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CONTENT

The Social Construction of Environmental Reality: An Analysis of Life Cycle Asses sment in the Food Industry

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Abstract

This article offers a critical sociological-philosophical-communicological review of the Life Cycle Assessment (LCA) method in the context of the food industry. While LCA has been established as a standardized tool for quantifying environmental impacts, this study analyses it not merely as a technical method but as an epistemological construct that actively shapes societal understanding of sustainability. Drawing on the theory of social construction of reality, situated knowledge, and critical theory, the article explores how methodological choices within LCA (e.g., system boundary definition and indicator selection) are not neutral but reflect specific social and political priorities. The findings reveal that standardized LCA approaches often lead to epistemological reductionism by homogenizing complex ecological processes and neglecting local contexts and environmental justice issues. Furthermore, the article examines the instrumentalization of LCA in sustainability communication and green marketing, where quantitative data are frequently used to legitimize existing business models rather than to drive systemic change. The discussion emphasizes the need to transcend instrumental rationality and shift toward transdisciplinary and deliberative approaches. The article advocates for integrating Social Life Cycle Assessment (S-LCA) and broader Life Cycle Sustainability Assessment (LCSA) frameworks to address sustainability challenges in the food industry more holistically, incorporating social justice and cultural sensitivity.

Keywords: life cycle assessment (LCA); social construction of reality; situated knowledge; sustainability environmental communication; epistemology of ethics; sociology of responsibility

1. Introduction

In recent decades, sustainable development and environmental responsibility in the global economy, particularly in the food industry, have gained unprecedented significance. This stems from growing public awareness of anthropogenic environmental impacts and shifting consumer demands for more ecologically sustainable and ethically acceptable practices. As the environmental crisis raises fundamental questions about the limits of human activity within planetary boundaries (Rockström et al., 2009), measuring and understanding environmental impacts has become crucial for both the scientific community and policymakers.

The food industry is a key sector with substantial impacts on natural resource use, greenhouse gas emissions, water consumption, and biodiversity. Poore and Nemecek (2018), in their comprehensive meta-analysis, highlight the extreme variability of environmental impacts across different food products and production systems, underscoring the need for robust assessment tools. In this context, Life Cycle Assessment (LCA) has emerged as a standardized method for evaluating the environmental footprint of products, processes, and services.

LCA provides a holistic evaluation of impacts across all life cycle stages: from raw material extraction ("cradle"), through processing, distribution, and use, to final disposal ("grave") or reuse ("cradle-to-cradle"). By focusing on the entire life cycle, LCA reveals complex interconnections between economic, environmental, and increasingly social dimensions of food production. It identifies "hotspots"—phases or processes with the highest environmental impacts—where technological or procedural improvements can significantly reduce overall footprints.

However, this article posits that LCA is not a neutral technical tool for quantification. Instead, we analyze it as an epistemological instrument that transcends mere measurement, exposing deeper philosophical and sociological dimensions of environmental thought. LCA is an epistemological construct that actively shapes societal perceptions of environmental reality. This epistemological framework defines what counts as "environmental reality" in a given historical and social context.

Such perceptions are not necessarily reflections of objective conditions but are co-shaped by cultural, political, and economic factors, the diverse needs of stakeholders, and the ideological orientations of experts. For instance, the preferences of study commissioners or the interests of funders of specific technological solutions can influence methodological choices in LCA (e.g., system boundaries or allocation methods). Additionally, data limitations, methodological constraints, and insufficient funding for comprehensive studies further shape these perceptions (Finnveden et al., 2009).

Traditional environmental LCA (E-LCA) often falls short in capturing the full complexity of sustainable food systems. Quantitative data alone cannot fully explain the social consequences of food production and consumption. Thus, sustainability policymaking must account for how societal discourses and normative structures influence the definition of metrics and standards, requiring interdisciplinary approaches that integrate social perspectives into environmental assessments (Gugushvili & Otto, 2023).

The aim of this article is to conduct a critical sociological-philosophical-communicological review of LCA in the food industry. We focus on analysing its epistemological assumptions, conceptual boundaries, and societal implications, demonstrating how LCA co-shapes perceptions of nature and proposed solutions to environmental crises. Using concepts from the philosophy of science, environmental ethics, and social construction theory, we illuminate how scientific methods are not passive reflections of reality but active participants in its construction. The analysis specifically addresses issues of epistemological selectivity, impact standardization, and the political instrumentalization of sustainability communication in global frameworks like the European Sustainable Products Initiative.

2. Methodology

This article is designed as a critical theoretical review. As the goal is not an empirical case study but a meta-analysis of LCA's epistemological foundations and societal implications, the methodological approach combines discourse analysis, philosophical reflection, and synthesis of existing literature at the intersection of environmental studies, sociology of science, philosophy, and communication studies.

The methodology is grounded in a critical analysis of LCA through the lens of social constructivism and related theories. This approach allows us to examine how scientific procedures like LCA are embedded in broader societal processes of "reality" construction.

The critical review was conducted through literature review, discourse analysis, and theoretical synthesis. A systematic review of scientific literature on LCA's methodological challenges in agri-food systems (e.g., Finnveden et al., 2009; Poore & Nemecek, 2018) was paired with critical scholarship from the sociology of science and environmental humanities on the quantification and standardization of environmental problems. Discourse analysis was employed to examine how LCA is used and communicated in scientific, political (e.g., the European Sustainable Products Initiative), and market (green marketing) discourses. We investigated how certain metrics (e.g., carbon footprint) become dominant and how this shapes "environmental truth." Theoretical synthesis integrates findings from the literature review and discourse analysis within the proposed framework, identifying patterns of epistemological selectivity, reductionism, and instrumentalization in LCA.

For result interpretation, interdisciplinary insights were applied, including contemporary practices like digital technologies for data accuracy (Obrecht et al., 2024b; Popowicz et al., 2025), while critically assessing their limitations within existing social structures. This approach aims to move beyond numerical evaluation toward a more comprehensive understanding of sustainability that incorporates social and cultural factors.

2.1. Social construction of reality as an analytical tool

The core theoretical framework derives from Berger and Luckmann (1966), who, in The Social Construction of Reality, argued that our understanding of the world results from ongoing social interactions, linguistic practices, and historical contexts. Reality is not a mere reflection of objective facts but the outcome of complex processes where it is negotiated, institutionalized, and reinforced. What we accept as "truth" is a product of social negotiation.

Traditional scientific approaches, often implicitly anchored in scientific realism (Bhaskar, 2008; Hacking, 2000), assume the existence of an objective, independent reality discoverable through empirical research. Social constructivism, however, emphasizes that even scientific "facts" (e.g., environmental impact measurements) are products of specific social histories, values, and institutions (Latour, 2004). In its strong form, constructivism posits that societal perception creates social reality as much as it reflects it. Meaning is assigned to objects and phenomena through human interaction with the world, mediated by cultural mechanisms like socialization (Jussim, 1991).

In this article, social construction theory is applied to analyse LCA. While LCA appears as an objective measure of environmental impacts, we treat it as a process involving the selection of categories, frameworks, and standards. These choices are non-neutral and influence how environmental problems are understood.

Language plays a key role. As Searle (1995) notes, social reality is built through linguistic practices that create and reinforce "social facts." Language is not just a communication tool but a medium for constructing reality. In LCA, this entails examining terminology (e.g., "carbon footprint," "ecosystem damage") that is not merely descriptive but also normative.

2.2. Situated knowledge and epistemological reflexivity

A second key methodological concept is "situated knowledge" (Haraway, 1988), which challenges the idea of complete objectivity and neutral, universal knowledge. Haraway (1988) stresses that all knowledge emerges from specific contexts, perspectives, and power positions. The analytical tools drawn from this concept include partial perspective and critical reflexivity.

Partial perspective acknowledges that all observers and researchers are "situated" within cultural, social, and historical frameworks. Our perception of reality is always constrained by our experiences and societal positions. For LCA, this means methodological, and data choices are influenced by the interests of researchers, study commissioners, or dominant scientific paradigms.

Critical reflexivity underscores the need for science to become self-reflective. Researchers should not only collect data but also critically examine how data are obtained, the assumptions behind methods, and how social, political, and economic interests shape scientific understanding. Foucault (1975) extends this perspective by showing how scientific and technical discourses are part of broader power mechanisms. Measurement and categorization are not just technical procedures but are heavily influenced by societal and institutional expectations, producing what we call "truth." LCA, as a method, operates within this tension: it functions as a "disciplinary apparatus" (Foucault, 1975) that selectively defines system boundaries and what counts as an "environmental cost" (Hornborg, 2019).

By integrating these concepts, we aim to move beyond traditional reductionism and introduce greater epistemological openness into measurement practices. This involves analysing how societal discourses are shaped through measurement procedures (Weder, Podnar & Golob, 2025).

2.3. Defining the subject of analysis: LCA in the food industry

The subject of analysis is the LCA method as defined by international standards (ISO 14040 and 14044) (ISO, 2006a, 2006b), with a focus on its application in the food industry. LCA is a comprehensive approach to assessing the environmental impacts of products throughout their life cycle, typically involving four phases:

Goal and Scope Definition: Determines the purpose, system boundaries, and functional unit, directly influencing the validity and interpretation of results.

Life Cycle Inventory (LCI): Collects data on inputs (materials, energy) and outputs (emissions, waste). Data gaps can distort outcomes.

Life Cycle Impact Assessment (LCIA): Evaluates environmental effects (e.g., climate change, acidification, toxicity).

Interpretation: Analyses findings and formulates improvement recommendations.

Our analysis examines how the theoretical concepts of social construction and situated knowledge manifest in these standardized phases, particularly in complex systems like the food industry, chosen for its significant environmental footprint and socio-economic linkages.

3. Results

The critical analysis reveals that LCA, despite its apparent objectivity, functions as a powerful mechanism for constructing environmental reality. Findings are structured around four themes: epistemological selectivity in defining LCA, reductionism from quantifying complex systems, social/ethical implications, and LCA's instrumentalization in communication and policy.

3.1. Epistemological selectivity and the construction of environmental reality

Defining "environmental truth" is not just technical but a socially constructed process. LCA participates in this through its methodological phases, especially goal and scope definition.

3.1.1. The politics of system boundary demarcation

The LCA methodology mandates explicit delineation of system boundaries (ISO, 2006a). However, this demarcation is not merely a methodological formality but a political and ethical act (Giampietro & Mayumi, 2009). Within the food industry, such boundaries are frequently circumscribed to align with vested interests. Consider, for instance, LCAs of intensive European livestock systems: the environmental burdens linked to feed production—deforestation, pesticide application, and land dispossession in South America—are routinely externalized through the use of averaged datasets or truncated system scopes. This epistemic selectivity facilitates the spatial dislocation of environmental costs, a phenomenon Martinez-Alier (2002) critiques as emblematic of "the environmentalism of the poor," wherein ecological degradation is displaced onto marginalized populations. By operationalizing such boundary work, LCA functions as a disciplinary apparatus (Foucault, 1975), rendering certain impacts "visible" (e.g., on-farm emissions) while relegating others (e.g., colonial land-use dynamics) to the realm of the "invisible" (Scott, 1998). Consequently, production practices are discursively legitimized as "sustainable" precisely through the strategic exclusion of their transnational externalities.

3.1.2. Functional units as value-laden constructs

The selection of functional units (FUs)—the quantifiable basis for comparative analysis—embeds normative presuppositions that privilege specific agro-industrial paradigms. Mass-based FUs (e.g., per kg of product) or energy-content metrics systematically favor hyper-efficient, industrialized systems optimized for yield maximization (e.g., input-intensive monocultures). This reductionist framing erases the multifunctionality of agrarian systems: biodiversity stewardship, cultural landscape preservation, and rural social cohesion are rendered illegible within the LCA's calculative logic. By collapsing the ontological complexity of food systems into

unidimensional efficiency metrics, LCA epistemically marginalizes holistic alternatives (e.g., agroecology), which may exhibit lower technical efficiency but superior socio-ecological resilience.

3.1.3. The epistemic violence of impact category selection

The prioritization of specific impact categories (e.g., global warming potential over soil microbiome degradation) is an enactment of power masquerading as technical necessity (Berger & Luckmann, 1966). The hegemony of carbon-centric metrics—a reflection of neoliberal environmental governance—systematically amplifies the epistemic authority of climate-centric frameworks while silencing competing narratives (e.g., toxics accumulation, agrarian knowledge erosion). This is not a neutral aggregation of "impacts" but a performative act that materializes certain realities (Latour, 2004): when LCA practitioners elect to quantify pesticide emissions via USEtox models (Rosenbaum et al., 2008) while omitting farmworker neurotoxicity studies, they co-produce an environmental reality where ecological harm is divisible from social harm.

3.2. The reductionism of quantification and homogenization of complexity

LCA is predicated on the assumption that nature can be measured and human impacts quantified. While quantification enables comparative analysis, this process risks oversimplification and the loss of essential contextual information.

3.2.1. Homogenization through indicators

The use of aggregated indicators—such as CO_2-equivalents for global warming potential—homogenizes the complexity of natural processes. Gases with distinct lifespans and ecological effects are reduced to a unified metric. Though methodologically expedient, this epistemic reductionism (Hornborg, 2001) collapses intricate interactions between agricultural practices, local ecosystems, and climatic patterns into singular numerical values.

For instance, livestock-to-crop comparisons based on carbon footprints often disregard pastoralism's role in biodiversity conservation or soil carbon sequestration. LCA may thus yield environmentally contradictory outcomes: a system optimized for carbon efficiency through intensification may simultaneously accelerate biodiversity loss or water depletion (Tilman et al., 2002), raising questions about its true sustainability.

3.2.2. Methodological uncertainties and modelling limitations

Impact characterization standards – particularly for complex categories such as biodiversity and land use – remain inadequately harmonized, undermining cross-study comparability (Hauschild et al., 2013), and reflecting what Robert Bullard (2005) identifies as "methodological environmental racism" in quantitative assessments. These

gaps systematically disadvantage marginalized communities, while privileging industry-friendly metrics. The case of Bayer-Monsanto's influence on pesticide impact modelling exemplifies this dynamic: their 2018 lobbying successfully narrowed the EU's LCA toxicity criteria to exclude endocrine disruptors (Corporate Europe Observatory, 2023).

The assessment of chemical toxicity (e.g., agricultural pesticides) exemplifies this epistemic fragility, and manifests what Beder (2006) terms "scientific mercenaryism". Beder analyses how corporations fund or control scientific studies to shape public opinion and policy in their favour. The term 'scientific mercenaryism' refers to the exploitation of science for commercial interests, where researchers or institutions act as 'mercenaries' for industry rather than providing independent evidence. She describes examples in the context of industries (e.g., tobacco, chemical) that manipulate data on health or environmental risks. Beder (2006) critiques this as a form of institutionalized bias, where science becomes a tool for corporate agendas rather than public good.

Models like USEtox (Rosenbaum et al., 2008), employed to quantify toxic impacts, rely on cascading assumptions about substance fate in ecosystems, exposure pathways, and dose-response relationships. Such assumptions carry inherent and substantial uncertainties. When LCA results are presented as definitive numerical outputs without transparent uncertainty analysis, they generate a fallacious impression of precision.

These practices generate "tunnel vision epistemologies" (Bammer, 2020) that violate the deliberative democratic principles. When Bayer-Monsanto's manipulated models are uncritically adopted in EU policy, they institutionalize what Jasanoff (2007, p. 33) calls "serviceable truths" – knowledge claims designed for regulatory convenience rather than ecological integrity. This epistemic violence becomes particularly acute when assessing Global South contexts, where the same models dismiss agroforestry systems as "unquantifiable".

Crucially, LCA's quantification practices are never merely technical exercises but interpretive acts of world-making. The method's outputs do not mirror "objective facts" but rather modelled representations of reality, contingent upon epistemic choices (e.g., selection of characterization factors), system boundaries, or value-laden normalization of incommensurable impacts. This epistemological tension mirrors Latour's (2004) paradox: the very tools meant to reveal environmental impacts actively shape what becomes legible as "impact."

3.3. Social and ethical implications: the neglect of justice

One of the most glaring shortcomings of conventional environmental LCA is its systematic neglect of the social and ethical dimensions of sustainability. Sustainability is not merely a question of environmental efficiency but also of social justice and equity (Sen, 2009).

3.3.1. Environmental justice and inequality

LCA often overlooks issues of environmental justice (Schlosberg, 2007), which concern the unequal distribution of environmental burdens and benefits among different social groups. The analysis focuses on aggregate impacts rather than on who bears them. In the food industry, these burdens frequently fall on agricultural workers exposed to pesticides, local communities suffering from water scarcity due to intensive irrigation, or communities in the Global South losing land to export crop production (Pulido, 2000).

By quantifying impacts while disregarding social consequences (e.g., effects on labour conditions, community health, food sovereignty), LCA neglects crucial ethical dimensions (Plumwood, 1993). A product may be deemed environmentally superior while its production remains socially unsustainable.

3.3.2. Situated knowledge and the exclusion of local perspectives

As a form of situated knowledge (Haraway, 1988), LCA often reflects the perspectives and values of those who develop and apply the method—primarily scientists and corporations from the Global North. This risks "epistemic colonialism" (Escobar, 2008), where the Global North defines sustainability metrics and norms that actors in the Global South must implement, regardless of local contexts and knowledge. This reinforces a neocolonial logic of environmental rationality that marginalizes alternative ways of understanding human-nature relationships (Shiva, 1989). Local knowledge and participatory methods that could broaden the interpretation of results are frequently excluded from standardized LCA procedures.

3.4. The instrumentalization of LCA in communication and policy

LCA is increasingly used as a basis for sustainability communication, green marketing, and environmental policymaking. However, findings reveal that this application is not without pitfalls.

3.4.1. LCA in green marketing and corporate legitimization

In the food industry, companies use LCA results to obtain eco-labels and communicate their sustainability commitments. Yet, analysis shows that LCA often becomes part of corporate "disciplinary self-regulation" (Bauman, 2007). Communication based on LCA tends to legitimize brands rather than drive systemic transformation in production.

Emphasizing specific indicators (e.g., reduced carbon footprint of a particular packaging) can divert attention from more problematic aspects of the entire value chain. As Golob, Podnar, and Žabkar (2023) caution, corporate sustainability communication often obscures systemic issues and shifts responsibility from institutional structures to individual consumer choices. Thus, LCA serves as a rhetorical tool that creates an impression of scientific rigor while potentially masking real sustainability challenges.

3.4.2. LCA in regulatory frameworks

The European Commission, under its Sustainable Products Initiative and Green Deal, promotes standardized methodologies like the Product Environmental Footprint (PEF), based on LCA (Busch, Ferrarini & van den Hurk, 2021). While these initiatives aim to enhance transparency and advance the circular economy, analysis shows that they largely operate within market-technological rationality. They focus on optimizing the existing system rather than addressing systemic transformation. Even in green and digital transition efforts, as Obrecht, Drašler, and Ogrin (2024a) warn, fragmented approaches persist, failing to holistically capture the systemic dimensions of sustainability. Standardization, though necessary for comparability, may stifle innovation and adaptation to local contexts.

4. Discussion

The findings of this analysis raise fundamental questions about the role of scientific methods like LCA in shaping environmental policy, public discourse, and practices in the food industry. If we accept that LCA is a socially constructed tool embedded in specific epistemological and institutional contexts, we must critically assess its presumed objectivity and universality. The discussion focuses on the implications of these findings and possibilities for developing more holistic and reflexive approaches to sustainability assessment.

4.1. Epistemological assumptions and the discursive nature of LCA

Results indicate that LCA is not a mere mirror of environmental reality but a lens that co-shapes it. The epistemological assumptions embedded in its methodology—choice of system boundaries, functional units, and impact categories—are not neutral (Finnveden et al., 2009). These choices determine which impacts become "visible" and significant, while others remain overlooked or marginalized. This construction process is crucial, as it defines the framework within which sustainability debates unfold.

The discursive nature of scientific methods demands that we interpret LCA as part of broader social practice. LCA is not just a measurement tool but also a narrative device. Quantification becomes a story about what we value and what we are willing to sacrifice. For instance, emphasizing carbon footprint as a primary metric creates a discourse that may favor certain technological solutions (e.g., high-tech intensive agriculture) over more ecologically integrated approaches whose benefits are harder to quantify within standard LCA frameworks.

This finding challenges the traditional divide between "objective" science and "subjective" interpretation. Scientific knowledge itself becomes part of meaning-making mechanisms (Latour, 2004). Thus, it is imperative that LCA applications explicitly articulate the assumptions and values underlying methodological choices. Transparency

is not just about data accessibility but also about disclosing epistemological and normative decisions. Without this, the demand for "scientific objectivity" risks becoming a rhetorical strategy to legitimize specific political or economic interests (Stirling, 2008).

4.2. The challenges of reductionism and the need for epistemic pluralism

The reductionism inherent in quantification, which homogenizes the complexity of ecological and social systems, is a central critique of LCA. Translating complex phenomena into simplified metrics loses contextual understanding. This is particularly problematic in the food industry, where local specificities (climate, soil, cultural practices, social structures) are key to sustainability.

The concept of situated knowledge (Haraway, 1988) offers an alternative to this universalizing tendency. Rather than seeking a singular, objective truth, it encourages the recognition of partial perspectives and the inclusion of diverse viewpoints. For LCA, this means moving beyond a purely techno-economic approach to incorporate local community perspectives, ethical norms, and social justice concerns.

Epistemic pluralism is needed. How can we integrate knowledge traditionally excluded from scientific arenas? Recent research highlights the importance of participatory methods and local knowledge (Lulovicova & Bouissou, 2024). Qualitative approaches, such as ethnographic studies and in-depth stakeholder interviews (farmers, workers, local residents), can reveal social dynamics and environmental impacts that quantitative LCA data alone cannot capture. This strengthens the integration of social knowledge into LCA, enabling a more comprehensive and equitable analysis.

4.3. Integrating social factors and environmental justice

Traditional LCA frequently ignores social consequences and questions of environmental justice (Schlosberg, 2007). Neglecting impacts on workers, local communities, or inequalities in resource access (Pulido, 2000) results in an incomplete sustainability assessment. Sustainable food systems must be not only environmentally sound but also socially just.

The development of Social Life Cycle Assessment (S-LCA) attempts to address this gap (UNEP, 2020). S-LCA incorporates social dimensions such as workers' rights, social equity, and community well-being. However, S-LCA also faces challenges in measuring subjective experiences and risks reducing social issues to a set of optimizable indicators without addressing structural inequalities.

A shift toward Life Cycle Sustainability Assessment (LCSA) is needed, integrating environmental (E-LCA), economic (LCC), and social (S-LCA) dimensions. Yet, this integration must not be merely additive. It requires a transdisciplinary approach

recognizing interconnections and conflicts between these dimensions. As Obrecht et al. (2024a) emphasize, systems thinking is crucial for understanding complex interactions in sustainability transitions.

In the food industry, this means sustainability assessments cannot ignore issues like food sovereignty, fair trade, or the impact of global supply chains on local economies. For example, a practice that reduces emissions while increasing farmers' dependence on multinational corporations for seeds and fertilizers cannot be labelled fully sustainable.

4.4. Political instrumentalization and sustainability communication

The use of LCA in marketing and policy reveals its role as a tool of power. LCA can serve as a mechanism to legitimize certain economic interests and reproduce the status quo. In green marketing, LCA results are often simplified into eco-labels, giving consumers a sense of responsible choice without demanding fundamental changes in production models.

This ties into broader challenges of sustainability communication. As Golob, Podnar, and Žabkar (2023) note, effective sustainability communication must go beyond quantification and information-sharing. It should open space for reflection, meaning making, and collaboration among diverse social actors. If communication relies uncritically on LCA results, it risks becoming a form of greenwashing that individualizes responsibility and obscures systemic problems.

Similarly, incorporating LCA into global regulatory frameworks, such as the EU's Sustainable Products Initiative (Busch et al., 2021), carries risks. Standardization dictated by the Global North may reproduce neocolonial patterns (Escobar, 2008; Shiva, 1989) by disregarding diverse epistemologies of nature and local contexts.

4.5. Beyond instrumental rationality: toward a deliberative approach

Critiques of LCA highlight the dominance of instrumental rationality (Habermas, 1984), where the focus is on means efficiency rather than reflecting on ends. Sustainability transformation in the food industry requires shifting from mere technical optimization to broader societal needs and ethical standards.

Environmental assessments should incorporate deliberative processes involving diverse stakeholders with differing perspectives and values (Kohn, 2013). This means actively engaging stakeholders in interpreting LCA results and shaping policies. Transparency and participation enhance the legitimacy of outcomes and foster inclusive dialogue among industry, policymakers, and consumers (Weder, Podnar & Golob, 2025).

Rather than presenting LCA results as absolute, researchers and decision-makers should clearly disclose assumptions, uncertainties, and exclusions shaping the

assessment. This would allow LCA to become a tool for learning and dialogue rather than merely reinforcing existing practices.

