

Developing Conscious Information Consumption Skills and Media Literacy in the Age of Digital Change and Media Technologies

Mariia Plotnikova¹, Nataliia Vovchasta², Vsevolod Zelenin³, Natalia Hnedko⁴ and Liudmyla Hetmanenko⁵

¹Department of Economics, Entrepreneurship and Tourism, Faculty of Economics and Management, Polissia National University, Zhytomyr, Ukraine

²Department of Foreign Languages for Engineering, Lviv Polytechnic National University, Lviv, Ukraine

³Department of Psychology, Faculty of Psychology, Mykhailo Dragomanov State University of Ukraine, Kyiv, Ukraine

⁴Department of Digital Technologies and Computer Science Teaching Methods, Faculty of Mathematics and Informatics, Rivne State University of Humanities, Rivne, Ukraine

⁵Department of Natural Sciences and Mathematics Education and Technologies, Institute of In-Service Teachers' Training, Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine

mfplotnikova@gmail.com (corresponding author)

natvovchasta@gmail.com

sevacello@gmail.com

natalia.hnedko@rshu.edu.ua

hetmanenko@kubg.edu.ua

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Abstract: Relevance. The need to study media literacy is driven by the growing destructive influence of information, which is transforming public consciousness and increasing the risk of manipulation in the digital environment. Declining trust in the media, the spread of disinformation, and the growing role of social networks as the main source of news require an in-depth analysis of new communication threats and the search for effective means to overcome them, especially in the field of education. Therefore, the problem of critical thinking among young people, who are at the epicenter of digital interaction and most susceptible to information influence, is becoming increasingly relevant. **Aim.** The purpose of this scientific article is to empirically measure the levels of media literacy and critical thinking in a social sample, as well as to identify the statistically significant impact of variables such as age, level of education, and participation in media education programs on the formation of relevant cognitive competencies. **Methods.** During the study, a sociological survey was conducted among Ukrainian citizens in 2024-2025 using a structured online questionnaire, which allowed us to form the initial data for further analysis. Based on this data, the hypotheses were tested using the classic Student's t-test for independent samples with the JASP software package (in particular, the "Descriptives" and "Independent Samples T-Test" tools). **Results.** The results of the analysis revealed that taking media education courses has a statistically significant impact on the level of media literacy ($M = 32.915$ and 20.910) and critical thinking ($M = 33.111$ and 21.059) among respondents, as evidenced by a t-test with a high Cohen's effect ($d \approx -1.57$, $p < 0.001$). The educational level of respondents has a significant impact on cognitive indicators, in particular, respondents with higher education had significantly higher mean values of media literacy ($M = 30.023$ and 18.473 at $p < 0.001$) and critical thinking ($M = 30.556$ and 18.871 at $p < 0.001$). In addition, a statistically significant age differentiation was found in the levels of media literacy (Group 0: $M = 29.904$, $SD = 6.301$; Group 1: $M = 20.448$, $SD = 9.380$) and critical thinking (Group 0: $M = 30.201$, $SD = 6.530$; Group 1: $M = 20.510$, $SD = 9.209$), as evidenced by high t-statistics ($t = -13.244$; $p < .001$) and a large Cohen's effect ($d = -1.187$), indicating a significant association of younger age with higher levels of cognitive competence. **Conclusions.** The study revealed a low level of media literacy and critical thinking among certain groups of respondents, which indicates the need to implement systematic educational programs aimed at developing cognitive and socio-communication skills. Importantly, the findings highlight the potential of e-learning as an effective environment for media literacy development, since online courses and digital learning platforms can flexibly adapt content for different age and educational groups. This supports the practical integration of media literacy modules into formal and informal e-learning formats, demonstrating how digital tools enhance accessibility and personalization of training. Furthermore, the results reveal a shift in e-learning theory, showing that the effectiveness of online learning in this domain depends not only on access to information but also on the design of interactive, competence-oriented educational interventions. Thus, the study contributes to both the practice and theory of e-learning by identifying critical factors for structuring digital courses that strengthen resilience against disinformation and manipulation. At the same time, the lack of a deeper analysis of socio-cultural factors is a limitation, which opens prospects for further interdisciplinary research in this area.

