of

the mentor to engage students in the subject being studied and overcome the barrier of initial misunderstanding:

"He can turn even the most boring biography or book into something interesting and engaging."

"He has a way of making people listen to him that I've never seen in another teacher."

"His ability to present information in a way that is both engaging and emotional, monitoring the audience's response and adjusting accordingly."

Innovation and originality in arranging classes are directly related to clarity and fascination (12):

"She conducts vivid classes by incorporating theatrical elements, music, films, and even Russian cuisine to demonstrate linguistic nuances."

"Through active gestures, she figuratively helps us imagine how a journalist gathers, processes, and communicates information."

"His classes are characterized by their lightness and humor. Typically, historical stories are remembered by students thanks to his interesting and understandable presentations."

At last, the applied usefulness of learning provokes a very positive reaction (18). This trend is particularly evident in the case of journalists, whose profession is inherently practical:

"Working in a team is like working in a TV studio, where emotions run high."

"She is one of the few in the journalism department who talks about new technologies in the correspondent's profession."

"The class was different from others due to its friendly atmosphere and emphasis on practices, which could not but please."

However, although the practice-oriented approach is generally justified and effective, its straightforward dominance raises doubts and objections. In response to the emotional statements of students, some authors hasten to make such appeals: "When students arrive at university, they should feel like journalists. Teachers should be their colleagues, not just pedagogues. A model of the editorial staff can be created in any discipline, and the editorial atmosphere can be applied to the entire educational process" (Avdonina, 2018: 17). Such statements cannot be considered correct, and not only because not all subjects in the curriculum aim to imitate a media company. The editorial office of the media and the university are different institutions with differences in goals, products, and other aspects, which creates specific challenges for teachers of professional subjects. In our opinion, there is a ground for discussing his dual identity, namely, his simultaneous involvement in the academic community and the mass media, and the intertwining of pedagogical and industrial professional ideologies (Korkonosenko, 2023: 59). We suppose that this synthesis will be well-received by students.

In the Personal qualities section, the symbolic leadership belongs to communicability (21). This is an expected result, as without this quality, there would be no possibility for interaction at all. However, it does not mean that the teacher simply should be available for contacts.

"The ability to reveal the individual needs of each student and adapt the approach according to them."

"I was pleased that the teacher was willing to work with me, and it seemed to justify my right to play a role in this world."

"True passion for their subject and a sincere desire to teach students to think independently."

"This leaves the students with room for self-discovery, allowing them to begin forming their own individual style even during the learning process and helping them fall in love with their profession."

In students' perception, communication is organically combined with empathy and responsiveness (19). That is, a dialogical approach to communication is valued, and the sincere interest of the teacher in the unique personality of the student is appreciated. Of course, for university employees, with their many official duties, this can be an uncomfortable style of behavior. However, firstly, this style attracts young people and, therefore, has educational efficiency. Secondly, the analyzed portraits show that it is not uncommon in university life:

"She is the kind of person who you can always turn to for help or advice. It was noticeable that she cares deeply and rejoices in the success of her students."

"Her warmth and kindness allow students to perceive her not only as a teacher but also as an older sister."

“If someone is feeling worried or emotional, she will never ignore it. She will come and listen, discuss the issue, and offer support.”

Certainly, such assessments should not be mixed with a condescending attitude towards laziness or idleness (which is partly covered by the demanding/gentleness parameter – 11). Instead, a teacher's rigor and respect for own subject do not prevent him from being the “My best professor” for a student:

“She is characterized by an absolute demand for knowledge of the subject (discipline), and as a teacher, she does not accept a superficial understanding of the material.”

In studies using formalized methods, it is usually not possible to capture those aspects of the teacher's personality that extend beyond their official role; at least, it is not possible to enumerate such “extra” activities. However, working with student impressions reveals that they value getting to know their teachers' interests and activities outside of work (18). Such knowledge not only enhances the teacher's image but also makes it more relatable, clear, and attractive.

“During the summer, my teaching schedule takes a break, but my journalism and creative activities come to life. When I have free time, I devote it to this creative process.”

“She is a person who does not remain indifferent to the problems of others. Recently, a non-profit organization has appeared that helps homeless people. She not only personally takes part in the activities, but also involves students.”

“In different periods of her life, she had different hobbies: music, singing, directing documentaries and theater performances. Despite having already earned more than one diploma, she decided to enroll in higher directing courses.”

“Almost any literary works that are named by representatives of the younger generation are familiar to the professor, he can always keep up the conversation and stays abreast of current trends. It is very important for students to feel that the teacher understands them and is open to dialogue.”

If a profession is presented by mentors with a broad outlook and diverse hobbies, it seems to be enriched with colors in the eyes of students. Regardless, exposing oneself to the audience informally does not interfere with the availability of educational material or the preservation of the teacher's image in students' grateful memories. Correspondingly, the same can be said about the perception of appearance and manner of behavior. The relatively low mention rate (10) is likely due to the fact that not every lecturer has a bright, memorable appearance. This, of course, is not a disadvantage. However, if a lecturer does have an extraordinary appearance, then their image merges with the mental representation of the profession and leaves a lasting impression on the students' minds:

“She has a unique style. Her image has always been an example of good taste, intelligence, and education.”

“He has the voice of a true orator – sometimes he slows down the speech and speaks in a soft whisper to emphasize the significance of his words, making you think; sometimes he raises his voice with a solemn tone; and sometimes he pauses suddenly.”

“She always came to class as if she was from a movie set, elegantly dressed and with a cup of coffee in her hands. She also taught this grace to the female half of the audience.”

Since we are discussing the impressions of teachers and attempts to draw their portraits, it is impossible to do so without considering the visual aspect. The examples above show that appearance and style of behavior can be a valuable part of pedagogical skills, as they help to engage students in the subject matter. As stated in the literature on the psychology of pedagogy, the issue of the influence of a higher education teacher's appearance on the formation of their positive or negative image among students has not been adequately explored. At the same time, a survey of students at pedagogical universities revealed that “appearance of teacher is considered by students and trainees as an important part of his successful professional activity and affects the efficiency of interaction in diad ‘teacher-student (listener)’” (Gaponova, 2017: 187-188). Examples from the portraits of favorite professors provide strong confirmation of these conclusions.

5. Conclusion

First of all, the research conducted provides a basis for a conclusion regarding the effectiveness of the chosen method. The students' vivid impressions, presented in their essays reflect the teacher's priority characteristics, by their opinion. His personality combines high methodological qualifications, erudition, exactingness, talent for communication and striking

individual traits. Accordingly, in ideal, students imagine the learning process as active interpersonal communication, rather than just the acquisition of normative knowledge and skills. Thus, they actually describe the desirable style of behavior for teachers, which goes beyond simple following official regulations.

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The Platform Assemblage Model: A New Framework for Media and Information Literacy Education

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Abstract

Contemporary media and information literacy (MIL) education faces a fundamental challenge: its analytical tools remain rooted in concepts like “text,” “author,” and “audience” inherited from print culture, while the media environment has transformed into a complex ecosystem of platforms, algorithms, and participatory networks. This article proposes a new theoretical framework for MIL education based on the concept of the Platform Assemblage. Drawing on assemblage theory (DeLanda), actor-network theory (Latour), and critical platform studies (van Dijck, Gillespie), we argue that media phenomena are not discrete texts but dynamic gatherings of heterogeneous actors – human and non-human, including algorithms, interfaces, legal codes, and user communities. We articulate five dimensions for analyzing any platform-based media formation: (1) neuro-mimetic resonance (how platforms engineer collective affect); (2) quasi-biological replication (memetic evolution under algorithmic pressure); (3) chronophagy (the capture of attention as economic driver); (4) the dark matter of the latent (the generative power of the unseen); and (5) algorithmic co-agency (non-human actors as co-creators). The article demonstrates how each dimension translates into specific competencies for MIL education, enabling learners to move beyond content analysis to infrastructure critique. We conclude by proposing a pedagogical shift from hermeneutics to cartography: teaching students to map platform assemblages rather than merely interpret media messages. This framework equips educators with conceptual tools for fostering critical agency in platform-saturated environments.

Keywords: media literacy, information literacy, platform studies, assemblage theory, algorithmic literacy, digital education, critical pedagogy, attention economy

1. Introduction

Media and information literacy (MIL) has long been recognized as an essential competency for democratic citizenship in the digital age. UNESCO's MIL framework emphasizes the ability to access, analyze, evaluate, and create media content across various forms and contexts (Wilson et al., 2011). Traditional MIL education has focused on developing critical skills for interpreting media messages: identifying bias, evaluating sources, understanding authorship, and recognizing persuasive techniques (Buckingham, 2007; Potter, 2019; Tinák, Gálik, 2026). These competencies remain necessary, but they are no longer sufficient. Recent scholarship has begun to reconceptualize media literacy for the platform environment. Cho et al. (Cho et al., 2024) have proposed a comprehensive framework for social media literacy that shifts attention from individual messages to the distinctive affordances and dynamics of social media platforms. However, even this expanded framework remains primarily focused on user competencies – what individuals need to know and do to navigate

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social media effectively. In our previous work (Markov, Shtayn, 2026), we introduced the concept of “second-order media literacy” to describe the capacity to understand not just media content but the historical and semantic conditions under which media become legible. The present article extends this line of inquiry by proposing that genuine media literacy for the platform age requires a shift from analyzing what users do to analyzing the assemblages within which users act.

The media environment that contemporary learners inhabit is fundamentally different from the one for which traditional MIL frameworks were designed. It is no longer organized primarily around discrete texts produced by identifiable authors and distributed through predictable channels. Instead, it is composed of dynamic, platform-based ecosystems in which content is continuously generated, algorithmically curated, and collectively transformed by distributed networks of human and non-human actors. A teenager scrolling through TikTok is not simply “consuming content”; they are navigating an assemblage that includes the platform's recommendation algorithm, its interface design, its data extraction infrastructure, the affective labor of countless creators, and the participatory practices of commenters and remixers (Zulli, 2020). The “message” they encounter is not a fixed text but a temporary stabilization of this entire network.

This transformation poses a profound challenge for MIL education. The conceptual tools we provide to learners – author, text, audience, bias, source – were developed for a media regime that is rapidly receding. They capture only the visible surface of platform-based media, leaving the underlying infrastructures and processes invisible and therefore unchallengeable. As Gillespie (Gillespie, 2018) has argued, platforms are not neutral intermediaries but “custodians of the internet” whose algorithms, policies, and architectures actively shape public discourse. If MIL education does not equip learners to understand and critique these infrastructural dimensions, it risks producing citizens who can interpret media messages but cannot grasp the forces that determine which messages reach them in the first place.

This article proposes a new theoretical framework for MIL education based on the concept of the Platform Assemblage. Drawing on assemblage theory (DeLanda, 2006; DeLanda, 2016), actor-network theory (Latour, 2005), and critical platform studies (Gillespie, 2014; Srnicek, 2017; van Dijck, 2013), we reconceive platform-based media phenomena as dynamic gatherings of heterogeneous actors whose interactions produce cultural effects. We articulate five dimensions for analyzing any Platform Assemblage and demonstrate how each dimension translates into specific competencies for MIL education. Our goal is to equip educators with a conceptual vocabulary for teaching what we call infrastructural literacy: the ability to understand, navigate, and critically engage with the platforms and algorithms that increasingly mediate public life.

2. Materials and methods

The main sources for this article are drawn from three intersecting fields of research. First, we draw on assemblage theory as developed by Manuel DeLanda (DeLanda, 2006; DeLanda, 2016) and actor-network theory as formulated by Bruno Latour (Latour, 2005), which provide the ontological foundations for understanding media phenomena as distributed networks rather than discrete objects. Second, we engage with critical platform studies, including the work of van Dijck (van Dijck, 2013) on platform connectivity, Gillespie (Gillespie, 2014; Gillespie, 2018) on algorithmic governance, and Srnicek (Srnicek, 2017) on platform capitalism, which illuminate the political-economic dimensions of platform infrastructures. Third, we draw on media literacy scholarship, particularly Buckingham (Buckingham, 2007), Potter (Potter, 2019), and the UNESCO MIL framework (Wilson et al., 2011), to identify the gaps and limitations in current pedagogical approaches.

The study employs several complementary methods. The systematic method allows us to synthesize insights from diverse disciplinary sources – philosophy, media studies, education research – into a coherent theoretical framework. The comparative method enables us to contrast traditional MIL approaches with the platform assemblage model, identifying specific points of divergence and innovation. The problem-chronological approach situates the transformation of the media environment within a broader historical trajectory, from the Gutenberg parenthesis of print culture to the platform era. Finally, the analytical method is used to break down the Platform Assemblage into five analytically distinct dimensions, each of which can be examined separately while recognizing their mutual constitution in practice.

The argument proceeds in four stages. First, we diagnose the limitations of traditional MIL frameworks in addressing platform-based media. Second, we introduce the theoretical foundations of the Platform Assemblage model. Third, we articulate the five dimensions of the model and

demonstrate how each translates into specific MIL competencies. Fourth, we explore pedagogical implications and propose a shift from hermeneutics to cartography as the core methodology for media literacy education.

3. Discussion

Traditional media literacy education emerged in response to the mass media of the twentieth century: newspapers, radio, television, and film. Its core competencies were designed to equip citizens with critical tools for navigating a media environment characterized by centralized production, one-way distribution, and relatively stable texts (Buckingham, 2007; Potter, 2019). Key concepts included authorship (who created this message?), format (what genre or medium is it?), audience (who is it for and how might they interpret it?), content (what does it say and how?), and purpose (why was it made?). These questions remain valuable, but they presuppose a media ontology that no longer holds.

The platform environment differs in several fundamental respects. First, production is distributed. Content is not created by identifiable authors but emerges from the interactions of millions of users, algorithmic recommendations, and platform affordances. A viral TikTok video may have no single author; it is a collective emergent of the platform ecosystem. Second, texts are unstable. Content is continuously remixed, repurposed, and recontextualized as it circulates across platforms. A meme is not a fixed text but a family of variations. Third, distribution is algorithmic. What users see is determined not by editorial choice but by recommendation algorithms optimized for engagement. Fourth, value is extracted from interaction. Platforms monetize not content but the data generated by user engagement. Fifth, non-human actors are constitutive. Algorithms, interfaces, and protocols actively shape what can be said, seen, and done.

Traditional MIL frameworks, focused on analyzing discrete texts produced by identifiable authors, cannot adequately address these dimensions. They render the infrastructural layers invisible, leaving learners with tools for interpreting messages but not for understanding the systems that produce and circulate them.

To address this gap, we turn to assemblage theory and actor-network theory, which provide conceptual resources for understanding distributed, processual, and heterogeneous phenomena. Manuel DeLanda's (DeLanda, 2006; DeLanda, 2016) assemblage theory offers a precise ontological vocabulary. An assemblage is a whole whose properties emerge from relations between heterogeneous parts. Its components retain autonomy – they can be “unplugged” from one assemblage and “plugged into” another. Assemblages are defined by twin processes: territorialization, which stabilizes identity and boundaries, and deterritorialization, which destabilizes and opens toward new connections.

Bruno Latour's (Latour 2005) actor-network theory adds the principle of radical symmetry: agency is distributed across networks of human and non-human actants. A platform's recommendation algorithm, its content moderation AI, its interface buttons, its terms of service – these are not passive tools but active mediators that translate and transform action. They make certain realities possible and others impossible.

Applying this lens to platform-based media, we define the Platform Assemblage as a dynamic gathering of heterogeneous actors – human and non-human – whose interactions produce cultural effects. The unit of analysis is not the discrete text but the entire network of relations that brings it forth and gives it meaning.

We identify five constitutive dimensions of any Platform Assemblage. For each dimension, we explain its operation and derive specific competencies for media and information literacy education.

Neuro-Mimetic Resonance: Understanding Affective Capture

Description. Platforms are technologies for synchronizing affect across populations. Memes, trends, and aesthetic templates function as cultural attractors, organizing collective feeling and attention before any propositional content is processed (Connolly, 2002; Papacharissi, 2015). The “This is Fine” meme – a dog in a burning room – spreads not through argument but through participatory alignment with an affective stance of ironic detachment. Platform interfaces capture affect through buttons (like, heart, react) that quantify emotional response and feed it into recommendation algorithms.

MIL Competencies. Learners need to:

- Recognize that media engagement begins at the affective level, before conscious interpretation.

– Identify how platform interfaces (likes, reactions, notifications) are designed to capture and amplify emotion.

- Distinguish between affective resonance and propositional content in media messages.
- Develop metacognitive awareness of their own affective responses to platform content.
- Understand how platforms optimize for high-arousal emotions (outrage, anxiety) because they drive engagement.

Quasi-Biological Replication: Tracing Memetic Evolution

Description. Content on platforms evolves. A source video, image, or text functions as a memetic genome; user responses (parodies, remixes, reactions) are phenotypic expressions subject to variation and selection. Recommendation algorithms act as selective environments, determining which variations thrive (Milner, 2016; Shifman, 2014). The "Hanahaki Disease" trope emerged in fan communities and evolved under the selective pressure of AO3's tagging system, demonstrating how platform infrastructure shapes narrative form.

MIL Competencies. Learners need to:

- Trace the evolution of memes, tropes, and narratives across platforms and over time.
- Understand that content variations are not random but shaped by algorithmic selection pressures.

– Identify how platform features (tags, search, recommendations) function as selective environments.

– Recognize that dominant content forms are not naturally superior but algorithmically favored.

– Analyze how platform business models (engagement optimization, ad revenue) shape evolutionary trajectories.

Chronophagy: Analyzing Attention Economies

Description. Platforms capture and metabolize user time – chronophagy. Infinite scroll, autoplay, push notifications, and streaks are behavioral architectures designed to minimize friction and maximize session length (Crary, 2013; Williams, 2018). Narrative forms evolve to optimize chronophagy: cliffhangers, serialization, and hooks are adapted to platform interfaces that reward continuous engagement.

MIL Competencies. Learners need to:

– Recognize interface elements designed to capture and extend attention (autoplay, infinite scroll, recommendations).

– Understand that platform metrics (views, watch time, engagement) measure attention extraction, not value or quality.

– Develop strategies for intentional platform use, including setting time limits and recognizing choice points.

– Analyze how narrative forms (cliffhangers, serialization) are shaped by chronophagic imperatives.

– Compare chronophagic models across platforms and identify alternatives (e.g., crowdfunding, physical media).