4.5.1. The normative role of science in sustainability policy

Science's role in sustainability policymaking is not merely descriptive but also normative. Scientific models and methods, like LCA, do not just reflect existing environmental conditions—they actively shape policy goals, priorities, and metrics. As Stirling (2008) warns, there is a risk of science "closing down" decision-making possibilities rather than "opening them up" when quantitative models are used as the basis for unambiguous policy decisions.

This normative power is especially pronounced when scientific findings underpin standardized policies and sustainability labelling. In this context, science must not act as an authoritative interpreter of reality but as a facilitator of pluralistic dialogue on values, priorities, and action pathways. This heightens its responsibility in co-creating just and inclusive sustainability transitions.

4.6. Limitations and recommendations for future research

This critical review highlights structural and epistemological limitations of LCA. However, the method continues to evolve.

A key practical limitation remains data availability. In the food industry, data on production practices, resource use, and emissions often vary by geography or culture, complicating accurate comparisons and reliability (Finnveden et al., 2009).

Moreover, LCA—especially in its standard environmental form—struggles to adequately capture socio-economic and cultural dimensions essential for holistic sustainability understanding. Result interpretation often simplifies complex interactions.

Future research should focus on:

Developing adaptive, context-sensitive LCA models: Models must better account for local environmental challenges, cultural practices, and social contexts rather than relying on standardized global assumptions.

Integrating qualitative and quantitative methods: Research should explore combining LCA data with qualitative insights from social sciences, including participatory stakeholder engagement.

Advanced technologies and transparency: Investigate the potential of AI and blockchain for improving data accuracy, traceability, and supply chain transparency (Obrecht et al., 2024b; Popowicz et al., 2025), while critically assessing their social implications.

Deepening S-LCA and LCSA analysis: Further methodological refinement and practical implementation of social and full life cycle sustainability assessments, with emphasis on addressing power and justice.

With these approaches, LCA can evolve into a more robust and socially relevant tool—one that serves not just technical optimization but genuine sustainability transformation.

5. Conclusion

This text has highlighted the intricate relationship between Life Cycle Assessment (LCA) methodology and the social construction of environmental reality in the food industry. The analysis demonstrates that LCA is not merely a neutral technical tool for quantifying environmental impacts but a powerful epistemological construct that actively shapes sustainability perceptions and decision-making.

Environmental reality, as perceived through the lens of scientific tools today, is not the result of linear accumulation of objective facts but a complex formation of discourses, institutional interests, and scientific representation (Latour, 2004). We have found that LCA's measurement procedures and methodological assumptions (system boundaries, functional units, indicator selection) are embedded in broader social, political, and cultural contexts. These choices are not neutral—they reflect dominant values and interests, potentially leading to epistemic reductionism and the marginalization of local perspectives and environmental justice concerns (Haraway, 1988; Martinez-Alier, 2002).

The quantification offered by LCA often homogenizes complexity and may yield solutions that are technically efficient within narrow parameters (e.g., carbon footprint) yet problematic from a holistic sustainability standpoint. Furthermore, we have illuminated how LCA is instrumentalized in sustainability communication and policy, frequently serving to legitimize the status quo rather than drive genuine transformation (Golob et al., 2023).

For a more comprehensive and just environmental future, it is essential to move beyond techno-scientific reductionism and instrumental rationality (Habermas, 1984). This article advocates for a transdisciplinary and deliberative approach—integrating social and ethical dimensions (via S-LCA and LCSA) while embracing diverse epistemologies and participatory methods.

The key question for the future is not merely improving LCA's measurement accuracy but fostering epistemic reflexivity within the scientific community and society at large. We must recognize that environmental science co-shapes reality. If we wish to advance truly sustainable and socially just transformation in the food industry, we must ensure that environmental truth is not merely a product of models and indicators but the result

of open, inclusive dialogue among science, society, and nature. LCA is an important tool, but it must be used with awareness of its limitations and social implications.

Note

All three authors are lead authors, as they had an equal leading role in the design and implementation of the research and the preparation of this article.

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ARGUMENTS FOR THE AUTONOMY OF MEDIA LITERACY AS A MANDATORY SUBJECT IN MACEDONIAN SCHOOLS

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Abstract:

Media literacy is integrated as a teaching content in the Macedonian language subject in primary school, but its implementation is lagging behind in secondary education because of the curricula of primary and secondary schools in the country that have not been in a homogeneous relationship for years. In recent years, efforts have been made for media literacy to take part in everyday school experience through external project, or with media clubs' formation within the schools. But the effect that is achieved is far from the desired one (only few students among the school are getting real knowledge about the topic). In order to make better progress for the students and for them to understand the need and essence of this knowledge and skill, it should be elevated to a separate subject, which will be taught by skilled teachers. Unfortunately, teachers of Macedonian language and literature, without proper additional preparation are not sufficiently informed in Media literacy (not to the level of teaching the topic). Therefore, this case study aims to show the need for such an autonomous subject in schools, whereby Media Literacy will finally enhance its necessary place in education, and our young people will gain the necessary knowledge for functional life in the 21st century. For this purpose, in addition to theoretical research, empirical research will be conducted by surveying teaching staff and students and it will focus to provide the importance of such subject.

Key words: media literacy, primary school, mandatory subject, innovation

1. Introduction

October 31, 1938 remains remembered in history as a day of mass panic in the USA, when millions of Americans listened to Orson Welles' radio drama The War of the Worlds. According to the narration, broadcast in the form of a breaking news radio bulletin, an authoritative journalist explained in detail how the Earth was being attacked by Martians. Many listeners did not realize that it was a fictional and artistic depiction of an invasion, but believed they were witnessing a real event. In just a few minutes, the streets of some American cities were filled with people leaving their homes, hospitals admitted individuals with panic attacks, and police lines were flooded with calls—in which, as Hadley Cantril observed, "they did not ask whether the news was true, but simply how to escape." (Cantril 2025, 7) In 1939 panic was born from a radio broadcast; today the same psychological mechanisms are activated via the internet, social networks, and mobile applications—only with much faster spread and stronger impact. This event illustrates that in the absence of critical thinking and the ability to assess the credibility of information, media can cause chaos—even when their primary goal is the creation of artistic content.

Eight and a half decades later, despite the technological advancement of media, warning labels for the type and purpose of content, as well as age restrictions, the danger of manipulation—often unintentional—remains the same, or becomes greater. Therefore, the issue of media literacy is not only current but necessary for the stability of democratic processes and the safety of the public. It is, in fact, an individual ability to access, evaluate, and create media content across different platforms, which influences the development of critical thinking and informed participation in society.

Efforts made at the local level on this issue are not uniform. Certainly, they start from education, then public events such as "Media Literacy Days," conferences, the publication of numerous scientific papers, manuals, brochures, and the like—but these efforts are not sufficient, given that the Republic of North Macedonia is still at the bottom of the Media Literacy Index in Europe for 2023 (M. Lessenski)—a position it has continuously occupied since 2018.

The scope of the problem is large and multilayered; it includes aspects of low systemic education, low trust, as well as weak media freedom. Nevertheless, this paper will focus only on the educational process and how it can help in the struggle to create a media-aware population. Today's integration of media literacy and culture as a topic of study is formally integrated into several subjects in primary education, such as Macedonian language as the mother tongue, then in the curricula of mother tongue subjects of communities, as well as the subjects Technical Education and Informatics and Civic Education—but the most significant and most systematic presence is precisely in Macedonian language instruction. Beginning with the 2025/2026 school year, media literacy will also be integrated into the subject Macedonian Language and Literature in

general secondary education (gymnasiums). Additionally, the Faculty of Philology—Skopje, and the Faculties of Education in Skopje and Bitola already offer elective courses in media literacy in programs for future teaching professionals.

In the period from 2018 to 2023, the integration of media literacy into teaching brought satisfactory progress—the greatest among the countries in the last cluster—but still insufficient for a transition into a higher category. This clearly indicates that the existing model is inadequate. To achieve a real leap forward, media literacy should become a separate subject taught by teachers with specialized training, with modern teaching resources provided and continuous institutional support and opportunities for further development. This will ensure systemic, practically oriented, and professionally delivered instruction, which will raise the level of media literacy nationwide.

2. From Media Chaos to Educational Cosmos

2.1. The Arche of the Problem: From Hesiod to the Index

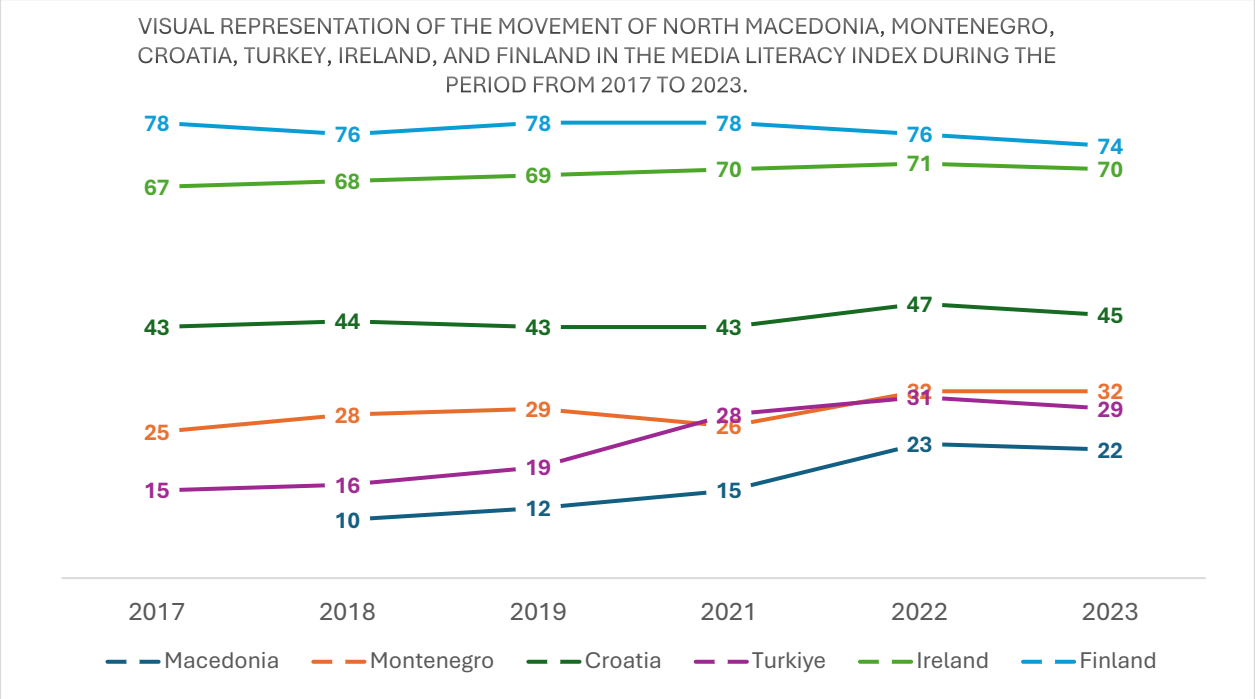
"In the beginning was Chaos," says Hesiod in his Theogony (Hesiod 2021, 8). In a symbolic sense, that chaos—an undefined abyss and primordial state before the creation of the cosmos—can be compared to the position of countries at the bottom of the Media Literacy Index. Here, education, the media environment, and trust in institutions are out of balance, and reforms are the attempt to establish cosmos: order, harmony, and stability.

It seems that all efforts are conditioned by or guided through the above-mentioned Index, produced by the Open Society Institute – Sofia (author M. Lessenski), which is a composite indicator combining data on media freedom, education, and the level of trust in institutions. Its rankings are not just abstract numbers, but a story about how capable a system is of transforming the initial state of chaos into a functional cosmos.

This dynamic is shown in Chart 1, which illustrates North Macedonia's movement in the Media Literacy Index from 2018 to 2023, compared with several countries with different development trajectories. Finland retains the top of the first cluster, Ireland records a stable transition into the highest category, and Croatia progresses from the third to the second cluster. Türkiye and Montenegro have significant shifts, but with different trends in stability. Macedonia, for its part, records a growth of 12 points in the analyzed period—the second fastest in the last cluster—but despite that, remains in the lowest category.

This disproportion between relative progress and absolute position underscores the need for systemic and long-term solutions.

The chart shows how countries move between stagnation and progress in creating media-resilient societies. It shows that North Macedonia is a step away from exiting the fifth cluster, while Sweden has a long stagnation. However, the difference is essential: in



Sweden, the standstill stems from having reached an already high level of educational and media infrastructure, where further growth requires innovations rather than the improvement of existing practices. In contrast, North Macedonia is still struggling to establish the basic prerequisites—institutional support, resources, and strategy—without which the exit from media chaos and the transition into a functional cosmos remain a challenge, not a reality.

To grasp the magnitude of the path, we must look at where Macedonia began its development.

1. First Steps (2017–2019): If we follow the journey through the numbers, we will see that North Macedonia's story in the Index does not begin with the first available data from 2017 (M. Lessenski), but in 2018 (M. Lessenski), when the country first entered the list—at the very bottom among 35 ranked countries, with 10 points, and above it was Türkiye with 16 points. The low points are not accidental, especially given the conclusion of a 2016 study conducted by the School of Journalism and Public Relations, which stated: "In the Republic of Macedonia, media literacy is an almost unknown category and very little has been done so far for its promotion and implementation" (Shopar, Ḱupeva, and Temenugova 2016, 9). On the other hand, the same report emphasizes that

in the sphere of education, nowhere, in any document—law, strategy, or development program—is media literacy mentioned as a key component. This situation represents media chaos, in which the basic mechanisms for critical information and professional reporting are degraded, leaving the public without a firm foundation for developing a media-resilient society.

One significant stride in this period is the attempt to implement media literacy in primary education from 2018 via the Slovenian combined model of media education, with updated teaching content in multiple subjects, such as the mother tongue, Civic Education, and others. The public became increasingly familiar with the term, and events and campaigns encouraged awareness of critical reception of media content. This resulted in a modest step in the Media Literacy Index in 2019 when there was a minimal improvement of two points, but the position remained unchanged.

It is important to note that it took nearly three years for these changes to be implemented in practice, with the adoption of the Concept for Primary Education and the new curricula for first and third grade from 2021, when for the first time the term "media literacy" came to life in school classrooms.

2. From Infodemic to Stagnation (2021–2025): The post-COVID report from 2021—"Double Trouble: Resilience to Fake News at the Time of Covid-19 Infodemic" (M. Lessenski)—notes an increase in the overall score to 15 points, but with no improvement in placement. Macedonia remains at the bottom, together with Albania and Bosnia and Herzegovina.

This period is particularly significant from an educational perspective, because precisely in 2021 larger reforms in primary school curricula began, integrating media literacy into several subjects, training teaching staff, and preparing manuals with functional activities for teaching purposes.

The country recorded its greatest point increase in 2022 (M. Lessenski), when it rose to 40th place out of a total of 41 countries, with 23 points. This increase was not enough to exit the fifth cluster. The role of changes in education is obvious, as in this period activities on the ground intensified in scope—workshops for students, projects from governmental and non-governmental organizations—with the aim of encouraging critical media thinking already in the classroom. A strong attempt was also made to form Media Clubs in several schools, with trained teachers who continuously collaborate with experienced journalists to foster a "journalistic spirit" among students.

The situation appears seemingly even better in the latest 2023 report (M. Lessenski), when Macedonia climbed one place higher—to 39th position—but this shift was more a consequence of declines in other countries' results than of stable domestic progress.

The main reason is that introducing media literacy in primary education as an integrated area across several subjects did not bring the expected result. This approach—although conceptually advanced—faced, in practice, insufficient methodological support, limited teacher training, and a lack of systemic evaluation. The shortcoming is partially compensated by the introduction of new accredited programs in higher education institutions that prepare teaching staff, with a special emphasis on the Faculties of Education in Skopje and Bitola, as well as the Faculty of Philology in Skopje, in order to strengthen media literacy competencies already during their studies. However, there is also a lack of a national plan for systematic professional development of already active teachers, through which they would acquire or upgrade skills for integrating media literacy into teaching, via trainings, mentoring support, or practical tools.

The effect of all educational interventions on the broader media climate is still limited, which becomes visible in the current period. Although a report on the state of the Media Literacy Index for 2024 is not available, it can be noted that in 2025, according to the World Press Freedom Index (Reporters Without Borders 2025), the country recorded a decline from 35th place last year to 42nd place. Disinformation remains widespread, and the lack of professionalism further erodes trust, maintaining a state of chronic media chaos.

These fluctuating results do not stem solely from the educational system, but from a broader social and institutional climate. Although recent years have seen increased institutional activity, deeply rooted problems remain: a poor media market, low ethical standards, weak development of media literacy, and media dependence on state funding, which creates room for influence and clientelism.

Hence, even though the foundations for a cosmos—i.e., a harmonized system of knowledge and skills for critical media thinking—are being laid in the educational segment, the general media environment remains unstable and filled with chaotic influences, which makes the complete transition from chaos to a sustainable cosmos difficult rather than real.

3. Chaos as a Constant

3.1. Nailed to the Bottom

The data reveal a consistent problem: for almost a decade the country's position has remained nailed to the bottom, with small and insufficient fluctuations. When educational and media policies are based on chaotic impulses without a clear strategy, the result is not harmony but prolonged chaos.

This standstill is particularly visible among the young population. According to data from "Survey Report on News Consumption, Recognition of Disinformation and Civic

Engagement among Young People in North Macedonia" (Prof. Dr. Marijana Marković et al. 2024, 9–16), only 32.7% of them check whether sources and links from information are functional, while as many as 63.7% passively receive all information through social networks. This indicates high susceptibility to manipulation through "algorithmic" news intake without research, verification, or analysis.

3.2. Philosophy of Media Transformation

Psychology and philosophy recognize four dynamics that shape the universe: harmony—the balance toward which systems and individuals strive; chaos—disruption of that balance; power—the instruments for steering society, but also the individual; and, finally, order or cosmos—successful organization. If the initial "media chaos" was the arche—the source of all possible changes—then our path toward the cosmos is still unfinished. For real progress, systematic, sustainable, and mutually interconnected reforms are needed, which will lead the country out of the abyss of the fifth cluster toward stability and harmony.

In that process, education plays the key role, because media literacy is inextricably linked to the quality and direction of educational policies. It is not enough merely to copy the Slovenian model or to insert the relevant terms into national documents, as has already been done. Systemic control, regular review of results, and adaptation of measures to real challenges are necessary. Without such a strategic approach, integrating critical thinking, media content analysis, and digital skills into curricula remains partial and without a measurable effect.

The experience of the highest-ranked countries in the index shows that, besides media freedom and trust in institutions, it is precisely consistent educational policies that treat media literacy as a core competence—on par with reading, writing, and mathematics—that enable the transition from chaos to cosmos. In the national context, the absence of such a system means that education fails to form the "critical mass" of citizens who will initiate lasting transformation.

An illustrative situation can explain this need: if a student learns that a sensationalist headline often contains words with strongly emotional meaning and shading—such as "incredible," "shocking," or "brilliant"—they will initially be cautious and recognize such attempts at manipulation. But if those headlines remain the dominant standard in the media environment, perception changes—from exception, they become the rule, and critical distance gradually disappears.

In other words, reforms in the media sphere and in education must develop synchronously—because one without the other is like trying to build a heavy stone house on straw foundations.

4. From Plan to Practice: Toward a Stable Model of Media Literacy

4.1. Normative and Conceptual Foundation

Reforms related to introducing media literacy into the educational system, as already noted, began most strongly in 2021 with the adoption of the new Concept for Primary Education. In order to strengthen the integration of media literacy, in 2023 the Bureau for Development of Education (BDE), in partnership with USAID, IREX, MIM, ICS, and MOF, issued the document Framework for Media Literacy in Primary Education (BDE 2023, 23), which states that media literacy competencies, as part of the National Standards for Primary Education, are included in curricula in various ways. Primarily, a topic dedicated to media literacy has been introduced in the subjects Macedonian, Albanian, Turkish, Serbian, and Bosnian languages, from first to ninth grade. Additionally, parts of media literacy are embedded in the content and assessment standards of other school subjects, as well as as a tool for implementing activities aimed at achieving certain standards in almost all subjects. The Framework also provides for the possibility of in-depth study through free elective subjects from fourth to ninth grade.

Although from a conceptual standpoint and at the time of adoption this is a logical and significant step, the framework still does not have sufficient practical effect to initiate essential transformation.

The formal presence of media literacy in Macedonian Language, Technical Education, Informatics, and Civic Education does not guarantee equal implementation. In Macedonian Language instruction for Grade VI, for example, media content often falls into third place due to the extensive program in grammar, literature, and expression and composition, which is too large for the planned annual fund of 144 hours. An additional problem is the insufficient preparedness of teaching staff: trainings are short (2–3 days), and although materials are available, their applicability is limited.

In other subjects the situation is even more constrained. In Technical Education and Informatics, media topics are reduced to “online safety” or “online living,” with only 4–6 hours per year. In Civic Education for Grade VII, media literacy is treated solely as a concept within the content “Personal Identity,” through a standard that reads: “explains the connection between social media identity and personal identity” (BDE 2024, 20). Therefore, it is not pessimistic to conclude that the fragmented allocation of about 25 hours of media literacy results in shallow and unstable progress.

A further problem arises from gradual implementation: at the time of writing this paper, two cohorts in primary school (VIII and IX grade) and three cohorts in secondary education (II, III, and IV year) will not be covered by the new teaching content at all. This creates a generational gap and limits the overall effectiveness of the reforms.

Although the 2023 Framework clearly sets the theoretical and methodological foundation, including the possibility of preparing programs for elective subjects in this area, actual implementation depends on the will of schools, teacher motivation, and allocation of class hours. This is confirmed by the fact that to date a program for such a subject has still not been approved and published on the official BDE site. Such dependence creates a risk of uneven and incomplete development: on the one hand, students who will have the good fortune to expand their media literacy, and on the other, students who will miss the opportunity and remain with a spontaneous or low level of competence.

This situation not only limits the effectiveness of reforms but also deepens existing inequality in access to quality education, preventing the creation of a generationally aligned level of media culture.

Whether this researcher's position—supported by a theoretical framework—will coincide with the real situation on the ground should be shown by the survey to be conducted among various stakeholders in the educational sphere.

4.2. The Voice of the Educational Community

1. Methodological Setup of the Survey: The survey was conducted among teachers, professors, and students in primary and secondary education, with the aim of checking on the ground the progress of reforms and assessing the effectiveness of activities carried out so far to improve media literacy, while testing the hypothesis that the implemented reforms have not resulted in the expected outcomes.

2. Target Group and Structure of Respondents: The research included a total of 147 respondents, of whom 91 were teaching staff and 56 students. The teachers were from primary and secondary education, with representation of different subject areas, to provide a broader picture of preparedness for introducing media literacy into teaching. The students were of different ages and educational profiles, to gain insight into their real abilities for critical reading and analysis of media content. The larger representation of teachers in the sample is a conscious choice, since their capacity and willingness to implement new content are a key prerequisite for the effectiveness of reforms.

3. Structure and Content of the Questionnaire: The questionnaire consisted of a combination of closed questions and practical tasks, structured into three thematic segments:

o Identification of visual manipulations—distinguishing a real photo from a photo generated by artificial intelligence;

o Recognizing the credibility of information—distinguishing a true from a false news item;

o Critical analysis of news headlines—distinguishing sensationalist from objective headlines.

Each segment was designed to enable measurement of respondents' practical skills, not only their theoretical knowledge of media literacy. This approach made it possible to identify specific weaknesses and strengths in the media education process, as well as to determine the degree of preparedness for applicable reforms.

4. Data Collection and Processing Procedure: The survey was conducted online, with voluntary and anonymous participation. Data were processed using descriptive statistics and thematic analysis. In this part of the text, we will devote attention only to mapping the key results, while the detailed results and the visual materials used are presented in Appendix 1.

o Recognizing the Reality of Photographs: The first set of questions concerned the ability of respondents to distinguish real photos from those created with artificial intelligence. The anticipated diversity in accuracy across different target groups proved correct, but, unfortunately, without a consistent positive trend. Strikingly, high-school students achieved the highest accuracy rate of 50%, even though for them media literacy is neither present as a subject nor as an integrated topic in the curriculum. Only 13.64% of respondents in this group had a formal teaching activity during their schooling, and the frequency of such activity was no more than once a year. This indicates that the acquired ability is due more to individual interest and frequent exposure to social network content than to systematic instructional support. This generation of students is characterized by skills in easily detecting the classic mistakes that artificial intelligence still makes: inconsistent shadows, distorted facial proportions, etc. However, their analytical eye often tends toward excessive skepticism, leading to the misidentification of real photographs as manipulated.

Students in VI and VII grades, who study media literacy as part of a systematized teaching program, achieved an accuracy rate of 45.56%, slightly lower than high-school students but higher than students in VIII and IX grades (37.72%). The trend shows that lower grades have higher precision, but—like other groups—are skeptical of the authenticity of real photographs.