Keywords: Media education, Search skills, Critical analysis of media materials, Cognitive components, Media literacy, Critical thinking, Cognitive competence, Information society, Digital environment

1. Introduction

In the current conditions of intensive development of the information environment, the formation of media literacy as a key component of citizens' information security is of particular importance. Rapid transformations in the field of digital technologies and the active penetration of social networks into everyday life are changing the mechanisms of communication, affecting not only the way information is disseminated but also the structure of public perception. It is in the online space that a new type of interaction between the user and media content is being formed, in which social platforms are the main source of news, opinions, and positions (Chen, Chen & Xia, 2022). At the same time, this media space is increasingly being used as a tool for information pressure, manipulation, and dissemination of false information (Truba *et al.*, 2024).

The decline in trust in traditional and digital media, recorded both in global and Ukrainian practice, is evidence of a crisis in the communication system caused by the spread of fake news, information polarization, and loss of public reflexivity (Parker, 2024). These challenges are particularly acute among young people, who are the most vulnerable to visually appealing, emotionally charged, and personalized messages. Therefore, the need to study the problem of media literacy is due to the growing destructive information influence that transforms public consciousness and increases the risks of manipulation in the digital environment. The decline in trust in the media, the spread of disinformation, and the growing role of social media as the main source of news require an in-depth analysis of new communication threats and the search for effective ways to overcome them. The problem of critical comprehension of information among young people, who are at the epicenter of digital interaction and are most exposed to information influence, is of particular relevance.

The purpose of this research article is to empirically substantiate the level of critical thinking and media literacy among the population through quantitative analysis to identify the links between these cognitive characteristics and such factors as the level of education, age of respondents, and experience in media education programs. The study aims to typologize the levels of cognitive competence, identify intra-group differences, and outline structural imbalances that necessitate systemic intervention in information culture policy.

2. Literature Review

In the scientific discourse, media literacy and critical thinking are seen as key cognitive components necessary for effective navigation in the context of information overload and digital polarization. Media literacy is interpreted as an integrative process of acquiring knowledge, skills, and attitudes that allow a person to identify, interpret, critically evaluate, and produce media content in various formats (Chen, Chen & Xia, 2022; Truba *et al.*, 2024). At the same time, critical thinking is understood as the ability to independently analyze, logically generalize, identify cause and effect relationships, and formulate informed judgments in the context of media consumption (Ekawati & Jannah, 2025; Hidayati *et al.*, 2024; Santamaría-Cárdaba *et al.*, 2024). Given the transformations of the educational environment, current research emphasizes the importance of implementing comprehensive educational initiatives focused on the development of digital and media literacy, in particular through the integration of artificial intelligence, innovative teaching methods and the creation of training modules that stimulate critical thinking and digital resilience (Oliveira *et al.*, 2024).

The relevance of developing these competencies is increasing in the context of the spread of fake news, disinformation and manipulative influence, which transforms the information environment in the context of cognitive confrontation (Shah *et al.*, 2024; Trixa & Kaspar, 2024; Zou *et al.*, 2024). In this context, numerous empirical studies have shown the positive impact of media education on information security awareness, increased cognitive reflection, and the development of critical source verification skills (Almulla & Al-Rahmi, 2023; Lee, Cho & Kim, 2023; Martin *et al.*, 2021; Tommasi *et al.*, 2023). In particular, the works of González-Pérez and Ramírez-Montoya (2022), Qi and Yang (2024), Tazhenova, Mikhaylova and Turgunbayeva (2024) emphasize the role of formal and informal educational initiatives that activate analytical thinking and promote digital resilience skills. At the same time, empirical studies show that young people are increasingly aware of the importance of critical thinking for navigating the media space, and confirm the need to institutionalize relevant educational programs that combine media education, technical awareness, and the ability to analyze information independently (A Bani Yassen & Al Danani, 2024; Kiss, 2024).

Much of the research also emphasizes the age, social, and educational variability in the level of critical thinking and media literacy (Akimova, Akimova & Akimova, 2022; Almulla & Al-Rahmi, 2023; Budnyk, 2023; Qi & Yang,

2024). The study by Qi and Yang (2024) shows that young people, despite their high level of digital activity, show insufficient ability to distinguish between authentic content and manipulation, which necessitates targeted educational interventions. At the same time, the results of the study by Alharbi, Elfeky and Sultan (2022) indicate that educational level and experience in media education programs are significant determinants of the development of relevant competencies.