The Dark Matter of the Latent: Navigating Visibility and Invisibility

Description. Public platform content is the visible tip of an iceberg. The greater mass is dark matter: private groups, deleted content, unspoken assumptions, ephemeral messages, and abandoned drafts (Toscano, Kinkle, 2015). Platforms structure visibility through features like "Close Friends," private accounts, and disappearing messages. Fanon (fan canon) – widely held but unofficial interpretations – exerts gravitational pull on visible culture, sometimes condensing into official content.

MIL Competencies. Learners need to:

– Recognize that much significant communication happens in invisible spaces (private groups, DMs, ephemeral content).

– Understand that platform architectures create gradients of visibility that shape what can be said.

– Distinguish between official content and fanon, recognizing the generative power of unofficial interpretation.

– Develop strategies for navigating private and public spaces safely and ethically.

– Analyze how content moderation and platform policies produce invisibility by removing or demoting content.

Algorithmic Co-Agency: Collaborating with Non-Human Actors

Description. Algorithms are not tools but co-agents, actively shaping cultural form and social practice (Gillespie, 2014; Seaver, 2019). Creators work within fields pre-structured by algorithmic constraints, adapting content to platform metrics. Platforms like AO3 exert taxonomic agency through tagging systems that provide the grammar for collective articulation.

MIL Competencies. Learners need to:

- Recognize that algorithms are active participants in media production, not neutral distributors.
- Understand how platform metrics (views, likes, retention) shape creative decisions.
- Analyze how tagging systems and categories make some content visible and other content obscure.
- Develop critical awareness of how algorithmic feedback loops influence their own content consumption and creation.
- Advocate for algorithmic transparency and participatory governance of platform systems.

4. Results

The five-dimensional model of the Platform Assemblage, translated into MIL competencies, offers more than a simple addition to the existing toolkit of media educators. It proposes a fundamental reconceptualization of what media literacy means and requires in the platform age. In this discussion, we elaborate the theoretical and pedagogical implications of this shift, address potential objections, and outline directions for future research and curriculum development.

From Content Critique to Infrastructure Critique. The most significant implication of the Platform Assemblage model is that it shifts the focus of media literacy from content critique to infrastructure critique. Traditional MIL education teaches students to ask questions about media messages: Who created this? What techniques are used to attract attention? How might different people interpret this message? Whose interests are served? These questions, derived from classic frameworks like the Center for Media Literacy's five core concepts, remain valuable. However, they presuppose that the primary object of analysis is the message itself.

The platform environment renders this presupposition problematic. When a teenager encounters a video on TikTok, the “message” they see is the product of countless infrastructural decisions that precede and shape any content-level analysis. The recommendation algorithm decided to surface this video rather than another. The interface design determined that it would appear in vertical full-screen format with a caption overlay. The platform's business model ensured that it was optimized for engagement metrics rather than informational quality. The content moderation AI filtered out certain elements before the video reached public view. These infrastructural layers are not neutral conduits; they actively constitute what can be seen, said, and known.

Teaching infrastructure critique means equipping learners with concepts and methods for analyzing these layers. Students need to understand that platforms are not simply “where content lives” but active agents in cultural production. They need to recognize that algorithmic systems have politics, that interface designs embody values, and that business models shape communicative possibilities. The five dimensions provide a systematic vocabulary for this critique: learners can analyze how neuro-mimetic resonance captures affect, how quasi-biological replication selects for certain content variations, how chronophagy optimizes for attention extraction, how dark matter structures visibility, and how algorithmic co-agency distributes creative authority.

The Limits of Individualist Approaches to Media Literacy. A second implication concerns the limitations of individualist approaches to media literacy. Much MIL education implicitly assumes that the problem is individual competence: if learners acquire sufficient skills and knowledge, they can navigate the media environment effectively. This assumption underlies competency-based frameworks that enumerate what individuals should know and be able to do. While individual competencies are necessary, they are not sufficient.

The Platform Assemblage model reveals that media environments are structured by forces that cannot be addressed at the individual level alone. No amount of individual critical thinking can change the fact that recommendation algorithms optimize for engagement, that platform business models incentivize outrage and sensationalism, that content moderation systems operate opaquely, or that user data is continuously extracted and commodified. These are collective action problems that require collective responses: regulatory frameworks, platform governance reforms, public interest technologies, and organized user advocacy.

This insight has important pedagogical implications. MIL education must complement individual skill-building with collective literacy: the capacity to understand how platform systems work at scale, to identify points of leverage for collective intervention, and to participate in democratic governance of media infrastructures. Students need opportunities to engage with policy debates about platform regulation, to understand how collective action (boycotts, campaigns, advocacy) can influence platform behavior, and to imagine alternative models of platform governance (cooperatives, public service platforms, community-owned infrastructures). The dark matter dimension, which highlights the generative power of private communities and unofficial interpretations, offers a particularly rich entry point for exploring collective agency outside corporate platform structures.

Developmental and Age-Appropriate Applications. The five-dimensional model is not a one-size-fits-all framework. Different dimensions become relevant at different developmental stages, and pedagogical strategies must be adapted accordingly. We offer preliminary guidelines for age-appropriate implementation:

Early adolescence (ages 11-14). At this stage, learners are developing basic awareness of platform environments but may lack the cognitive maturity for abstract systems thinking. The focus should be on observable dimensions: neuro-mimetic resonance (recognizing how platforms make them feel) and chronophagy (noticing how platforms capture their time). Simple exercises like affect journals (tracking emotional responses to different platform content) and attention audits (logging time spent on different platforms) can build metacognitive awareness without requiring complex theoretical frameworks.

Middle adolescence (ages 14-16). Learners at this stage can engage with more abstract concepts like algorithmic influence and memetic evolution. Activities might include tracing the spread of a meme across platforms, analyzing how their own TikTok feed changes in response to their engagement, or comparing how different platforms surface content. The quasi-biological replication dimension becomes accessible through hands-on investigation of platform dynamics.

Late adolescence (ages 16-18). Older learners can grapple with the full complexity of the model, including the political-economic dimensions of platform capitalism and the ethical questions raised by algorithmic governance. They can engage with the dark matter dimension by exploring questions of privacy, visibility, and community in their own platform use. They can analyze algorithmic co-agency by examining how platforms shape creative production and considering questions of accountability and transparency.

University level and adult education. At the highest level of sophistication, learners can engage with the theoretical foundations of the model, critique its assumptions and limitations, and apply it to original research or advocacy projects. They can explore comparative questions: how do different platform assemblages vary across national contexts, regulatory regimes, or cultural settings? They can investigate historical questions: how did current platform assemblages emerge, and what alternatives have been foreclosed?

Teacher Preparation and Professional Development

Implementing the Platform Assemblage model in MIL education requires significant teacher preparation. Most educators themselves lack training in platform studies, algorithmic literacy, or infrastructure critique. They may be unfamiliar with concepts from assemblage theory or actor-network theory. They may feel overwhelmed by the complexity and rapid change of platform environments.

Professional development programs should address several key areas. First, teachers need conceptual foundations: a working understanding of the five dimensions and their theoretical underpinnings. Second, they need pedagogical strategies: age-appropriate activities, discussion guides, assessment methods. Third, they need ongoing support: communities of practice where educators can share resources, troubleshoot challenges, and stay current with platform changes. Fourth, they need institutional backing: recognition that infrastructure critique is a legitimate and important component of media literacy, not an optional add-on.

The model itself can serve as a framework for teacher development. By applying the five dimensions to their own professional practice – analyzing how platforms shape their teaching resources, how algorithms influence their professional learning networks, how chronophagy affects their work-life balance – teachers can develop the same competencies they will teach to students.

Research Directions. The Platform Assemblage model opens numerous avenues for future research. We identify several priorities:

Empirical studies of platform assemblages in educational contexts. How do platform assemblages actually function in schools and classrooms? What platform-specific literacies are students developing informally, outside formal curricula? How do different platform assemblages shape learning outcomes, social dynamics, and civic engagement?

Comparative studies across platforms and contexts. How do the five dimensions manifest differently across platforms (TikTok vs. YouTube vs. Instagram), across national contexts (different regulatory regimes), and across user populations (different age groups, cultural backgrounds, socioeconomic positions)? What can these comparisons reveal about the contingencies and possibilities of platform design?

Intervention studies. Can explicit instruction in the five-dimensional model improve students' critical agency? What pedagogical strategies are most effective for developing infrastructure critique? How can we measure competencies like "ability to map a platform assemblage" or "capacity to identify algorithmic influence"?

Critical and normative inquiry. What would better platform assemblages look like? How might platforms be designed to support rather than undermine media literacy? What policy frameworks could foster more transparent, accountable, and democratic platform governance? How can the model inform advocacy and reform efforts?

Historical and genealogical research. How did current platform assemblages emerge? What alternatives were proposed, experimented with, or foreclosed? How have platform logics evolved over time, and what trajectories can we project into the future?

Addressing Potential Objections. We anticipate several potential objections to the Platform Assemblage model and offer preliminary responses.

Objection 1: The model is too complex for practical educational use. Response: the full theoretical apparatus is indeed complex, but the five dimensions can be translated into age-appropriate concepts and activities. Just as students learn simplified versions of scientific concepts before encountering their full complexity, they can learn simplified versions of platform critique before engaging with advanced theory. The model provides a coherent framework for progression from basic to advanced understanding.

Objection 2: Platform environments change too rapidly for any stable framework. Response: While platforms change constantly, the underlying dynamics captured by the five dimensions are relatively stable. Recommendation algorithms, attention economics, memetic evolution, and participatory cultures are enduring features of the platform environment, even as specific implementations evolve. The model aims to describe structural dynamics, not transient features.

Objection 3: Infrastructure critique may foster cynicism or disengagement. Response: This is a legitimate concern. Critical analysis without constructive alternatives can indeed produce hopelessness. However, the model also reveals points of leverage and possibility. The dark matter dimension highlights the generative power of communities outside corporate platforms. The algorithmic co-agency dimension opens questions of accountability and design. The pedagogical strategies we propose emphasize not just critique but agency: understanding systems in order to navigate them intentionally and advocate for better alternatives.

Objection 4: The model neglects traditional media literacy competencies. Response: We do not propose replacing traditional competencies but expanding them. Content critique remains essential; it must now be complemented by infrastructure critique. The goal is a richer, more comprehensive media literacy adequate to the platform environment.

The Platform Assemblage model reorients media literacy education toward the infrastructural dimensions of platform-based media. It reveals that individual content critique, while necessary, is insufficient for understanding or navigating contemporary media environments. It points toward collective literacy, developmental sequencing, teacher preparation, and new research directions. Most importantly, it equips learners not just to interpret media messages but to understand and engage with the systems that produce them – a crucial capacity for democratic citizenship in the platform age.

5. Conclusion

The media environment has transformed, but MIL education has not kept pace. While platforms, algorithms, and participatory networks have become the primary infrastructures of cultural production, our pedagogical tools remain rooted in concepts developed for print and

broadcast media. This gap leaves learners ill-equipped to understand, let alone critically engage with, the forces that shape their media environments.

The Platform Assemblage model offers a way forward. By reconceiving media phenomena as dynamic gatherings of heterogeneous actors, it provides conceptual resources for addressing the distributed, processual, and infrastructural dimensions of platform-based media. The five dimensions – neuro-mimetic resonance, quasi-biological replication, chronophagy, dark matter, and algorithmic co-agency – translate directly into MIL competencies, equipping learners with tools for navigating platform-saturated environments.

The pedagogical shift from hermeneutics to cartography – from interpreting texts to mapping processes – is not a rejection of traditional MIL but an expansion. Close reading remains valuable; it must now be complemented by infrastructure critique. Teaching students to interpret media messages remains essential; they must also learn to trace the assemblages that produce and circulate those messages.

This expanded MIL framework serves a broader civic purpose. Democratic citizenship in the platform age requires not just critical consumers but critical participants – people who understand the systems they inhabit and can advocate for more just, transparent, and accountable platforms. The Platform Assemblage model provides conceptual foundations for such citizenship. It reveals that platforms are not neutral technologies but political assemblages, shaped by power relations and open to contestation. Teaching students to map these assemblages is teaching them to read the powers that shape their world – and to imagine how it might be otherwise.

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Media and Information Literacy in Education: A Bibliometric Analysis of Global Research Trends (2000–2025)

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Abstract

Media and Information Literacy (MIL) has become a vital educational priority in the digital age, equipping learners with critical competencies to navigate complex media environments, combat misinformation, and engage responsibly with digital technologies. While scholarly interest in MIL has grown rapidly over the past two decades, a systematic global mapping of research trends remains limited. This study presents a comprehensive bibliometric analysis of 2,866 peer-reviewed publications related to MIL in educational contexts, indexed in the Web of Science Core Collection between 2000 and 2025. Using the Bibliometrix package in R, we examined publication patterns, influential authors, leading institutions and countries, intellectual structures, and thematic evolution. Results reveal a sharp increase in MIL research post-2010, coinciding with rising concerns around fake news, digital citizenship, and social media influence in educational environments. The United States, the United Kingdom, and Australia emerged as dominant contributors, while collaborative networks show increasing engagement from Asia and Latin America. Thematic analysis identified evolving research priorities, from foundational literacy frameworks to AI-mediated learning, algorithmic awareness, and policy integration. Despite conceptual growth, the field remains geographically uneven, and integration between media literacy, information science, and pedagogy is still emerging. This study contributes a global overview of the MIL research landscape in education, identifies research gaps, and offers directions for interdisciplinary collaboration and inclusive knowledge production.

Keywords: media literacy, information literacy, digital education, bibliometric analysis, global trends, misinformation.

1. Introduction

Media and Information Literacy (MIL) refers to the set of competencies that empower individuals to access, analyze, evaluate, and create information and media content in various forms. According to Alcolea-Díaz et al. (Alcolea-Díaz et al., 2020), MIL is essential not only for personal empowerment but also for fostering informed citizenship and strengthening democratic participation. The concept amalgamates various literacies, media literacy, information literacy, digital literacy, and news literacy into a comprehensive framework to prepare learners to navigate the complex and dynamic landscape of the digital age (Grizzle et al., 2014). As the boundaries between media and information platforms continue to blur due to technological convergence, MIL has emerged as a critical skill set. It enables learners to discern the credibility of information, understand media bias, produce user-generated content ethically, and actively participate in civic life. These competencies are particularly relevant in the current context of digital abundance,

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algorithmic personalization, misinformation, and online radicalization (Koltay, 2011). Consequently, educational systems worldwide have increasingly embraced MIL as a vital component of 21st-century learning frameworks.

The 21st century has witnessed a significant shift in how knowledge is produced, consumed, and disseminated. With the ubiquity of digital technologies, students are constantly exposed to vast amounts of information from diverse media sources. However, access alone does not guarantee comprehension or discernment. The educational imperative now lies in cultivating critical thinking and evaluative skills that go beyond traditional literacy (Livingstone, 2004). Media and information literacy provides students with tools to assess source credibility, detect fake news, understand data manipulation, and foster digital responsibility (Bulger, Davison, 2018).

Incorporating MIL into formal and non-formal education systems is now regarded as essential for preparing students for lifelong learning and global citizenship. The European Commission included MIL in its key competences for lifelong learning, while the Sustainable Development Goals (SDG 4.7) emphasize education that promotes informed decision-making, sustainability, and civic engagement, all of which hinge on MIL competencies (Fraillon et al., 2013). Schools and universities have responded by embedding MIL into curricula, though integration levels vary significantly across countries and institutions (Frau-Meigs et al., 2017).

Given the exponential growth of scholarly output on MIL in the past two decades, a bibliometric synthesis becomes essential for making sense of the existing research landscape. Bibliometric analysis provides quantitative insights into publication trends, thematic evolution, collaboration networks, and the intellectual structure of a research field. It is a valuable tool for researchers, educators, and policymakers to identify knowledge gaps, assess the maturity of the field, and map the influence of authors, journals, and institutions (Donthu et al., 2021). While several systematic reviews have addressed components of MIL, such as digital literacy or media education in isolation, there is a lack of integrative bibliometric studies that comprehensively analyze MIL within the context of education from a global perspective. The growing diversity of research outputs, interdisciplinary contributions, and regional variations in MIL application warrant a meta-level analysis that transcends narrative or thematic reviews (Sánchez et al., 2023). A bibliometric approach not only tracks the volume and growth of scholarly publications but also helps uncover the structural dynamics of the research field, such as co-authorship networks, keyword co-occurrences, and citation linkages. Tools like VOSviewer, CiteSpace, and Bibliometrix have enabled such analyses with increasing sophistication and visual clarity. However, such methods remain underutilized in MIL-focused research synthesis, leaving a critical gap in evidence-informed decision-making.

Research Gaps in Prior Reviews: Previous reviews of MIL in education have largely been conceptual, pedagogical, or regional in focus. For instance, Frau-Meigs et al. (Frau-Meigs et al., 2017) offered a European perspective on media education, while Hobbs (Hobbs, 2010) emphasized curriculum design strategies. These works provided rich insights but lacked the methodological rigor of bibliometric mapping. Moreover, recent studies have typically been limited to specific themes, such as fake news detection (Guess et al., 2020), social media literacy (Mustafa, 2025), or digital citizenship (Choi, 2016), rather than offering a panoramic view of the field's evolution.

Furthermore, few studies have addressed the comparative development of MIL across geographic regions, author networks, and institutional contributions. There is limited understanding of how MIL research differs between Global North and Global South contexts, or how institutional funding and collaboration patterns shape scholarly output. Similarly, the thematic clustering of MIL topics over time remains unexplored, particularly as the field intersects with emerging concerns like AI literacy, data privacy, and algorithmic accountability.

Objectives of the Study: In response to these gaps, this study aims to conduct a comprehensive bibliometric analysis of global research on Media and Information Literacy in education from 2000 to 2025. The primary objectives are as follows:

1. To map the global research output on MIL in education, identifying publication volume, growth trends, and key publication outlets.
2. To identify thematic evolution and intellectual structure, including key research areas, conceptual clusters, and emerging trends.
3. To analyze the contributions of leading authors, institutions, and countries, uncovering patterns of scholarly collaboration and knowledge dissemination.

This bibliometric synthesis is grounded in data retrieved from reputable academic databases, using co-citation, co-word, and co-authorship analyses to construct a multi-dimensional overview of the field.

Research Questions: To guide the bibliometric investigation, the following research questions (RQs) are proposed:

- RQ1: How has global research on Media and Information Literacy in education evolved from 2000 to 2025 in terms of publication trends and thematic focus?
- RQ2: What are the dominant intellectual structures and thematic clusters within the field as revealed through co-citation and keyword analyses?
- RQ3: Which authors, institutions, and countries have emerged as leading contributors in the development of MIL in education?