Unfortunately, there is yet another problem. Only 53.33% of respondents stated that they had experience with similar activities at school, which means that even when curricula include content in which current and socially necessary activities for students and the development of their critical thinking can be carried out, this is not the case, and the development of such skills remains spontaneous.

Particularly significant is that the results confirm the conclusion that teaching staff must undergo systematic training and continuous upgrading. Professors showed the lowest accuracy rate (24.36%), regardless of teaching profile. Difficulties most often arise in perceiving subtle visual anomalies, such as improperly placed shadows, changes in texture, or an unreal atmosphere. Although class and subject teachers in individual items record minimally higher results, their overall accuracy remains low (31.05%); this marginal difference may be partly due to trainings implemented by the BDE, but it is obviously not sufficient.

In the pedagogical-methodical literature, although there is no unified threshold, it is accepted that a teacher must possess a high level of mastery of the teaching content—not only to transmit information, but also to adapt it to students' cognitive needs. Concepts like Pedagogical Content Knowledge (PCK) and Content Knowledge for Teaching (CKT) indicate that a teacher should master the content at a level that allows transforming it into effective instruction, which implies depth, flexibility, and contextual understanding. The fact that students achieve higher accuracy in recognizing such photos suggests an inversion of the expected relationship and points to the need for strengthened and structured professional development programs.

All this leaves no room for doubt: formal instruction is beginning to show results, but they are insufficient. Serious investment is needed in the higher educational levels, and—more importantly—priority and substantive professional development of the teaching staff. Without that foundation, any attempt at reform is merely an architecture of illusion.

o True or False News: The situation is somewhat better when it comes to the degree of recognizing the truthfulness of news by headline. High-school students have 70.00% correct answers; they are followed by subject teachers with 61.96%, classroom teachers with 59.29%, and professors with 58.46% accuracy. The weakest performance is among students in VI and VII grades, with 49.33%. The problems all groups share boil down to not knowing the rules that a news item must not omit important information.

For example, all groups of respondents predominantly selected as true the news item: "Research shows that students who use TikTok more than 2 hours a day are more likely to believe in fake news." Although the headline sounds logical and statistically grounded, the problematic point is that respondents rated it as true without critically evaluating the source. The formulation "research shows" implies the existence of a scientific or institutional basis, but in the absence of specific data—such as institution, methodology, or time of implementation—the news does not meet the criteria for credibility. This indicates an underdeveloped ability to recognize manipulation through false authoritativeness, which is particularly important in the context of media literacy. An additional worrying fact is that teaching staff are those who lead in failing to recognize this danger in the headline. This not only confirms the need for systematic training, but

also indicates that intuitive judgment is often preferred over analytical judgment—even among those who have the professional responsibility to develop these skills in students.

o Sensationalism vs. Informativeness: The third block of questions was based on measuring respondents' ability to recognize sensationalism in certain headlines. Headlines were deliberately generated to be clear in their sensationalism, using words that give an emotional color to the text, with those words written in capital letters, often with exclamation points. The alarming situation is that the headline: "UNBELIEVABLE! Students caught using ChatGPT on a test!" was assessed as informative by 46.67% of students in VI and VII grades, who studied these rules within regular classes according to the Grade VI Macedonian Language curriculum. This result indicates an underdeveloped ability to recognize linguistic markers of sensationalism, which is especially concerning given that this group formally studies media literacy.

Instead of recognizing emotional manipulation, some students interpreted the content as objective information, which shows that the curriculum is not effective enough in developing critical reading of media texts.

However, there is room to consider that this phenomenon may also be due to the "naivety" characteristic of this age group, and not only to ignorance, since with respect to other headlines that are clearer in their message, they show a higher degree of recognizing sensationalism, with 83.33% accuracy, which—together with the success of classroom teachers—makes them the best in this set of questions.

It can be concluded that this is the strongest field of knowledge among respondents from the six groups, and precisely for that reason it should be used as a basis for further improvement of teaching practices.

Although the results show potential, they simultaneously indicate the need for systemic support, methodological precision, and continuous training of teaching staff.

5. Roadmap for Development

The survey results showed that although media literacy is recognized as an essential competence according to institutional commitments, its implementation in the educational system is still fragmented and insufficient.

The efforts so far toward formalization are targeted and quite extensive when it comes to drafting documents, laws and by-laws, and manuals, but efforts seem to falter when it comes to teacher training. The survey results identified limited capacities among teaching staff for transferring media skills, due to a lack of formal education during studies, short trainings, insufficient methodological support, and the absence of systemic evaluation.

The integrated model of media literacy across multiple subjects, according to experience to date, does not provide stable results. Students show potential for critical thinking, but results vary depending on age, not exposure to formal instruction. These insights indicate the need for a systemic approach that will overcome existing weaknesses and enable long-term and effective integration of media literacy into education.

Hence, several recommendations arise, based on extensive analysis but also the researcher's personal insight gained from everyday teaching practice:

5.1 Urgent impetus to develop programs for a free elective subject "Media Literacy." Instead of preparing a single program for one elective subject, it is necessary to develop separate elective subjects for each grade, with thematically diverse content aligned with the National Standards, but also with topics already included in compulsory subjects. This approach will enable continuity, gradual upgrading, and adaptation of content according to students' age and cognitive development.

5.2 Provide continuous institutional support through BDE, the Ministry of Education and Science (MES), and higher education institutions, thereby guaranteeing long-term and practically oriented trainings, with mentoring support and evaluation of acquired knowledge. One-off trainings on this topic do not guarantee success. While the basics of media and the messages they carry remain the same, the ways of transmission and forms of media content change daily. Therefore, teaching staff must receive regularly updated trainings and tools that follow technological changes and new disinformation tactics, so that instruction remains relevant and effective.

5.3 Make existing manuals and tools for integrating media literacy available in every school and to every teacher, but also listen to the voice of educators and continue creating manuals according to their needs. Such materials should be practically applicable, easily adaptable to different student capacities and education levels, and regularly updated to track new media trends and challenges.

5.4 Encourage teacher involvement in creating teaching materials. This approach, especially if implemented with institutional support, will ensure increased motivation and ownership of the process, as well as experiential learning, which is currently lacking. At the same time, it will overcome the problem of limited exercises in textbooks. According to the guidelines and concept of education, teachers today have the opportunity to create their own content and, even without consulting the MES or BDE, can completely replace the exercises proposed in the textbooks, as long as they adhere to achieving the prescribed assessment standards. However, such undertakings require resources that schools and teachers cannot provide, which limits teacher effectiveness and creativity. Attempts to offer such exercises through digital versions of textbooks are currently limited and not very functional precisely because the circle of professionals working on them has not been expanded nationwide.

5.5 Encourage wider formation of media clubs in schools, which will increase the practical application of media literacy. Such an endeavor existed as part of the efforts that the Macedonian Institute for Media carries out on the ground. The activity was part of USAID's media literacy project called "Young People Reflect," and in the last two school years (2023/2024 and 2024/2025) numerous media clubs were formed in primary and secondary schools. If the trend and support for establishing such clubs continue, students and teachers will continuously receive the necessary support for successful implementation of media literacy and quality acquisition of key knowledge.

5.6 Conduct regular evaluations of students' achievements through testing of critical thinking and media analysis, with standardized instruments and clearly defined criteria. These tests should be carried out periodically, but not on target groups; rather, they should constitute comprehensive testing. It should not affect students' grades and success, but should help provide feedback to teachers and institutions on the effectiveness of teaching approaches, as well as on needs for additional training or adjustment of teaching content.

5.7 Media literacy should become an autonomous, mandatory subject in primary and secondary education, with one or two classes per week, thereby ensuring the perception of its importance among students and teachers. Today, such a subject as autonomous and mandatory does not exist in any country in the world, but its necessity is not the same in every society.

Considering the slow development of the country in this area, there is a real need for such a subject to become mandatory in our educational system. Instead of following the Slovenian model, which implements topics in a fragmented way across multiple subjects, we can be pioneers in making it independent as a separate teaching unit.

In more recent history, other subjects have followed a similar developmental path. Information Technology, which was initially represented only through elective content, over time became a compulsory subject as a response to the increasing digitalization of society. Civic Education was introduced to strengthen democratic culture, awareness of human rights, and active civic participation. These examples show that social and technological changes often dictate the emergence of new, autonomous subjects—a trend that media literacy should follow as well.

This recommendation is placed last, even though the title of this study arises from it, because its implementation requires time and a systemic solution—preparing teaching staff with appropriate education and drafting a clear normative framework for it, as well as analytical preparation of such a subject that will gradationally correspond to the needs of modern society, but above all to students' cognitive abilities.

It seems that this is one of the ways for integration to abandon the chaotic model and begin generating the essential benefits envisaged by the Framework for Media Literacy

in Primary Education (2023). Thus, the educational system will move from the initial chaos toward a stable cosmos—order, harmony, and functionality in the development of media literacy.

6. Future Directions for Continuing the Research

The research opened a new doubt—are teaching staff capable of preparing young people for the world that awaits them? The answer to this question contains research that is not based solely on media literacy, but on a broader spectrum of skills that a student should acquire in order to become an independent, critically oriented, and socially responsible individual.

This opens the need for an in-depth re-examination of the role and structure of the Macedonian educational system—not only as a place where information is transmitted, but as a process of forming awareness, values, and the ability to orient oneself in a reality that is transforming with unprecedented speed and complexity.

As for media literacy as a compulsory and autonomous subject, future research should be directed toward:

1. Long-term monitoring of the effects of the proposed measures for integrating media literacy, through repeated administration of the survey and trend analysis over a period of at least 3 years.

2. Expanding the sample with a larger number of schools and including additional categories of respondents, such as parents and policy makers, to obtain a broader perspective.

3. Comparative analysis with countries that have different integration models, in order to identify applicable best practices.

4. Pilot programs in selected schools for testing new teaching content and methods, with a focus on adaptation according to age and cognitive development of students.

5. Qualitative research through interviews and focus groups with teachers and students, for a deeper understanding of practical challenges and opportunities in teaching application.

Such directions would enable not only confirmation and upgrading of current insights, but also building a more stable foundation for long-term educational policies in the field of media literacy.

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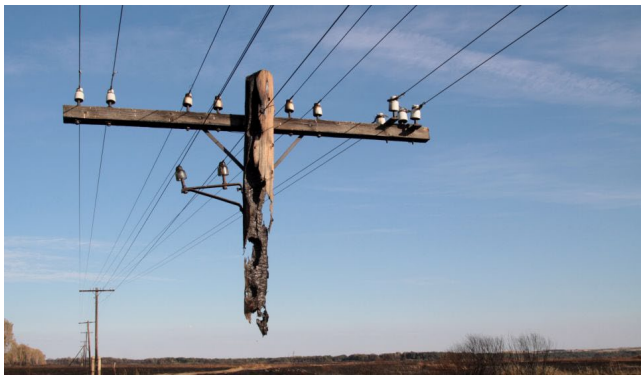
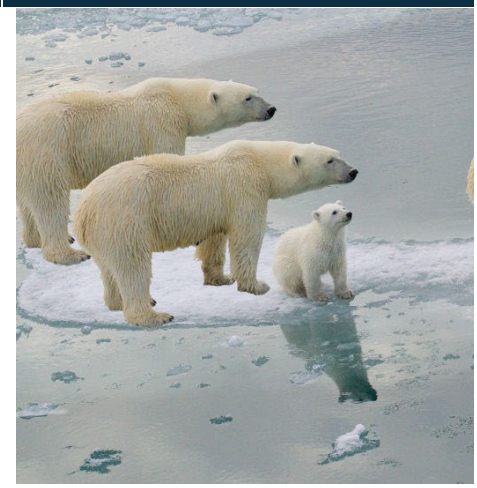
Прилози

PHOTO 1:	PHOTO 2:
	

Target group	Real photo (correct response)	AI photo	Cannot tell	Real photo (correct response)	AI photo	Cannot tell
Student from VI or VII class	20.00%	73.33%	6.67%	20.00%	73.33%	6.67%
Student from VIII or IX class	21.05%	73.68%	5.26%	10.53%	84.21%	5.26%
High school student	22.73%	68.18%	9.09%	59.09%	36.36%	4.55%
Class teacher	21.43%	64.29%	14.29%	35.71%	50.00%	14.29%
Course teacher	21.57%	74.51%	3.92%	17.65%	80.39%	1.96%
High school professor	15.38%	69.23%	15.38%	30.77%	65.38%	3.85%
Percentage of accurate responses:	20.36%	70.54%	9.10%	28.96%	64.95%	6.09%

PHOTO 3:	PHOTO 4:
	

The photograph is real, but edited. A photo edited with AI is considered the correct response.

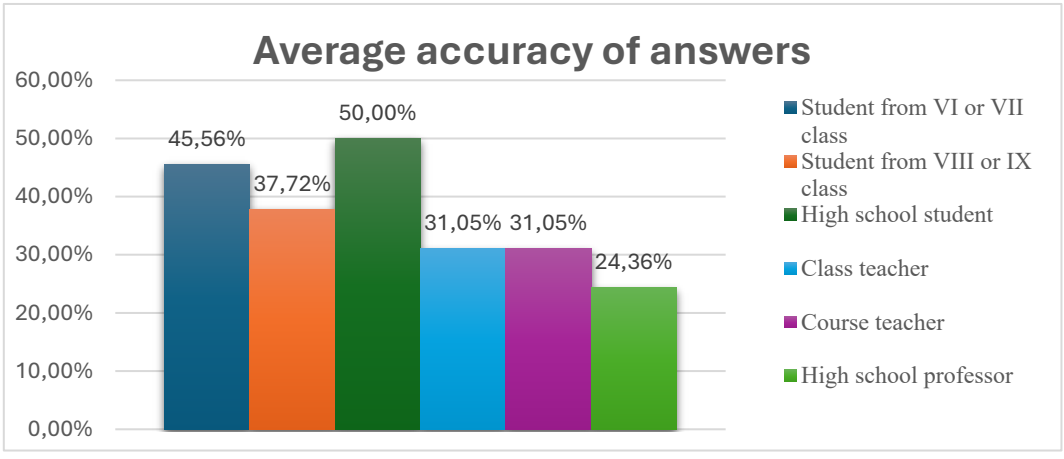
Target group	Real photo (correct response)	AI photo	Cannot tell	Real photo (correct response)	AI photo	Cannot tell
Student from VI or VII class	26.67%	53.33%	20.00%	33.33%	66.67%	0.00%
Student from VIII or IX class	5.26%	89.47%	5.26%	36.84%	57.89%	5.26%
High school student	27.27%	63.64%	9.09%	63.64%	31.82%	4.55%
Class teacher	0.00%	85.71%	14.29%	57.14%	35.71%	7.14%
Course teacher	7.84%	86.27%	5.88%	52.94%	47.06%	0.00%
High school professor	19.23%	69.23%	11.54%	50.00%	34.62%	15.38%
Percentage of accurate responses:	14.38%	74.61%	11.01%	48.98%	45.63%	5.39%

PHOTO 5:				PHOTO 6:		
						
Target group	**Real photo (correct response)**	**AI photo**	**Cannot tell**	**Real photo (correct response)**	**AI photo**	**Cannot tell**
Student from VI or VII class	20.00%	80.00%	0.00%	33.33%	60.00%	6.67%
Student from VIII or IX class	5.26%	89.47%	5.26%	52.63%	42.11%	5.26%
High school student	0.00%	95.45%	4.55%	36.36%	63.64%	0.00%
Class teacher	28.57%	57.14%	14.29%	50.00%	28.57%	21.43%
Course teacher	17.65%	70.59%	11.76%	72.55%	21.57%	5.88%
High school professor	30.77%	46.15%	23.08%	80.77%	0.00%	19.23%
Percentage of accurate responses:	17.04%	73.14%	9.82%	54.27%	35.98%	9.75%

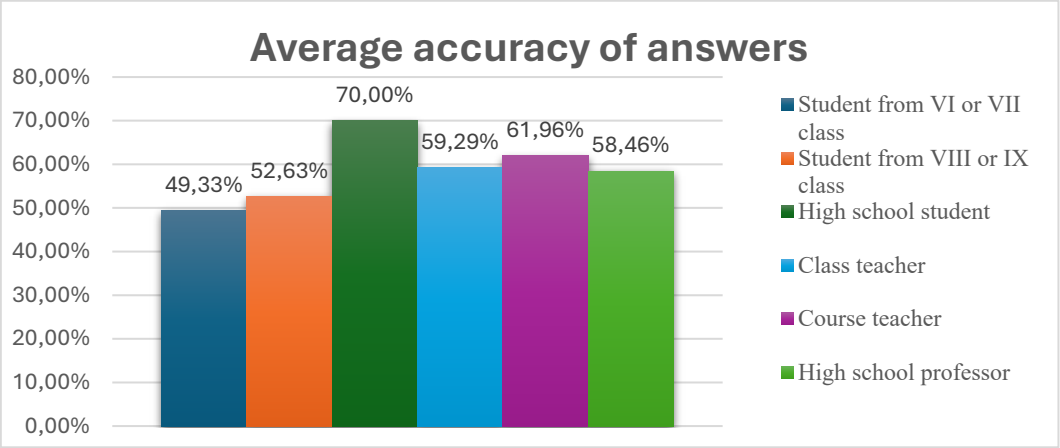
Have you had similar activities to this one within your education?	Yes	No	Don't remember
Student from VI or VII class	53.33%	40.00%	6.67%
Student from VIII or IX class	63.16%	21.05%	15.79%
High school student	13.64%	59.09%	27.27%

Have you ever organized similar activities for your students, related to recognizing false photographs?	Yes	No	Don't remember
Class teacher	57.14%	35.71%	7.14%
Course teacher	45.10%	50.98%	3.92%
High school professor	34.62%	61.54%	3.85%

How often are these activities organized?	Weekly	Monthly	Once a year	A few times a year (less than five)
Student from VI or VII class	25.00%	0.00%	12.50%	62.50%
Student from VIII or IX class	16.67%	33.33%	25.00%	25.00%
High school student	0.00%	33.33%	33.33%	33.33%
Class teacher	12.50%	37.50%	12.50%	37.50%
Course teacher	13.04%	21.74%	13.04%	52.17%
High school professor	0.00%	11.11%	44.44%	44.44%



Set of questions 2



Individual results:

Titles:	NEWS 1: Elementary school in Bitola will introduce extracurricular activities to deal with fake news			NEWS 2: The government announced that a state service will be established to control all information published on social networks		
Target group	**Reliable news**	**Unreliable newsвест**	**I can't tell**	**Reliable news**	**Unreliable news**	**I can't tell**
Student from VI or VII class	66.67 %	20.00%	13.33 %	93.33%	6.67%	0.00 %
Student from VIII or IX class	52.63 %	15.79%	31.58 %	31.58%	52.63%	15.79 %
High school student	72.73 %	27.27%	0.00 %	27.27%	72.73%	0.00 %
Class teacher	71.43 %	14.29%	14.29 %	35.71%	50.00%	14.29 %
Course teacher	52.94 %	41.18%	5.88 %	31.37%	60.78%	7.84 %
High school professor	53.85 %	30.77%	15.38 %	38.46%	57.69%	3.85 %

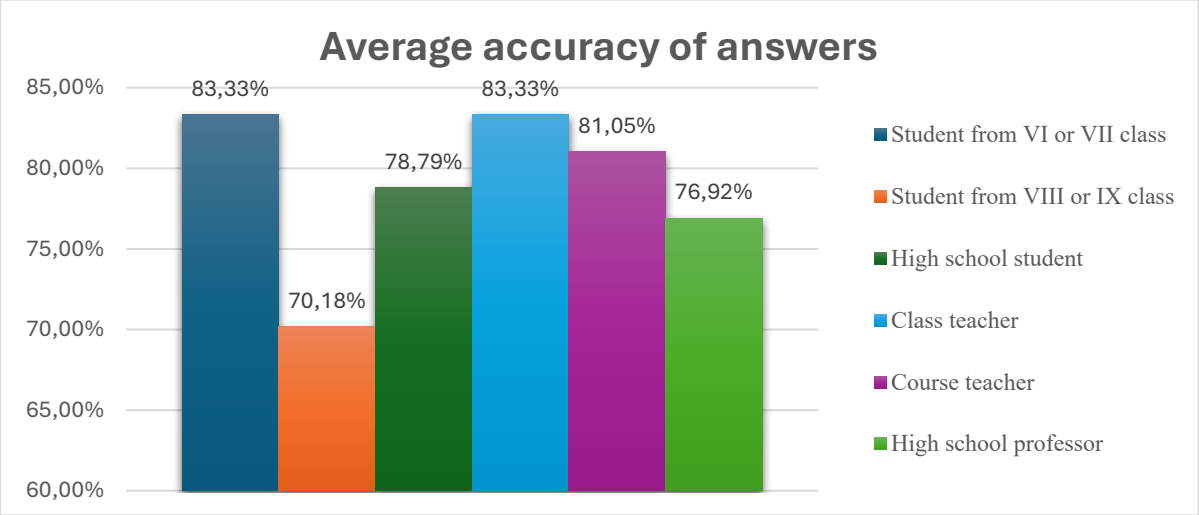
Titles:	NEWS 3: A well-known online store is offering free phones to students who participate in surveys			NEWS 4: Research shows that students who use TikTok for more than 2 hours a day are more likely to believe fake news		
Target group	**Reliable news**	**Unreliable news**	**I can't tell**	**Reliable news**	**Unreliable news**	**I can't tell**
Student from VI or VII class	66.67 %	20.00%	13.33 %	93.33%	6.67%	0.00 %
Student from VIII or IX class	52.63 %	15.79%	31.58 %	31.58%	52.63%	15.79 %
High school student	72.73 %	27.27%	0.00 %	27.27%	72.73%	0.00 %
Class teacher	71.43 %	14.29%	14.29 %	35.71%	50.00%	14.29 %
Course teacher	52.94 %	41.18%	5.88 %	31.37%	60.78%	7.84 %
High school professor	53.85 %	30.77%	15.38 %	38.46%	57.69%	3.85 %

Titles:	NEWS 5: A group has been discovered in Skopje that created fake news using ChatGPT to get clicks		
Target group	**Reliable news**	Target group	**Reliable news**
Student from VI or VII class	66.67%	Student from VI or VII class	66.67%
Student from VIII or IX class	68.42%	Student from VIII or IX class	68.42%
High school student	68.18%	High school student	68.18%
Class teacher	71.43%	Class teacher	71.43%
Course teacher	74.51%	Course teacher	74.51%
High school professor	73.08%	High school professor	73.08%

Question Set 3: Sensationalistic and informative headlines

Titles:	SCANDAL AT SCHOOL: Teacher took all students' phones!			**UNBELIEVABLE! Students caught using ChatGPT on a test!**		
Target group	**Informative headline**	**Sensationalist headline**	**Can't tell**	**Informative headline**	**Sensationalist headline**	**Can't tell**
Student from VI or VII class	33.33%	Student from VI or VII class	33.33%	46.67%	53.33%	0.00%
Student from VIII or IX class	26.32%	Student from VIII or IX class	26.32%	47.37%	47.37%	5.26%
High school student	27.27%	High school student	27.27%	18.18%	81.82%	0.00%
Class teacher	14.29%	Class teacher	14.29%	7.14%	78.57%	14.29%
Course teacher	23.53%	Course teacher	23.53%	21.57%	74.51%	3.92%
High school professor	30.77%	High school professor	30.77%	26.92%	73.08%	0.00%

Headlines:	**Teachers discuss the use of artificial intelligence in teaching**		
Target	**Informative headline**	**Sensationalist headline**	**Can't tell**
Student from VI or VII class	86.67%	13.33%	0.00%
Student from VIII or IX class	89.47%	10.53%	0.00%
High school student	86.36%	13.64%	0.00%
Class teacher	92.86%	0.00%	7.14%
Course teacher	92.16%	5.88%	1.96%
High school professor	88.46%	11.54%	0.00%


Average accuracy of answers
85,00%
80,00%
75,00%
70,00%
65,00%
60,00%
83,33%
70,18%
78,79%
83,33%
81,05%
76,92%
Student from VI or VII class
Student from VIII or IX class
High school student
Class teacher
Course teacher
High school professor

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Aleksandra Spasevska is a professor of Macedonian language and literature and holds a master's degree in Macedonian literature. Her research interests focus on literature, media and digital literacy, as well as critical thinking in education. She actively participates in scientific and educational projects and is involved in youth and civic initiatives, promoting the role of education and activism in contemporary society.

The New Homo Sapiens and Media Literacy in the Digital Age

DEMUSH BAJRAMI

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Abstract

In the context of the increasing digital integration into daily life, this paper examines the emergence of the 'New Homo Sapiens', an individual shaped by continuous media engagement and evolving communication practices.It further explores how this shift influences identity, cognition, and social behavior, alongside examining the role of media literacy in facilitating individuals' adaptation to the challenges of contemporary digital life. Accordingly, the research adopts a conceptual approach grounded in interdisciplinary perspectives, drawing from media ecology and digital literacy studies. A qualitative review of existing findings, supported by evidence from the Western Balkans' educational context (North Macedonia, Kosovo and Albania), leads to the conclusion that the readily accessible information and new forms of expression have introduced both benefits and challenges into the learning domain. Therefore, the region's educational models should integrate media literacy as a central element to cultivate critical thinking skills, ensure ethical media engagement, and foster digital citizenship among the digitally shaped, New Homo Sapien.