However, a critical comparison of these studies reveals several research gaps. First, while many works confirm the positive influence of media education on resilience to disinformation, they often lack a longitudinal perspective that would allow assessing the sustainability of these effects. Second, the majority of studies focus either on youth or students, whereas older age groups and socially vulnerable categories remain underexplored, despite evidence of their lower levels of media literacy. Third, although there are findings on the role of online education, insufficient attention is paid to how different formats of e-learning (synchronous vs. asynchronous, formal vs. informal) affect the development of critical thinking. Finally, much of the current literature is descriptive in nature and does not provide a systematic theoretical framework that integrates media literacy with broader concepts of digital citizenship and societal resilience. These gaps justify the need for further empirical research aimed at identifying the determinants of media literacy across socio-demographic groups and developing models of effective educational interventions adapted to the digital environment. Thus, the generalization of scientific positions suggests that systemic support for media literacy and critical thinking requires the integration of educational, cultural, and information and communication strategies aimed at increasing the cognitive autonomy of the individual in a complex information ecosystem.

3. Methods

The empirical basis of this study was a sociological survey conducted during 2024–2025 using a structured online questionnaire (Appendix A). The total sample included 507 respondents selected using non-probability quota sampling, which ensured variability in age, education level, and previous participation in media literacy courses. The answers in the critical thinking (*critical_score*) and media literacy (*media_score*) blocks were evaluated using a Likert scale, where each statement in the questionnaire had a five-point rating scale: 1 – completely disagree, 2 – rather disagree, 3 – hard to say, 4 – rather agree, 5 – completely agree.

The respondents were citizens of Ukraine aged 18 to 46 who voluntarily agreed to participate in the study and provided informed consent to the processing of personal data in an anonymous form. The study included people who had basic skills in using digital technologies and were able to fill out the online questionnaire on their own. Those who were under the age of majority, had limitations in the perception of written content due to cognitive or psychological factors, or did not complete the survey were excluded from the analysis.

To generate the initial data for the t-test, respondents were divided into two consolidated age groups: those aged 20 to 25 years inclusive (Group 0) and those aged 26 years and older (Group 1). Similarly, the respondents were divided into two groups by education: those with secondary or incomplete higher education (Group 0) and those with complete higher education or a degree (Group 1). Participation in media literacy training was operationalized as a binary variable: “yes” (Group 1) and “no” (Group 0).

The aim of the study was to assess the impact of these three socio-demographic characteristics on two key dependent variables: *critical_score* (level of critical thinking skills) and *media_score* (level of media literacy). Each of these indicators was measured on a standardized continuous scale, with respondents classified into five ordinal categories: low (8-15 points), below average (16-23 points), average (24-31 points), above average (32-36 points), and high (37-40 points).

The methodology was structured into three consecutive analytical stages, each of which included hypothesis testing by applying the classical Student's t-test for independent samples. In the first stage, the mean values of *critical_score* were compared between the groups formed by the variable *MediaCourses_Taken* to test whether participation in educational initiatives significantly correlated with improved critical thinking. In the second stage, the same variable was analyzed in the dichotomous categories of *Education_Level*, which allowed us to identify statistically significant differences based on formal academic achievement. The third stage included comparisons based on *Age_Group* to identify age differences in cognitive resilience to manipulative content and disinformation. A similar three-stage approach was applied to the *media_score* analysis, which allows for a comprehensive assessment of the relationship between media literacy and the same socio-demographic parameters. All statistical procedures were conducted using the JASP software package (in particular, the Descriptives and Independent Samples T-Test tools).

The main hypotheses of the study are as follows:

Hypothesis (H1): Taking media education courses has a statistically significant positive impact on the level of media literacy and critical thinking.

Hypothesis (H2): The level of education is a factor of differentiation of media literacy and critical thinking.

Hypothesis (H3): Respondent's age correlates with the level of media literacy and critical thinking, with younger participants of the study having higher scores of both characteristics compared to representatives of the older age group.

To ensure methodological consistency and comparability of the results, both dependent variables (critical_score and media_score) were normalized, which eliminated scale-related distortions and increased the reliability of intergroup comparisons. This approach allowed us to statistically test the hypotheses about the differential impact of education, age, and targeted media training on the development of critical and media analytical competencies in the Ukrainian socio-cultural context.