Significance of Study: This study is significant for multiple reasons. First, it fills a methodological and thematic void by offering the first large-scale bibliometric analysis of MIL in education, thereby enabling a data-driven understanding of the field's growth and structure. Second, it provides a foundation for future research by identifying underexplored themes, declining areas of interest, and nascent topics with high research potential. Third, the findings assist curriculum designers, educational policymakers, and institutional leaders in aligning pedagogical strategies with global trends. By identifying regional strengths and gaps, the study can inform capacity-building initiatives and foster cross-border academic collaboration. Moreover, in an era where misinformation and digital polarization pose serious threats to democratic societies, understanding how MIL is being conceptualized and taught becomes a matter of urgent educational and civic concern. Finally, this bibliometric synthesis contributes to the larger discourse on digital transformation in education. As MIL becomes a cornerstone of future-ready education systems, empirical clarity on its research trajectory ensures that pedagogical interventions are not only innovative but also evidence-based and globally contextualized.

Literature Review: Media and Information Literacy (MIL) is a multidimensional and evolving concept that encapsulates the competencies needed to access, evaluate, use, and create information and media content ethically and effectively. The term combines two traditionally separate areas, media literacy and information literacy, into a holistic framework essential for modern education and civic participation. According to UNESCO, MIL is defined as a set of competencies that empower citizens to access, understand, evaluate, and use information and media critically and responsibly. It encourages informed decision-making, freedom of expression, intercultural dialogue, and democratic participation (Alcolea-Díaz et al., 2020). UNESCO has been one of the major global actors promoting MIL as a foundational element of 21st-century education and digital citizenship. Similarly, the European Commission defines media literacy as the ability to access the media, to understand and critically evaluate different aspects of the media and media content, and to create communications in a variety of contexts. In its framework, information literacy complements media literacy by emphasizing the need to locate, assess, and ethically use information, especially in digital environments (Fraillon et al., 2013). In the United States, the American Library Association (ALA) describes information literacy as the ability to “recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information effectively” (Mounce, 2005). The merging of media and information literacies acknowledges the changing digital landscape, where media content and information sources are increasingly integrated across platforms.

The intersection of media literacy and information literacy has become particularly critical due to the digital transformation of education, where students increasingly engage with online resources, digital tools, and multimedia content (Cisneros Sánchez et al., 2025). MIL supports students in becoming critical thinkers, discerning consumers, and ethical producers of content. It helps students navigate the challenges of misinformation, algorithmic bias, digital echo chambers, and privacy concerns. MIL education has thus become a cornerstone of fostering digital citizenship, enabling young learners to critically analyze media messages, engage in online discourse responsibly, and understand the ethical implications of their digital actions. Scholars such as Frau-Meigs (Frau-Meigs, 2012) and Hobbs (Hobbs, 2017) emphasize that teaching MIL not only equips students with practical skills but also cultivates a civic mindset, preparing them to participate meaningfully in a digital democracy. In response to growing concerns over disinformation and online manipulation, several national education systems have incorporated MIL into curricula. For example, Finland's education policy includes MIL as a strategy to develop

critical thinking and civic competence (Kupiainen, 2013). Likewise, the Philippines became the first country to adopt UNESCO's MIL curriculum in secondary schools (Alcolea-Díaz et al., 2020), positioning itself as a regional leader in MIL-based education policy.

Past Reviews and Meta-Studies: Over the past two decades, a variety of narrative and systematic reviews have sought to chart the development of MIL-related research, focusing on specific dimensions such as digital literacy, misinformation, and educational technology. However, while valuable, these reviews have often been limited in scope, methodology, or geographic reach. One of the earliest systematic reviews in the field was conducted by Potter (Potter, 2010), who analyzed media literacy interventions and identified a lack of longitudinal studies and consistent definitions. More recently, researchers like McDougall et al. (McDougall et al., 2018) offered a narrative synthesis of media literacy education in the UK, highlighting policy inconsistencies and the need for teacher training. Meanwhile, Erstad, Voogt (Erstad, Voogt, 2018) reviewed digital literacy in schools across Europe and concluded that MIL was unevenly integrated into pedagogical practices and often overshadowed by technical ICT training. Recent systematic reviews have attempted to explore the broader educational context. For instance, Sakdiyah (Sakdiyah, 2025) used a bibliometric and systematic approach to study mathematical literacy but noted that information literacy was under-represented in pedagogical strategies, indicating a need for broader conceptual integration across subjects. Likewise, Mustafa (Mustafa, 2025) conducted a systematic review on the role of social media in fostering academic literacy and critical thinking, emphasizing the importance of MIL in university-level curricula. Ataniyazova, Panicker (Ataniyazova, Panicker, 2025) explored the influence of social media on declining reading habits among youth and concluded that media education can be a crucial mechanism for reinvigorating deep reading and critical engagement with content. This aligns with Zaymoglu (Zaymoglu, 2025), who stressed the visual and data literacy dimensions of MIL in journalism education, underscoring the growing complexity of digital content interpretation.

Despite the growing interest, one consistent gap across these studies is the absence of a comprehensive bibliometric mapping of global MIL research in education. Existing reviews are either limited to specific countries (like Poland, Indonesia, the UK), specific educational levels, or narrow themes like digital tools or misinformation. Moreover, few reviews have adopted bibliometric techniques, such as co-citation analysis, keyword co-occurrence, or thematic clustering, which can reveal deeper patterns in knowledge production and intellectual structure.

Another noticeable limitation in prior reviews is the underrepresentation of global South perspectives, despite significant MIL policy initiatives in regions like Southeast Asia and Sub-Saharan Africa. As Shibambu, Mojapelo (Shibambu, Mojapelo, 2024) point out in their scoping review of climate change literacy, African students are often excluded from global conversations about digital competencies despite being profoundly impacted by information ecosystems.

Furthermore, many prior studies neglect the interdisciplinary nature of MIL research, which spans fields such as education, communication, information science, and sociology. A bibliometric approach is uniquely suited to unraveling these intersections, mapping collaboration networks, and identifying leading institutions and authors. The absence of a holistic, global bibliometric synthesis of MIL in education from 2000 to 2025 represents a critical research gap. By analyzing publication trends, intellectual structures, thematic clusters, and leading contributors, a bibliometric study can provide a panoramic view of the field's development. It also allows for evidence-based recommendations for researchers, educators, and policymakers aiming to strengthen MIL integration across education systems.

2. Materials and methods

This study adopts a bibliometric methodology to analyze global research trends in Media and Information Literacy (MIL) within the field of education, covering the period from 2000 to 2025. The data was sourced from the Web of Science (WoS) Core Collection, a widely recognized and reputable bibliographic database known for its extensive indexing of high-quality scholarly literature across disciplines. The decision to use WoS was based on its robust citation indexing, coverage of influential journals, and compatibility with bibliometric analysis tools such as Bibliometrix and VOSviewer (Mongeon, Paul-Hus, 2016).

The data collection process began by querying the database using a combination of keywords relevant to the study: “media literacy,” “information literacy,” “media and information literacy,” “MIL,” and “digital literacy,” all in conjunction with the term “education.” These keywords were

searched in all fields to ensure comprehensive retrieval of relevant publications. The initial query returned with 7,177 documents.

Subsequently, a stepwise filtering approach was applied to refine the dataset. First, the document type filter was used to include only peer-reviewed journal articles, reducing the dataset to 5,675 articles. This step ensured the quality and scholarly relevance of the material included in the analysis. Next, a language filter was applied to select only articles published in English, bringing the dataset down to 5,160. Finally, the dataset was limited to specific research areas closely aligned with the objectives of this study, including Education, Communication, Information Science & Library Science, Computer Science, and Social Sciences. After this final refinement, the dataset comprised 2,866 English-language journal articles published between 2000 and 2025. This corpus served as the foundation for the subsequent bibliometric analysis.

Data Cleaning: To ensure the accuracy and reliability of the analysis, a rigorous data cleaning process was undertaken before applying bibliometric methods. This involved the removal of duplicate records, which commonly occur in large bibliographic datasets due to overlapping indexing or re-publication. Identifying and eliminating such duplicates prevented inflation of publication counts and co-authorship metrics.

Author names were standardized to resolve inconsistencies, such as different spellings, use of initials, or formatting differences (like “Smith, J.” vs. “Smith, John”). Normalization of author names ensured the correct attribution of publications and accurate mapping of collaboration networks. Institutional names were also harmonized to avoid errors in the affiliation analysis; for example, variations such as “Harvard University,” “Harvard Univ,” and “Harvard Med Sch” were unified. In terms of keywords, spelling differences, synonyms, and conceptually similar terms like “media literacies” and “media literacy” were consolidated for consistency. This was particularly important for co-word analysis, where precision in keyword labeling directly affects thematic clustering results (Zupic, Čater, 2015).

The cleaned and standardized dataset was exported in formats compatible with analytical software tools such as R and VOSviewer, allowing for seamless integration into the bibliometric workflow.

Bibliometric Tools and Analytical Methods: The bibliometric analysis was conducted using a combination of R-based software and visualization tools, primarily Bibliometrix and Biblioshiny, along with VOSviewer (Cobo et al., 2011). Bibliometrix, an open-source R package developed by Aria, Cuccurullo (Aria, Cuccurullo, 2017), is designed specifically for science mapping and bibliometric analysis. Biblioshiny, its web-based graphical interface, was used for interactive exploration of trends, networks, and thematic structures. In addition, VOSviewer, developed by Van Eck, Waltman (Van Eck, Waltman, 2010), was employed for generating high-quality network visualizations of co-authorship, keyword co-occurrence, and co-citation patterns. Its strength lies in graphical clarity and clustering accuracy, making it particularly effective for representing large bibliographic networks.

Ethical Considerations: As this study is based entirely on secondary data derived from publicly available bibliographic records in the Web of Science Core Collection, there are minimal ethical risks involved. No personal, sensitive, or identifiable human subject data was collected, and therefore, formal ethical clearance or institutional review board (IRB) approval was not required. However, ethical standards were upheld by ensuring the accurate attribution of all scholarly work cited or analyzed. The analysis respected intellectual property rights by using metadata solely for research purposes in accordance with the terms of use of the Web of Science database and software tools such as Bibliometrix and VOSviewer. The interpretations made from the data are transparent, reproducible, and aligned with responsible research conduct principles.

3. Discussion

The bibliometric findings of this study reveal several significant trends and structural dynamics in the global research landscape of Media and Information Literacy (MIL) in education. The growth trajectory, thematic evolution, and institutional dominance observed over the past two decades highlight both the maturing of the field and the persistent challenges related to global equity, interdisciplinarity, and knowledge transfer from research to practice.

One of the most prominent trends is the sharp increase in scholarly output after 2010, particularly accelerating after 2016. This rise aligns closely with the proliferation of social media platforms like Facebook, Twitter, and YouTube, and the resulting transformation in how individuals,

particularly youth, access, create, and share information. The digital media environment significantly expanded the scope of MIL, transitioning it from a niche pedagogical concern into a global educational and policy imperative. Platforms that enabled user-generated content brought forth complex challenges related to misinformation, disinformation, media manipulation, and algorithmic bias, thereby increasing the urgency for integrating MIL into educational systems. These developments prompted researchers, educators, and policymakers to re-evaluate traditional notions of literacy and adapt to the dynamic realities of digital communication.

Another key insight from the analysis is the dominance of institutions and researchers from the Global North, especially the United States, the United Kingdom, Spain, Germany, and Canada. Universities like Nanyang Technological University, University of Amsterdam, Stanford University, and University of Huelva emerged as influential hubs in MIL research. This geographical concentration of scholarly influence raises critical concerns about knowledge equity and inclusivity. While the Global North continues to shape much of the theoretical and methodological discourse, emerging participation from countries like China, South Africa, Pakistan, and Malaysia shows encouraging signs of global diffusion. Nevertheless, the limited representation of countries from regions such as Sub-Saharan Africa, Central Asia, and the Middle East reflects structural barriers, such as a lack of research funding, limited access to academic networks, and language constraints, that hinder broader participation in global knowledge production.

The thematic evolution revealed in the keyword analysis and document coupling reflects the shifting conceptualization of MIL. Initially rooted in frameworks of media awareness and critical reading (often grounded in traditional media studies), MIL has evolved into a dynamic, multidimensional competence that includes digital literacy, health literacy, social media navigation, and fact-checking skills. The keyword co-occurrence maps show how recent research increasingly incorporates themes like "misinformation," "health misinformation," "disinformation," and "media manipulation" particularly during the COVID-19 pandemic, which intensified the urgency of equipping citizens with critical evaluative skills in a rapidly changing media landscape. This shift illustrates how MIL is no longer seen as a static set of skills but as an evolving capacity essential for democratic participation, health decision-making, and civic engagement in digital societies.

However, despite the growing academic and policy attention, a gap remains between MIL research and its practical implementation in educational systems. Several countries have introduced national frameworks or curriculum guidelines for MIL, like Finland, Sweden, and Canada, and organizations like UNESCO have played a critical role in advocacy and capacity-building. Yet, the practical integration of MIL into everyday classroom practice, particularly in under-resourced education systems, remains inconsistent and fragmented. Many educators still lack the training, resources, or institutional support to embed MIL effectively in their teaching. The persistence of this policy-practice gap suggests that while research has effectively defined the scope and urgency of MIL, more attention is needed on implementation strategies, teacher professional development, and culturally responsive pedagogies that consider local contexts.

When compared with earlier literature reviews and meta-studies, this study offers a more holistic and quantitative perspective. Prior reviews, such as those by Frau-Meigs et al. (Frau-Meigs et al., 2017) and Mihailidis (Mihailidis, 2018), have examined MIL from a qualitative or conceptual lens, focusing on curriculum design, pedagogical models, or ideological critiques. While valuable, such studies often rely on selective samples and may not capture the full scope of global research activity. By using bibliometric tools, this study provides empirical evidence of publication trends, thematic clusters, institutional dominance, and citation dynamics, thereby complementing existing reviews with a data-driven overview. Moreover, the analysis underscores that the intellectual structure of the field is increasingly interdisciplinary, with contributions from education, communication studies, information science, health communication, and digital humanities, highlighting the need for more integrated approaches to both research and practice.

Implications: The findings of this study hold several important implications across education, policy, and research domains. For educators, the evolution of MIL demands the integration of flexible, critical, and participatory pedagogical approaches that not only teach digital skills but also foster critical thinking, civic responsibility, and ethical media engagement among students. MIL curricula must be localized, age-appropriate, and inclusive of diverse digital contexts. For policymakers, the study provides evidence to support the development of national literacy strategies that are aligned with global frameworks like those from UNESCO, ensuring that MIL is

embedded not just as a competency but as a lifelong learning objective. For researchers, the analysis highlights opportunities to explore underrepresented regions, such as Africa, the Middle East, and parts of South America, and to address emerging challenges like algorithmic bias, deepfakes, and AI-driven misinformation. Strengthening global scholarly collaboration and expanding the interdisciplinary scope of MIL may be critical for building a more equitable and resilient information society.

4. Results

This section presents a comprehensive bibliometric analysis of the research landscape surrounding Media and Information Literacy (MIL) in Education from 2000 to 2025. Through visualizations and quantitative insights, the analysis explores patterns in publication trends, citation impact, key sources, influential authors, institutional and country-level collaborations, and evolving research themes. By leveraging bibliometric tools such as VOSviewer and Bibliometrix, the study identifies the most active contributors, thematic clusters, and trending topics, offering a detailed understanding of how the field has matured and diversified over time. These findings provide a foundation for recognizing scholarly progress, highlighting research gaps, and informing future academic inquiry and policy development in MIL.

Figure 1 illustrates the annual scientific production on Media and Information Literacy in Education from 2000 to 2025. The trend shows minimal activity before 2010, followed by a gradual increase until 2015. After 2016, research output began rising sharply, with a substantial surge from 2019 onward, peaking in 2024 at over 450 articles. This rapid growth reflects the increasing global importance of MIL in education, likely driven by digital transformation, misinformation crises, and policy emphasis. The sharp decline in 2025 is likely due to incomplete indexing for the current year rather than an actual drop in research output.

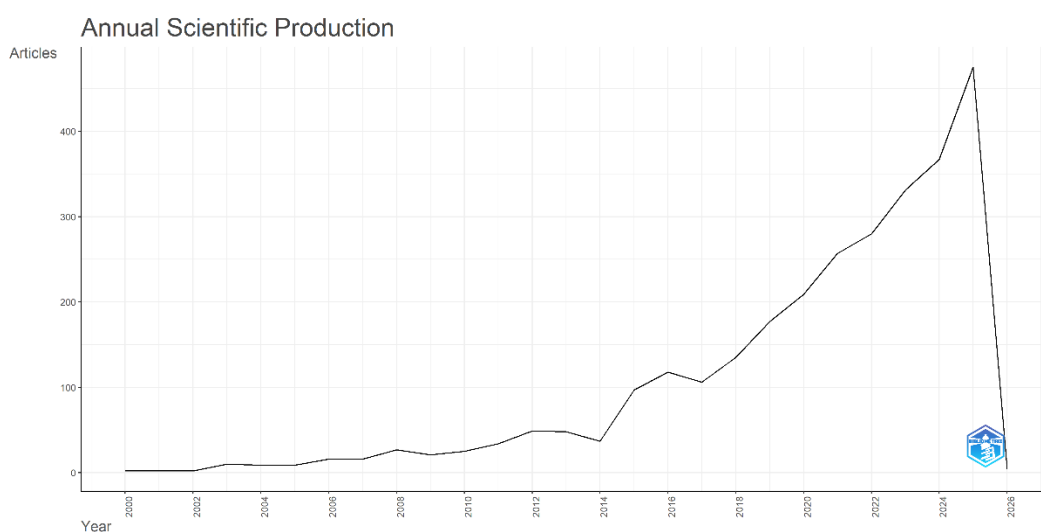


Fig. 1. Annual Scientific Production

Figure 2 shows the average citations per year for publications related to Media and Information Literacy in Education from 2000 to 2025. A notable peak is observed in 2002, indicating that early publications received high citation impact, likely due to fewer competing works and foundational contributions. From 2004 to 2023, citation averages remain relatively steady, fluctuating modestly between 2 and 5 citations per year. A sharp rise appears again in 2025, though this spike is likely a statistical artifact caused by a small number of recent articles receiving early attention. Overall, the graph reflects both early seminal influence and a possible resurgence in interest in newer publications.

Figure 3 highlights the most relevant academic journals contributing to the field of Media and Information Literacy in Education. The leading source is Media Literacy and Academic Research with 70 documents, followed closely by Media Education-Mediobrazovanie (69 documents). Other influential journals include Education and Information Technologies (57) and Information Communication & Society (51), indicating strong interdisciplinary engagement.