Keywords: New Homo Sapiens, Media Interaction, Identity, Social Behavior, Educational Models, Critical Thinking, Digital Citizenship.

1. Introduction

We live in an era when digital technologies and media have become deeply embedded in the way humans think, communicate, learn, and interact. The digital revolution has not only transformed our access to information but also fundamentally altered our cognitive processes, behaviors, and social dynamics.

Within this context, a new type of human being is emerging - often referred to in contemporary discourse as the *"New Homo Sapien."* This term describes individuals whose identities, habits, and ways of understanding the world are shaped by constant exposure to and interaction with digital media, artificial intelligence, and virtual environments. *"The talent of critically navigating the expanding media landscape has become increasingly important as technological developments continue to transform it."* (Konarbay, 2023)

The New Homo Sapien is characterized by digital fluency, rapid information processing, multitasking abilities, *and* also a vulnerability to misinformation, reduced attention spans, and weakened critical thinking skills. In this complex media landscape, Media Literacy has become more crucial than ever. It is no longer just a tool for learning how to use technology but a vital framework for developing critical awareness, ethical engagement, and informed decision-making in digital environments.

This paper seeks to explore the evolution of the human experience in the digital age through the lens of *Media Literacy*. It aims to analyze the characteristics of the *"New Homo Sapien,"* assess the role of media in shaping this evolution, and argue for the urgent need to rethink educational practices. The central research questions guiding this inquiry are: How has the digital age transformed the cognitive and social profile of modern humans? What role should media literacy play in preparing individuals for life in an increasingly digital world?

Theoretical Framework

The *New Homo Sapien*, increasingly tethered to information through the rapid clicks and zaps of modern technology, has entered an era where knowledge is not just sought but instantly accessed. With each tap, swipe, and search, we navigate a world brimming with data, transforming how we interact with reality and each other. The once-distant boundaries between thought and information are now blurred, as we effortlessly scroll through an endless stream of content, communicating and learning at the speed of light.

This digital symbiosis has made us more connected, but also more dependent on the virtual world, reshaping our cognition, relationships, and perceptions of time and space.

We are no longer just Homo sapiens; we are becoming *Homo Digitalis*, where the pursuit of knowledge is defined by an immediate and ever-present connection to the global flow of information. *"Homo Zappiens has learnt to deal with information overload by clicking and zapping. It has learned how to navigate efficiently and effectively through information, how to communicate, and how to build effectively on a network of peers."* (Veen, 2007)

The study of the *New Homo Sapien* in the context of *media literacy* draws on several interdisciplinary theoretical perspectives, primarily from post-humanism, digital literacy theory, and media ecology. These frameworks help explain the profound changes in human behavior, cognition, and social interaction resulting from the digital age. *"At the same time, media literacy is becoming necessary in an increasing number of walks of life as the significance of media in society and its influence grows, communications become more diverse and their amounts increase, mobile and ubiquitous media technologies are present everywhere, and new technologies evolve continuously."* (S. Salomaa & L. Palsa, 2019) Post-humanism challenges traditional understandings of human identity by emphasizing how humans are increasingly entangled with technology. According to post-humanist thought, the boundaries between humans and machines are becoming increasingly blurred, creating a new kind of subjectivity - one that is shaped by digital networks, algorithms, and artificial intelligence. This perspective provides a foundation for understanding the emergence of the *New Homo Sapien*, or what some scholars call *"Homo Digitalis"* - a digitally-augmented human being whose consciousness, communication, and identity are mediated by technology. *"The conception of Homo Digitalis is in the power of the digital machine algorithm, and we are in its confinement."* (Dasion, A. G. R. & Prananta, A. W., 2024)

Digital literacy theory focuses on the skills, competencies, and critical thinking needed to navigate and make sense of the digital world. In the age of information overload, digital literacy extends beyond technical ability; it includes the capacity to analyze, evaluate, and create digital content responsibly. This theory is central to *media literacy*, which equips individuals with the tools needed to engage thoughtfully in digital environments. *Media ecology*, introduced by theorists such as Marshall McLuhan and Neil Postman, examines how media and communication technologies shape human perception, understanding, and culture. From this perspective, media are not just passive tools but active environments that influence how we think, feel, and interact. Media ecology helps frame the digital landscape as an environment that has reconditioned the human mind, shifting patterns of attention, memory, and social behavior. *"And Media Ecology has taken up the task of detailing some of the many ways this has happened and will continue to happen."* (Levinson, 2000) Meanwhile, through *media ecology*, Neil Postman further clarifies the role of media: *"An environment is, after all, a complex message system which imposes on human beings certain ways of thinking, feeling, and behaving. It structures what we can see and say, and, therefore, do. It assigns*

roles to us and insists on our playing them. It specifies what we are permitted to do and what we are not. Sometimes, as in the case of a courtroom, or classroom, or a business office, the specifications are explicit and formal. In the case of media environments (e.g., books, radio, film, television, etc.), the specifications are more often implicit and informal, half concealed by our assumption that what we are dealing with is not an environment but merely a machine. Media ecology tries to make these specifications explicit. It tries to find out what roles media force us to play, how media structure what we are seeing, and why media make us feel and act as we do. Media ecology is the study of media as environments." (Postman, 1970) As Levinson points out, *"Beyond the compelling, general principle that communication counts, McLuhan also taught us that the specific medium of communication makes a big difference. A Media Ecology classmate once put it this way: We study how whether one writes with a squiggle this way or that way can change the course of civilization."* (Levinson, 2000). Taken together, these theories illustrate how digital transformation is not just a technological shift, but a cognitive and cultural one. The New Homo Sapien is both a product and participant in this transformation, making media literacy not only relevant but essential in fostering self-awareness, ethical reflection, and resilience in the digital era.

The Digital Age and Its Impact on Human Identity

The digital age has introduced transformative changes that extend far beyond technological tools — it has fundamentally reshaped what it means to be human. As we integrate technology into nearly every aspect of daily life, the concept of identity is increasingly mediated by digital experiences. The rise of the New Homo Sapiens reflects this shift — a being whose identity is no longer formed solely through direct human interaction and traditional learning, but also through digital content, virtual environments, and algorithm-driven platforms. Today, this is evident. "It seems excessive to explain that homo sapiens will soon switch to homo digitalis." (Dasion, A. G. R., & Prananta, A. W. , 2024)

Technological advancements have drastically changed how we process information, acquire knowledge, and connect with others. Instant access to information through search engines, online courses, and multimedia platforms has redefined learning, making it more flexible and accessible — but also more fragmented. Cognitive processes are adapting to rapid information consumption, often favoring speed over depth. Learning is no longer linear or confined to the classroom; it is interactive, continuous, and often influenced by peer-to-peer sharing in digital spaces.

Social interactions have also evolved. The rise of digital communication tools — from messaging apps to video calls — has created new forms of interaction, reducing the need for physical presence while increasing the frequency and immediacy of communication.

"The introduction of smartphones further accelerated this digital revolution, giving people constant access to media, information, and entertainment." (Han, 2024) However, these interactions often lack the emotional depth and nuance of face-to-face exchanges, which may affect empathy, relationship-building, and emotional intelligence.

Social Media, AI, and Constant Connectivity

Social media platforms play a central role in shaping identity and perception. "The interactive nature of social media has also empowered users to participate in content creation and distribution. User-generated content, such as videos, memes, and blogs, has democratized media production, allowing anyone with an internet connection to share their voice. This shift has not only changed how people consume content but also how content is created and distributed." (Widen, 2024) They allow users to curate and project idealized versions of themselves, leading to new forms of self-expression but also to self-comparison, anxiety, and pressure to conform to digital norms. The constant feedback loop of likes, shares, and comments creates a performance-based model of self-worth that can deeply influence young people's development.Artificial Intelligence (AI) further complicates identity formation by introducing new dimensions of interaction that were previously unimaginable. Personalized algorithm s shape what content we see, subtly guiding our opinions, preferences, and even behaviors. "With the growing presence of algorithms and their far-reaching effects, artificial intelligence (AI) will be mainstream trends any time soon." (Shin, 2020) In this sense, identity is increasingly co-created between the individual and the machine — blurring the line between autonomy and influence. Constant connectivity, while convenient, also brings challenges. The expectation of being "always available" leads to digital fatigue, reduced privacy, and a sense of restlessness. It becomes harder to disconnect, reflect, and engage in sustained focus — all of which are essential for deep learning and self-awareness. As AI systems become more integrated into daily life, they mediate and influence the ways in which individuals express themselves, communicate, and even perceive their own identities. Social media algorithms, for instance, curate the content we see based on our behaviors and preferences, creating a digital persona that may be far removed from our authentic self. This process encourages individuals to mold their identities according to an idealized version of themselves that aligns with algorithmic preferences or social trends, thereby blurring the lines between reality and a curated self-image.

Moreover, AI's increasing role in data collection and surveillance deepens the complexities of self-perception. With personalized AI tools that analyze our habits, preferences, and interactions, individuals may begin to feel as though their sense of identity is not entirely their own, but is shaped or even dictated by external forces. This can lead to a sense of disconnection between one's true self and the identities projected

or assumed by AI-driven platforms. The over-reliance on AI for validation and self-expression risks diminishing personal autonomy, creating a paradox where identity formation is both more accessible and more controlled than ever before.

Shifts in Attention Span, Critical Thinking, and Communication Patterns

Numerous studies suggest that the digital environment is contributing to a decline in attention span. *"One critical area of concern is the effect of social media on attention span, especially among the younger generation."* (Hilman, 2024) The constant influx of notifications, short-form content, and multitasking demands encourages surface-level engagement over deep concentration. This shift impacts not only how we consume information, but also how we form opinions and solve problems. Critical thinking - once a cornerstone of education - is being challenged by the ease of access to pre-packaged opinions and filtered information. The abundance of unverified content online requires individuals to develop *media literacy* skills to evaluate sources, detect bias, and make informed decisions. *"Key challenges include discerning between accuracy and misinformation, the uneven distribution of digital literacy, disparities in access to technology, and motivational barriers in seeking reliable information."* (Yu, J., Bekerian, D. A., & Osback, C., 2024) Communication patterns have also shifted. Abbreviated texts are shaping a new, visual-digital language. While these forms of expression are creative and culturally rich, they can sometimes replace deeper, more nuanced verbal or written communication, leading to misunderstandings and reduced language proficiency over time.

Media Literacy- Role and Relevance

In the digital age, where information is abundant, fast-moving, and often unfiltered, *media literacy* has become an essential component of preparing individuals — particularly the *New Homo Sapien* — for life in a hyperconnected world. As technology increasingly mediates how people learn, communicate, and perceive reality, the ability to critically engage with media content is not just beneficial but vital for responsible and informed participation in society.
Media literacy refers to the process of teaching and learning about the various forms of media, their content, purposes, and effects. It encompasses the skills needed to access, analyze, evaluate, and create media messages across different platforms, including television, social media, digital news, and online videos. More than just a technical skill set, *media literacy* fosters critical thinking, ethical awareness, and an understanding of how media influences attitudes, behavior, and societal structures. In the context of the

New Homo Sapien — a human being shaped by constant exposure to digital environments-*media literacy* serves as a foundation for navigating complex information ecosystems. It empowers individuals to distinguish between credible sources and misinformation, recognize bias and manipulation, and engage thoughtfully with digital content.

Media Literacy as a Critical Skill for the New Homo Sapien

The media plays a major role in informing the public by serving as the primary channel through which people access news, trends, and information about the world around them. Through various platforms — such as television, newspapers, digital outlets, and social media — the media shapes public understanding of current events, social issues, and political developments.
"In their framing of stories, the media influence public perceptions of an issue, trend, or new product and subsequently influence attitudes." (Byrne, 2025) By curating and disseminating information, the media helps individuals form opinions, make informed decisions, and engage with important conversations. In doing so, it serves as both an educator and a watchdog, holding power to account and ensuring transparency in governmental and corporate actions.
"The media play a central role in informing the public about what happens in the world, particularly in those areas in which audiences do not possess direct knowledge or experience." (Happer, C. & Philo, G., 2013) However, the media's influence also comes with responsibility, as the way information is presented can significantly impact public perception and shape societal narratives.

The *New Homo Sapien* is constantly consuming and producing content, often unconsciously. In this environment, *media literacy* becomes a survival skill — enabling people to think critically about the media they encounter daily and to reflect on their own media habits. *Media literacy* helps individuals understand how media constructs reality, promotes certain ideologies, and influences public discourse. *"A growing field of research, inclined to raise awareness of present and future challenges for our education system, is 'media/digital literacy'."* (Erstad, 2015) For younger generations who are growing up in this digital landscape, *media literacy* is especially crucial. It teaches them not only how to use media tools but also how to question and challenge the messages embedded within them. As digital citizens, they must learn to protect their privacy, practice respectful communication, and recognize their role as both consumers and creators of content.

Despite its growing relevance, integrating *media literacy* into formal education systems remains a significant challenge. Many curricula around the world still treat *media literacy* as an optional or secondary subject, rather than embedding it as a core

component of education. This is partly due to a lack of trained educators, insufficient resources, and limited policy support. In some cases, *media literacy* is reduced to teaching basic digital skills, such as using a computer or navigating the internet, rather than fostering critical and reflective engagement with media. Moreover, rapid technological changes often outpace the ability of educational institutions to update their content, methods, and tools accordingly.
There is also resistance in some educational cultures, where traditional teaching models are prioritized over innovative, interdisciplinary approaches. As a result, many students enter adulthood without the competencies needed to critically assess the information they encounter online, making them more vulnerable to manipulation, disinformation, and digital fatigue.

Media Literacy in the Western Balkans: Real-World Examples and Comparative Perspectives

The emergence of the New Homo Sapien in the Western Balkans, as elsewhere, is closely tied to the region's rapid digital transformation. Young people in countries like North Macedonia, Kosovo, and Albania are increasingly connected to global media networks, accessing content through smartphones, social media, and online platforms. However, this growing connectivity also highlights the urgent need for structured media literacy to help them navigate the complexities of the digital world responsibly and critically.

In recent years, several initiatives across the Western Balkans have aimed to strengthen media literacy and digital skills among students and the general population:

North Macedonia has integrated media literacy into some parts of its national curriculum, particularly in civic education and language classes. In partnership with organizations like the Metamorphosis Foundation and international actors such as the EU, UNESCO, and USAID, schools have started piloting workshops focused on identifying fake news, understanding media bias, and promoting ethical online behavior.

The Macedonian Media Institute (MIM) and IREXas part of the USAID Media Literacy Project "YouThink," have also shown a serious approach to including media literacy in the curriculum of primary and secondary education in North Macedonia. "MIM and IREX have been cooperating with educational institutions in the past three years to include media literacy in formal education. As a result, media literacy became part of the curricula of grades I-IX in 2021, and over 8,000 teachers from all schools in the country were trained on how to organize lessons in this part of the curriculum." (Macedonian Institute for Media, 2025)

In Kosovo, the Ministry of Education, supported by NGOs such as Balkan Investigative Reporting Network (BIRN) and Kosovo Education Center (KEC), has launched

awareness campaigns and school-based training programs to build media literacy. “140 students, members of Media Clubs along with mentor teachers from 7 high schools are participating in the training sessions on the theme “Media Literacy.” (SMART Balkans, 2025)

The use of digital platforms like KosovaEducation.org during the pandemic also demonstrated how schools can pivot toward online learning models, although access and digital equity remain challenges.

Albania has seen similar developments, particularly through partnerships with the Albanian Media Institute and international donors in various projects for secondary school students and teachers, providing training in critical thinking, safe internet use, and content creation.

The media and information education curriculum has already been piloted in 20 pre-university schools in several cities, such as Lezhë, Elbasan, Durrës, and Tirana. This process had already started in 2020 in Albania. With the support of the European Union and UNESCO, the Albanian Media Institute and the Agency for Quality Assurance in Pre-university Education (ASCAP) have adapted the media and information education curriculum, developing several modules for teacher training. In this case, 10 trainers and 240 teachers were trained in all schools involved in the pilot.

"During this process, teachers had the opportunity to integrate the curriculum into teaching to access information, develop critical thinking skills, and create media content. In total, 8456 students at the lower level and 1372 students at the higher level had the opportunity to hear about Media Literacy in schools, and some of them were directly involved in the pilot classes." (Albanian Media Institute, 2025)

Comparative Perspectives: Traditional vs. Modern Approaches

Traditionally, education systems in the Western Balkans (North Macedonia, Albania, and Kosovo) have been teacher-centered, focused on memorization, and passive knowledge acquisition. Media and digital content were often seen as distractions rather than learning tools. In many rural or under-resourced areas, access to technology was limited, and schools lacked the infrastructure to incorporate digital methods.

In contrast, modern approaches to education — inspired by EU frameworks and global trends — emphasize student-centered learning, digital literacy, and critical engagement. Newer models promote project-based learning, where students use media to research, collaborate, and present their ideas. Online platforms, e-learning modules, and hybrid classrooms are gradually becoming more common, especially in urban areas and private institutions.

However, the transition is uneven. While urban schools and well-funded programs adopt digital tools more rapidly, many public schools still face barriers such as outdated curricula, lack of digital infrastructure, and insufficient teacher training.

Despite these challenges, the Western Balkans show growing awareness of the importance of media literacy in shaping a digitally literate, critically thinking generation of New Homo Sapiens. To accelerate progress, ongoing investment in teacher training, curriculum reform, and equitable access to technology will be essential. Media literacy is not just a technical skill — it's a democratic necessity in the age of information.

The emergence of the New Homo Sapiens — a digitally immersed and technologically influenced version of modern humanity — presents both promising opportunities and pressing challenges for contemporary education systems. The findings and arguments explored throughout this paper reveal a growing disconnect between the pace of technological advancement and the capacity of educational systems to adequately prepare individuals for this new digital reality.

Interpretation of Findings and Arguments

The evolution of human identity in the digital age is not merely a change in how people use technology, but a deeper transformation of how they think, communicate, and engage with the world. Theories such as media ecology and post-humanism demonstrate that constant interaction with digital environments reshapes cognition, attention, and even the perception of self. The role of media literacy, therefore, becomes central in equipping individuals, especially youth, with the tools to critically navigate this new terrain.

Evidence from programs in the Western Balkans, such as those in North Macedonia, Kosovo, and Albania, shows that while there are significant efforts to integrate Media Literacy, the implementation remains fragmented. These cases illustrate that media literacy, when effectively delivered, fosters digital literacy, critical thinking, and ethical responsibility — skills that are essential for the New Homo Sapien.

But what are the Tensions Between Technological Advancement and Educational Readiness? One of the key tensions identified is the gap between technological innovation and educational adaptation. While technology evolves rapidly, bringing with it artificial intelligence, immersive digital content, and constant connectivity, many education systems remain anchored in traditional, rigid models of instruction. Curricula are often slow to change, teachers may lack the necessary training, and infrastructure may be inadequate, especially in under-resourced regions.

This mismatch creates a scenario where students are growing up in a world their schools are not fully prepared to address. The result is a generation that may be highly skilled in

using digital tools but lacks the critical capacity to analyze media content, understand its influence, or use it responsibly.

Ethical and Social Implications

The rise of the New Homo Sapien brings forth numerous ethical and social concerns. These include issues related to digital privacy, algorithmic manipulation, online identity construction, and mental health. Constant exposure to curated realities and filtered information on social media platforms can lead to unrealistic expectations, decreased self-esteem, and polarization of beliefs.

Moreover, unequal access to digital tools and media literacy exacerbates social inequalities. Those with access to high-quality digital education are better equipped to succeed in the modern world, while those without are at risk of being digitally excluded, deepening the educational and economic divide.

There are also ethical questions surrounding the role of AI and big data in education. Personalized learning algorithms can be helpful, but they also raise concerns about surveillance, data security, and the commercialization of learning processes.

In summary, while the digital age offers vast potential to enhance learning and expand human capabilities, it also demands a rethinking of what education must provide. Media literacy is no longer optional — it is essential for preparing the New Homo Sapien to be not just a competent digital user, but a conscious, ethical, and critical participant in the digital world.

Conclusion

The digital age has brought about a fundamental transformation in the way humans think, communicate, and interact, giving rise to the concept of the New Homo Sapien — a being shaped by constant exposure to technology, media, and information flows. This paper has explored the evolving nature of human identity in a media-saturated world and emphasized the critical role that media literacy must play in shaping responsible, informed, and resilient digital citizens.

Key points include the recognition that technological advancements are outpacing the readiness of traditional education systems, creating a gap that must be urgently addressed. While digital tools offer new ways of learning and expression, they also bring challenges such as misinformation, shortened attention spans, and ethical dilemmas surrounding privacy and identity. Media literacy emerges as a vital skill for navigating these challenges, especially in regions like the Western Balkans, where digital education initiatives are still developing but show promising progress.

Looking ahead, the future of education must be reimagined to keep pace with rapid technological change. Media literacy should not be treated as an optional subject, but as a core part of modern curricula. Schools must equip students not only with technical skills but with the critical capacity to question, analyse, and ethically engage with media content. Education must also support emotional and cognitive development, helping individuals maintain a strong sense of identity in a world of digital overload.

Recommendations include greater investment in teacher training, updated curricula that integrate Media Literacy across subjects, and stronger collaboration between governments, educators, and tech platforms. Policymakers should ensure that access to digital education is equitable and inclusive, while researchers should continue to explore the psychological, social, and cultural impacts of media on human development.

In conclusion, preparing the New Homo Sapien for the digital age is not just an educational challenge — it is a societal imperative. Media Literacy stands at the heart of this transformation, offering the tools needed to build a more thoughtful, ethical, and connected future.

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Media literacy in ballet art

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Abstract

The necessity to balance each individual's daily life between the need for Media Literacy and its crucial element, critical thinking, the correct selection, and direction for navigating one'sown quality day of life consumption, we say it should also be located in the arts. This research will explore the unique role of ballet art in the development of media literacy and critical thinking among attendees. Its central hypothesis is that ballet, as a multimedia form of expression that includes movement, music, and visual art, can significantly contribute to the improvement of these skills in the audience. The methodology of the research involves a mixed approach using both qualitative and quantitative data collection techniques. Surveys and interviews with ballet performance attendees will provide insight into their experience and perception of ballet as a medium. Concurrently, content analysis will be applied to identify the specific aspects of ballet performances that most contribute to the development of media literacy. The results of this research are expected to show that ballet can serve as a powerful tool for education and the development of critical thinking, offering new perspectives on the role of art in contemporary society. The information and data obtained from this research will serve as a basis for the development of educational programs that integrate ballet into media literacy curricula, and vice versa, incorporating media literacy with ballet in elementary and secondary education programs.

Keywords: media literacy, critical thinking, ballet art, educational innovation.

Introduction

Culture encompasses values, beliefs, customs, art, knowledge, language, and institutions that shape the way of life of communities. It evolves through historical development, intercultural exchange, technological progress, and globalization, influencing both personal and collective identities.

Art, as a creative expression of human imagination and ideas, is a vital part of culture. It communicates symbolic meanings, provokes emotional responses, and serves not only as entertainment but also as an educational tool and a medium for preserving cultural heritage. By connecting individuals through shared aesthetic experiences, art opens new perspectives and fosters understanding.

In contemporary society, media literacy and critical thinking have become essential competencies. The constant exposure to vast amounts of media content demands the ability to critically analyze, evaluate, and select information. While research has explored how various media forms influence critical thinking, the potential of ballet as a medium in this context remains underexplored.

This study investigates the role of ballet as an interdisciplinary art form—combining movement, music, and visual aesthetics—in developing media literacy and critical thinking among audiences. The research aims to:

1. Identify elements of ballet performances that stimulate analytical and interpretive engagement.

2. Explore how audience experiences with ballet can inform educational practices.

3. Propose ways to integrate ballet into media literacy curricula in primary and secondary education.

The study seeks to address the following research questions:

- Which aspects of ballet performances contribute most to the development of media literacy and critical thinking?

- How can the audience's interpretive experiences with ballet be translated into educational strategies?

By examining these questions, the research contributes to a broader understanding of how the arts can be leveraged as innovative tools for fostering essential cognitive and cultural skills.

Theoretical framework

Медиумската Media literacy and critical thinking are core competencies in contemporary education and cultural development. Both involve the capacity to analyse,

evaluate, and actively engage with media, which is particularly significant in the digital era. They enable individuals to participate in society in an informed and reflective way, making them crucial for developing responsible and engaged citizens.

Media literacy

Media literacy can be defined as the ability to critically engage with media and media technologies, encompassing access to media content, the capacity to understand it, and the skill to create personal messages (Smailova et al., 2023, p. 251). It is now recognised as a key component of general literacy, comparable in importance to reading and numeracy skills, as it supports individuals in navigating complex media environments.