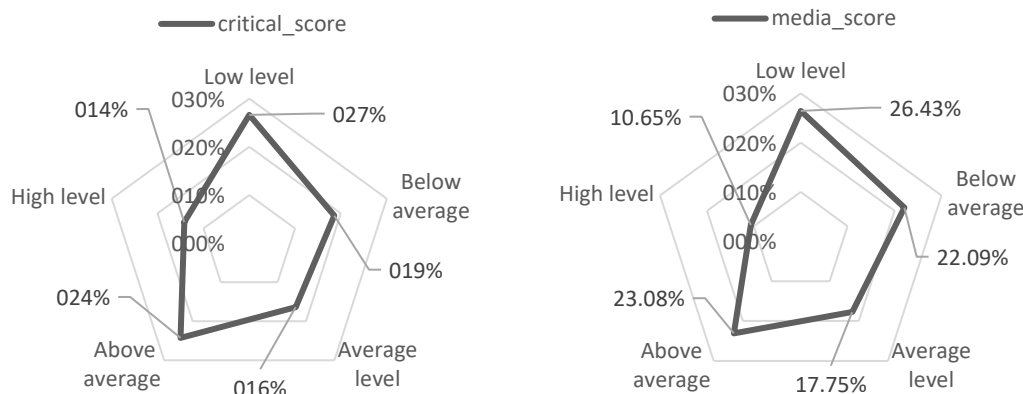
4. Results

Currently, media literacy and critical thinking are emerging as integrative cognitive and analytical abilities that provide a high level of objective comprehension of information flows, its relevant evaluation, reasoned analysis of reliability, and timely identification of risks of manipulative influence and disinformation strategies. Media literacy involves not only the ability to assess the reliability and legitimacy of information sources, but also the ability to identify cause-and-effect relationships between information messages, predict the social and cognitive effects of their impact, formulate logically sound conclusions and build hypothetical scenarios (Park *et al.*, 2021). These competencies are most effective in a structured educational environment, where the critical and analytical potential of the individual is systematically developed. In particular, structured e-learning platforms and online courses provide scalable and flexible frameworks for developing these skills, enabling interactive exercises, multimedia content, and scenario-based simulations. Examples include online modules that guide learners through fake news detection, social media content analysis, and interactive critical thinking challenges (Alharbi, Elfeky & Sultan, 2022; Martin *et al.*, 2021).

In the pedagogical discourse, critical thinking is interpreted as a holistic process of independent, rational and at the same time socially oriented comprehension of problems, which involves the ability to deep conceptual analysis, generate innovative ideas, make non-standard decisions and formulate predictive strategies based on intellectual modeling. The development of critical thinking and media literacy requires the simultaneous activation of cognitive resources (i.e. analytical thinking, logical generalization, reflection) and socio-cultural resources (i.e. socialization, critical communication, countering destructive information influence). Therefore, the parallel development of both competencies within educational programs is of particular importance. The methodological foundations of this approach are the formation of digital skills, mastering the principles of information security, cyber hygiene, personal data protection, and the ability to recognize fake news and information provocations as key threats to the modern information environment.

The results of a quantitative study conducted among 507 respondents allowed us to typologize the levels of critical thinking (critical_score) and media literacy (media_score) based on a five-level scale. The obtained empirical data show significant intra-group fluctuations and reveal the structural features of both cognitive constructs in the study sample (Figure 1).

Despite the relatively large sample (N = 507), it should be emphasized that its representativeness is limited by several factors. First, the study relied on voluntary participation, which may have led to self-selection bias and overrepresentation of individuals already interested in the topic of media literacy. Second, the sample is geographically and socio-culturally concentrated, which reduces the possibility of extrapolating the findings to broader populations. These limitations may affect the generalizability of the results: for example, the identified structural disproportions in cognitive competencies could be even more pronounced in rural or socio-economically disadvantaged groups not represented in the study. Therefore, while the findings are robust within the studied cohort, caution should be exercised in applying them universally.



Source: Compiled by the author

Figure 1: Distribution of respondents by the level of critical thinking and media literacy

The empirical results based on the survey of 507 respondents allow us to identify the characteristic features of the levels of critical thinking and media literacy. The analysis of the *critical_score* criterion showed that the most common is the low level of development of the relevant cognitive skills, which was recorded in 135 people, which is more than a quarter of the entire sample. A similar figure is observed in the “below average” category, which included 94 respondents. Together, these two levels demonstrate that almost half of the survey participants do not have sufficient skills to critically evaluate information, which indicates the presence of significant cognitive deformities or a lack of appropriate information culture. At the same time, only 14.2% of respondents demonstrated a high level of critical thinking, while the average and above average levels were found in the aggregate in a little more than 40% of respondents. This structural unevenness in the distribution suggests that there is significant potential for the development of critical thinking, provided that there is systematic and targeted intervention at the level of educational policy.