The presence of journals from literacy studies, library science, communication, and education shows the diverse academic interest in MIL. This distribution reflects both pedagogical and socio-technical approaches to MIL in global educational research.

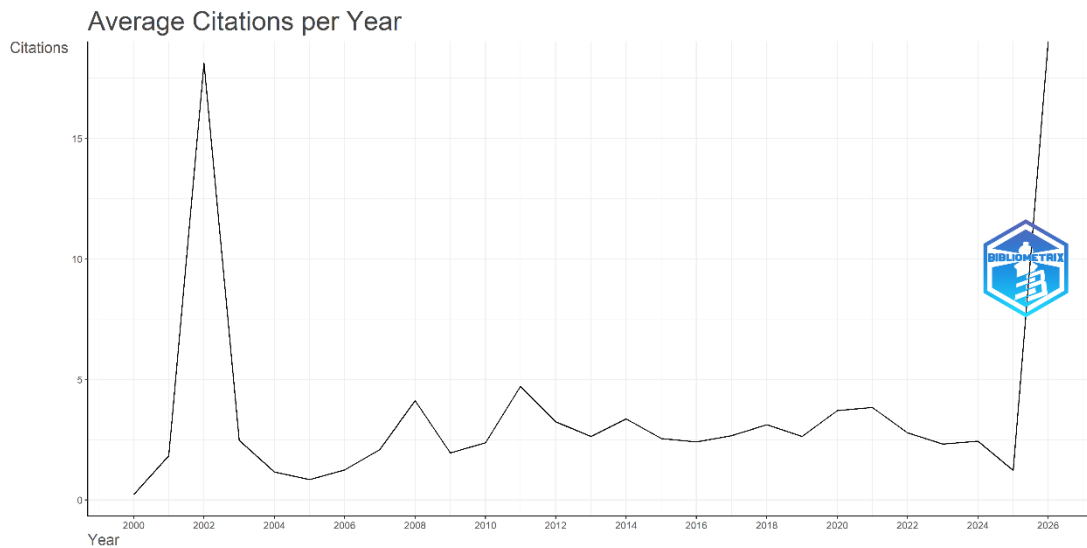


Fig. 2. Average Citations per Year

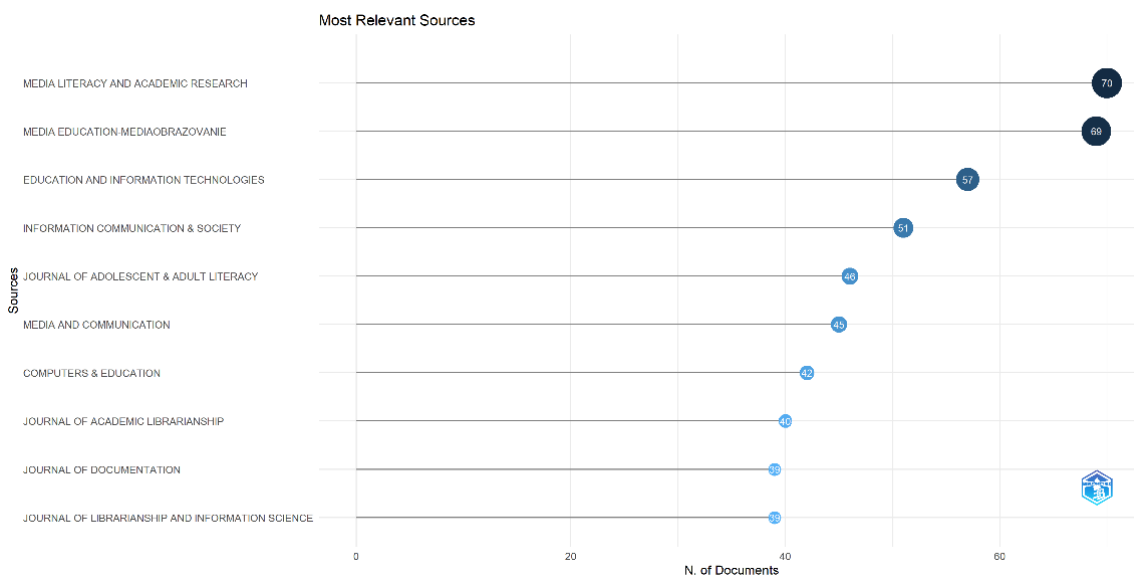


Fig. 3. Most Relevant Sources

Figure 4 visualizes the most relevant academic affiliations based on co-authorship networks in Media and Information Literacy in Education research. Prominent institutions such as Nanyang Technological University, University of Amsterdam, and Stanford University appear as central hubs, indicating their strong research output and collaborations. European institutions like University of Huelva, University of Granada, and University of Zurich also form significant clusters, reflecting regional research communities. The dense interlinkages suggest an increasingly global and collaborative research landscape, with diverse participation from universities in Asia, Europe, Africa, and North America. This network reveals key institutional contributors shaping the MIL discourse worldwide.

key theoretical, empirical, and methodological contributions that have shaped the MIL discourse, particularly in digital literacy, media effects, and educational technology contexts.

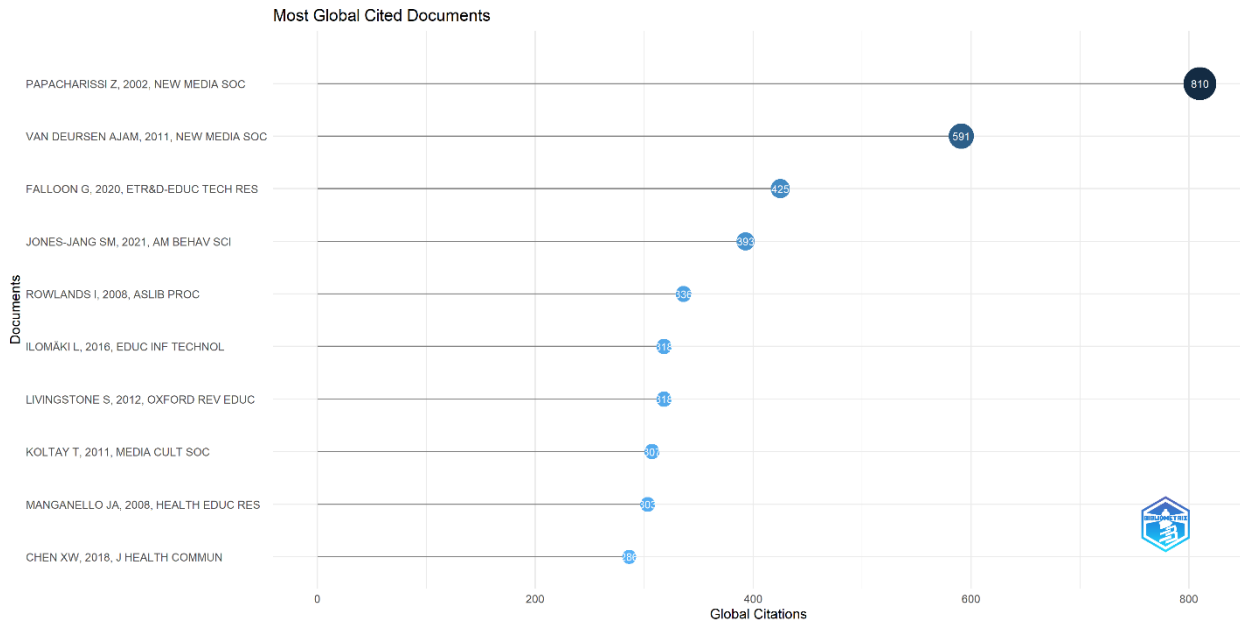


Fig. 6. Most Globally Cited Documents

Figure 7 presents a keyword co-occurrence network, offering insights into the conceptual structure of the research on Media and Information Literacy (MIL) in education. The most prominent keywords include "media literacy," "digital literacy," "social media," "students," and "internet," indicating core thematic areas. The color gradient (from blue to yellow) represents the average publication year of documents using those keywords, highlighting a chronological shift in focus. Recent studies (in yellow) concentrate on "disinformation," "fact-checking," "health literacy," and "media manipulation," reflecting growing concerns about misinformation and the role of media literacy during global events like the COVID-19 pandemic. Older themes (in blue), such as "new literacies," "childhood," and "methods," illustrate foundational pedagogical and developmental concerns. This evolution signifies a transition from traditional literacy pedagogy to contemporary digital and socio-political challenges in media education.

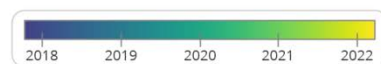
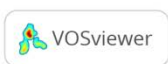
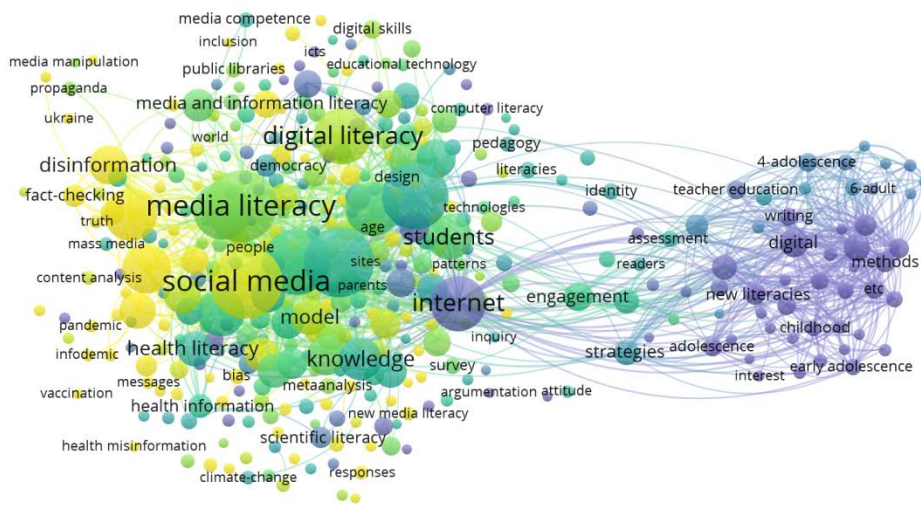


Fig. 7. Keyword Co-Occurrence Network

Figure 8 illustrates the evolution of trending terms in Media and Information Literacy in Education research from 2015 to 2025. Early terms like “internet,” “information literacy,” and “education” have remained foundational, while more recent keywords such as “misinformation,” “fake news,” “covid-19,” and “disinformation” show a thematic shift toward socio-political and public health concerns. High-frequency terms like “social media” and “digital literacy” have dominated research from 2019 onwards, reflecting the digital transformation of education and growing concerns over online content credibility. This trend analysis reveals a shift from foundational literacy education to more complex, real-world challenges involving digital platforms, trust, and media manipulation.

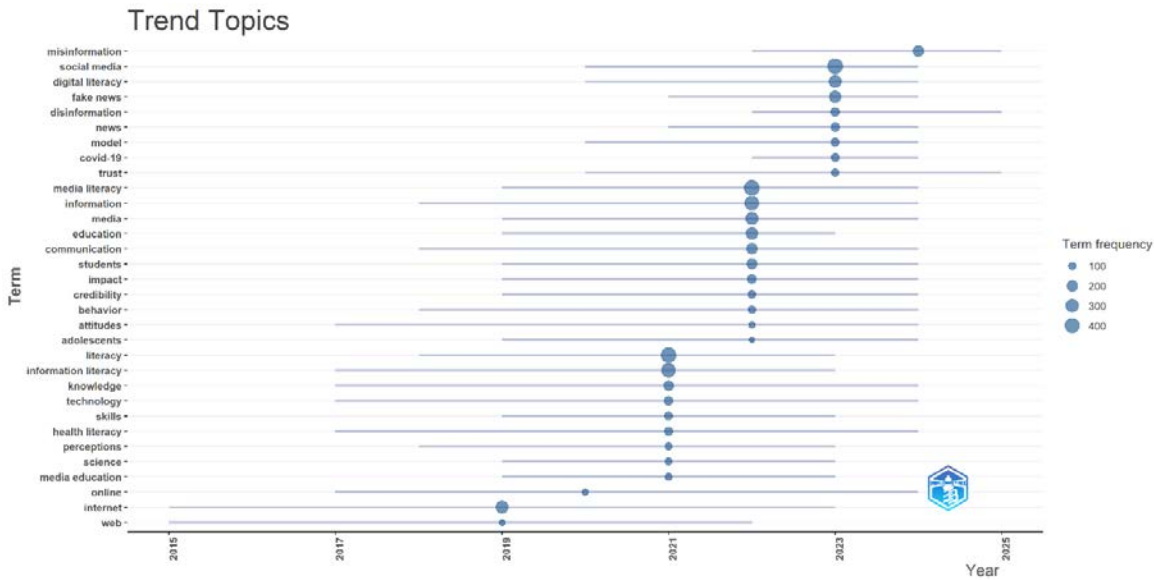


Fig. 8. Trend Topics

Figure 9 shows a strategic diagram of thematic clusters based on document coupling, mapped by centrality (relevance) on the x-axis and impact (development) on the y-axis. The upper-right quadrant highlights dominant and well-developed themes, particularly “misinformation,” “fake news,” and “media literacy”, which are both central and impactful in the field. The bottom-left quadrant features foundational but less-developed themes such as “digital literacy” and “information literacy,” suggesting potential for future research reinforcement. Clusters like “social media” lie near the center, indicating emerging or transversal topics bridging different areas. The coupling analysis reveals that current scholarly discourse is intensely focused on combating misinformation in digital environments, while earlier core literacies remain structurally important yet under-explored in impact.

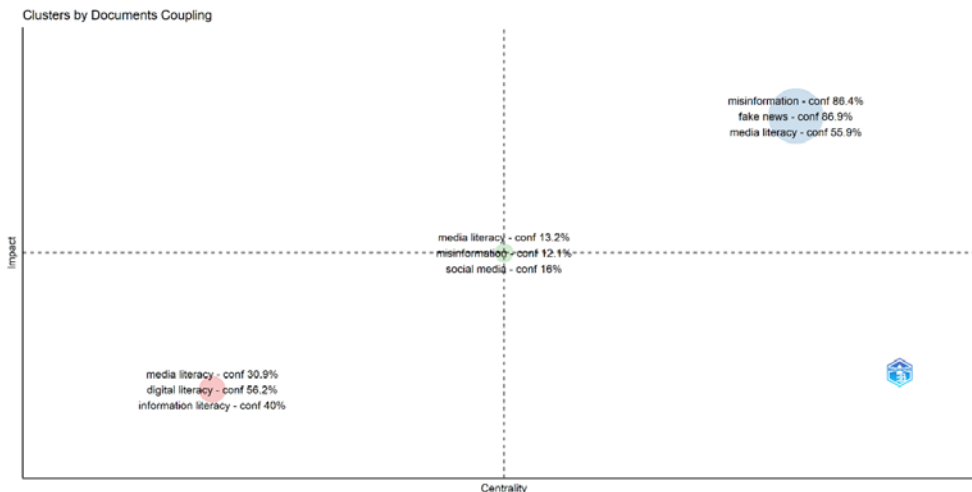


Fig. 9. Cluster by Document Coupling

Figure 10 visualizes the bibliographic coupling network of authors in the Media and Information Literacy in Education research landscape. Authors such as Alexander Fedorov, Sonia Livingstone, Emily K. Vraga, and Alexander J.A.M. van Deursen emerge as central figures, indicating their works are frequently cited alongside others. The node colors represent the average year of publication, showing the temporal evolution of author contributions, ranging from foundational scholars (darker nodes, earlier years) to emerging voices (lighter nodes, recent years like 2023–2024). The presence of both Western and non-Western scholars, such as Shaohai Jiang, Rida Afriliyasanti, and Petro Katerynych, reflects the field's growing international scope. This network highlights intellectual linkages and the authors shaping key dialogues in MIL, particularly across topics like misinformation, digital literacy, and education policy.

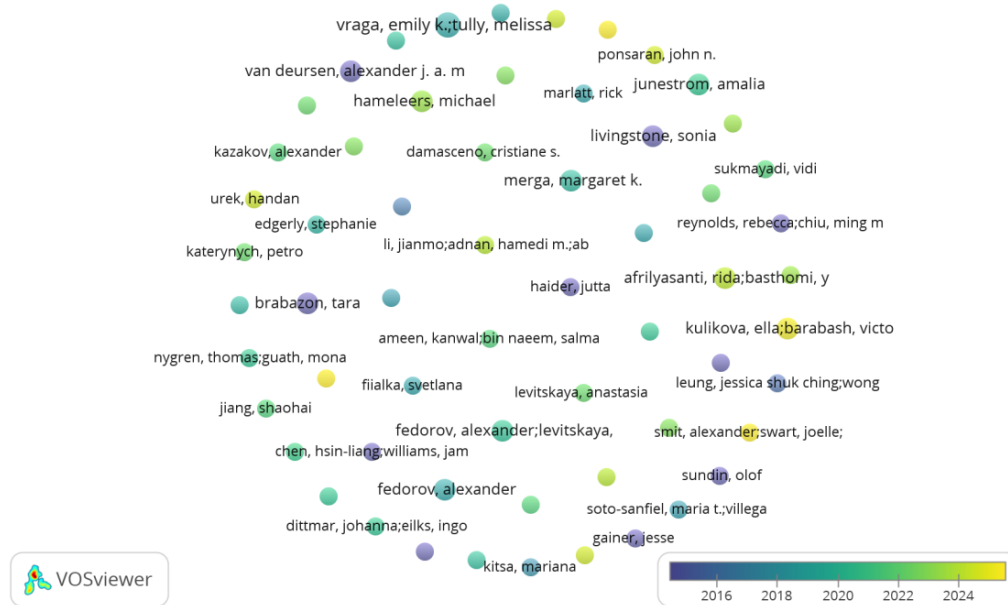


Fig. 10. Bibliographic Coupling Network of Authors

Figure 11 presents a global collaboration map illustrating international research partnerships in the field of Media and Information Literacy (MIL) in education. The map reveals that the United States, Spain, China, the United Kingdom, Australia, and Germany are the most active countries, both in terms of research output (darker red shading) and collaborative linkages (blue connecting lines). Strong bilateral and multilateral collaborations are evident among Western nations, especially across North America and Europe. Notably, there is increasing participation from emerging contributors such as India, Brazil, South Africa, and Malaysia, highlighting MIL's expanding global relevance. The density of blue lines connecting countries reflects a growing international research network, emphasizing MIL's recognition as a cross-border educational and policy issue. However, minimal activity is seen from several regions in Africa and the Middle East, suggesting the need for more inclusive global engagement.