Beyond basic technical competence, media literacy involves a combination of cognitive, emotional, and social skills: analytical and critical thinking, creative production of media messages, reflection, ethical reasoning, and active civic participation (Smailova et al., 2023, p. 5; Johnson, 2019). This broader perspective aligns with the view that effective media literacy education must integrate critical thinking, ethical behaviour, and responsible citizenship (Taylor, 2021).

An important dimension of media literacy is the capacity to deconstruct and critically analyse media texts to understand their influence on social coexistence (Green & Brown, 2020). For young people, especially school-aged children, its development should be prioritised alongside traditional literacy skills (Smailova et al., 2023, p. 8). Research also emphasises the role of parents and the home environment: when combined with school-based initiatives, parental mediation significantly enhances children's media literacy (Adams, 2022). Furthermore, well-designed media literacy programmes have been shown to reduce behavioural problems among children and adolescents and to have a lasting positive impact (Smailova et al., 2023, p. 3).

Critical thinking

Critical thinking is integral to media literacy, as it enables the evaluation of the quality and accuracy of content—whether in news, advertising, or social media—and supports informed decision-making (Johnson, 2019). It also plays a role in promoting diversity of opinion and active participation in digital contexts (Green & Brown, 2020).

In combating misinformation, critical thinking is central to identifying unreliable sources, challenging false claims, and understanding the mechanisms of regulation and participation (Smailova et al., 2023, p. 15). In the post-truth era, scholars argue that the ability to critically evaluate information must be at the forefront of pedagogy (Green & Brown, 2020).

In educational settings, teaching students to question and assess media content strengthens their ability to distinguish fact from falsehood (Adams, 2022). This not only prepares them for active citizenship but also develops skills for meaningful civic engagement in modern society.

Summary of theoretical framework

In summary, the reviewed theoretical perspectives underscore the interdependence between media literacy, critical thinking, and the interpretive engagement fostered by artistic forms such as ballet. While existing literature recognises the value of art in cultivating analytical and reflective capacities, there remains a notable gap in understanding how ballet, as a multimedia art form, can serve as a vehicle for these competencies. This study builds on the outlined frameworks by applying them to a cultural context that has been largely unexplored, aiming to provide empirical evidence on ballet's potential to enhance both cognitive and cultural dimensions of media literacy.

Previous research

The existing literature examines media literacy, critical thinking, and art as separate concepts, yet little attention has been given to their intersection—particularly the potential of ballet as an art form to foster what some scholars call media wisdom. This concept refers to the capacity to select relevant information, resist emotional manipulation, and adopt a conscious and rational approach to information consumption (Smailova et al., 2023). The absence of studies directly linking ballet to the development of such competencies marks a significant gap in the academic field.

Ballet and media influence

While prior research has explored media influence on ballet dancers, most of it focuses on topics such as body image and dissatisfaction. For example, studies show that media exposure can shape dancers' perceptions of the ideal body, with stronger effects among ballet dancers compared to non-dancers (Author, year). These findings are relevant because they illustrate the broader role media plays in shaping perceptions and values. However, they do not examine ballet as a medium that could counterbalance such influences by fostering critical engagement with media messages.

Interdisciplinary skills in the digital era

In the digital age, literacy is no longer confined to reading and writing—it demands a blend of media literacy, information literacy, and critical thinking skills (Bass, 2024). Scholars argue that to be truly literate today, individuals must combine these competencies to navigate complex and often manipulative media environments. This aligns with the premise of the present study: ballet, as a multidimensional form combining movement, music, and visual aesthetics, can serve as an engaging context for developing such skills.

Art as a tool for active inquiry

Media literacy education relies on active inquiry and critical thinking, encouraging participants to analyse and create messages with awareness of their potential impact (Lipkin, 2021). Ballet performances—rich in symbolism, narrative, and emotional depth—provide a unique opportunity to cultivate these skills in audiences. By interpreting visual, auditory, and symbolic elements, viewers engage in cognitive and interpretive processes similar to those used in deconstructing media messages.

Ballet and collective experience

Dance scholars highlight the collective dimension of performance, noting that dance brings people together as spectators and performers, fostering awareness of shared temporal and spatial experiences (Nunn, 2022). This social aspect adds to its potential as an educational tool: collective reflection can strengthen critical awareness and media wisdom by connecting personal interpretation with group dialogue.

Ballet as communication and social commentary

Renowned choreographer Martha Graham described dance as “one of the arts of communication,” rejecting the notion that it exists in isolation from society (Graham, 1939). Similarly, Monden (2014) emphasises that ballet reflects broader cultural and social contexts, addressing contemporary issues through artistry. This suggests that ballet can be a medium for discussing social themes, thereby engaging audiences not only emotionally but also intellectually.

Implications for the present study

The reviewed literature shows that while ballet has been studied in relation to media influence on performers, little is known about its role in developing audiences' media literacy and critical thinking. By positioning ballet within media literacy education, this study addresses an unexplored intersection between the arts and digital-age competencies. It proposes that the interpretive skills fostered through engaging with ballet performances could be applied to broader media contexts, enriching both artistic appreciation and civic participation.

Methodology

Research design

This study adopts a mixed-methods design, combining qualitative and quantitative approaches to provide a comprehensive understanding of ballet's potential to develop media literacy and critical thinking. The combination of methods allows for both statistical generalisation and in-depth exploration of participants' perspectives, thereby enhancing the validity and reliability of the findings.

Data collection methods

Surveys: The survey component includes both closed-ended and open-ended questions to measure levels of media literacy, critical thinking, and the ability to interpret artistic content. Data will be collected during the 2023 season of the National Opera and Ballet in Skopje, immediately after selected performances. In total, 80 participants will be surveyed, selected through a combination of random sampling (audience members approached on-site) and purposive sampling (acquaintances who are regular attendees). Surveys will be distributed both in paper format at the venue and online to increase accessibility.

Interviews: Semi-structured interviews will be conducted with 20 participants from the survey pool to explore their experiences and interpretations in greater depth. Each interview will last approximately 20–30 minutes, be audio-recorded with consent, and later transcribed verbatim. Open-ended questions will focus on the perceived impact of ballet performances on participants' analytical engagement and critical thinking.

Content analysis: A qualitative content analysis will be conducted on selected ballet performances from the 2023 season. The unit of analysis will be the entire performance, examining choreography, staging, music, and visual design. A coding scheme will be developed to categorise symbolic, narrative, and aesthetic elements that may stimulate

critical thinking and media literacy. To ensure coding reliability, two independent coders will analyse the performances, and inter-coder agreement will be calculated.

Target group / participants

The study population comprises attendees of the National Opera and Ballet, including individuals with varying familiarity with ballet and media. The sample includes participants from different age groups, educational backgrounds, and professional profiles. For comparative purposes, participants will be categorised as regular attendees or first-time visitors, allowing the study to explore potential differences in interpretive engagement.

Data analysis

The collected data will be analysed using distinct approaches for the quantitative and qualitative components, followed by an integrative synthesis to provide a comprehensive understanding of the research problem.

Quantitative data

Survey data will be processed using SPSS and Microsoft Excel to ensure accuracy and facilitate both descriptive and inferential statistical analysis. Descriptive statistics: Mean, median, standard deviation, and percentages will be calculated to identify general trends and patterns in the participants' responses. Inferential analysis: Independent-samples t-tests, one-way ANOVA, and χ^2 (Chi-square) tests will be used to examine differences between subgroups (e.g., regular vs. first-time attendees, age groups, educational background). Correlation analysis: Pearson's correlation coefficient will be applied to examine potential relationships between demographic factors and the level of media literacy or critical thinking. Significance will be determined at the $p < 0.05$ level.

Qualitative data

Interview transcripts and open-ended survey responses will be analysed through thematic analysis, following Braun and Clarke's (2006) six-step approach: familiarisation with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. Coding: Data will be coded inductively and categorised to capture recurring ideas and experiences related to ballet's role in developing media literacy and critical thinking. Contextual analysis:

Responses will be interpreted within the context of specific ballet performances, considering visual, musical, and narrative elements. Reliability: Two independent coders will analyse the transcripts, and inter-coder agreement will be calculated to ensure consistency.

Integration of results

The study will employ a convergent mixed-methods design, in which quantitative and qualitative data will be analysed separately and then merged. This triangulation process will allow cross-validation of findings, highlighting points of convergence and divergence between statistical trends and in-depth narrative accounts.

Validity and reliability

To ensure validity and reliability: Instrument validation: The survey instrument will be pilot-tested with a small group (n=10) to refine question clarity and structure. Internal validity: Use of multiple data sources and methods will strengthen the robustness of findings. External validity: The diverse sample will enhance the generalisability of results to a wider audience of ballet attendees. Qualitative credibility: Member checking will be employed by sharing summarised interpretations with selected participants for feedback, and peer debriefing will be used to review thematic coding decisions. This analytical approach will ensure that the conclusions are empirically grounded, methodologically transparent, and applicable for educational and artistic contexts.

Results

Demographic profile

Age: The largest proportion of participants were aged 36–50 years (33.3%), followed by those aged 18–25 years and 26–35 years (20% each). Participants under 18 years and over 50 years each accounted for 13.3% of the sample. These findings indicate a demographically diverse audience, with a notable concentration in the working-age population.

Educational qualification: Most participants reported holding a higher education degree (42.7%), while 26.7% had completed postgraduate studies. Only 5.3% had attained basic education, suggesting that the audience was predominantly composed of individuals with a relatively high level of formal education.

Frequency of attendance: An equal proportion of participants attended ballet performances occasionally (42%) and regularly (42%), while 15.3%were attending for the first time.

Media literacy

Ability for critical analysis: Nearly half of the respondents (45.3%) stated that they always engage in critical analysis of media content, while 29.3% reported doing so sometimes. A smaller proportion (25.3%) indicated that they rarely or never apply critical analysis to media.

Awareness of the impact of art: More than half of the participants (58.7%) had reflected on how art can shape their perspectives on media.

Experience with ballet

Evaluation of the experience: Over half of the audience (52%) rated their experience as excellent, while 28.7% considered it good. Only 3.3% described their experience as unpleasant.

Most memorable elements: The emotional message was identified as the most memorable aspect of the performance by 59.3% of respondents. Music, movement, and visual elements were each highlighted by 13.3% of the participants.

Critical thinking

Reflection on symbolism and narrative: A vast majority of respondents (98.7%) reported that the performance encouraged them to think more deeply about symbolism and narrative structure.

Ability to recognize intent: Four-fifths of the audience (80%) stated that they clearly understood the intended message of the performance, while the remaining 20% reported only a partial understanding.

Conclusions from the data

Demographic relevance: The sample reflects a demographically diverse audience, with a notable proportion of highly educated individuals and regular attendees of artistic events. This composition provides a relevant and informed participant base for assessing the relationship between ballet, media literacy, and critical thinking.

Media awareness: The majority of participants demonstrate awareness of the significance of art in shaping perspectives and fostering critical thinking. This awareness forms a strong foundation for the integration of artistic experiences into educational strategies.

Experience and emotions: Ballet performances engage audiences on a deeply emotional level while simultaneously encouraging reflection on symbolic and narrative elements.

Educational implications: The findings suggest that ballet can serve as an effective pedagogical tool for developing media literacy and critical thinking, particularly when integrated into broader educational and cultural initiatives.

Qualitative in-depth analysis

Purpose of the analysis: The qualitative component examines participants' subjective experiences, attitudes, and perceptions regarding the influence of ballet on their critical thinking and media literacy. This analysis is based on responses to open-ended survey questions, focusing on emergent themes and patterns.

Key themes and findings

Notable elements of ballet

Emotional message: Participants consistently identified the emotional dimension of ballet as the most impactful aspect. Performances were described as evoking "deep feelings" and "empathy for the story." Example: "The emotional message helped me understand the story and reflect on my personal experiences."

Symbolism and artistic creativity: Visual design (costumes, set design) and choreography were perceived as integral to interpreting the narrative and symbolic messages. Example: "The set design felt like a metaphor that made me reflect on many life questions, including broader societal issues."

Impact on media literacy

Inspiration for analyzing media content: Respondents indicated that ballet inspired a more nuanced approach to analyzing media messages. Example: "Ballet taught me that every image or movement carries a message, just like the media messages we encounter daily."

Parallel to critical thinking: Some participants reported that ballet heightened their attention to detail, similar to evaluating the credibility and intent of news content. Example: “The ballet performance prompted me to focus on details, much like when analyzing a news article.”

Encouragement for the development of critical thinking

Interpretation of symbolism: Participants expressed that ballet motivated them to search for deeper meanings in both artistic and media contexts. Example: “Interpreting the symbolism in the performance gave me a new perspective on how to approach complex issues.”

Inspiration for discussion: Several participants engaged in post-performance discussions on topics such as social values and cultural differences. Example: “I talked with my friends about how media can manipulate our emotions, inspired by the ballet.”

Key conclusions from the qualitative analysis

Profound emotional engagement – Ballet establishes a strong emotional connection with audiences, making it a powerful medium for fostering empathy alongside analytical skills.

Catalyst for critical thinking – Performances stimulate reflection on symbolic content and encourage the formation of informed, evidence-based conclusions.

Application to media literacy – Participants identify clear parallels between interpreting ballet and critically evaluating media, suggesting that the skills are transferable.

Discussion

Interpretation of findings: The findings of this study indicate that ballet can play a meaningful role in the development of media literacy and critical thinking. Almost all participants (98.7%) reported that the performance prompted them to reflect on symbolism and narrative, supporting theoretical perspectives that frame media literacy as more than simple information exchange — it also requires the capacity to analyze symbolically and culturally significant messages.

The emotional dimension of ballet emerged as a key factor, with 59.3% of respondents identifying it as the most influential element. This is consistent with the concept of media wisdom, which highlights the importance of equipping individuals with the skills to navigate and evaluate emotionally charged messages in the media environment. The

integration of visual, musical, and kinetic components in ballet engages audiences in complex interpretative processes, encouraging deeper analytical thinking.

Furthermore, results indicate that regular attendees of ballet performances tend to demonstrate more advanced skills in analyzing and interpreting media content. This supports the view that sustained engagement with the arts can strengthen critical thinking abilities. In this sense, ballet can be seen not only as an aesthetic experience but also as a platform for practicing and enhancing media literacy.

Implications for practice

Integration of ballet in education: Ballet can serve as a highly effective educational tool. Incorporating the analysis of ballet performances into curricula could foster students' ability to critically evaluate visual and narrative content.

Interdisciplinary curriculum development: Educational programs that combine artistic disciplines with media literacy should be designed across all educational levels. These could include practical activities where students produce their own artistic content, accompanied by critical analysis of symbolic meaning.

Teacher training and professional development: Teacher training programs could integrate modules on using artistic performances, including ballet, as resources for developing critical thinking and media literacy skills in students.

Promotion of cultural awareness: Incorporating ballet and similar art forms into formal and informal education could enrich students' cultural knowledge and increase their sensitivity to diverse cultural and historical contexts.

Ethical Considerations

This study was conducted in compliance with established ethical research guidelines for studies involving human participants. Prior to data collection, all participants were informed about the purpose, scope, and procedures of the research, as well as their right to withdraw at any time without penalty. Written informed consent was obtained from each participant before participation.

To ensure confidentiality, all personal identifiers were removed from the data, and responses were coded anonymously. Data were stored securely in password-protected digital files accessible only to the research team. No identifying information was included in the reporting of results.

Given that the study involved adult participants attending public cultural events, the research posed minimal risk. Nevertheless, care was taken to respect participants'

privacy and autonomy throughout the process. The study adhered to the ethical principles outlined in the Declaration of Helsinki and followed relevant institutional and national regulations governing research with human participants.

Research Limitations

Sample characteristics and potential bias: The participant pool consisted mainly of regular ballet attendees, which may have introduced bias due to their prior familiarity with and appreciation for the art form.

Focus on a single art form: The study examined only ballet, which limits the generalizability of findings to other art forms or types of media content.

Cultural and geographical context: All participants were drawn from a specific cultural and geographical setting, which may shape their perceptions and engagement with ballet.

Subjectivity of qualitative data: Open-ended survey responses and interview data carry an inherent degree of subjectivity, which may make it difficult to draw universally applicable conclusions.

Absence of longitudinal data: The study did not assess the long-term effects of exposure to ballet on the development of media literacy and critical thinking. Future research could address this gap through longitudinal designs.

Conclusion

This study is among the first to position ballet explicitly within the framework of media literacy and critical thinking development. Its uniqueness lies in bridging performing arts and digital-age competencies—an intersection rarely explored in academic literature. The empirical findings confirm that ballet performances stimulate audiences to engage in deeper interpretation of symbolic and narrative content, enhancing analytical skills directly applicable to media evaluation.

The practical implications are significant. Integrating ballet analysis into school curricula can foster interdisciplinary learning, improve students' ability to critically assess emotionally charged content, and increase cultural awareness. Teacher training programs can use ballet as a model for developing educational approaches that connect art appreciation with critical media skills. This makes ballet not only a cultural experience but also a pedagogical tool with measurable educational benefits.

While the study is limited by its focus on a single art form, a specific cultural context, and a predominantly regular-attendee participant pool, it opens a new pathway for research at the intersection of the arts and media education. Future studies could expand

this work by including diverse art forms, broader demographic samples, and longitudinal designs to examine long-term effects.

In conclusion, ballet emerges not only as a cultural and aesthetic experience but also as a transformative medium for cultivating media wisdom. Recognising and harnessing this potential could significantly contribute to the development of more holistic, arts-integrated approaches to media literacy education in the 21st century.

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Media literacy – needs and challenges in the education of youth

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Abstract

Human progress has ushered in the digital age, an era in which we must all learn to navigate rationally. We swim in a sea of information that reaches us every single day. From birth, we enter the media ether. In this digital era, everyone can publish, making it increasingly difficult to find the truth without proper education. Never before have young people interacted with media in this way. Therefore, if they are already in a situation where they spend so much time consuming media and receiving information from it, they must understand how media works, how it impacts their lives, and how to create media content correctly and effectively. It is especially important to raise children's awareness of the types of information, how to differentiate between them, how information travels, and the effects media have on their lives. They need to be trained to think critically and make rational decisions, because they themselves are a medium. Today, a variety of entertainment, informational, and educational content blends images, videos, words, and sounds. From an early age, children need skills to help them understand, evaluate, and use these messages. Critical thinking is the most important skill for becoming media literate, and it is a prerequisite for making sound decisions in all spheres of social life. Therefore, as teachers, we face a tremendous challenge: to train students, through playful activities and problem-solving situations, to use media safely and successfully adapt to the digital age, because they are the driving force behind our country's progress.

Keywords: media, news, information, youth, social media, fake news, internet

1. Introduction

Media literacy, a relatively new social concept, stems from the need to encourage critical and analytical thinking and develop civic awareness. In this context, it involves building knowledge for the critical evaluation and independent creation of media messages. Democratic societies must embed the right to freedom of speech and access to information as a prerequisite for civic expression and active citizenship. However, only media- and digitally literate citizens can meaningfully participate in locating, exchanging, using, and creating information.

Modern social life involves the daily use of media and new information technologies, along with the constant acquisition of new skills for wise, rational, ethical, and effective use in learning, research, communication, and entertainment. Media literacy therefore encompasses the competence for critical analysis, evaluation, and independent creation of media messages.

Young people receive a large number of messages every day and are often unable to tell true from false news. This is a problem because society needs a media-literate youth capable of differentiating between types of information and thinking critically and independently.

1.1. What is media literacy?

Media literacy is the ability to critically analyze, evaluate, and create media content in different formats (video, text, audio, images). It includes understanding the role of media in society and developing a critical approach to information.

Media literacy means being able to access, analyze, evaluate, and create media content in various forms, and ultimately act upon or use that content.

It is particularly important for young people, who are exposed daily to vast amounts of information from different sources. Ideally, it would be part of formal education. However, in North Macedonia, young people encounter media literacy primarily through non-formal education.

The technological landscape has evolved rapidly in recent years, with social media now playing a central role in young people's lives. Social media brings significant new challenges but also exciting opportunities. Research is beginning to uncover how specific experiences on social platforms can affect young people's mental health.

2. Social Networks and Interaction with Media

2.1. What is a social network?

A social network is an online platform that allows users to communicate, share information, and create and maintain relationships with others. It is a place where you can post photos, videos, texts, and comments, follow other users, and participate in different groups or communities.

Some well-known examples include:

- Facebook – connect with friends and family, share statuses, photos, and events.
- Instagram – focused on sharing photos and videos.
- Twitter/X – uses short posts ("tweets") to share opinions, news, and more.
- TikTok – a video platform for sharing short, often humorous or creative clips.
- LinkedIn – a professional network for career, business, and networking.

The idea behind all of them is connection—whether personal, professional, or creative.

Never before have young people been in such constant interaction with the media. If they are already spending large amounts of time with media and receiving information from it, they must understand how media functions, how it affects their lives, and how to produce media content correctly and effectively.

Someone considered "literate" in the online world shapes their personality, social behavior, and worldview through various tools for collaboration and information management. The vast amount of information available on computer screens, mobile phones, magazines, and newspapers is broadcast through the digital ether. These messages are mediated, and people are flooded with them daily. Young people in particular face great difficulty determining what is true and what is not.

In this digital era, where anyone can publish, it is becoming harder to find the truth without proper education. Media literacy opens the door to fuller and more creative engagement in the online (and offline) media world. It also incorporates other forms of literacy—linguistic (reading and writing), audiovisual (visual literacy), and digital or information literacy. The concept of media literacy continues to evolve alongside communication platforms and new media. It is a tool for protecting citizens—especially young people—an educational instrument, and a means for active participation in the media sphere.

The impact of media messages does not always correspond to the creator's intent, and it is not the same for all audiences. Some will interpret a message one way, others differently. The unlimited possibilities for creating and transmitting media messages

have enabled the uncontrolled and unsanctioned spread of false and manipulative content, hate speech, and incitement to violence. In this sea of information, it has become difficult to judge what is good and what is harmful—hence the need for media literacy to help us make sound decisions.

3. The Macedonian Context

Online media and social networks are overflowing with diverse, engaging, and exciting content. The Internet is an excellent way to connect with friends and family, stay informed about the world, learn new skills, share photos, videos, and opinions. When used properly, it can transform the lives of children and young people by connecting them to a whole world of opportunities for communication, learning, and freedom of expression.

However, the Internet is also misused daily, often for harmful purposes—and children and young people are the ones who pay the price.

Now that we are aware of both the benefits and the challenges of online environments, it is crucial to emphasize the importance of using safe and secure spaces for online learning. Protecting children on the Internet depends on multiple factors, including active knowledge-building about emerging threats and challenges. Both parents and teachers play a key role in this process.

Young people today must be equipped to use technology skillfully to access the information they need—and, more importantly, to recognize and select the right information from the overwhelming volume available. This means that traditional literacy (reading, writing, arithmetic) has now expanded to include digital literacy.

Media literacy among young people remains a serious challenge in North Macedonia and requires substantial work. Critical thinking among youth is of particular importance in every country. Young people often want to be informed quickly, without checking the accuracy of each piece of news. This rush to accumulate information can lead to misconceptions and distorted perceptions on various topics.

It is evident that Macedonian media can mislead readers with just a few sentences taken out of context—allowing outlets to profit while readers end up with false information. All stakeholders in society must be part of the solution, starting with education that teaches young people to form their own opinions and verify every news item. Literacy for the 21st century introduces a new set of knowledge, skills, and attitudes necessary for a successful and high-quality life.

4. Literature Review

Digital technologies have become a universal feature of young people's lives. Screen exposure starts early—children in the U.S. under the age of two spend an average of 42 minutes per day with screen media. By adolescence, most are fully immersed in a world of smartphones, computers, and social media. Recent nationally representative statistics suggest that 95% of adolescents aged 13–18 in the U.S. have access to a smartphone, and 88% have access to a desktop or laptop computer at home.

UNESCO (2021) actively promotes Media and Information Literacy (MIL).

Its research on global media literacy stresses that information today is power, and that "citizens must be able to recognize misinformation, propaganda, and bias in the media."

Pew Research Center (USA, 2019) found that only 26% of American adults are able to identify fake news. Most people struggle to distinguish credible sources from manipulative ones.

EU Kids Online (2020), a European study, shows that young internet users often do not verify the sources of the information they share. Children and adolescents are susceptible to influencers and commercial messages, often without recognizing sponsored content.

Ofcom Report (UK, 2023) notes that 30% of young people believe they are media literate, but in practice demonstrate limited critical thinking skills. Only 15% can accurately explain how algorithms influence their news feed content.

Macedonian Context – UNDP & Ministry of Education and Science (2022):

A study on media literacy in North Macedonia found that only 12% of respondents know how to verify information using multiple sources. Teachers and professors require additional training to pass this knowledge on to students.

Over 400 children and young people in North Macedonia participated in a UNICEF U-Report online safety survey in 2023. One in three respondents (31%) reported experiencing online bullying. Many (18%) admitted that a lack of knowledge on how to stay safe online is one reason why cyberbullying persists, while 41% felt that institutions do not take it seriously enough.