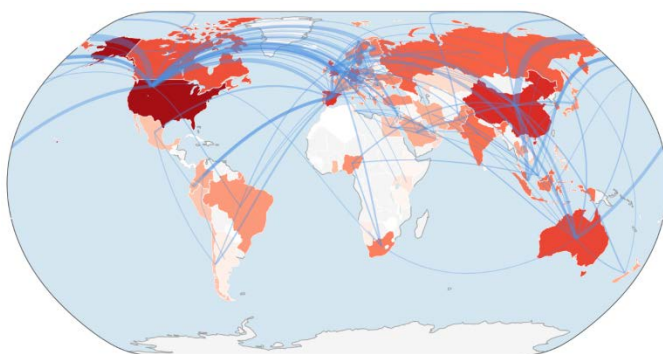


Fig. 11. Countries Collaboration Map

5. Conclusion

This bibliometric analysis of Media and Information Literacy (MIL) in Education from 2000 to 2025 provides a comprehensive overview of the field's growth, thematic evolution, and intellectual landscape. The study reveals a significant rise in research activity post-2010, largely driven by the digitalization of education and the increasing societal need to navigate complex information ecosystems. From foundational concerns with critical reading and media awareness, MIL has expanded to encompass dynamic competencies such as digital citizenship, misinformation resilience, and online ethical behavior. Prominent scholars, journals, and institutions from the Global North dominate the field, indicating both leadership and an imbalance in global knowledge production. Meanwhile, emerging contributions from the Global South signal a shift toward greater inclusivity and diversification of perspectives. Despite the maturity of the field, several challenges remain. The gap between MIL policy frameworks and classroom implementation continues to limit its real-world impact. Likewise, while research volume has grown, thematic fragmentation and geographical imbalance persist. The field must now pivot toward deeper interdisciplinary integration and practical application.

Looking ahead, future research should prioritize three key directions. First, there is a need for context-sensitive empirical studies that evaluate the effectiveness of MIL programs in diverse educational settings, particularly in low-resource or marginalized communities. Second, researchers should explore emerging MIL challenges such as AI-generated content, algorithmic bias, deep-fake technology, and data privacy concerns, areas that are underexplored but increasingly relevant in the digital age. Third, greater emphasis should be placed on South-South and North-South scholarly collaborations, ensuring more equitable participation in shaping the MIL research agenda. Mixed-methods studies, longitudinal impact assessments, and cross-cultural pedagogical research may also be essential in driving the field forward. Ultimately, MIL is no longer a supplementary skill but a foundational component of 21st-century education. Strengthening its research base, diversifying its voices, and ensuring its integration into formal and informal learning systems may be key to empowering future generations to critically engage with media and information in an increasingly complex world.

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Do Certain Forums Affect Students' Trust In News Situations?

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Abstract

As college students increasingly encounter news across traditional and social media platforms, understanding how platform context shapes trust judgments remains important. This study examined how undergraduate students evaluate the credibility of news presented in traditional news and social media video formats, with particular attention to algorithmic awareness, media literacy, and platform-based trust. Participants included 235 college students who completed an online survey and viewed two short video clips representing different media formats. Results indicated high engagement with news content and strong awareness of algorithmic content curation. Although overall trust ratings for traditional news and social media clips did not significantly differ, direct comparisons revealed a stronger preference for traditional news sources in perceived trustworthiness and confidence. Participants were also more likely to question information encountered on social media and reported that stylistic features, including tone, pacing, and presentation, influenced credibility judgments. No significant gender differences emerged. Findings highlight the relationship between media literacy, platform design, and trust, emphasizing the continuing importance of presentation and forum type in shaping perceptions of news credibility among college students. The study also demonstrates that students actively compare information across platforms, reinforcing the importance of critical evaluation skills within contemporary digital news environments and journalism.

Keywords: algorithmic awareness, college students, media trust, news credibility, social media.

1. Introduction

As online media has continued to expand. It is important to understand the impacts that our communities face due to this ever-changing digital landscape. Furthermore, online media has crossed over into different sectors, such as the news. A once black and white landscape categorized by two main forums of news media, print and broadcast, is long gone. Today, there is an increasingly gray area. This change has a stronger effect than seen on the surface (Johnson, John, 2025; Tandoc et al., 2018). One major stakeholder in this cross between old school journalism and the digital world is college-aged students.

Many studies have been conducted on print and broadcast news trust or social media trust (Kohring, Matthes, 2007). More recently, there have been more studies conducted on social media algorithms and whether users can identify algorithmic influence (Bucher, 2018; Zarouali et al., 2021). It is known that the traditional forms of media have been in sharp decline (Lee, 2005). However, younger consumers have moved towards social media and an ever-growing news platform (Johnson, John, 2025). However, no to minimal studies have been done regarding college-aged students' trust in news situations among different platforms.

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This study aims to understand students' trust in news forums by testing trust in journalism, algorithmic awareness, media bias, ideological lean, social media use, and media literacy. This is vital information as the next generation to make informed, ethical, and decisive decisions will be college-age students.

2. Materials and methods

Media literacy and Need for Cognition (Cacioppo, Petty, 1982) serve as key moderating factors in how individuals interpret and respond to news content. Those with higher news media literacy (Ashley et al., 2013) understand the constructed nature of media messages and are more adept at identifying bias or misinformation, while individuals high in Need for Cognition tend to process information more analytically. Based on previous literature, the following research questions were posed:

RQ1: How do college students evaluate the trustworthiness of news presented in traditional news formats compared to social media video formats?

RQ2: How does platform context influence college students' confidence in the accuracy and credibility of news content?

RQ3: To what extent are college students aware of algorithmic content curation when consuming news across media platforms?

RQ4: How do stylistic features such as tone, pacing, and presentation influence the perceived credibility of social media-based news content?

RQ5: Does gender relate to differences in perceived trust and credibility of news across traditional and social media platforms?

Participants were 237 college students recruited from undergraduate communication courses at a large public university in the southern United States. After excluding incomplete surveys, the final analytic sample consisted of 235 participants for most analyses. In terms of demographics, 150 (63.7 %) participants identified as female and 85 (36.3 %) participants identified as male. Participants represented a range of academic classifications: 75 (32.1 %) participants were juniors, 66 (28.3 %) participants identified as seniors, 44 (18.6 %) participants were sophomores, and 36 (15.2 %) participants were freshmen; 14 (5.8 %) participants identified as graduate students or selected another classification.

Students reported a wide variety of academic majors spanning communication, social sciences, humanities, business, and STEM fields. Access to the Internet was high across the sample. Two hundred fourteen participants (91.1 %) reported being able to connect to the Internet most of the time or always. Participants also reported frequent engagement with news and media platforms. More than three-quarters of the sample agreed or strongly agreed that they use news to stay informed about current events and to understand what is happening in the world.

Patterns of news exposure reflected a multi-platform media environment. Participants reported encountering news through a combination of traditional outlets and social media platforms rather than relying on a single source. Social media and online news sites were among the most commonly reported avenues for accessing news, while television news remained a regularly used source for many participants. This overlap suggests that students in the sample routinely navigate and compare information across multiple media contexts rather than consuming news within a single platform ecosystem.

This study received approval from the university's Institutional Review Board before data collection. Participants were recruited through a SONA Platform and completed the study online via a secure survey platform. All 237 students who accessed the survey reviewed an informed consent statement before proceeding. Of these, 235 participants consented and provided usable data for most analyses.

Students were offered extra credit for participation where permitted by their instructor. Alternative assignments of equivalent value were made available to students, ensuring that participation was voluntary and free from coercion. Extra credit amounted to 0.5 course credits when applied.

After providing consent, participants completed survey items assessing news use, trust in media, algorithmic awareness, and social media self-efficacy. All participants then viewed two short video clips embedded in the survey. One clip represented a traditional news format, and the other represented a social media-style short video. Following each clip, participants responded to a set of trust and credibility items specific to that video. Demographic questions were completed at

the end of the survey. Based on system timestamps, the average completion time for the survey was approximately 20 minutes.

News use and trust were assessed using a series of Likert-type items. Participants rated their agreement with statements such as using the news to stay informed, relying on news to understand current events, and trusting information provided by traditional media and social media ($\alpha = .88$). Responses were recorded on five-point scales ranging from strongly disagree to strongly agree. According to M. Kohring and J. Matthes (Kohring, Matthes, 2007) Trust in News Media Scale.

Algorithmic awareness was measured using multiple items assessing participants' understanding of how social media platforms curate content. Items addressed awareness that algorithms determine which posts are shown, that user behavior influences future exposure, and that algorithms may introduce bias or lack transparency. Responses were recorded on five-point agreement scales ($\alpha = .92$). According to Brahim Zarouali, Sophie C. Boerman, and Claes H. de Vreese, Algorithmic Media Content Awareness Scale (Zarouali et al., 2021).

Social media self-efficacy was assessed using five items measuring perceived ease of use, mental effort, and perceived control when interacting with social media platforms. Responses were recorded on seven-point scales ranging from strongly disagree to strongly agree ($\alpha = .94$). According to L.F. Bright, S.B. Kleiser and S.L. Grau (Bright et al., 2015).

After viewing each video clip, participants rated their agreement with six statements assessing trustworthiness, accuracy, reliability, source credibility, and presentation style. Responses were recorded on five-point agreement scales. Participants also completed forced-choice items comparing the two clips and indicating whether platform type affected their trust judgments ($\alpha = .88$).

3. Discussion

Viewers' trust in news media greatly affects the forms of news content that viewers consume. The multidimensional study by M. Kohring and J. Matthes (Kohring, Matthes, 2007). Confirming its hypothesis that trust can be measured in hierarchical order, the study breaks the measurements into four dimensions. First is trust in the selectivity of topics, which is the belief that journalists cover the most relevant issues. Second is trust in the selectivity of facts, which is confidence that journalists use the most significant facts. Third is trust in the accuracy of the depiction, which is trust in reporters correctly representing the state of reality. Lastly, trust in journalistic assessment, which is the belief that reporters conduct fair evaluations. Each factor of this scale evaluates journalistic performance from an individual's perspective.

Algorithmic curation fundamentally shapes how audiences encounter news content by personalizing information flows and influencing what users see or miss. This process affects exposure diversity – limiting encounters with differing perspectives – and shapes perceptions of fairness and transparency in news delivery. To understand users' awareness of these mechanisms, Zarouali et al. (Zarouali et al., 2021) developed the Algorithmic Media Content Awareness Scale (AMCA), which measures how individuals recognize and evaluate the role of algorithms in curating online content. The scale encompasses three key dimensions: awareness of content filtering (understanding that algorithms selectively present or hide information), awareness of automated decision-making (recognizing that algorithms – not humans – make many content choices), and awareness of bias (acknowledging that algorithmic processes may systematically favor certain types of information or viewpoints). Together, these dimensions help explain how user awareness of algorithmic systems mediates perceptions of fairness, credibility, and trust in digital news environments.

Perceived media bias refers to the belief that news content or media platforms exhibit ideological leanings that favor one side of the political or social spectrum over another (Lee, 2005). When audiences perceive bias – whether intentional or not – they tend to question the objectivity and fairness of journalistic practices. This perception undermines the credibility of news outlets and leads to a decrease in trust toward both individual news sources and the media as an institution. As research shows, audiences who believe the media are ideologically slanted are less likely to rely on them for accurate or impartial information, reinforcing skepticism and selective exposure to confirmatory outlets.

Patterns of media habits and routines play a central role in shaping individuals' exposure to news and information. Rather than making deliberate choices, users often engage with news through habitual scrolling and platform routines, which influence the diversity and frequency of content encountered. To capture how deeply social media use is integrated into daily life, Jenkins-Guarnieri et al. (Jenkins-Guarnieri et al., 2013) developed the Social Media Use Integration Scale

(SMUIS). This scale measures two dimensions: social integration and emotional connection – the extent to which social media use is tied to one’s social relationships and emotional experiences – and integration into social routines, reflecting how embedded these platforms are in everyday activities. High integration tends to produce passive and repetitive exposure patterns, meaning users are more likely to encounter algorithmically curated or homogenous content rather than actively seeking diverse perspectives. Thus, habitual media use contributes to patterned exposure that can reinforce existing beliefs and shape perceptions of credibility and trust in news.

Individual differences in information processing motivation also influence how people evaluate and trust news. The concept of Need for Cognition (NFC), introduced by Cacioppo and Petty (Cacioppo, Petty, 1982), refers to a person’s tendency to engage in and enjoy effortful cognitive activities such as analyzing, evaluating, and reflecting on information. Individuals high in NFC are more likely to critically assess media content rather than accept it at face value. Similarly, measures such as the News Media Literacy Scale assess awareness of journalistic processes, recognition of bias, and understanding of how media messages are constructed. Together, these cognitive and literacy-related traits are associated with lower levels of blind trust in media, as analytically minded individuals tend to scrutinize news sources, question credibility, and recognize potential bias or manipulation. However, such critical engagement can also promote more informed and conditional trust, grounded in evaluation rather than passive acceptance.

The relationship between audiences and information credibility is shaped by the type of forum through which news is encountered – whether traditional news outlets or social media platforms. News organizations are typically associated with professional journalistic norms, while social media integrates user-generated content and algorithmic curation that can obscure editorial accountability. This distinction affects how users perceive reliability and fairness. Simultaneously, perceived media bias (Lee, 2005) plays a critical role in shaping trust. When individuals believe that either platforms or news outlets exhibit ideological leanings, they tend to evaluate content as less objective and less credible. This erosion of trust in news (Kohring, Matthes, 2007) reflects broader concerns about fairness and transparency in information environments.

4. Results

Participants reported high levels of engagement with news content. A total of 182 participants, representing 77.4 % of the sample, agreed or strongly agreed that they use the news to stay informed about current events. Similarly, 179 participants, or 76.2 %, agreed or strongly agreed that they read or watch the news to understand what is happening in the world. Additionally, 169 participants, representing 71.9 % of the sample, agreed or strongly agreed that following the news makes them feel like a well-informed person.

Algorithmic awareness was notably strong. One hundred ninety-seven participants (83.8 %), agreed or strongly agreed that algorithms determine which posts they see on social media platforms. One hundred ninety-one participants (81.3 %) recognized that their past clicks, likes, or shares influence the content they encounter. A total of 162 participants (68.9 %), agreed or strongly agreed that algorithms may present biased information. In addition, 172 participants (73.2 %), agreed that algorithms should be more transparent about how content is selected and prioritized.

Composite trust scores were calculated by averaging six trust-related items for each video clip. Higher scores reflected greater perceived trust. For the traditional news clip, the mean trust score was 3.47 with a standard deviation of 0.84. For the social media clip, the mean trust score was 3.48 with a standard deviation of 0.88. A t-test conducted among participants with complete data for both clips indicated no statistically significant difference between trust in the traditional news clip and trust in the social media clip, $t(164) = 0.09$, $p = .93$.

Despite similar composite scores, item-level analyses revealed meaningful differences. For the traditional news clip, 136 participants (58.0 %), agreed or strongly agreed that the clip felt reliable and accurate. Additionally, 143 participants (60.9 %), agreed or strongly agreed that the use of sources or experts made the clip more trustworthy. In contrast, only 99 participants (42.1 %), agreed or strongly agreed that the social media clip provided an accurate picture of the situation. Furthermore, 160 participants (68.1 %) agreed or strongly agreed that they are more likely to question information encountered on social media.

Platform Comparisons and Perceived Credibility

When asked to directly compare platforms, participants expressed a clear preference for traditional news formats. A total of 131 participants (55.6 %) indicated that the traditional news

clip felt more trustworthy overall. In comparison, 43 participants (18.2 %) selected the social media clip as more trustworthy. Forty-six participants (19.4 %), reported trusting both clips equally, while 16 participants (6.8 %), indicated that neither clip felt trustworthy.

Similarly, 134 participants (57.1 %), reported that the traditional news clip gave them greater confidence in the information presented, whereas 40 participants (16.9 %), selected the social media clip. Nearly two-thirds of the sample, 151 participants (64.3 %), indicated that the platform itself affected how much they trusted the story.

Stylistic features were particularly influential in evaluations of social media content. A total of 169 participants (71.9 %), agreed or strongly agreed that tone, style, or pacing affected how much they trusted the social media clip. Additionally, 162 participants (68.9 %), agreed or strongly agreed that the person or voice delivering the message influenced their trust judgments.

5. Conclusion

The findings of this study examine how platform context shapes trust judgments. Participants demonstrated high levels of engagement with news and strong awareness of algorithmic curation, yet their trust evaluations revealed important tensions between media literacy and media reliance.

One of the most noteworthy findings is the apparent paradox between algorithmic awareness and continued engagement. A substantial majority of participants recognized that algorithms determine content visibility, may introduce bias, and are not fully transparent. These findings align with prior research suggesting that users are increasingly aware of platform mechanisms but lack practical alternatives to algorithmically curated environments, particularly when social media serves as a primary gateway to news exposure (Bucher, 2018; Eslami et al., 2015).

The absence of a statistically significant difference between composite trust scores for traditional news and social media clips is also theoretically meaningful. While participants ultimately expressed greater confidence in traditional news when making direct comparisons, the similarity in overall trust ratings suggests that social media content may be approaching parity with traditional news in perceived credibility at an aggregate level.

At the same time, item-level analyses and forced choice comparisons revealed a clear and consistent preference for traditional news sources. Participants were more likely to trust traditional news, report greater confidence in its accuracy, and view it as more reliable overall. These findings align with demonstrating the continued authority of institutional news media, particularly when cues such as expert sources, formal presentation, and professional norms are present (Johnson, Kaye, 2015).

The salience of stylistic and presentational features in evaluations of social media content further highlights the role of mediated message design in shaping credibility perceptions. Participants reported that tone, pacing, and the presence of a visible speaker strongly influenced how much they trusted social media videos. This finding supports research on social presence and mediated authenticity, suggesting that personalization and relational cues can enhance engagement while simultaneously complicating credibility assessments. This raises important questions about how effective appeals and perceived relatability may substitute for traditional credibility markers in digital environments.

The results suggest that students are not passive or uninformed media consumers but rather critically aware participants operating within constrained media ecosystems. Instructional efforts may benefit from moving beyond awareness-based interventions toward strategies that emphasize comparative evaluation, platform-specific norms, and the communicative consequences of algorithmic design. Additionally, the findings point to the need for continued research that examines trust as a situational and platform-contingent construct rather than a stable individual trait.

By empirically demonstrating how college students negotiate trust across traditional and social media contexts, this study contributes to ongoing conversations in communication studies about credibility, media convergence, and the evolving relationship between audiences and news institutions. The results highlight the continued relevance of trust research while also pointing toward new theoretical and practical challenges posed by algorithmically curated media environments.

This study investigated whether different components, such as various media platforms, algorithm awareness, and self-efficacy, affect college-aged students' trust in news situations. There are two main findings: first, evidence shows that college-age students are more aware of algorithms than previously thought. Secondly, more students preferred traditional news forums over social

media news forums. These findings have significant implications on today's society, as this changes a stigma that students are unaware of the media they consume and why they consume it. While this study tends to focus on college-age students' trust in news situations based on the forum, future research should explore how this will affect news media in the future (Bucher, 2018).

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Predictors of Online Civic Participation among Women Journalists: The Role of Digital Media Literacy

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Abstract

In the contemporary world, where interactions, mobilisations and opinions are deeply influenced by digital media, civic participation remains uneven, even among journalists who are deeply engaged in the digital spaces. Thus, the skills required to efficiently navigate digital spaces, Digital Media Literacy (DML), are the need of the hour. Moreover, finding the relationship between DML and Civic participation in digital spaces is inevitable. Addressing this, the present study examines whether DML predicts online civic participation among women journalists in India. Hence, this study applies the Binary Logistic Regression model to predict the factors influencing online civic participation of women journalists in India in the digital era. The study analysed a random sample of 300 women journalists working on digital media platforms from six major metropolitan cities in India. The findings indicate that digital media literacy is a strong and statistically significant predictor of online civic participation ($B = 1.502$, $SE = 0.411$, $p < .001$), with higher DML levels substantially increasing the odds of engagement. By focusing on women journalists, this study contributes to existing scholarship on the gender digital divide and its impact on civic engagement in the Global South, enforcing the role of digital media literacy initiatives.

Keywords: digital media literacy, civic participation, women journalists, India, digital skills.

1. Introduction

Today, campaigns and protests are not just physical; they have transcended to the virtual digital realm, where you can sit in the comfort of your home and still raise your opinion against pretty much anything and everything. From sharing first-hand information to spreading awareness to fundraising and mobilizing support for a social cause, civic participation today is deeply intertwined with everyday digital practices (Theocharis, 2015; Tinák, Gálik, 2026). Thus, digital media has become an inevitable part of common people's civic engagement, even before we know it. Social media platforms, in particular, have enabled the rapid dissemination of information, fostered networked publics, and facilitated new forms of collective action. Though these platforms promise greater civic inclusion due to their easy reach and accessibility, participation remains highly uneven. Not all users who have access to digital media choose to engage civically, nor do they do so with equal confidence, effectiveness, or impact (Valenzuela, 2013).

Scholars of technological determinism put forward the idea that technology has a causative link to shaping the nature of a society. On the contrary, in the book *Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide* (Norris, 2001) argues that access to technology does not produce democratic engagements. Moreover, digital skills, socio-demographic factors, and social positioning (Boulianne, 2015) play a significant role in determining whether digital opportunities translate into meaningful civic action. Digital Media

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Literacy (DML) has emerged as a critical concept in this context. DML encompasses not only the technical skill sets required to navigate digital spaces but also the critical skills of evaluating online information, understanding media logics, and creating and circulating content (Kahne et al., 2012). These skills are extremely relevant in the current digital age marked by misinformation and AI-generated deepfakes.

Empirical research has linked digital media literacy to political engagements, online expression, and civic engagement, particularly among youth and marginalised groups (Kahne et al., 2012; Mihailidis, Thevenin, 2013). However, most of these studies remain descriptive and correlational, documenting associations between the two without actually testing if DML can predict civic participation when other influential factors are accounted for. At the same time, a parallel body of literature has identified several well-established predictors of online civic participation, including socio-demographic characteristics, media use patterns, and political orientations (Verba et al., 1995; Boulianne, 2015). What remains underexplored is how DML operates alongside these factors and whether it retains explanatory power when they are statistically controlled.

Despite these insights, few studies integrate digital media literacy, socio-demographic anchors, media-use characteristics, and motivational orientations within a single predictive framework. This gap is clearly evident in the case of women journalists, whose civic engagement in digital spaces is shaped by intersecting dynamics of visibility, professional identity, and structural constraints. Addressing this gap, the present study adopts a predictive analytical approach to examine whether Digital Media Literacy predicts online civic participation among women, while controlling for age, employment status, frequency of media use, advocacy group membership, belief in the power of social media, political interest, and expressive online behaviours such as posting and discussion.

Table 1. Operationalisation of the Predictor Variables

Variable ID	Description	Type	Coding/Categories	Reference
DML	Digital Media	Continuous	Range: 1.0–3.0	–
Age	Age group of the	Categorical	1 = 18–25; 2 =	–
Media_Use	Frequency of	Ordinal	1 = High; 2 =	Low
Advocacy_Membership	Membership in	Nominal	1 = Yes; 0 = No	No
SM_Power	Belief in the	Nominal	1 = Yes; 0 = No	No
Pol_Interest	Level of political	Ordinal	1 = High; 2 =	Low
Posts_on_Issues	Frequency of	Ordinal	1 = High; 2 =	Low
Employment	Employment	Nominal	1 = Employed; 2 =	Employed

Statistical Model: The DV, online civic participation among women journalists, were coded as: 1, if the respondent is an active civic participant.

$$Y = \begin{cases} 1, & \text{if the respondent is an active civic participant} \\ 0, & \text{if the respondent is not an active civic participant} \end{cases}$$

The model estimates the log-odds of a respondent being an active civic participant as a function of multiple independent variables. The logistic regression equation is specified as follows:

$$Z = \text{Log} \left(\frac{P_i}{1-P_i} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where:

- P_i is the probability that the i -th respondent is actively participating in civic participation,
- $1-P_i$ is the probability that the respondent does not engage in online civic participation,
- $\text{Log} \left(\frac{P_i}{1-P_i} \right)$ is the log-odds of active civic participation,
- β_0 is the intercept,
- β_1 to β_2 are the coefficients for the predictor variables $\beta_1 X_1$ to $\beta_8 X_8$, and ε is the error term.
- X_1 to X_8 are the predictor variables

$$\text{Log} \left(\frac{P_i}{1-P_i} \right) = \beta_0 + \beta_1 (\text{DML}) + \beta_2 (\text{Age}) + \dots$$

2. Materials and methods

Binary logistic regression was used for forming the empirical model of this study since the dependent variable, civic participation, is binary or dichotomous (Agresti, 2006). Also, it is considered a good model for analysis in which both continuous and categorical independent variables are applicable (Garson, 2006).

For the current study, Digital Media Literacy (DML) was treated as the primary independent variable (IV) of interest, as the central objective was to examine its influence on online civic participation of women journalists in the Indian context. To ensure that the observed relationship between DML and civic participation was not confounded by alternative explanations, a set of control variables was included in the analysis. These control variables comprised of socio-demographic factors (age group, employment status), media use characteristics (frequency of media use, membership in advocacy groups, belief in the power of social media), and online behavioral indicators (participation in socio-political discussions, frequency of posting on social issues). Including these variables as controls allowed the model to statistically isolate the effect of DML while accounting for background characteristics and behavioral tendencies that might otherwise influence civic participation outcomes.

SPSS (IBM Statistical Package for Social Sciences, version 31.0) software was used for the quantitative data analysis. The study employs binary logistic regression for data analysis, as the dependent variable (DV), Civic Participation, is dichotomous or binary.

The study employed a quantitative survey design, conducted among 300 women journalists across India. Purposive sampling, supplemented by snowball dissemination, was adopted to reach respondents who met the study's inclusion criteria of women actively engaged in journalistic work in digital media platforms and who are regular users of digital media for personal content sharing. The online survey was administered between February 2025 and April 2025. Responses were collected from six major metropolitan cities in the country – Delhi, Mumbai, Kolkata, Bangalore, Chennai, and Hyderabad, in order to equally represent respondents across diverse regional and linguistic contexts within the country. The survey link was disseminated to a total of 500 women journalists across India through professional networks and media organisations. At the end of the data collection period, 335 valid responses were received, of which 300 were retained for analysis after data cleaning, corresponding to a response rate of 60 %.

The variables used in the study are presented in Table 1.

3. Discussion

Digital Media Literacy (DML) refers to the ability of an individual to efficiently and responsibly access, use, understand, critically analyse, and engage with digital media (Eshet-Alkai, 2004; Fedorov, Levitskaya, 2015; Guess et al., 2020; Swart, 2021) of all forms. The modern-day definition of DML extends beyond its traditional notion of making an individual technically proficient in using and accessing digital platforms. DML, in the context of this study, focuses not only on the technical side but also on the critical consumption and content creation aspects. Hence, DML can only be conceptualised as a multi-dimensional skill. This study operationalises DML through three skills: technical, critical thinking, and content creation, since prior scholarship argues that for effective online participation (Baird, 2022), digital illiteracy acts as a serious barrier (Hoffmann et al., 2015).

First, technical skills are the practical ability to use smartphones and other gadgets and are considered the basic level of digital competence. Studies have proven that higher levels of digital and technical skills significantly increase individuals' online engagement (Vicente, Novo, 2014). Additionally, self-efficacy in navigating digital spaces positively correlates with digital civic participation (Choi et al., 2017) but it alone cannot guarantee digital civic engagement (Tenenboim, 2025).

Second, critical thinking skills, which are considered the most important aspect of digital media literacy by scholarship, as they go beyond the traditional norms of simply accessing digital media to critically understand and analyse it, thus combating misinformation in this era of deepfakes (Anstead et al., 2025). Critical thinking skills capture the evaluative and interpretive competencies central to civic participation in information-rich digital spaces: (i) understanding and interpreting media messages (critical consumption) (McGrew, 2019), and (ii) verifying credibility through strategies like double-checking and lateral reading (Wineburg, McGrew, 2019; Brodsky et al., 2021).

Lastly, content creation skill contributes to the production part of DML. It helps in the participatory dimension, where individuals can produce and share content online. Civic participation online is not possible without expressing one's opinion online through comments, posts and discussions. Higher levels of media literacy can predict higher interaction with digital platforms and multimedia content creation, which can be translated to digital participation (Literat, 2014).

Thus, combining these three skill sets to develop the ability to carefully navigate and utilise digital media for the greater good of society is imperative for individuals working in information-dissemination environments, especially digital media journalists. Thus, improving media and information literacy is imperative for developing knowledge on human behaviour (Austin et al., 2021), such as civic engagement (Belentsov, 2025). The set of activities, which individuals carry out on their own or in groups, enhances the living conditions of others and is typically called Civic participation (Cnaan, Park, 2015). Whereas "civic participation online differs from this offline or on-ground civic participation definition, it unfolds to include unconventional activities such as sharing awareness posts, writing emails to authorities about civic issues, and fundraising through digital platforms" (Cho et al., 2020). Moreover, as per earlier studies, commitment to community (social issues) and efficiency in navigating digital technologies have a significant positive effect on online civic engagement (Deng, Fei, 2023; Durotoye et al., 2025). On the other hand, some studies argue that platform use and engagement alone cannot predict online civic participation behaviours (Valenzuela, 2013).

Socio-demographic factors play a major role in civic participation both online and offline. Historically, India has had clear gender divisions in social and political participation, where women have been deliberately left behind (Prillaman, 2021), including in work sectors that require social exposure, such as journalism. Thus, women journalists fall within the highly sensitive intersection of marginalised communities in India. As women are a marginalised community and journalism is a profession which requires a sense of accountability, when a woman journalist, in particular, is able to critically 'use' and 'engage' with the digital media platforms, they become civic participants online. According to studies, digital life elements foster positive social participation among women by providing a sense of community (Showkat et al., 2025). Prior studies also substantiate this claim, stating that digital platforms have the potential to effectively communicate ideas that can increase women's civic participation (Mano, 2023). Thus, studying the nuances of this intersectionality in digital spaces further requires considering other socio-demographic factors, such as age (Vicente, Novo, 2014) and employment status (Alvarez et al., 2017). Age as a predictor is found to be negatively associated with online socio-political expression, contrary to the common belief that young users may have more interaction since they spend more time on digital spaces (Boulianne, Shehata, 2021). Some studies suggest that socio-economic factors become irrelevant once the digital divide is overcome, while others argue that they continue to shape differential access to and engagement with digital platforms (Vicente, Novo, 2014; Yang et al., 2025).

Research has consistently demonstrated that characteristics of media usage play an important role in shaping online civic participation, although their effects often depend on context and motivation. Studies show that the frequency of social media use, particularly for public discussion, is positively associated with civic and political engagement, as it facilitates exposure to civic information and networked interaction (Boulianne, 2015, De Zúñiga et al., 2012). Beyond usage frequency, scholars highlight the importance of networked affiliations and advocacy-oriented connections, suggesting that individuals embedded in activist or issue-based online networks are more likely to engage civically (Lee, 2021). Research also indicates that beliefs about the efficacy of social media, such as viewing platforms as effective tools for mobilisation and social change, can strengthen the link between online activity and civic action (Valenzuela, 2013). However, emerging evidence cautions that media exposure alone is insufficient, as active engagement and contextual factors mediate participatory outcomes (Oden, Porter, 2023).

With the growing popularity of social media platforms (such as X, Instagram, Facebook, etc.), individuals, especially marginalised groups, have begun using them as an alternative platform for self-expression. Given that online civic participation often involves using the internet as a platform for self-expression (Bennett et al., 2009), assessing its influence became important. Digital gender divide and skill factors are not the only standalone factors that account for disparities in online civic engagement; behaviours and motivations also affect them. Individuals who frequently posted or shared content on socio-political issues on social media were found to engage in civic participation both online and offline

(Gearhart et al., 2024). The literature also reveals that scenarios in which age is negatively related to civic participation suggest that underlying motivations (e.g., political interest) matter more than mere media use characteristics (Boulianne, Shehata, 2021).

The literature review revealed a significant lack of empirical studies in the domain. The current study is thus trying to bridge this gap by quantitatively assessing whether DML can predict online civic participation along with control variables such as age, employment, media use frequency, political interest, belief in the power of social media, posting on social issues and advocacy membership, while holding gender constant (females in this case). As a result, a preliminary hypothesis was formulated based on the existing literature, which gave qualitative descriptive evidence for a possible association between Digital Media Literacy and Civic participation (Kahne et al., 2012; Mihailidis, Thevenin, 2013). Based on the literature, this study assumes that DML levels of women journalists have an influence on their online civic participation, and hence, the following null hypothesis was formulated;

H₁: Digital media literacy significantly increases the likelihood of online civic participation among women journalists.

This study tries to address this gap through a predictive analysis using binary logistic regression. It not only establishes whether DML is statistically significant but also allows for the identification of additional predictors that may strengthen or weaken women's likelihood of civic participation online. By moving beyond descriptive accounts to predictive modelling, this study contributes a more rigorous, empirically grounded understanding of how DML shapes civic outcomes among women journalists in India.

4. Results

Descriptive Statistics: The final respondents were N = 300, with an age range of 18 years or older. Figure 1 shows the DML score of the respondents based on their technical skills, critical thinking and content creation skills.

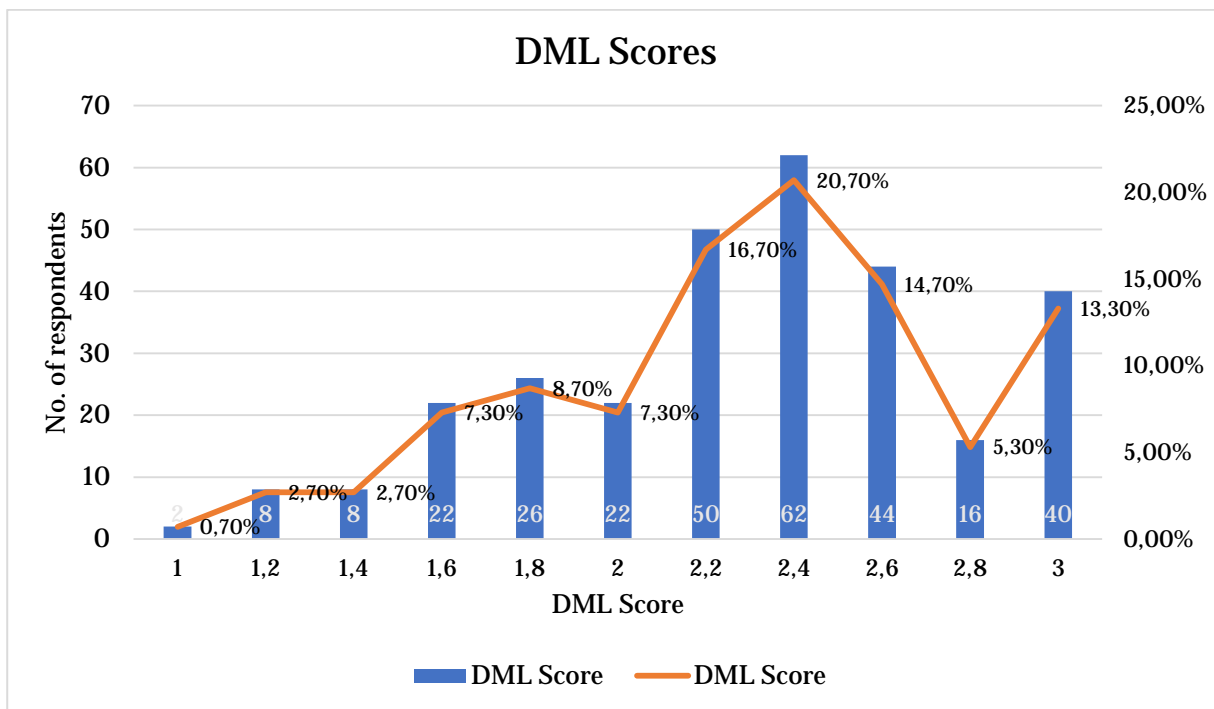


Fig. 1. Distribution of DML Scores Among Respondents

Notes: Numbers displayed inside the bars represent the frequency (N) of respondents at each Digital Media Literacy (DML) score. Percentages shown outside the bars indicate the proportion of respondents corresponding to each score, calculated based on the total sample size (N = 300). Higher DML scores indicate higher levels of digital media literacy.