The first steps toward media literacy in the Macedonian media sphere were taken with the adoption of the Law on Audio and Audiovisual Media Services in 2013, which mentioned the term for the first time—though without defining it. A few years earlier (2009–2011), the Macedonian Institute for Media was the first NGO to open the topic through research, the preparation of a teacher's manual for primary and secondary education, and various training activities.

Critical thinking among youth remains vital. The tendency to consume information quickly—without verifying its accuracy—leads to misperceptions. Macedonian media continue to exploit this through out-of-context statements that attract clicks and profit, at the expense of truthful reporting. Embedding media literacy in education has long been established practice across Europe and the world.

5. Research Methodology

The primary source of data for this study was a survey distributed to students in various schools. The questionnaire contained a combination of closed and open-ended questions, allowing for a detailed analysis of different aspects related to the need for media literacy and the protection of young people's digital identities.

The survey was intended for students (Appendix 1). It included 90 respondents aged 10 to 14 from primary schools in the Republic of North Macedonia.

The data obtained were analyzed using both qualitative and quantitative methods of text analysis. This involved identifying themes and trends in participants' answers, as well as analyzing the frequency of certain expressions and concepts. The research methodology aimed to provide an in-depth examination of the topic and deliver relevant and meaningful results that could contribute to improving education through the integration of digital media into teaching. It also sought to offer guidelines and suggestions for more responsible use of digital media and social networks, emphasizing the importance of individual critical thinking.

6. Discussion and Conclusion

The general section of the survey collected demographic information, including gender and place of residence. The survey was conducted electronically and was completely anonymous to protect participants' privacy.

Of all respondents, 62.5% were female and 37.5% were male, indicating a predominance of female participants. Regarding place of residence, 60.9% lived in rural areas, while 39.1% lived in urban areas, showing that the research primarily included students from rural communities.

Most frequently used media among respondents:

- Social networks – 57.5%
- Television – 55%
- YouTube – 55%

- Internet websites – 37.5%
- Radio – 15%
- Newspapers/magazines – 10%

These results show that social networks are the leading medium, consistent with trends among youth, and suggest a shift toward digital sources of information and away from traditional media.

Time spent online:

- Less than 1 hour: 27.5%
- 1–2 hours: 20%
- More than 3 hours: 52%

This indicates that young people are exposed to a vast amount of information daily, making it increasingly difficult to determine the origin and credibility of that information.

Educational activities on distinguishing true from false information:

- Often: 32.5%
- Sometimes: 47.5%
- Rarely: 12.5%
- Never: 7.5%

These responses show that there is effort within the education system to foster critical thinking, and most students report at least occasional discussions on these topics—a positive sign.

Importance of media literacy in school curricula:

- Yes: 70%
- No: 15%
- Don't know: 15%

This high level of interest points to increased awareness among young people about the risks and dangers of the digital world they inhabit.

Greatest perceived risks when using media:

- Cyberbullying – 69%
- Fake information – 61.9%

- Internet addiction – 28.6%
- Other – 7.1%

Cyberbullying is seen as the most serious threat, underscoring the need for focused education on this issue.

Most common forms of cyberbullying reported:

- Offensive comments – 77.5%
- Spreading false rumors – 70.4%
- Exclusion from group chats – 28.9%

What students want to learn about media:

- How to protect themselves
- How to recognize false information
- How to use the internet safely
- How media works

A small number expressed no interest in learning about media.

Negative experiences online:

Most students reported no bad experiences, though some mentioned exposure to games with offensive content, violence, or inappropriate behavior.

Preferred activities to improve media literacy:

- Projects – 54.5%
- Workshops – 42.4%
- Lectures – 42.4%
- Regular classes – 39.4%

Media literacy is now more than ever an essential part of daily life. Media messages are “packaged” and delivered in ways that, without media literacy and education, appear “natural” and objective. With the rise of new media (internet, mobile phones, etc.), individuals have gained new spaces for self-expression. Virtual identity, in every sense, is a form of self-representation, and media content plays a major role in shaping perceptions of oneself, others, and the world. Building the most accurate possible picture requires media literacy.

7. Recommendations for Improving Youth Media Literacy

Integration into Education:

- Introduce media literacy as a compulsory subject in primary and secondary schools.

Teacher Training:

- Provide professional development programs for teachers to effectively teach media literacy.

Creation of Resources:

- Develop tailored materials and tools to help students identify and counter misinformation.

Promotion of Critical Thinking:

- Encourage activities that develop critical thinking and the ability to analyze media content.

Project-Based and Research-Based Learning

How?

- Students independently research specific topics such as “How does fake news spread?” or “How can I protect myself from cyberbullying?”.
- End products may include presentations, videos, or podcasts.

Example:

A school might form a mini-journalism team where students produce news stories and verify facts.

Use of Digital Tools and Resources

How?

- Utilize online platforms and simulators (e.g., Checkology, News Literacy Project).
- Employ games and quizzes for fact-checking practice.
- Analyze TikTok, Instagram, and YouTube content within a teaching context.

Example:

Students compare how the same news story is covered by a traditional news outlet versus a TikTok influencer.

Tips for Making the Internet a Safer Space

- Remember that every time we go online, we leave a digital footprint. Once something is published, it cannot be taken back.
- Share carefully.
- Ask for permission before sharing someone else's photo or video.
- What you do online can have real-world consequences.
- Never share personal information such as your address, phone number, bank account details, or passwords.
- Personal privacy and security are just as important online as offline. Protecting key information helps prevent harm to devices, reputations, and relationships.
- Stop the spread of harmful or false messages by not forwarding them to others.
- It starts with you—don't spread rumors, and don't share content aimed at hurting or humiliating someone. What may seem like an innocent joke to you can deeply hurt someone else.
- If you're concerned about your safety or something that has happened to you online, talk immediately to a trusted adult.
- Understand that people and situations online are not always what they seem. Learning to tell what is real from what is fake is a crucial safety skill.
- Communicate with others according to the principle: treat others as you would like to be treated.
- Good manners do not change simply because you are communicating through a screen.
- Be aware that online "friends" may not be who they claim to be.
- Never send malicious messages online—whether via email, chat, or messaging apps like Skype, MSN Messenger, Yahoo! Messenger, or ICQ.

Literature

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Annex – Student Questionnaire

Topic: Media Literacy – Needs and Challenges in Primary Education

Dear Students,

This survey aims to understand your opinions and experiences with using media (television, internet, social networks, newspapers, etc.) and how your school helps you distinguish accurate from inaccurate information. Your answers will be used only for research purposes and will remain completely anonymous. Thank you for your honesty!

1. Gender

o Male

o Female

2. Place of residence

o Urban

o Rural

3. Which media do you use most often? (You can choose more than one)

o Television

o Internet websites

o Social networks (Facebook, Instagram, TikTok, etc.)

o YouTube

o Newspapers/magazines

o Radio

o Other: _____

4. How much time do you spend online each day?

o Less than 1 hour

o 1–2 hours

o 3–4 hours

o More than 4 hours

5. Does your school teach you how to distinguish true from false information?

o Yes

o No

o Not sure

6. Do your teachers talk to you about safe internet and social media use?

o Often

o Sometimes

o Rarely

o Never

7. Do you think it is important to learn about media literacy in school?

o Yes

o No

o Don’t know

8. What do you think is the biggest danger when using media?

o Fake information (disinformation)

o Cyberbullying

o Internet addiction

o Other: _____

9. What would you like to learn about media at school?

10. Have you had any negative experiences with the internet or social media? If you want, you can share:

11. Would you like more activities related to media in your classes (videos, projects, discussions)?

- Yes
- No
- Don't know

12. Which types of learning activities do you think would improve your media literacy?

- Workshops
- Lectures
- Regular classes
- Projects

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Artificial Intelligence and Digital Disinformation: Ethical Challenges for Media Literacy and Journalism

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Abstract

This paper explores the dual role of artificial intelligence (AI) in addressing and exacerbating digital disinformation, situating the discussion within the broader context of media ethics and self-regulation. By examining global and regional practices, the research identifies how AI technologies contribute to the rapid dissemination of false information, amplify algorithmic biases and create ethical dilemmas for media. These challenges are particularly pronounced in emerging democracies, where support for ethical journalism remains limited. The study emphasizes the urgent need to adapt self-regulatory frameworks to address the unique risks posed by AI-driven content creation and dissemination. Key recommendations include integrating AI accountability within the media ethics framework, fostering transparency in algorithmic decision-making and providing journalists with targeted training to navigate the ethical implications of AI tools. Comparative findings suggest that aligning these frameworks with international standards could significantly mitigate the impact of disinformation while strengthening trust in the media. This research contributes to the growing discourse on media and information literacy by bridging the gap between theoretical insights and practical applications. It underscores the interdisciplinary nature of addressing digital disinformation, combining technological, sociological and policy perspectives to propose actionable solutions for media sustainability. The paper is particularly relevant for understanding the intersection of AI, critical thinking and ethical journalism in the digital age.

Keywords: Artificial intelligence, digital disinformation, media ethics, media literacy.

1. Introduction

The rapid advancement of artificial intelligence (AI) technologies has significantly reshaped the media landscape, introducing both promising possibilities and complex ethical dilemmas. With society's growing dependence on digital information, advanced AI systems have emerged as powerful tools capable of generating highly convincing forms of disinformation—ranging from deepfakes and synthetic audio to fabricated narratives—at an unprecedented scale. These phenomena have serious implications for journalistic integrity, public trust, and democratic resilience (Westerlund, 2019; Germani et al., 2024).

Digital disinformation, defined as the deliberate dissemination of false or misleading content intended to manipulate public perception, is significantly amplified by algorithmic infrastructures that prioritize user engagement rather than factual accuracy. As research from Northwestern University (2023) reveals, social media algorithms tend to elevate emotionally charged or bias-confirming content, regardless of its factual reliability, thereby accelerating the viral spread of misinformation. This phenomenon is not merely a technical flaw but also presents profound epistemic and ethical challenges. The unchecked proliferation of AI-generated disinformation further threatens journalism's foundational role as a guardian of truth, transparency, and accountability. These concerns are particularly acute in transitional democracies and fragile information ecosystems, where media literacy frameworks are underdeveloped and self-regulatory institutions often lack the capacity to respond effectively (Tuneva, 2023).

Yet, paradoxically, AI also holds potential as a counter-disinformation tool. It offers scalable solutions for automated fact-checking, semantic analysis, and pattern recognition that can support journalists and media organizations in identifying and responding to falsehoods. Still, the application of these tools is not neutral; it raises concerns over algorithmic transparency, the epistemic boundaries of automated systems, and potential infringements on rights to free expression (Lange & Lechterman, 2021; Bontridder & Poullet, 2021).

This paper explores the dual role of AI in the production and mitigation of digital disinformation, with a focus on its ethical implications for media literacy and journalism. Drawing on both empirical findings and normative analysis, it argues for the integration of AI literacy and ethical frameworks into media self-regulation, professional standards, and public policy. Furthermore, the study draws from global and regional case studies—including comparative insights from press councils across Europe to propose a set of actionable recommendations that reinforce democratic integrity and media credibility.

2. 2. Theoretical and Conceptual Framework

Пресекот The intersection of artificial intelligence (AI), digital disinformation, and media ethics necessitates an interdisciplinary framework—one that draws from media studies, information science, communication ethics, and critical algorithm studies. At the heart of this analysis is the recognition that disinformation is not solely a technological issue, but a socio-political and epistemological phenomenon—deeply embedded in how information is produced, circulated, and legitimized within digital environments.

2.1 Artificial Intelligence and Information Disorder

AI technologies increasingly shape the architecture of information environments. Machine learning models, particularly large language models (LLMs) and Generative Adversarial Networks (GANs), exhibit powerful capabilities to generate, personalize, and disseminate synthetic content that closely mimics human expression—raising significant concerns about the authenticity of digital information (Shoaib et al., 2023). These systems, trained on vast datasets, are also vulnerable to the flaws and biases of their human developers; such biases can infiltrate the data and algorithms, influencing how content is produced, ranked, and disseminated (Kertysova, 2018).

The concept of information disorder, as developed by Wardle and Derakhshan (2017), provides a foundational framework for understanding the different dimensions of false or harmful information in the digital age. Their typology distinguishes between disinformation (false content created with the intent to cause harm), misinformation (false content shared without harmful intent), and malinformation (genuine information used maliciously to inflict harm). Artificial intelligence is implicated in all three categories—by facilitating the automated creation and dissemination of disinformation, enabling algorithm-driven amplification of misinformation, and supporting data-mining techniques used in targeted malinformation campaigns. The creation, production, and distribution phases of these information types are increasingly complex and opaque due to AI's scale and speed, making journalistic verification and accountability significantly more difficult (Wardle & Derakhshan, 2017). Moreover, the speed, scale, and opacity of AI-driven information systems make it increasingly difficult to verify the origin, intent, and credibility of digital content—posing significant challenges for journalistic fact-checking and accountability (Buchanan et al., 2021).

2.2 Media Ethics and the Challenges of AI

Media ethics provides the normative foundation for journalistic responsibility, rooted in principles such as truthfulness, fairness, accountability, and the minimization of harm. However, these principles are increasingly strained in the age of algorithmic mediation and automated content generation.

The rise of AI-generated journalism challenges conventional notions of authorship and attribution. When large language models or automated systems contribute to the creation of news content, the boundary between human and machine authorship becomes blurred. As Bontridder and Poullet (2021) point out, AI tools used in content production can obscure the line of editorial responsibility, raising concerns about transparency and accountability. Similarly, Lange and Lechterman (2021) emphasize that the absence of clear disclosure regarding AI involvement in the journalistic process can create ethical ambiguity about content provenance, leading to potential erosion of public trust.

In response to these concerns, new models of attribution and transparency are being proposed. Some researchers advocate for the implementation of labeling systems—such as the Artificial Intelligence Attribution (AIA) framework—that mark the extent of AI involvement in content creation (Bertolini et al., 2023). These frameworks suggest visual cues or metadata indicators that distinguish between human-authored, AI-assisted, and fully AI-generated content, offering a clearer ethical structure for digital journalism.

Moreover, the speed and scale at which algorithmically curated content is disseminated—often driven by engagement-based metrics—can lead to the prioritization of sensational or emotionally charged material over fact-based reporting. This dynamic further complicates the ethical obligations of journalists to provide accurate, balanced information in a digitally mediated environment.

Overall, the integration of AI into media production demands a re-evaluation of ethical frameworks, with greater emphasis on transparency, attribution, and editorial oversight in the digital age.

Moreover, algorithmic curation on platforms such as Facebook, YouTube, and TikTok is governed by engagement-based metrics rather than editorial standards. This prioritization of emotional or polarizing content over balanced reporting undermines the gatekeeping function traditionally performed by journalists. Gerbaudo (2023) observes that TikTok's architecture constructs "clustered publics" by algorithmically grouping users around shared preferences, thereby deepening filter bubbles and reducing content diversity.

The spread of synthetic media further erodes epistemic trust—defined as the public's confidence in the reliability and authenticity of information sources. As Twomey et al.

(2023) demonstrate in their analysis of social media discourse during the Russo-Ukrainian war, deepfake content has the capacity to sow confusion and distrust, particularly when audiences are unable to distinguish manipulated content from reality. This epistemic crisis threatens democratic processes based on informed deliberation, consent, and accountability.

In this context, ethical journalism must not only continue to verify content rigorously but also increase transparency around editorial practices and the involvement of AI technologies. Paik (2023) calls for a reconceptualization of journalistic ethics to reflect the algorithmic conditions of contemporary media. He proposes a model of distributed accountability—one that acknowledges the collective ethical responsibility of journalists, technologists, and platform designers in upholding truth and public trust.

2.3 Media Literacy and AI Literacy as Democratic Imperatives

In the digital age, Media and Information Literacy (MIL) frameworks must evolve to encompass Artificial Intelligence (AI) literacy—the capacity to comprehend, critically evaluate, and responsibly utilize AI technologies. This includes recognizing algorithmic biases, understanding the role of data in shaping AI outputs, and developing critical perspectives on the authenticity of digital content. Integrating AI literacy into existing MIL programs is essential for equipping individuals with the skills to navigate and critically assess information in AI-driven environments (Ndungu, 2023).

The importance of MIL is particularly pronounced in emerging democracies and post-conflict societies, where media systems are often fragile, and public trust may be diminished. As Tuneva (2024) highlights, the absence of robust media education and weak self-regulatory institutions can render societies especially susceptible to disinformation campaigns, both foreign and domestic. Therefore, embedding AI and data ethics into MIL curricula is not merely a pedagogical concern but serves as a vital safeguard for democratic integrity.

Incorporating AI literacy into MIL empowers citizens to critically engage with AI-driven content and fosters resilience against misinformation and manipulation. This integration is crucial for maintaining informed public discourse and upholding democratic processes in an era where AI technologies increasingly influence information dissemination.

2.4 Self-Regulation and the Ethics of AI Use in Journalism

Traditional self-regulatory mechanisms—such as codes of ethics, editorial guidelines, and press councils—must evolve to meet the emerging ethical challenges posed by AI integration in journalism. Comparative analysis shows that a growing number of ethical bodies in Europe, including those in Finland, Belgium, and Armenia, have begun updating their frameworks to address issues such as algorithmic transparency, automated news production, and the ethical implications of user-generated content (Tuneva, 2024). These emerging standards emphasize the disclosure of AI involvement in content creation, the necessity of human oversight in editorial processes, and safeguards against algorithmic bias and discrimination.

While recent updates to ethical codes and self-regulatory frameworks represent meaningful progress, many remain voluntary in nature and depend on the strength and credibility of the media that uphold them. In contexts where media ecosystems face political pressure, economic vulnerability, or fragmented professional standards, the practical implementation of these principles can be inconsistent. At the same time, the rapid development and deployment of AI technologies—often shaped by global tech actors—pose new challenges that require self-regulatory bodies to be more agile, better resourced, and technologically informed. Strengthening the legitimacy and adaptability of self-regulation is therefore not only possible, but essential to ensuring ethical standards evolve alongside technological change.

3. Methodology and Analytical Approach

This study adopts a qualitative, interdisciplinary research design aimed at exploring the ethical implications of artificial intelligence (AI) in journalism and media literacy, with a particular focus on the phenomena of digital disinformation. The approach reflects a commitment to both analytical rigor and contextual relevance, recognizing AI's complex dual function as both a driver of disinformation and a potential instrument for its mitigation. By combining comparative analysis, semi-structured expert interviews, and desk-based research, the study captures a multi-layered view of how media systems respond to AI-driven ethical challenges within different regulatory, professional, and socio-political contexts.

The core of the analysis is a comparative review of ethical and self-regulatory frameworks across more than 20 countries, including Finland, Belgium, Germany, Armenia, and North Macedonia.

This review examines how diverse press councils address several pressing issues: algorithmic transparency and accountability, the use and labeling of AI-generated content, institutional strategies for countering digital disinformation, editorial

responsibility in algorithmically curated environments, and the protection of vulnerable or marginalized groups. National and international documents—spanning codes of ethics, internal newsroom guidelines, and formal recommendations of press councils - were analyzed.

The study incorporates qualitative data from 12 semi-structured interviews with representatives of national ethics councils and self-regulatory bodies affiliated with the Alliance of Independent Press Councils of Europe (AIPCE). These interviews were designed to probe the practical challenges related to AI adoption in the media sector.

Recent academic studies, institutional reports, and policy briefs published by organizations such as UNESCO, the Council of Europe, the European Data Protection Board, and international media development bodies were also analyzed.

4. Results and Discussion: The Dual Role of AI in the Age of Disinformation

The findings of this study reveal the ambivalent nature of artificial intelligence (AI) in today's media landscape. AI simultaneously empowers malicious actors with tools to scale and personalize disinformation, while also offering journalists and platforms advanced methods for detecting and countering falsehoods. This duality presents both ethical risks and strategic opportunities—especially in fragile media environments where regulatory safeguards and digital literacy are still evolving.

4.1 AI as a Catalyst for Digital Disinformation

Artificial intelligence (AI) systems have significantly amplified the production and dissemination of disinformation. These technologies can fabricate entire news articles, synthetic images, or deepfake videos that are nearly indistinguishable from authentic content. Westerlund (2019) discusses the emergence of deepfake technology and its potential to create convincing fake media content, posing significant challenges for information integrity. Similarly, research by Vinay et al. (2024) demonstrates how large language models can be manipulated through prompt engineering to generate persuasive disinformation, highlighting the ease with which AI can be exploited to produce misleading narratives.

During the COVID-19 pandemic, AI-generated health misinformation about vaccines, false cures, and infection rates proliferated across social media platforms, eroding public trust and undermining health policy efforts. Menz et al. (2023) demonstrated that within 65 minutes, a publicly available large-language model generated 102 distinct blog articles containing over 17,000 words of disinformation related to vaccines and vaping.

In political contexts, AI tools have been employed to create microtargeted propaganda based on psychological profiling, posing significant risks to democratic integrity. Research indicates that AI-enhanced microtargeting allows political campaigns to deliver personalized and persuasive messages to specific voter segments, subtly influencing their behavior—a tactic that leverages psychological vulnerabilities to shape electoral outcomes (Ahmad et al., 2024). These practices are increasingly documented as tools for manipulating public opinion and destabilizing trust in democratic institutions.

These developments highlight a shift from traditional disinformation tactics to what Buchanan et al. (2021) term "automated persuasion at scale." When combined with algorithmic recommendation systems that prioritize engagement, this creates a volatile feedback loop where falsehoods are not only produced more rapidly but also disseminated more effectively than truths. Such systems, driven by engagement metrics, tend to amplify sensationalist content, thereby exacerbating the spread of disinformation.

4.2 Ethical Dilemmas and Algorithmic Opacity

The integration of artificial intelligence into media environments presents a range of ethical challenges that transcend the traditional dichotomy of truth and falsehood. Central among these is the issue of algorithmic opacity. Many AI-driven systems operate as "black boxes," offering limited insight into how editorial decisions are made—such as which content is prioritized, demoted, or removed. This lack of transparency undermines accountability and makes it difficult for both journalists and audiences to evaluate the integrity of information flows.

A related concern is the bias embedded in AI training data. As Kertysova (2018) emphasizes, algorithms often inherit the social and cultural biases present in the datasets on which they are trained, leading to the perpetuation of stereotypes and the marginalization of vulnerable communities. When left unexamined, these biases risk entrenching inequality and misrepresentation in both automated content generation and algorithmic curation. Equally problematic is the absence of clear disclosure regarding AI-generated content, which can erode informed consent and blur the boundaries of editorial responsibility.

Insights from expert interviews conducted with representatives of media ethics councils across Europe further reinforce these concerns. While some countries—such as Finland, Belgium, and France—have begun developing ethical guidelines that address the use of AI in journalism, most self-regulatory bodies still operate without binding standards or adequate resources to monitor compliance. As one interviewee aptly remarked, "We are updating the rulebook while the game is already being played—with more powerful

players and less control." This comment captures the institutional urgency and asymmetry that self-regulatory bodies face in responding to the rapid evolution of AI technologies in newsrooms and media platforms.

4.3 AI as a Tool for Detection and Defense

Despite the substantial ethical risks posed by AI, these technologies also present significant opportunities for enhancing the resilience of journalism and mitigating the spread of disinformation. In recent years, fact-checking organizations and newsrooms have increasingly adopted AI-driven techniques, particularly those based on natural language processing (NLP) and machine learning, to detect and analyze misleading content with greater efficiency and scale.

Shaik (2023) highlights how machine learning models can identify recurring patterns in deceptive narratives, including emotional manipulation and sentiment polarization—features commonly associated with disinformation campaigns. In parallel, Santos (2023) demonstrates the ability of AI systems to cross-reference claims in real time with trusted databases, thereby accelerating the fact-checking process and improving accuracy. Additionally, Buchanan et al. (2021) explore how AI-powered monitoring systems can detect coordinated disinformation efforts across linguistic and geographic boundaries, offering a transnational view of influence operations and networked propaganda.

Such AI-based tools are particularly valuable during sensitive periods, such as election cycles or public health emergencies, when the speed and volume of content production can overwhelm human verification efforts. However, these technological advancements must not replace human editorial judgment. As emphasized by several interviewees in this study, human oversight remains essential to ensure that automated systems do not inadvertently reinforce dominant ideologies, overlook contextual nuance, or suppress legitimate speech. Maintaining this balance is vital for preserving journalistic standards and upholding the principles of free expression in AI-assisted media environments.

4.4 Emerging Gaps in Media Ethics and Self-Regulation

Comparative analysis conducted for this study reveals a growing disconnect between the pace of technological innovation and the slower evolution of ethical media standards. Most existing codes of ethics were developed prior to the rise of algorithmic content generation and therefore do not adequately reflect the challenges introduced by artificial intelligence. This misalignment has resulted in a number of critical normative gaps that remain insufficiently addressed across national and institutional contexts.