Table 2. Age distribution of the respondents

Age Group	Number (n)	Percentage (%)
18–25 years	60	20.0
26–35 years	100	33.3
36–45 years	58	19.3
More than 45 years	82	27.3
Total	300	100.0

The cross-tabulation effects, along with the chi-square tests of independence of civic participation by DML, age and political interest, are presented in [Tables 3, 4](#) and [Tables 5](#), respectively. To enhance readability and facilitate descriptive comparison, the continuous DML score was recoded into three categories: high, medium, and low, using an equal-interval approach. Scores ranging from 1.00 to 1.66 were classified as low DML, scores from 1.67 to 2.33 as medium DML, and scores from 2.34 to 3.00 as high DML. The continuous DML score was retained for the logistic regression analysis to preserve statistical power.

Table 3. Cross-tabulation of Civic Participation (CV) by Digital Media Literacy (DML)

DML	CV: No	CV: Yes	Total
Low DML	12 (30.0 %)	28 (70.0 %)	40 (100 %)
Medium DML	18 (18.4 %)	80 (81.6 %)	98 (100 %)
High DML	22 (13.6 %)	140 (86.4 %)	162 (100 %)
Total	52 (17.3 %)	248 (82.7 %)	300 (100 %)

Notes: Values in parentheses represent row percentages.

Pearson Chi-Square $\chi^2(2, N = 300) = 6.15, p = .046$; Linear-by-linear association $\chi^2 = 5.67, p = .017$.

Table 4. Cross-tabulation of Civic Participation (CV) by Age

Age Group	CV: No	CV: Yes	Total
18–25 years	18 (30.0 %)	42 (70.0 %)	60 (100 %)
26–35 years	20 (20.0 %)	80 (80.0 %)	100 (100 %)
36–45 years	14 (24.1 %)	44 (75.9 %)	58 (100 %)
More than 45 years	0 (0.0 %)	82 (100.0 %)	82 (100 %)
Total	52 (17.3 %)	248 (82.7 %)	300 (100 %)

Notes: Values in parentheses represent row percentages.

Pearson Chi-Square $\chi^2(3, N = 300) = 26.28, p < .001$; Linear-by-linear association $\chi^2 = 19.97, p < .001$.

Table 5. Cross-tabulation of Civic Participation (CV) by Political Interest

Political Interest	CV: No	CV: Yes	Total
High	8 (12.3 %)	57 (87.7 %)	65
Medium	7 (10.0 %)	63 (90.0 %)	70
Low	37 (22.4 %)	128 (77.6 %)	165
Total	52 (17.3 %)	248 (82.7 %)	300

Notes: Values in parentheses represent row percentages.

Pearson Chi-Square $\chi^2(2, N = 300) = 6.76, p = .034$; Linear-by-linear association $\chi^2 = 4.81, p = .028$.

[Table 6](#) and [Table 7](#) represent the Model Fitness and Model Summary for the regression analysis.

Table 6. Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	59.239	13	<.001
	Block	59.239	13	<.001
	Model	59.239	13	<.001

Table 6 shows that the overall fitness of the model was examined using the Omnibus Tests of Model Coefficients and pseudo R^2 indices (Cox & Snell R^2 and Nagelkerke R^2). The Omnibus Test yielded a statistically significant result ($\chi^2 = 59.239$, $df = 13$, $p < .001$), indicating that the predictors collectively improved the model fit over the null model.

Table 7. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	217.440 ^a	.179	.297

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than

As per **Table 7**, the pseudo R^2 values (Cox & Snell $R^2 = .179$; Nagelkerke $R^2 = .297$) suggest that the model explains between 17 % and 29 % of the variance in online civic participation. These results indicate that the binary logistic regression model is statistically adequate for predicting the likelihood of online civic participation among respondents.

Table 8. Binary Logistic Regression Results

Variable	Predictor	B	Wald	Sig.	Exp(B)
	Intercept	-5.108	11.999	.001	.006
X1	Digital Media Literacy	1.502	13.341	<.001*	4.491
X2	Age Group	0.950	22.482	<.001*	2.585
X3	Media Use Frequency		4.139	.126	
	High	1.409	2.935	.087	4.092
	Medium	0.149	0.067	.795	1.160
	Low (Ref.)	0	.	.	.
X4	Advocacy membership	.204	0.198	.656	1.227
X5	Belief in SM power	.343	0.507	.477	1.408
X6	Posting on Social Issues		4.395	.111	
	High	-0.604	1.348	.246	0.547
	Medium	-0.967	4.392	.036	0.380
	Low (Ref.)	0	.	.	.
X7	Political Interest		11.464	.003	
	High	1.888	11.167	.001*	6.605
	Medium	0.471	0.984	.321	1.601
	Low (Ref.)	0	.	.	.
X8	Employment Status		6.605	0.86	
	Employed	-0.902	2.857	.091	0.406
	Unemployed	-0.807	1.624	.203	0.446
	Student	0.700	0.699	.403	2.013
	Self-employed (Ref.)	0	.	.	.

Notes: Variable(s) entered on step 1: Digital media literacy (Range 1.00-3.00), Age group (was treated as a single ordered predictor), Media use frequency (1: High, 2: Medium, 3: Low), Advocacy membership (1: Yes, 2: No), Belief in SM power (1: Yes, 2: No), Posting on social issues (1: High, 2: Medium, 3: Low), Political interest (1: High, 2: Medium, 3: Low), Employment (1: Employed, 2: Unemployed, 3: Student, 4: Self-employed). * Represents significant values.

Political interest also emerged as a significant motivational factor shaping online civic participation. In the regression model, political interest showed a significant overall effect (Wald = 11.464, $df = 2$, $p = .003$) (refer to **Table 8**). Notably, respondents with high political interest were substantially more likely to participate civically online ($B = 1.888$, $p = .001$; $Exp(B) = 6.61$)

compared to those with low political interest, indicating a strong motivational threshold effect. Cross-tabulation (see [Table 5](#)) showed that civic participation rates were markedly higher among respondents with high (87.7 %) and medium (90.0 %) political interest than among those with low (77.6 %) political interest. The chi-square test confirmed a significant association ($\chi^2(2, N = 300) = 6.76, p = .034$), and the linear-by-linear association ($\chi^2 = 4.81, p = .028$) indicated that participation increased systematically with higher levels of political interest ([Gearhart et al., 2024](#)). Journalists are inherently expected to have a strong socio-political awareness, which was reflected in this outcome. The results highlight political interest as a crucial driver that works in tandem with digital literacy to translate skills into civic action.

In contrast to DML and political interest, media use frequency did not significantly predict civic participation in the multivariate model (overall $p = .126$). This finding reinforces the prior study results, which state the distinction between exposure and engagement, suggesting that frequent use of digital platforms does not automatically lead to civic participation ([Oden, Porter, 2023](#)) once literacy and motivation are taken into account. Similarly, membership in advocacy groups and belief in the power of social media were not significant predictors, indicating that symbolic affiliation or perceived platform efficacy alone may be insufficient to spur civic action. These findings point to a gap between attitudinal alignment and participatory behaviour, particularly in digital environments ([Tenenboim, 2025](#)). Posting on social or general issues revealed a more complex pattern. While the overall effect was not significant, one category of posting behaviour showed a significant negative association with civic participation ($B = -0.967, p = .036; \text{Exp}(B) = 0.38$). This suggests that moderate levels of expressive posting may not translate into sustained civic engagement and may instead reflect performative or episodic participation. Moreover, employment status did not emerge as a significant predictor, indicating that online civic participation may be less constrained by formal labour structures, as digital platforms reduce barriers related to time, location, and institutional access.

5. Conclusion

The study aims to statistically analyse whether digital media literacy (DML) can predict online civic participation among Indian women journalists. In the current study, DML was taken as the primary independent variable (IV) while keeping online Civic Participation as the dependent variable (DV). To isolate the effect of the IV of interest, seven control variables were introduced, including age, employment status, frequency of media use, advocacy group membership, belief in the power of social media, political interest, and expressive online behaviours such as posting and discussion. Based on the prior literature and arguments, the paper hypothesised that DML significantly increases the likelihood of online civic participation among women journalists. The findings suggested that respondents with higher DML levels have higher civic participation intent. Proficiency in digital media usage provides the necessary competencies for navigating and engaging with digital spaces, while political interest supplies the motivational impetus for civic action. These findings support prior scholarship that has stressed the importance of self-efficacy as well as having both access and required skills in digital spaces to ensure inclusive civic participation online. Interestingly, the results here strongly suggest that women, especially those working in information and socio-political environments in India, have a strong civic sense that reflects in their digital interactions and contributes to the existing literature on civic engagement patterns in the Global South. This underscores the importance of incorporating unified digital media literacy-related courses at the national level of education. The findings can also be closely tied to broader practices of digital citizenship, in which individuals actively engage, deliberate, and contribute responsibly within digital public spheres. Women are trying to break the social stigma and deliberate ignorance they faced throughout generations in socio-political discourse, using their skills and access to digital media.

Despite its contributions, this study has several limitations that should be acknowledged. Although the sample includes respondents across India, the scope of this study is limited to women journalists in India and cannot be generalised to the larger female population of the country, as the researcher was looking at a particular niche community of individuals working in digital media spaces. Further studies can be done with a larger, general population to understand broader patterns. Secondly, the study focuses on online civic participation and has not assessed if this translates into offline or physical action. Finally, the data rely on self-reported measures, which may be biased by social desirability, particularly given respondents' identities as journalists.

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The Model of Critical Media Education: Toward a Critical Media and Information Literacy Paradigm

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Abstract

This article develops Critical Media Education (CME) as a theoretically grounded paradigm within media and information literacy (MIL) scholarship and media literacy education. Moving beyond instrumental or protectionist approaches, CME is theorized as an emancipatory model aimed at cultivating learners able to interrogate and contest the power relations reproduced through mediated discourse and platform infrastructures. Media and information are conceptualized not as neutral reflections of reality but as discursive and ideological practices that shape meanings, identities, and social consensus. Anchored in Freirean critical pedagogy and complemented by cultural studies and critical political economy, the article integrates four interrelated dimensions: critical epistemology, textual and discourse critique, political economy and platform critique, and praxis-oriented media production. These dimensions are operationalized through guiding analytical questions and indicative classroom practices, offering a usable framework for media literacy education, teacher education, and curriculum work. The article also addresses risks of moralization and outlines safeguards that preserve plural interpretation, autonomous judgment, democratic participation, and future empirical development in datafied societies for contemporary classrooms and wider public cultures. It further argues that CME advances media literacy education when critical reading, structural platform analysis, and civic action are connected within one coherent pedagogical model for contemporary democratic societies.

Keywords: critical media education, media and information literacy, critical media literacy, critical pedagogy, media power, cultural hegemony, political economy of media, platform governance, algorithmic curation, democratic citizenship.

1. Introduction

In the contemporary era, where media – especially digital media – exerts an extraordinary influence on the ways individuals understand and interpret the world, the need for an education that promotes critique and reflexive awareness has become increasingly urgent. In a society dominated by traditional and digital media, critical media education represents an essential pedagogical approach aimed at fostering active, conscious, and critical citizens.

The model of critical media education draws on the tradition of critical pedagogy and critical communication theory, developing as a response to the profound influence of media on the shaping of social reality, identities, and power relations. Unlike instrumental models of media education, which focus primarily on technical or protective skills, the critical model views media as a structure of power, ideology, and social representation, emphasizing analysis, reflection, and emancipatory action.

Traditionally, media literacy has been conceptualized mainly as the development of technical skills for using media or as a protective tool against harmful influences of information. However,

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such approaches often treat the individual as a passive consumer of media content, ignoring the political, ideological, and cultural role of media in shaping public opinion, identity, and social relations (Buckingham, 2003; Fedorov, Levitskaya, 2015; Gálik, 2019; Kellner, Share, 2007).

The model of critical media education emerges as a response to these limitations. It conceptualizes education as an emancipatory practice rooted in Paulo Freire's critical pedagogy and critical media theory. Within this framework, media is not seen merely as a source of information, but as a space in which ideology, power, and culture intersect. Critical media education seeks to develop among learners the capacity to analyze and deconstruct media messages, encouraging them to become reflective subjects capable of participating in democratic processes (Giroux, 2011; Hall, 1980).

A key component of this model is critical pedagogy, which provides the epistemological and normative basis for understanding education as a political and social practice. The Freirean concept of *conscientização*, or critical consciousness, stresses the importance of reading not only texts but also the world, fostering a critical awareness of power relations and ideological structures that determine media content (Freire, 1970; Freire, Macedo, 1987). In this way, critical media education is not merely a didactic tool, but a normative and emancipatory project aimed at empowering individuals and transforming the relationships among media, education, and society.

Moreover, the model integrates the analysis of cultural studies and critical theory, incorporating concepts such as hegemony, representation, and encoding/decoding (Gramsci, 1971; Hall, 1980). This approach makes it possible for critical media education to address not only media content, but also the ways in which it interacts with identity, social norms, and economic and political structures. Through this theoretical combination, the model offers a powerful framework for developing critical citizenship and preparing individuals to challenge dominant media narratives.

In sum, the model of critical media education aims to build a bridge between theory and pedagogical practice by placing critical media analysis at the center of the educational process and helping individuals develop the skills necessary to act as conscious, participatory citizens in society. It represents an important innovation in the field of education, offering a multidimensional perspective that connects pedagogy, media, and democracy.

Within UNESCO's framework, Media and Information Literacy (MIL) integrates critical access, evaluation, and creation of media and information across platforms, explicitly linking literacy to democratic participation and social responsibility (UNESCO, 2011).

Aim and contribution. This article makes three specific contributions: (i) it clarifies the epistemological status of Critical Media Education (CME) as a critical paradigm within media and information literacy (MIL), distinct from skill-based or protectionist models; (ii) it synthesizes CME's major theoretical foundations in Freirean critical pedagogy, cultural studies, and critical political economy; and (iii) it increases pedagogical usability through an operational framework (Table 1) that specifies four interrelated dimensions – critical epistemology, textual/discourse critique, political economy and platform critique, and praxis and civic agency – designed to support curriculum work, teacher education, and future empirical validation.

2. Materials and methods

This is a theoretical-conceptual article based on an integrative narrative review and model-building approach. In terms of source material, the analysis draws on peer-reviewed scholarship in media education, information literacy, critical pedagogy, critical media theory, cultural studies, political economy of communication, and platform studies, supplemented by key normative frameworks in the MIL field (e.g., UNESCO, 2011). Methodologically, the article proceeds through (a) conceptual clarification of core constructs (media, information, power, ideology, critical consciousness), (b) theoretical synthesis across traditions (Freirean pedagogy, hegemony and representation, and political economy), and (c) operationalization, whereby the conceptual model is translated into guiding analytical questions and indicative pedagogical practices (Table 1). The outcome is intended as a heuristic for pedagogical design and as a basis for subsequent empirical work rather than as a prescriptive or standardized intervention. This conceptual synthesis is grounded in close reading of foundational texts in critical pedagogy and critical media scholarship, aiming to produce a coherent analytic model and a transferable vocabulary for CME.

3. Discussion

Critical media education develops within a broader tradition of critical pedagogy, media theory, and cultural analysis. Critical education is a powerful concept that has evolved through the different theories and practices of renowned authors. D. Kellner, J. Share (Kellner, Share, 2005) explicitly articulate critical media education as a process that links the ideological analysis of media with democracy and social justice. They are among the authors who formalized the term Critical Media Literacy. These authors understand media education not simply as content analysis, but as a process that cultivates critical awareness of social relations, power, and ideology as conveyed through media. The creation of alternative media (videos, blogs, podcasts) enables learners to challenge dominant narratives, articulate their voice, and connect theory with practice. This process has an emancipatory and transformative character (Kellner, Share, 2007).

Critical media education is a process that includes: the analysis of power relations in media; the examination of ideologies, stereotypes, and exclusions; and the linking of media to issues of race, class, gender, and identity. Unlike neutralist models, this model does not claim absolute objectivity but acknowledges that education is always political.

The model of critical education considers media as a social construct. A key principle of this model is that media does not reflect reality; it constructs it. As D. Buckingham (Buckingham, 2003) emphasizes, media contents are products of editorial choices, economic interests, and cultural contexts. In schools, learners are guided to ask who produced the message, for whom it was created, and what is included and what is excluded. They must understand that media are mediated and ideological structures, and that the capacity to reflect on them is more important than the capacity simply to use them.

The critical model places media in a direct relationship with power. It explores the ways in which media normalizes dominant ideologies, reproduces gender, ethnic, or social stereotypes, and legitimizes unequal relations. Such analysis is essential for the formation of democratic and active citizens. In this model, learners are not passive consumers but active subjects of knowledge. Through discussion, debate, and the production of media content, they develop critical thinking, social awareness, and capacities for civic action.

J. Dewey (Dewey, 1916) conceptualizes education as a democratic process based on experience, reflection, and active participation. For P. Freire (Freire, 1970), education is a political and emancipatory process. He stresses that education should not be a *banking* model, where the learner receives information passively, but dialogical, where knowledge is constructed through critical reflection and interaction. According to him, no media is neutral; it represents economic, ideological, and political interests. He underscores that education is a means of liberating individuals from oppression and calls this process a pedagogy of liberation, which aims to help individuals understand and struggle for social justice by becoming agents of change in their society. His concept of critical consciousness is the epistemological foundation of critical media education. Learners learn to read media texts and to understand the ideological and power relations they represent (Freire, Macedo, 1987). They should develop the ability to read media critically, understanding the ideological and hegemonic relations that influence the production and interpretation of content (Hall, 1980, 1997).

Critical media education is a pedagogical and epistemological paradigm that extends beyond traditional media literacy, aiming not only at developing technical skills of reading and using media, but also at the ability to analyze, deconstruct, and problematize the ideological relations and power that media conveys (Buckingham, 2003; Kellner, Share, 2007). This model has deep roots in critical pedagogy, critical media theory, and cultural studies, and offers a theoretical framework for emancipatory and civic education.

At the center of CME stands P. Freire (Freire, 1970), whose critical pedagogy conceptualizes education as a political and emancipatory practice. Freire criticizes the banking model of education, where learners are treated as passive depositories of information, and proposes a dialogical relationship between teacher and learner, where knowledge is constructed collectively.

The Freirean concept of critical consciousness implies a transition from a naïve and passive consciousness, which takes reality as given, to a critical consciousness that understands reality as a social and historical product (Freire, 1970; Freire, Macedo, 1987). Within CME, this concept is operationalized as a critical reading of media, focusing on the ways in which media information produces, reproduces, and naturalizes power relations.

H. Giroux (Giroux, 2011) extends Freirean ideas by understanding education as a cultural and political practice that shapes identities and as a capacity for critical action in society. Media is seen as a space where ideology is produced and where individuals must develop critical skills to analyze and challenge dominant narratives. Giroux emphasizes the importance of dialogue and media production as a way of developing critical citizenship.