One major area of concern is the lack of explicit guidance on algorithmic transparency. Ethical frameworks rarely provide clarity on whether, or how, AI-generated content should be labeled for the public, raising questions about editorial accountability and

informed consent. Equally problematic are the limited provisions related to data privacy and user consent, particularly in the context of personalized content delivery and behavioral targeting—practices that increasingly rely on opaque algorithmic profiling. Additionally, there is a notable absence of strong protections for vulnerable and marginalized groups, who are often the primary targets of digitally amplified hate speech, stereotyping, or manipulation.

Nevertheless, a few press councils have begun to proactively adapt to these emerging issues. Examples from Finland, Catalonia, and Belgium show how updated codes of ethics can include AI-specific clauses that address transparency requirements, define standards for editorial responsibility when using automated tools, and promote user education as a key component of media literacy. These forward-looking models offer important insights for other self-regulatory bodies seeking to align journalistic ethics with the realities of digital and algorithmic media environments.

4.5 Regional Vulnerabilities: The Case of Emerging Democracies

In transitional media systems such as those found in the Western Balkans, the ethical challenges associated with AI are magnified by long-standing structural and institutional weaknesses. These environments are often characterized by politicized media ownership, which fosters biased reporting and undermines editorial independence. Furthermore, levels of media and AI literacy among the general public remain low, limiting citizens' ability to critically engage with algorithmically generated content or identify manipulative narratives.

Self-regulatory bodies in these regions frequently operate with limited financial and human resources, and their mandates often lack the authority or enforcement capacity needed to effectively oversee compliance with ethical standards. Additionally, institutional collaboration—particularly between media regulators, civil society organizations, and technology platforms—tends to be fragmented or underdeveloped, further weakening the media ecosystem's resilience to AI-driven disinformation.

As documented in the practice of media self-regulatory bodies (Tuneva, 2024), ethical violations are both systemic and widespread. These include the use of manipulative headlines, the failure to mark sponsored or political content transparently, and persistent patterns of misrepresentation or exclusion of vulnerable social groups. In such fragile contexts, the unchecked adoption of AI technologies—without adequate ethical safeguards, journalist training, or public education—risks exacerbating existing social inequalities and reinforcing dynamics of information disorder.

5. Conclusion and Recommendations

The evolving digital information landscape—shaped profoundly by the integration of artificial intelligence (AI), presents both critical challenges and transformative possibilities for journalism, media ethics, and public trust. As demonstrated throughout this study, AI technologies, particularly those utilizing deep learning and natural language generation, hold a dual role. On one hand, they enable the mass and rapid production of disinformation at a scale previously unimaginable. On the other, they offer advanced tools for detecting, verifying, and mitigating the very same falsehoods they help propagate. Navigating this paradox requires a coherent ethical response grounded in transparency, accountability, and critical engagement.

The risks associated with AI are especially pronounced in media systems that are institutionally fragile, as is often the case in emerging democracies. Limited AI and media literacy, weak regulatory infrastructures, and politicized media environments form an ecosystem in which algorithmically amplified disinformation can thrive. In such contexts, traditional self-regulatory mechanisms—though essential for defending press freedom and professional standards—are frequently outdated and ill-equipped to respond to the ethical complexities introduced by algorithmic technologies.

In light of these findings, this paper proposes a multi-level strategy to promote ethical resilience in journalism and fortify democratic information ecosystems. This strategy rests on four interlinked pillars: strengthening ethical and self-regulatory frameworks; promoting AI literacy within both media and the public sphere; enhancing intersectoral collaboration; and reimagining journalism itself to meet the epistemic demands of the AI era.

First, ethical and self-regulatory frameworks must be updated to address AI-specific risks, including issues of algorithmic transparency, synthetic content disclosure, and editorial responsibility in the deployment of automated tools. Press councils and media regulatory bodies should adopt clear, enforceable guidelines that are informed by international best practices, such as those already emerging in Finland, Belgium, and Germany. Furthermore, alignment with global initiatives—such as UNESCO's Recommendation on the Ethics of Artificial Intelligence and the European Commission's AI Act—can help ensure consistency and legitimacy across national contexts.

Second, AI literacy must become an integral component of media and information literacy (MIL) efforts. Educational programs should prepare citizens to critically engage with algorithmically curated and synthetic content, while journalists and editors should receive targeted training on the ethical implications of AI-based tools, including those used for content generation, audience targeting, and automated fact-checking. Transparency by technology companies is also essential; platforms should be required

to explain the logic of their algorithms and provide access to data for independent scrutiny and verification.

Third, sustained collaboration between key stakeholders is essential. Ethical benchmarks and safeguards must be co-developed by journalists, academics, civil society organizations, and technology providers, ensuring that ethical frameworks are both contextually grounded and technically informed. Support for cross-border research and regional knowledge exchange—particularly between countries with strong ethical practices and those in transition—can foster innovation and harmonize standards. Donors and international partners should prioritize capacity building for media regulators and press councils in under-resourced regions.

Finally, journalism must evolve not only technologically but ethically. In an age where authenticity is increasingly questioned and synthetic narratives are indistinguishable from reality, the profession must embrace radical transparency regarding the use of AI in editorial workflows. Credibility will depend not merely on verification but on openness about the tools and logic used in content production. Ethical journalism must also confront the inclusivity gap by promoting diverse representation in AI training datasets and editorial perspectives.

Ultimately, the integrity of journalism in the digital era will depend not only on adaptation to emerging technologies but on the cultivation of ethical resilience—the capacity of individuals, institutions, and societies to uphold truth, accountability, and human dignity in the face of technological disruption and epistemic uncertainty.

6. Limitations and Directions for Future Research

While this study provides a robust exploration of the ethical challenges surrounding AI and disinformation in journalism, several limitations should be acknowledged. First, the research is predominantly qualitative and relies on expert interviews and comparative analysis. While these methods yield rich insights, they may lack the generalizability of quantitative approaches. Second, the evolving nature of AI technologies means that some findings may soon require revision, particularly as regulatory frameworks and AI applications continue to advance rapidly.

Future research should explore the quantifiable impacts of AI literacy programs on user resilience to disinformation, as well as comparative analyses of enforcement mechanisms in self-regulatory bodies. Further interdisciplinary studies involving technologists, ethicists, and policymakers are essential to address the complex interplay of automation, accountability, and media credibility in the digital age.

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The Role of Media Literacy in Addressing the Challenges of the Social Network TikTok

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Abstract

In the era of the digital revolution, the use of social networks has become an integral part of the daily lives of billions of people. TikTok is one of the most popular and fastest-growing social platforms in the world, whose appeal lies in digital entertainment through creating, sharing, or following short videos. The platform features a powerful algorithm that personalizes content for users, creating an engaging and compelling experience. As a result, TikTok has become a central space for young people, serving both educational and entertainment purposes, but also as a source of viral challenges — a powerful way to engage users. These challenges can be fun, educational, and creative, but they can also pose risks to safety and health, and can negatively impact participants' emotional and psychological well-being. These trends spread quickly due to the platform's algorithms and active promotion via the "For You Page," making them difficult for users to avoid. Young people's participation in such challenges has become a societal concern requiring a multidimensional approach to address it. The most important tool in combating TikTok's challenges is media education — equipping young people with the skills to understand the digital space, detect risks from dangerous trends, strengthen digital ethics, and increase awareness of safe platform use. This study offers approaches and solutions for helping young people address the challenges of TikTok, based on survey questionnaires and interviews with students aged 10 to 15. The findings reveal a clear need for increased integration of media education in schools, with a focus on teaching safe social media use.

Keywords: social network, TikTok, media literacy

Introduction

In modern digital society, social networks are among the most influential platforms for information, communication, and self-expression. They are an inseparable part of the daily lives of millions worldwide, enabling quick and easy exchange of ideas, opinions, and content. Social networks are a powerful tool with global influence, driving social change and transforming the way we function as individuals and communities.

With the advancement of technologies such as artificial intelligence, recommendation algorithms, and mobile connectivity, the influence of social networks has become deeper and more complex. They not only shape our behavior and perception of reality but also play a significant role in shaping attitudes, values, and identities — especially among younger generations. Therefore, analyzing their role and impact represents a key challenge for contemporary science, education, and social responsibility. One of the fastest-growing and most influential platforms today is TikTok, which in a short time has become the most popular in the world, especially among young people. Owned by the Beijing-based company ByteDance, TikTok launched its preliminary version in 2016, followed by an international version in 2018. The platform enables users to watch and share short, dynamic videos with easy editing options, fostering creativity, self-promotion, and interactivity.

For young people, the motivation to use TikTok includes following entertaining, musical, and humorous content, creating their own videos, following friends, influencers, and celebrities, and staying informed about current topics. The way TikTok works — through its "For You Page" algorithm — ensures that each user receives personalized content based on their interests and previous interactions. This results in high levels of engagement, but also digital dependency and exposure to potentially harmful content. Of particular concern are so-called "challenges" — short video tasks or activities that quickly go viral, create a sense of belonging, but sometimes lead to unsafe or risky behaviors in an effort to gain attention, "likes," or acceptance in the virtual community. Participation in such dangerous trends often leads to privacy issues, as well as harm to physical and mental health.

In this context, media literacy becomes a crucial tool for critically understanding, evaluating, and responsibly using media content. Developing skills to recognize manipulative techniques, practice ethical communication, and engage in safe digital behavior is essential for protection and self-advocacy in the digital space. The aim of this paper is to examine the habits of young people aged 10–15 in using TikTok, analyze their responses to the challenges they encounter, and explore the role of media literacy in addressing the specific risks associated with this platform. The research also offers recommendations for educational practices that would foster critical awareness and responsibility in using TikTok and similar platforms.

Through a literature review, data analysis, and statistical and graphical presentation of results, this study seeks to establish the relationship between media literacy and young people's ability to recognize and respond appropriately to the risks they face when using TikTok.

In addition, the paper aims to answer how much young people believe that family and school, through their educational content, influence their habits toward safer use of social networks. By analyzing all these aspects, this research helps reveal the real digital habits and challenges young people face, as well as the need for integrating media education. The findings and conclusions of this study are expected to be useful in designing systemic, educational, and technological policies for responsible, safe, and ethical navigation of young people in the digital world.

Literature Review

In today's modern digital society, social networks are an inseparable part of everyday life. They are multifunctional platforms primarily used as communication tools, playing a key role in the dissemination of information, serving as spaces for self-expression and creativity, and being utilized for education, business, and marketing purposes, as well as for mobilizing the public around specific social issues.

According to Statista (2023), more than 4.9 billion people worldwide use social networks, a significant portion of whom are young people aged 13 to 24. The power of social networks lies in their interactivity and the speed with which information spreads, meaning a single piece of content can quickly go viral and receive millions of views. For younger generations, who are the most digitally active, these platforms are not only channels for communication and information but also tools for expressing their identities and following global trends. As one youth and digital culture expert states in her research:

"Social networks not only reflect teenage life — they shape it." *(Twenge, J. M., 2017)*

One of the most influential and fastest-growing social networks of the past decade, which has achieved explosive popularity among young people, is TikTok. The number of active users on this platform has been steadily increasing. According to eMarketer data:

- January 2018 – 55 million users
- December 2018 – 271 million users
- December 2019 – 508 million users
- July 2020 – 689 million users

- September 2021 – 1 billion users
- May 2024 – 1.04 billion active users

Developed by the Chinese company ByteDance in 2016 under its original name "Douyin," TikTok merged with the Musical.ly app in 2018, after which it began expanding rapidly and dominating the media space. It operates through short videos ranging from 15 seconds to 10 minutes, which can be easily edited, enhanced with music, effects, and interactive features. The TikTok algorithm is designed to deliver content based on previous user interactions, resulting in high personalization and significant user engagement.

According to Montagnese et al. (2021), this algorithm is also responsible for creating digital dependency and exposing users — particularly young ones — to content that is not always appropriate. Especially concerning are TikTok "challenges" — short tasks or activities that spread quickly and encourage mass participation. Some of these challenges can be hazardous to health, such as:

- **Blackout Challenge** – choking until loss of consciousness
- **Milk Crate Challenge** – climbing unstable milk crates, often leading to severe injuries
- **Car Surfing Challenge** – riding on top of moving vehicles, often without safety measures
- **Cinnamon Challenge** – eating a spoonful of cinnamon without water
- **Superman Challenge** – imitating Superman's flight on unsafe surfaces

These challenges encourage imitative behavior among young people and create the false impression that the activity is fun and safe, without assessing the risk of injury or the consequences of such viral behavior.

The first academic analyses of TikTok appeared around 2019, focusing on young users and their habits. In the notable study *"Living in a Moment: Impact of TikTok on Influencing Younger Generation into Micro-Fame"* (2019), authors Sadia Riaz, Badriya Abdul Jaffer, and Arif Mushtaq conducted qualitative analyses of parental comments on app download platforms, as well as interviews with young TikTok users who had achieved "micro-fame." They concluded that TikTok enables young users to gain rapid micro-fame through short videos but can also have negative effects on their physical and mental health — such as distorted body image, increased narcissism, and the risk of eating disorders.

In a similar study, Kaye, Chen, and Zeng (2020) examined how TikTok influences young people's identities, showing that they often adapt to dominant trends, using the platform for both self-promotion and self-censorship. In "*Watch, Share or Create: The Influence of Personality Traits and User Motivation on TikTok Mobile Video Usage*" (2020), Montagnese et al. (2021) and Omar & Dequan (2021) identified that TikTok use can cause increased anxiety, depression, sleep problems, and pressure to participate in certain trends.

The study "*Using TikTok for Public and Youth Mental Health – A Systematic Review and Content Analysis*" (2022) highlights that although TikTok is the most-used platform for children and young people, high-quality methodological assessments of its content are lacking — which can endanger public and mental health.

More recent research, "*Hyperconnected: Children and Adolescents on Social Media. The TikTok Phenomenon*" (2023), points out that TikTok posts generate large numbers of likes, comments, and followers, which help users feel valued and accepted. This creates a sense of satisfaction that fuels addictive behavior and a strong desire to repeat such actions.

Another recent study, *"Can't Stop Scrolling! Adolescents' Patterns of TikTok Use and Digital Well-Being Self-Perception*" (2024), examined TikTok usage patterns and levels of digital well-being among Spanish adolescents aged 12–18. It found that adolescents often lose control over their social media use, which negatively impacts their daily lives. The study recommends limiting the time adolescents spend on TikTok, enforcing mandatory parental controls on devices, implementing educational programs that promote healthy digital habits, and supporting families in addressing the challenges of excessive TikTok use.

Although TikTok enjoys explosive popularity, especially among young people, the academic and professional community has not sufficiently explored the depth of its psychological, social, and educational consequences. There is a significant gap in understanding how the platform influences young people's identities, self-perception, emotional health, value systems, and interpersonal relationships. Some research focuses on individual aspects, but comprehensive, long-term, and interdisciplinary analyses covering the full impact of the platform are largely missing.

Due to the urgency, seriousness, and importance of this issue for young people's daily lives and development, there is a strong need to intensify systematic and critical research efforts. Such efforts should aim to develop appropriate policies for media education and digital literacy.

Research Methodology

Purpose of the Research

This research aims to examine the role of media literacy in addressing the challenges posed by the social network TikTok among young people. The study is based on a survey questionnaire and interviews with students aged 10 to 15. The sample of students was selected randomly.

A total of 310 students from 17 schools in 13 different municipalities across the country took part in the research, sharing their experiences with using TikTok. The survey contained 10 questions related to young people's experiences on the platform: whether and how often they use it, what types of content they typically follow, how they react when encountering a TikTok challenge, the reasons they might accept such a challenge, their past experiences with participating in TikTok challenges or seeing their peers participate, what consequences they believe such participation might have, whether they think their family and school can help them deal with these challenges, and what kinds of educational content schools could provide to encourage safer use of social networks.

The interviews focused on students' experiences and situations related to TikTok use, as well as strategies for dealing with these challenges.

Results

With technological advancements and the digital revolution, young people today are increasingly present on social networks, using the online space for communication, self-expression, information, and building personal and social identity. Through various platforms such as TikTok, Facebook, Snapchat, YouTube, and others, they communicate, get informed, follow trends, participate in challenges, and share personal experiences. These platforms give young people a sense of belonging and the opportunity to connect with people who share similar interests or views, regardless of geographical boundaries.

Social networks also influence the formation of their opinions, attitudes, and values, and even their professional aspirations. In this way, social networks have become an essential part of how young people live and communicate today. This is why it is very important for them to be media literate, to act responsibly and ethically in the online space, and to know how to respond appropriately to the challenges of social networks.

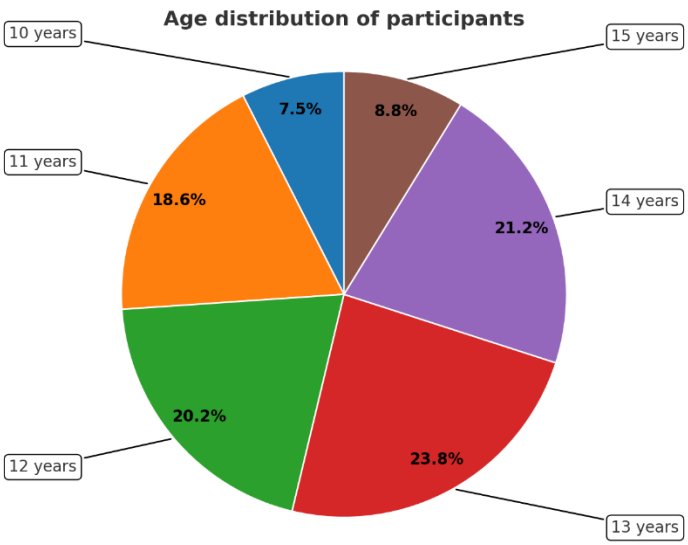
On TikTok, many challenges are widespread that can be harmful to young people, affecting both their physical health and emotional well-being, as well as compromising their privacy. These challenges quickly go viral and attract young people, leading to

mass participation. Often, they are unaware of the risks and consequences of accepting such challenges due to a lack of critical thinking.

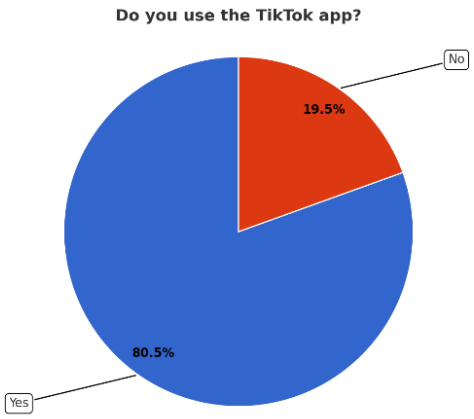
For this reason, this study examines the reasons why young people participate in TikTok challenges and their reactions, as well as their awareness of the consequences of such participation. The paper also highlights the role of family and school as key in developing media literacy competencies and critical thinking among young people, which can significantly contribute to more responsible and safer use of social networks and the internet in general.

This study involved 307 students from 17 schools in 13 different municipalities across the country, aged 10 to 15 years.

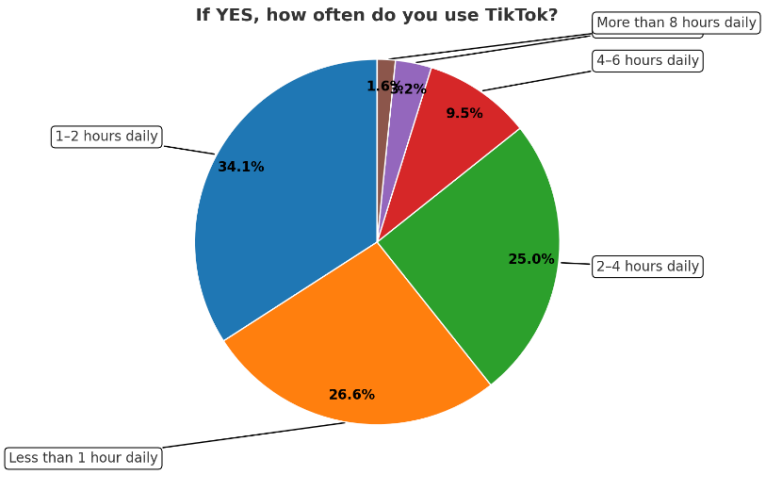
- 7.5% were 10 years old
- 18.6% were 11 years old
- 20.2% were 12 years old
- 23.8% were 13 years old
- 21.2% were 14 years old
- 8.8% were 15 years old



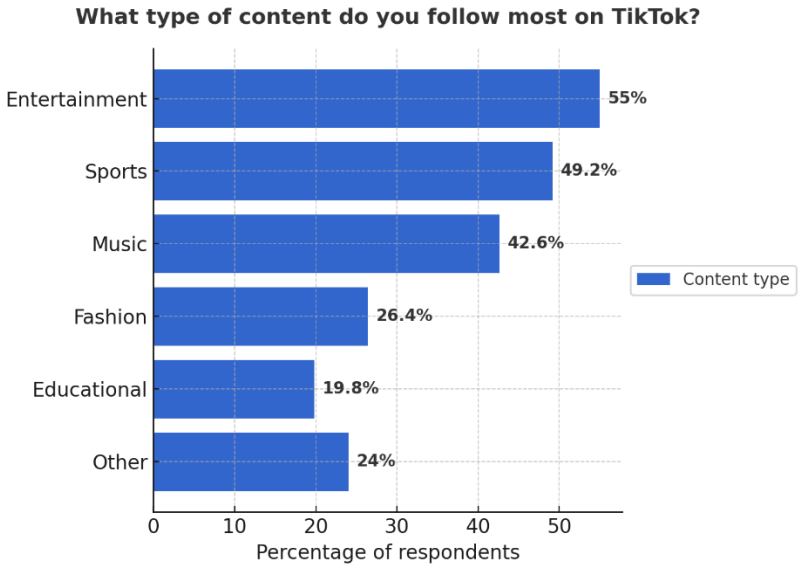
On the first question, *"Do you use the TikTok app?"*, 80.5% of the students answered that they use it, while 19.5% said they do not.



On the second question, *"If your answer is YES, how often do you use it?"*, the largest number of students (34.1%) answered that they use it from 1 to 2 hours daily, followed by 26.6% who use it less than 1 hour daily, 25% who use it from 2 to 4 hours daily, 9.5% who use it from 4 to 6 hours daily, 3.2% who use it from 6 to 8 hours daily, and 1.6% who use it for more than 8 hours daily.

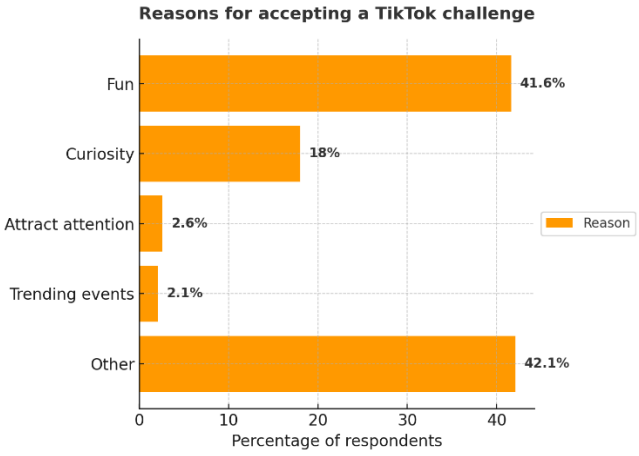


On the third question, "*What type of content do you most often follow on this app?*", students could choose more than one answer. The largest share of students (55%) said they follow mostly entertainment content, 49.2% follow sports content, 42.6% music content, 26.4% fashion content, 19.8% educational content, and 24% answered "other." Under "other," they mentioned health and beauty tips, following the daily routines of popular influencers, and current events.



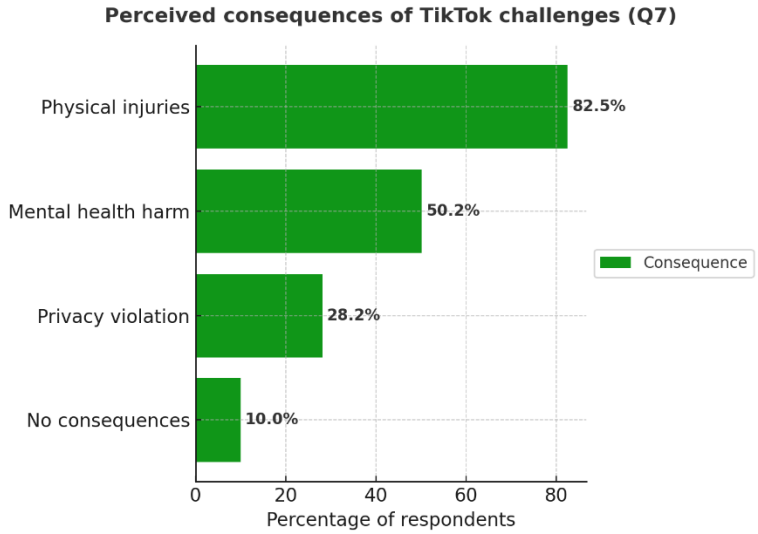
On the fourth question, "*What is your most common reaction when you encounter a TikTok challenge?*", the largest share of respondents (53.8%) said they do not accept TikTok challenges, 19.8% said they have not encountered a TikTok challenge, 17.6% rarely accept, 5.1% think about the consequences but often accept, and 3.7% accept if the challenge is interesting.