Another dimension of CME's theoretical basis derives from critical media theory and cultural studies. S. Hall (Hall, 1980; Hall, 1997) proposes the concept of encoding/decoding, whereby media messages are encoded by producers and may be decoded in different ways by audiences: they may accept, negotiate, or oppose the message. This framework is crucial for critical media education because learners learn to read media critically and reflexively, identifying ideological and hegemonic relations.

D. Kellner, J. Share (Kellner, Share, 2007) further develop the idea of Critical Media Literacy, stressing that media education should not be limited to analysis but should include the active production of media as a means of cultivating critical skills and active citizenship. Critical media skills include recognizing the ideological, economic, and cultural influences of media, as well as the capacity to produce content that challenges dominant narratives. D. Buckingham (Buckingham, 2003) emphasizes that traditional media literacy approaches are limited because they focus primarily on technical or protective skills. He proposes a broader approach in which critical analysis, interpretation, and cultural discussion are more important than merely using media.

The theoretical foundation of CME also includes macro-social analysis of media. Critical theorists such as T.W. Adorno, M. Horkheimer (Adorno, Horkheimer, 2002) and A. Gramsci (Gramsci, 1971) argue that media is part of the culture industry and functions as a mechanism for reproducing cultural hegemony. Critical media education aims to expose these structures, helping learners understand how media messages may reproduce social inequalities and the ideological norms of society.

An important element of the theoretical basis is the link between CME and democracy and critical citizenship. Critical pedagogues argue that the ability to read and analyze media is a necessary condition for active participation in society (Biesta, 2011; Giroux, 2011). Learners develop not only analytical skills, but also the capacity to make informed decisions, to deliberate in the public sphere, and to contribute to social transformation (Habermas, 1989).

This gives critical media education a normative and emancipatory dimension, positioning it as a pedagogical, cultural, and social practice that goes beyond formal and technological instruction.

In the context of contemporary societies mediated by media and digital technologies, media no longer represents merely an information channel, but a central arena for the production of meanings, identities, and power relations. Consequently, media education cannot be confined to technical skills or superficial content analysis; it requires a critical approach that addresses the ideological, economic, and political structures that shape media.

The model of critical media education conceptualizes media as an ideological text and education as a political process, where the goal is not adaptation to the existing media order, but social awareness and emancipation. Critical education seeks the development of critical consciousness and the linkage of reflection to transformative action (praxis), making the educational subject aware of the power structures that shape their life (Freire, 1985). It is grounded in the aim of empowering individuals to deconstruct media discourses, understand power relations, and act as active subjects in social transformation (Kellner, Share, 2007).

Social media are not merely communication tools but systems built upon the logic of connectivity, data, and algorithms (van Dijck, 2013). Critical media education, in this sense, should help individuals understand that digital interactions are mediated by corporate interests and invisible mechanisms of power. N. Couldry, U.A. Mejias (Couldry, Mejias, 2019) argue that digital platforms represent a new form of colonizing power, in which human experience is systematically converted into data for economic gain. In this sense, critical education must go beyond content analysis and include an examination of the technological and economic infrastructures that structure contemporary communication.

The model of critical education is a transformative approach to schooling that emphasizes social liberation, the analysis of power, and the role of education in transforming society. It frames education as a practice that challenges dominant systems and power structures and encourages individuals to develop a critical consciousness of society, culture, and politics. Such education teaches one to understand who creates information, why they create it, and what interests stand

behind it; it analyzes how images, language, symbolism, etc., are used to influence public thought; it teaches how to recognize the ideological orientations of different information sources; it trains individuals to be vigilant against disinformation and propaganda; and, finally, it aims to empower citizens to be more engaged, informed, and responsible in their use of media and information.

Media operates through a propaganda model, in which the political and economic interests of elites filter information and limit the pluralism of public debate (Herman, Chomsky, 1988). From this perspective, critical education should develop the capacity to identify the mechanisms of manipulation and selection of information, making media analysis a central component of civic formation. The model of critical education concerns the development of analytical and critical skills to understand, analyze, and evaluate information coming from different sources. It requires individuals to have the ability to critique media and the information it provides, to understand how messages may be manipulated, and to develop a more informed and reflective approach to media.

Schools, as part of power structures, employ various techniques to control and discipline learners' bodies and minds in order to make them conform to social norms. Traditional methods of schooling treat learners as passive, learning to obey and not to question or participate in the learning process. The teacher is the one who deposits knowledge in learners' minds, who have no opportunity to challenge or analyze the information given to them. This one-way process of knowledge transmission is a form of domination that helps maintain the social and economic status quo. Critical media education should focus on analyzing how media is produced, circulates, and is interpreted within specific social and economic contexts, rather than merely protecting learners from the risks of digital media. Learners should be treated as active subjects of interpretation, capable of reflection and critical debate (Buckingham, 2015).

Schools are not neutral institutions, but cultural spaces where dominant ideologies are produced and contested. Critical education should empower learners to understand how power operates through culture and knowledge, turning them into active political subjects (Giroux, 1983). Schools focus on tests, not on critical thinking. Learners learn to choose the correct answers, not to analyze and reason.

The model of critical education is a process of interaction and dialogue, where knowledge is not transmitted solely from teacher to learners, but a shared process of meaning-making is created. Teacher and learner are not positioned in different relations of power; rather, they create a common space in which meanings can be challenged and new meanings can be produced. Education should be an engaged and active process in which learners and teachers help one another to understand and challenge structures of power and domination. Learning should be thoroughly connected to real-life experiences, and learners should develop the capacity to analyze and reflect on these experiences. Education should help learners develop a critical consciousness of their reality and of the structures of injustice that surround them (Freire, 1970).

M.W. Apple (Apple, 2004) places critical education at the center of the analysis of ideology and curriculum, arguing that what is included as legitimate knowledge in school reflects specific social and political interests. Critical education must render visible the mechanisms through which the educational system contributes to the reproduction of class and cultural inequalities. This position is of particular importance for critical media education because media, like the curriculum, selects and hierarchizes meanings, directly shaping social consciousness. L. Masterman (Masterman, 1985) emphasizes that learners must understand that media is a social and ideological construction, and that critical education should develop analytical skills that allow them to deconstruct media messages and the interests behind them.

The model of critical education is linked to the idea of an education that encourages individuals to challenge systems of power and injustice. Learning is connected to their efforts to change social and political reality.

Schools are not only places where knowledge is transmitted, but also spaces where learners can develop a profound understanding of the world and engage in clear critiques of systems that keep them oppressed. Learning is a space where deep social transformations can occur, enabling individuals to stand against oppression and to create an egalitarian society (hooks, 1994). In critical media education, media is treated as a social text to be read and deconstructed; learners are not passive consumers, but dialogical subjects; and media analysis is connected to everyday life experiences and structural injustices.

H. Marcuse (Marcuse, 1964) argues that mass culture and media contribute to the creation of a one-dimensional consciousness, which restricts critical thinking and social resistance. From this

perspective, critical education has the function of preserving and developing the capacity for negative and critical thought, opposing the ideological conformism of advanced industrial societies. For H. Giroux (Giroux, 1992), media, art, and popular culture are powerful forms of informal education that directly influence the formation of identity and citizenship. Critical education, in this sense, should analyze and intervene in these cultural spaces, helping individuals move beyond borders ideologically and develop a critical consciousness toward dominant discourses. Media education must be fundamentally critical and not protective or moralizing (Masterman, 1985).

An important contribution to critical media education comes from British cultural studies, especially from S. Hall (Hall, 1980). The concept of encoding and decoding emphasizes that media messages do not have fixed meanings but are negotiable and are interpreted depending on the audience's social and cultural positioning.

Critical media education analyzes the representation of gender, race, class, and ethnicity; stereotypes and the normalization of power; and the ways in which identities are constructed through media discourses. According to D. Kellner, J. Share (Kellner, Share, 2007), the critical model of media education differs from liberal or functionalist approaches because media is not neutral; it is produced within ideological and economic structures; every media text is constructed – reality is not reflected but constructed; media reproduces power relations through representation and silence; audiences are active but socially positioned; and the goal of education is emancipation and social action.

A central component of critical media education is the analysis of ideology. This includes identifying the political and economic interests behind messages, analyzing dominant narratives, and deconstructing media common sense (Gramsci, 1971). N. Fairclough (Fairclough, 1995) emphasizes the importance of critical discourse analysis as a tool for understanding how media language produces and legitimizes power.

The critical model pays particular attention to ownership structures and to the logic of the media market. According to R.W. McChesney (McChesney, 2008), commercial media is dependent on the interests of capital and advertising, which directly affects content. Critical media education analyzes the concentration of media ownership, the influence of advertising, and the relations among media, politics, and corporations. Unlike traditional approaches, the critical model stresses the importance of learners' media production not merely as a technical skill, but as a political act and an expression of resistance. According to D. Buckingham (Buckingham, 2003), the creation of alternative media helps develop critical awareness, challenge dominant narratives, and build marginalized voices.

Digital platforms function as structures of exploitation of users' labor and data. Critical education, in this context, should cultivate skills for understanding and challenging these new forms of economic and ideological domination (Fuchs, 2014). In the context of these platforms, critical media education extends its focus toward algorithms and the control of visibility, surveillance capitalism (Zuboff, 2019), disinformation, and digital manipulation. This positions the critical model as a form of epistemic and civic resistance to neoliberal logics of information.

Recent Q1 scholarship strengthens the argument that Critical Media Education should be understood as more than skills training within media and information literacy. E.W. Austin and S. Domgaard (Austin, Domgaard, 2024) reformulate media literacy as a theory of change linked to message interpretation, while N. Valle, P. Zhao, D. Freed, K. Gorton, A.B. Chapman, A.L. Shea, N.N. Bazarova (Valle et al., 2025) synthesize critical social media literacy as a framework built around inquiry, reflection, and action. L. Pangrazio (Pangrazio, 2026) questions whether AI literacy can be reduced to technical competence, and A. Levido (Levido, 2024) shows that media education must move beyond technical skills even in primary classrooms. N. Ni Shuilleabhain, E. Rich, S. Fullagar (Ni Shuilleabhain et al., 2023) further demonstrate that digital media literacy must also address embodiment, affect, and social norms.

Recent empirical and policy-oriented studies also reinforce the practical relevance of CME. L. Römer, M. Supa, V. Hodbod' (Römer et al., 2023) connect media literacy education with civic participation among disadvantaged youth; G. Polizzi, J. D'Arcy, R. Harris, S. Yates, F. Yeoman (Polizzi et al., 2025) show that media literacy provision in the United Kingdom remains fragmented and uneven; S. Livingstone, R.S. Jessen, M. Stoilova, L.I. Stănicke, R. Graham, E. Staksrud, T. Jensen (Livingstone et al., 2025) introduce the idea of platform literacy as a necessary response to algorithmic risk; and S. Qian, C. Shen, J. Zhang (Qian et al., 2023) demonstrate that brief digital interventions can strengthen verification practices in social media environments.

Contemporary communication research also suggests that critical media education must link meaning-making, structural critique, and behavioral resilience. H. Cho, C.J. Carpenter, W. Li (Cho et al., 2025) show through meta-analysis that media literacy interventions produce consistent positive effects, while O. Kuru (Kuru, 2025) differentiates literacy training from inoculation strategies against misinformation. A. Sadza, S. Daalmans, E. Rozendaal, M. Buijzen (Sadza et al., 2024) demonstrate that adolescents are capable of critical deconstructions of mediated risk, though not automatically. Taken together, this recent literature supports the central claim of this article: CME advances MIL when textual critique, structural platform analysis, and civic praxis are combined within one coherent pedagogical model.

Critical education, built on Freire's critical pedagogy and his successors, aims at the liberation of the individual through critical consciousness. Although it offers considerable advantages, the critical model requires teachers trained in critical theory; it may be perceived as ideological or politicizing; and it is difficult to integrate into standardized curricula. D. Buckingham (Buckingham, 2015) warns that critical education must avoid moralization and preserve space for multiple interpretations. Nevertheless, an important risk is the high level of theoretical abstraction, which often makes the model difficult to operationalize in concrete teaching practices (Biesta, 2010).

Critical education is often perceived as political or ideological, which may provoke resistance from educational institutions and policy-makers. H. Giroux (Giroux, 2011) argues that critical pedagogy risks being marginalized or neutralized in neoliberal educational systems. Another limitation relates to the strong emphasis on individual consciousness-raising, underestimating the fact that critical consciousness does not automatically guarantee social action or structural change (Biesta, 2010).

To preserve the educational legitimacy of CME and to mitigate the risk of moralization, three procedural safeguards can be made explicit in classroom implementation: procedural pluralism, which prioritizes the quality of reasoning, evidence use, and interpretive justification over ideological conformity; reflexivity, which makes assumptions and positionalities discussable and models the revision of claims in light of counter-arguments; and dialogic ethics, which sustains space for disagreement and negotiated readings while connecting critique to democratic deliberation and participation.

4. Results

To reduce the risk of theoretical abstraction and to align CME with conventional expectations for conceptual scholarship in education and MIL research, this section presents the model as an analytic-practical framework that links core dimensions to guiding questions and indicative pedagogical moves. The framework is intended as a heuristic for curriculum design, teacher education, and subsequent empirical validation.

Table 1. Operational framework for Critical Media Education (CME)

Dimension	Guiding analytical questions	Pedagogical enactment and indicative outcomes
1) Critical epistemology (knowledge, authority, truth claims)	<ul style="list-style-type: none"> – What counts as evidence and who is authorized to define “truth”? – Which assumptions are treated as “common sense” and which voices are marginalized? – How do institutional routines and professional norms shape credibility? 	<ul style="list-style-type: none"> – Source and evidence triangulation; comparison of outlets and genres. – Dialogic problem-posing discussion and reason-giving. – Outcomes: epistemic vigilance, reflexivity, justified judgment.
2) Textual/discourse critique (representation, framing, ideology)	<ul style="list-style-type: none"> – How is the issue framed? Which metaphors, categories, and emotions are mobilized? – Who is represented, how, and with what stereotypes, silences, or exclusions? – What dominant, negotiated, or oppositional readings are possible (Hall)? 	<ul style="list-style-type: none"> – Close reading, framing analysis, and CDA-informed examination of language/image (Fairclough). – Mapping stereotypes and omissions; comparing alternative framings. – Outcomes: interpretive competence, ideological critique, recognition of hegemony.

Dimension	Guiding analytical questions	Pedagogical enactment and indicative outcomes
3) Political economy and platform critique (ownership, algorithms, datafication)	<ul style="list-style-type: none"> – Who owns the outlet/platform and how is attention monetized? – How do advertising, metrics, and algorithmic curation shape visibility? – What data is extracted and how does commodification/surveillance operate? 	<ul style="list-style-type: none"> – Ownership and funding mapping; “follow-the-money” media analysis (Herman, Chomsky; McChesney; Mosco). – Platform walkthroughs: feed observation, data trail reflection. – Outcomes: structural literacy, awareness of infrastructural power.
4) Praxis and civic agency (media production, participation, democracy)	<ul style="list-style-type: none"> – How can critique be translated into responsible action in the public sphere? – What counter-narratives or alternative media can be produced? – How can deliberation remain plural, dialogic, and non-indoctrinating? 	<ul style="list-style-type: none"> – Participatory media production (e.g., podcasts, blogs, video essays) linked to community issues. – Classroom deliberation and civic projects. – Outcomes: civic agency, democratic participation, collective problem-solving.

The four dimensions are analytically distinct but intended to be used in combination: epistemic critique and discourse analysis are linked to structural platform analysis and to praxis-oriented production that supports civic participation.

5. Conclusion

By specifying CME's core dimensions and normative commitments, the article advances media and information literacy beyond skills-based or protectionist framings and provides a structured framework for analyzing mediated power while informing emancipatory pedagogical practice in media-saturated societies.

The model of critical media education represents a complex theoretical framework that interweaves critical pedagogy, media theory, and political philosophy. It shifts the focus from protection to emancipation, from consumption to production, from passivity to critical action. As such, it offers a robust theoretical foundation for research that seeks to understand and transform the relationship among media, education, and power.

The theoretical treatment above allows the derivation of several fundamental conclusions that consolidate the conceptual basis of critical media education as a field of study and pedagogy.

Critical media education cannot be reduced to an expanded form of media literacy; rather, it should be understood as an independent critical paradigm built on the assumption that education and media are intrinsically political processes. Media is not a neutral instrument of information, but a space where meanings, identities, and power relations are produced, which makes its analysis indispensable within democratic education.

Critical pedagogy constitutes the epistemological foundation of this model by providing the key concepts of critical consciousness, dialogue, and the active subject. The Freirean concept of *conscientização* proves particularly important for critical media education because it enables the transition from a passive relationship with media content to a reflective and analytical positioning toward dominant discourses.

The treatment shows that critical media education aims not only at the deconstruction of ideologies present in media, but also at the development of capacities for autonomous judgment and active participation in the public sphere. In this sense, it rejects both pedagogical neutrality and moralization or ideological indoctrination, focusing instead on building the critical capacities of the educational subject (Habermas, 1989).

The analysis underscores that pedagogical dialogue and the collective production of knowledge are essential elements for operationalizing critical media education. The learner is not treated as a passive consumer of media messages, but as a subject who interprets, negotiates, and potentially challenges the meanings produced by media.

The model of critical media education represents a deep, reflective, and transformative approach that goes beyond technical and protective skills. By integrating critical pedagogy, media

theory, and emancipatory practice, this model aims to form individuals capable of understanding, challenging, and reshaping mediated and social reality.

Critical media education emerges as an emancipatory project that closely links education with democracy, critical citizenship, and social justice. Under conditions of the dominance of digital media and the intensification of symbolic power, this model constitutes a necessary theoretical and pedagogical response to contemporary challenges, opening the way for further theoretical and empirical developments in the field of education and media studies.

This study is intentionally theoretical and does not provide empirical testing of the proposed operational framework. Future work should therefore examine how the dimensions in [Table 1](#) can be enacted across educational levels and cultural contexts and how they relate to outcomes such as critical judgment, epistemic vigilance, and civic participation. Methodologically, this could be pursued through classroom-based design studies, qualitative analyses of dialogic practice, and mixed-method evaluations of learners' interpretive and production capacities.

A second research priority concerns implementation conditions: teacher professional learning, curriculum constraints, and institutional cultures that may facilitate or neutralize critical pedagogy. Studying these conditions is essential for distinguishing between the normative aspirations of CME and the concrete possibilities of pedagogical practice.

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