On the fifth question, "*For what reasons would you accept a TikTok challenge?*", 41.6% answered for fun, 18% out of curiosity, 2.6% to attract attention, 2.1% to participate in trending events, and 42.1% for other reasons. The most common "other" reasons were: influence from influencers participating in the challenge, desire for competition, belonging to a group, boredom, and the need for excitement.

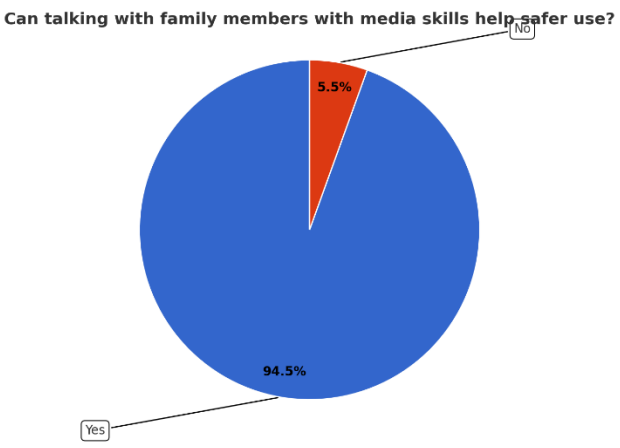


On the sixth question, *"Name some TikTok challenges you or your friends have participated in,"* most respondents said they had not participated in a TikTok challenge. Among those who had personally participated or whose friends had, the most frequently mentioned was the "Superman" challenge, followed by dance challenges, the Football challenge, "Russian Push-up," "Paracetamol Challenge," "Sprite Challenge," "Banana Challenge," "Stay Home or Go Out," and the "Spiderman" challenge.

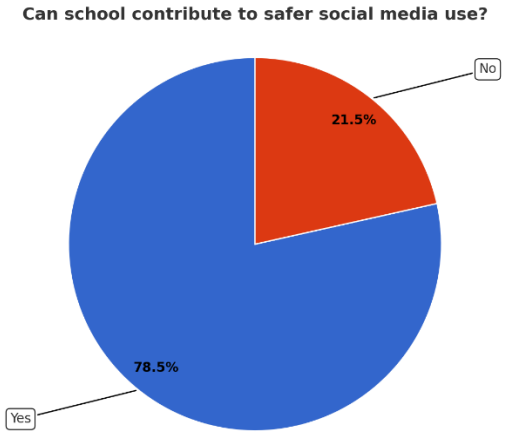
On the seventh question, *"What consequences do you think participating in TikTok challenges can have?"*, students could select more than one answer. The largest share (82.5%) mentioned physical injuries, followed by harm to mental health (50.2%), violation of privacy (28.2%), and the smallest share (10%) said there are no consequences and that it is just for fun.



On the eighth question, *"Do you think that conversations with family members who have media knowledge and skills can contribute to safer use of social networks?"*, the majority of respondents (94.5%) answered "yes," while only 5.5% answered "no."



On the ninth question, *"Do you think that the school, through its educational content, can contribute to safer use of social networks?"*, 78.5% of respondents answered "yes" and 21.5% answered "no."



On the tenth question, *"In what ways do you think the school can provide better education for young people on using social networks?"*, students gave several suggestions, including: discussions on the topic "Safe use of social networks," providing guidelines for using social networks for educational purposes, effective presentations on ethical and responsible internet use with examples of the consequences of inappropriate use, training for recognizing harmful influences of social media, more lessons with experts (pedagogical and psychological services, IT programmers, etc.), continuous media education during homeroom, forum theatre for specific situations of unethical social media use, media literacy workshops, debates on the consequences of accepting dangerous TikTok challenges, involvement of the school support staff and the Student Parliament in preparing activities to prevent harmful consequences of social media use, participation in educational projects related to media literacy, organizing educational events on social media safety, introducing a subject on the use of social networks, digital literacy classes, counseling to overcome problems that arise among social media users, interviews with people who have suffered consequences from dangerous TikTok challenges, educating parents about the risks of social media use and offering them approaches for educating their children, workshops for students who are more actively involved in TikTok challenges, increasing sports activities in schools, and banning phone use during classes and breaks.

The findings show that TikTok is a dominant social platform for young people aged 10–15, with a high rate of participation in challenges. While most challenges are harmless, a notable percentage involve risky or dangerous behavior. Despite a general awareness of potential harm, many young users still engage in such trends, driven by peer influence, entertainment appeal, and lack of adequate guidance. The role of media literacy is crucial here, students with stronger digital skills were more likely to avoid dangerous challenges and recognize risks. However, the relatively low percentages in

skills like adjusting privacy settings and identifying risky behavior point to the need for targeted education. Both family and school have an important role, but current efforts appear inconsistent, with nearly a quarter of young people receiving no guidance at all. Strengthening both home-based conversations and school-based programs could significantly improve safe TikTok use.

Discussion and Conclusions

In today's digital society, social networks are a part of everyday life for young people, serving as a means for them to get information, connect and communicate, follow trends, take part in challenges, share personal views, and build their personal and social identities. They can have positive effects on personal development, especially when used consciously, in moderation, and with the support of family and the educational system. The benefits include broad opportunities for socialization and peer connection, exchanging opinions, experiences, interests, and ideas, gaining information and education, developing creativity and digital skills. In this way, social networks represent an important tool for personal development, learning, participation, and self-expression.

Alongside the many positive aspects of social networks, they can also have harmful effects on the development of young people, especially when there is insufficient media literacy, parental supervision, and critical self-awareness. The negative aspects include creating an addiction to digital stimulation, reducing cognitive functions and shortening attention spans, promoting unrealistic standards and self-perception issues, cyberbullying, and participating in trends that often involve dangerous challenges.

From this research, we can conclude that a large number of young people aged 10 to 15 are active on TikTok and use it daily for several hours. According to the questionnaire data, they most often follow entertainment content, sports, music, and fashion, while using the platform least for educational content. TikTok continuously features challenges that pose a threat to the healthy physical, psychological, and social development of young people. Examples include challenges that require jumping from heights, consuming inappropriate substances (such as paracetamol or carbonated drinks in a short time), taking photos or creating short videos in dangerous conditions, choking, and even inflicting pain on oneself or others.

Regarding these dangerous TikTok challenges, the largest percentage of respondents stated that they do not participate in them or have never encountered such a challenge, but some admitted they would accept them, especially if they seemed interesting. When asked which challenges they or their friends had participated in, the most frequent answer was the "Superman" challenge, which involves jumping with arms extended forward, imitating Superman's flight—often onto unsafe surfaces—resulting in physical

injuries. Less frequently mentioned were the “Russian Push-up,” “Spiderman,” “Sprite Challenge,” “Paracetamol Challenge,” “Football Challenge,” and “Banana Challenge.”

The reasons given for participating in such challenges include fun, curiosity, the need for acceptance and attention, influence from popular personalities and influencers on the platform, as well as fear of exclusion. These results indicate that young people need to develop critical thinking and awareness about the consequences of engaging in activities that are risky to their physical and mental health. Therefore, their development should include competencies that integrate digital, emotional, and media literacy, such as: distinguishing between safe and risky online content, understanding social media algorithms, controlling impulses and peer pressure, recognizing personal feelings, assessing the danger of a specific challenge and responding appropriately, and understanding the consequences of sharing or promoting risky content.

According to respondents, the family has the greatest influence on developing the competencies needed for safer use of social networks. Therefore, it is crucial for society to develop mechanisms and policies to actively involve families in children’s digital education. Based on the questionnaire responses, in addition to family, schools play a significant role in acquiring media literacy that will improve young people’s safety when using social networks.

According to the research results, young people aged 10 to 15 believe that schools should introduce regular media literacy classes with a focus on safe social media use, continuously hold media literacy workshops, host lectures by experts, organize media education events, participate in projects related to media literacy, and engage in counseling, debates, and similar activities to increase media education among youth.

All of this points to the need for the education system to systematically and continuously invest efforts in developing students’ digital and media competencies by integrating media literacy content into curricula, with a particular emphasis on safe social media use. Finally, it is important to develop national education policies that give proper significance to media and digital literacy in order to keep pace with modern educational trends and meet the needs of young people, so they can navigate the digital world consciously, responsibly, and safely.

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She is one of the authors of a teacher's manual from the international project "Creative Application of New Teaching Techniques" and has contributed to reference materials in the field of "Media Literacy in the Era of Artificial Intelligence" and catalogs of good STEM practices. She is also a co-author of numerous poetry collections and short stories for children, as well as a reviewer and promoter of Macedonian children's literature and primary school textbooks.

Additionally, she serves as an assessor in international assessments of early grade reading and math literacy (EGRA and EGMA). She has participated in various projects, conferences, and campaigns in the field of education.

Digital skills among students in tourism and hospitality studies: the case of North Macedonia

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Abstract

As technology progressively influences daily life, the tourism and hospitality industries are integrating digital technologies to meet tourists' expectations. Consequently, digital skills are becoming progressively essential as the workplace evolves. Businesses consistently seek employees with these competencies, increasing the demand for knowledge in digital skills. The industry's digital need is evident, leading to the expanding value of digital workers. Employers are advocating for upgraded skills, resulting in today's job seekers requiring specialized skills to help them stand out from the crowd. While some certain universities and other educational institutions have modified or expanded the curriculum to address the increasing demand for digital skills, there is a pressing need for research to assess the growth of digital skills among students in tourism and hospitality studies, with them being the main providers of tourism services in the industry. This research, not previously conducted solely on students enrolled in tourism and hospitality studies in North Macedonia, aims to present findings on digital skills among students at the Faculty of Tourism and Business Logistics by identifying levels of digital skills. For this, a quantitative methodology was used through the application of a survey amongst 100 students at undergraduate studies.

Keywords: digital skills, hospitality, students, tourism, workplace.

Introduction

For many businesses within the tourism and hospitality industry, adapting to a digital environment had already become a high priority, even before the global pandemic (Yepez & Leimgruber, 2024). But nowadays, to stay competitive in today's economy, the tourism and hospitality industry is rapidly evolving by adopting digital technologies that are transforming business operations and offering numerous benefits, such as increased productivity, greater efficiency, and better guest interactions (Rusavska et al., 2024). In turn, by leveraging these advancements, digital skills have become a significant and even more essential need for hotel employees (Pshenichnykh & Novi, 2023); therefore, students who aim to pursue careers in tourism and hospitality cannot overstate the importance of possessing digital skills, as the industry heavily relies on digital solutions for communication, efficiency, and service delivery.

As was already indicated, digital skills are now an essential need for job employees, rather than a choice (Stofkova et al., 2022). This tendency is a result of digital technology's fast development and change not only in the workplace but in our everyday life as well (Kappeler, 2024). Therefore, students, i.e., hotel employees, who possess knowledge and experience in digital skills may find it easier to perform their necessary job duties. Universities and other educational institutions play a key role in equipping students with the necessary digital skills (Kayyali, 2024; Chanda et al., 2024) which can include a general understanding of basic technology to complete work tasks or abilities that relate to the tourism and hospitality industry, such as computer software and applications, digital devices, or guest-facing activities (Mandalia, 2023). Also, the proper curricula with the adequate learning and training of students in digital skills can help them enhance their career prospects and stay competitive in the job market (Kayyali, 2024).

This paper aims to explore the current state of digital skills among students in tourism and hospitality studies in North Macedonia and later classify them according to the classification established by the International Telecommunications Union (ITU) as no skills, low, basic (intermediate), and above basic (advanced) skills (International Telecommunications Union, 2018). To do so, the level of competence classification will be done on the five competence areas in the Digital Competence Framework for Citizens (DigComp) (European Commission, n.d.). Furthermore, the paper will highlight the importance of integrating digital skills into academic curricula and propose recommendations for enhancing digital education in tourism and hospitality studies.

By addressing these issues, universities can assist students in acquiring the necessary digital skills to improve their career readiness (Jørgensen, 2019) and contribute effectively to the evolving tourism and hospitality industry. Ultimately, providing graduates with solid digital competencies and knowledge will improve their employability and enable them to adapt to the rapidly changing demands of the industry.

Based on the above-mentioned challenges, two research questions were stated in this paper:

1) What is the level of digital skills among students in terms of competence areas: information, communication, security, content sharing, and problem-solving?

2) Which factors influence the level of digital skills the most?

Digital skills and industry readiness

As the level of digital technological integration increased, the more did the tourism and hospitality industry transform (Anwar et al., 2024). Ever since the travellers started the migration to the online world, passing from travel agencies and brochures to websites, social media, and mobile phones, digital skills competencies have become a key requirement for employees, i.e., students preparing to enter the workforce in this field (Praničević et al., 2019; Wang et al., 2016). But as the industry tries to stay current with technological changes, businesses constantly push for more skills in the workforce to ensure they are prepared.

However, digital skills in the tourism and hospitality industry extend beyond the basic knowledge of computer literacy and cover a much more complex set of skills (Minor et al., 2024). In today's interconnected work environment, they encompass a broad set of in-demand digital skills, such as digital communication and collaboration, data literacy and analytics, cybersecurity awareness, cloud technology, e-commerce, including AI and machine learning technologies, the Internet of Things (IoT), and blockchain technologies (Ivanov, 2019; Makridakis, 2017). While many students are comfortable using computers or smartphones, possess internet literacy, or are able to communicate with others through applications like email or social media and have the ability to complete tasks like paying the bills, many of these skills are considered entry-level, leading to a gap when that student (later an employee) tries to advance their career (Stylianou & Pericleous, 2025). This gap can affect their employability because they often lack industry-specific digital skills (Ali et al., 2018). Some of the industry-specific digital skills in the tourism and hospitality industries include using data analytics tools to track tourist or guest behaviour and market trends, then using big data analytics for personalized guest experiences, cybersecurity measures to protect guest and business data, and applying AI-driven tools for demand forecasting, among many others.

One of the major barriers to digital skill development is the lack of career-defined digital training in academic curricula (Ali et al., 2018). Furthermore, many educators may be resistant to change, possibly impeding students' success, due to a lack of understanding of the potential benefits or fear of the unknown (Balula et al., 2019; Cheung et al., 2018). Overcoming these barriers is crucial for equipping the next generation of students with

digital skills in the tourism and hospitality industry (Moussa et al., 2024). In the meantime, while there is still demand for traditional roles in hotel food services (such as chefs and waiting staff) (OECD, 2021), it is still evident that digital skills have become a prerequisite for success in the modern workplace. However, many tourism and hospitality study programs continue to focus on traditional management approaches with limited emphasis on technology integration and digital problem-solving (Lugosi & Jameson, 2017). As a result, students may graduate without the digital proficiency in the industry-specific digital skills, making it difficult for them to meet the businesses expectations (Carlisle et al., 2021).

Another obstacle is the lack of a practical approach to these industry-specific digital skills [19]. While having a digital skills theoretical framework is a necessity, on the other hand, providing a practical means of tracking progress in real-world digital systems in the tourism and hospitality industry is crucial for developing digital competency (Boella & Goss-Turner, 2019). To reduce the struggle of students adapting to a digital work environment in a professional setting and to close the gap in digital skills demand and lessen the differences between education and industry demands (Espellita et al., 2019) universities can foster partnerships between them and tourism businesses that can create internship opportunities, allowing students to apply their skills in real-world contexts (Carlisle et al., 2021; OECD, 2021). Universities could also promote lifelong learning initiatives through a form of online courses or professional programs, since lifelong learning has been highlighted as crucial in providing early responses to digitalization and also for keeping skills current (Bughin, 2018; Carretero et al., 2017). Leveraging these approaches enables universities to improve their students' industry readiness by enhancing their curricula (Hossny, 2018) and ensures graduates possess the proficiency and competences in digital skills needed for the workplace, contributing to a more digitally skilled workforce.

Research design and methodology

This research employs a quantitative, experimental approach to examine the level of digital skills areas in the tourism and hospitality industry in North Macedonia. The questionnaire was conducted at the Faculty of Tourism and Business Logistics from December 2024 to January 2025. A random sampling method was used to select 100 students from different years of study. Students' participation in the questionnaire was voluntary.

The questionnaire was created according to the research of Helsper et al. (2021) on youth digital skills indicator and International Telecommunication Union's research (2021) on digital skills assessment in the Republic of North Macedonia. It consisted of six parts, including Demographics and Technological factors and the five competence areas

according to the Digital Competence Framework for Citizens (DigComp), which served as the theoretical basis where students were able to do self-assessment on their digital skills with 6-point Likert scale answers: Information (13 questions), Communication (23 questions), Content sharing (12 questions), Security (9 questions), and Problem solving (8 questions).

The data was analysed using descriptive statistics to summarize the responses, followed by the utilized point assignment from the research by the International Telecommunication Union [32]. Answers on the 6-point Likert scale were put into four groups: advanced user (3 points), often true (2 points), rarely true (1 point), and not true at all (0 points). I don't understand the question (0 points), and I'd rather not answer (0 points) were also included. Moreover, an independent-samples t-test was used to determine if there is a difference between the level of digital skills among genders, then a one-way ANOVA to analyse if the level of digital skills differs between age groups. Linear regression was also used to analyse which out of the two factors most influences the level of digital skills among students. The analysis was conducted using the statistical software SPSS.

Results and discussion

Based on the data collected from the questionnaire, the demographic-technological distribution of the sample is presented in Table 1.

Table 1. Sample description

	% of Respondents N=100
Gender	
Female	64.0
Male	36.0
Age	
19	14.0
20	20.0
21	22.0
22	21.0
23	9.0
24	4.0
25	2.0
26	7.0
27	/

28	/
29	/
30	1.0
Year of study	
First year	25.0
Second year	15.0
Third year	27.0
Fourth year	17.0
Graduate	16.0
Usage of internet	
Home	38.5
Work/Faculty	26.9
While commuting	26.9
Somewhere else	7.7
Own or use	
Email address	19.8
Social media account	19.8
Blog	2.0
Microblog	2.0
Smartphone	19.8
Tablet, iPad or eReader	4.0
Laptop	16.8
PC	16.0

Source: Author research

The data from Table 1 indicates that the majority of students who participated in the questionnaire were young (20-23 years old) and predominantly female (64.0%). Most students access the internet at home (38.5%) and while at work, faculty, or commuting (26.9%). Smartphone usage is equal to email and social media usage, suggesting familiarity with basic digital communication tools. However, low engagement in blogging and microblogging (2.0%) could be considered as having limited digital content creation skills. To answer the first research question, the scores from the point system used to grade the answers were added up to find out how digitally skilled the students were in the five DigComp competences. The students were then put into four proficiency levels, which are shown in Table 2: “no skills,” “low skills,” “basic skills,” and “above basic skills.” According to the International Telecommunications Union [9], there are four levels of proficiency that show how well a person can use digital technologies, ranging from basic to advanced.

In summary, students lacking digital skills face the risk of digital exclusion, whereas those with low digital skills demonstrate a basic awareness of digital tools but a limited ability to use them effectively. Students with basic (intermediate) skills are those who at this level have functional digital literacy and can use them effectively for work, education, and communication. Students with above-basic (advanced) skills can perform complex digital tasks and use specialized technologies.

Table 2. Level of digital skills across all 5 competences areas

	No. of Respondents N=100
Information	
No skills	0
Low	13
Basic	52
Above basic	35
Communication	
No skills	0
Low	7
Basic	24
Above basic	69
Content sharing	
No skills	0
Low	7
Basic	32
Above basic	61
Security	
No skills	10
Low	1
Basic	12
Above basic	77
Problem solving	
No skills	0
Low	0
Basic	55
Above basic	45

Source: Author research

Most of these students show “basic” or “above basic” skills in all five DigComp competence areas. This means that the students in this group are generally good at digital skills. Many students (77) responded that their security skills were “above basic,” which shows they are aware of the issue and are good at handling it. However, notable “low” skills are present in Information (13), Communication (7), and Content sharing (7) competence areas. Targeted education or training may be necessary for these students to strengthen their digital skills.

Concerns rise in the reporting of 10% of "no skills" in Security, where the majority selected the "I don't understand the question" answer, which shows that this group of students might be vulnerable and require immediate attention through additional education and training.

Additionally, several factors from the demographic-technological distribution were used to address the second research question. An independent samples t-test in Table 3 was conducted to examine whether there is a significant difference in digital skills levels between women and men.

Table 3. Factor: gender

			Equal variances assumed	*Equal variances not assumed*
Levene's Test for Equality of Variances	F		.488	
	Sig.		.486	
t-test for Equality of Means	t		-1.388	-1.418
	df		98	77.376
	Sig. (2-tailed)		.168	.160
	Mean Difference		-.10202	-.10202
	Std. Error Difference		.07349	.07194
	95% Confidence Interval of the Difference	Lower	-.24786	-.24526
		Upper	.04381	.04122

Source: Author research

Since the p-value is 0.486, it is greater than 0.05, which means we cannot reject the null hypothesis of equal variances. This means that there is no statistically significant difference in digital skills between women and men. The mean difference (-.10202) suggests that on average women and men have very similar digital skills levels.

Next, we examined whether the age factor influences the level of digital skills among students studying tourism and hospitality. A one-way ANOVA test examined in Table 4 whether there are significant differences in digital skills levels across different age groups.

Table 4. Factor: age

	Sum of Squares	df	Mean Square	F	Sig.
Information	Between Groups	*7.040*	*8*	*0.880*	*4.312*
	Within Groups	*18.572*	*91*	*0.04*	
	Total	*25.612*	*99*		
Communication	Between Groups	*7.589*	*8*	*0.949*	*4.375*
	Within Groups	*19.730*	*91*	*0.217*	
	Total	*27.319*	*99*		
Content sharing	Between Groups	*1.778*	*8*	*0.222*	*0.813*
	Within Groups	*24.881*	*91*	*0.273*	
	Total	*26.660*	*99*		
Security	Between Groups	*4.865*	*8*	*0.608*	*7.818*
	Within Groups	*7.078*	*91*	*0.078*	
	Total	*11.943*	*99*		
Problem solving	Between Groups	*3.057*	*8*	*0.382*	*2.132*
	Within Groups	*16.312*	*91*	*0.179*	
	Total	*19.369*	*99*		

Source: Author research

The most significant difference is seen in the Security competence area (F=7.818, p=.000), suggesting that different age groups have widely varying levels of knowledge and confidence in online security. Also, there is a significant difference between Information (F=4.312, p=.000) and Communication (F=4.375, p=.000) competence areas, showing students that have the ability to find and manage information, as well as that there are different levels of communication-related digital skills. Problem solving (F=2.132, p=.040) shows significance, but at a weaker level. There are some differences between age groups, but the effect is not as strong as Security, Information and

Communication. As for Content sharing (F=.0813, p=.593), it does not vary significantly across age groups.

Finally, a linear regression was implemented to identify the factors that influence the five digital competence areas. Factors such as gender and age were chosen as independent variables, while Information, Communication, Content sharing, security, and Problem solving were chosen as dependent variables. Table 5 displays visual summaries of the regression analysis.

Table 5. Summary table of regression analysis

Dependent	Model Significance (ANOVA p-value)	R^2	Significant Predictors	Effect
Variable	0.646			
Information	(Not significant)	0.009	None	No effect
Communication	0.007			
Content sharing	(Significant)	0.089	Age	
Security	(p = 0.007)	Positive		

Source: Author research

Regression analysis shows that the gender factor (p=0.022) only has a significant influence in Problem solving digital skills; men tend to have higher problem-solving skills than women. The age factor significantly impacts Communication (positive - p=0.007), which means older students have better digital communication skills, and Security (negative - p=0.025), which means older students have lower security skills. Information and Content Sharing as a competence area are not affected by age or gender.

Limitations

Among the limitations of the research is that it can introduce bias, as students could overestimate or underestimate their digital skills. The sample size might also not fully represent the broader student population.

Conclusion

The research provides empirical evidence on digital competency levels, offering valuable insights for educational institutions and policymakers in curriculum design. Results from the research highlight the digital skills gap among tourism and hospitality students in North Macedonia, emphasizing the need for improved digital literacy. There is strong evidence of competencies in communication, problem solving, and security, yet

significant gaps in information processing and content sharing skills, which are crucial for digital engagement in the industry. The findings reinforce the need for higher education institutions to update curricula to include more practical digital training relevant to the industry's evolving needs. The research also suggests that digital skills development should focus on bridging gaps in information management, cybersecurity education, and advanced digital problem-solving techniques.

For future research directions, the research can compare digital skills among students enrolled in tourism and hospitality studies from different countries. It could also investigate the impact of digital upskilling initiatives on employability in the tourism and hospitality industry. Additionally, it could explore businesses expectations regarding digital proficiency and how well academic programs align with industry needs.

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