In terms of the *media_score* indicator, which represents the level of media literacy, a similar trend is also observed. The largest groups were those with low (134 people) and below average (112 people) levels, which together make up almost half of the sample. This indicates that a significant part of the population is not ready to comprehend the information flow, recognize manipulations, fakes and other threats of destructive information influence. A high level of media literacy was found in only 10.7% of respondents, which indicates an extremely limited number of people capable of full participation in a critical information dialogue. The average and above-average scores indicate some positive trends, but their representativeness is not yet sufficient to confirm the systemic impact of media literacy education practices.

Comparison of both scales shows that some respondents' critical thinking skills exceed the level of media literacy, which suggests the presence of cognitive resources that are not yet integrated into information and communication competence. This imbalance is due to the lack of specialized training in media education, which increases the need to roll out programs to develop both critical thinking and media literacy at all levels of education and through non-formal educational initiatives. The findings allow us to conclude that systemic intervention in the field of information culture formation is relevant and that further analysis of the impact of age, educational and behavioral variables on the level of formation of relevant competencies is advisable. E-learning interventions can bridge this gap by providing targeted, adaptive modules focusing on the practical application of critical thinking in media analysis.

Overall, the inclusion of e-learning strategies, tools, and methods – ranging from collaborative virtual environments to AI-powered assessment platforms – could provide actionable pathways for practitioners to implement the study's findings across diverse educational settings, thereby promoting systematic improvement in cognitive competencies.

Given the identified disproportions in the structure of respondents' cognitive skills, it is logical to conduct an in-depth analysis of the influential factors that potentially determine the level of media literacy and critical thinking. In this context, the following analysis focuses on three key variables: the level of awareness of media literacy and critical thinking, the level of education, and age characteristics.

4.1 The Impact of Media Education Courses on the Level of Media Literacy and Critical Thinking

One of the important determinants of cognitive competencies is participation in targeted training programs, so it is important to study how media education courses affect the level of critical thinking and media literacy, with a focus on identifying the effectiveness of educational interventions in increasing information resilience (Table 1).

Table 1: Indicators of media literacy and critical thinking depending on media education courses

Descriptives								
Group Descriptives								
	Group	N	Mean	SD	SE	Coefficient of variation	Mean Rank	Sum Rank
media_score	0	354	20.910	8.232	0.438	0.394	195.977	69376.000
	1	153	32.915	6.128	0.495	0.186	388.248	59402.000
critical_score	0	354	21.059	8.374	0.445	0.398	196.686	69627.000
	1	153	33.111	5.763	0.466	0.174	386.608	59151.000

Source: Compiled by the author

The results of the descriptive statistics showed that people who took media education courses (Group 0) had significantly higher mean values on media literacy ($M = 32.915$) and critical thinking ($M = 33.111$) compared to those who did not take the relevant courses (Group 1: $M = 20.91$ and $M = 21.059$, respectively). In addition, the group that received training shows lower variability, indicating more stable results. This distribution indicates the systemic effect of formalized learning on cognitive abilities: media education programs develop students' critical reading skills and ability to reflect. The results of a systematic review by Tommasi *et al.* (2023) also show that formalized media education courses demonstrate significant potential as an effective tool for developing metacognitive competencies in the context of initial vocational education and training. These findings also provide empirical support for the integration of e-learning methods, such as interactive online workshops, gamified learning platforms, and AI-assisted feedback systems, which can systematically enhance students' cognitive competencies in both media literacy and critical thinking.

In addition, structured online learning environments enable adaptive content delivery tailored to the learners' baseline skills, which can help reduce disparities observed across age and education levels. Implementing blended learning formats combining synchronous virtual discussions, asynchronous analytical exercises, and scenario-based simulations may further enhance the observed positive effects of formal training programs.

Instead, the lower standard deviation and coefficient of variation in the training group indicates the effectiveness of the course methodology. Taking specialized courses has a positive impact on the formation of media literacy and critical thinking, providing more stable and higher results for students. Almulla and Al-Rahmi (2023) study supports the conclusion that the methodology of specialized courses is effective, which is manifested in the lower standard deviation and coefficient of variation in the experimental group, as the results of SEM modeling show statistically significant positive relationships between socio-cognitive factors (social contact, influence, identity, support) and the development of reflective thinking and research style of learning; which, in turn, has a significant impact on the development of critical thinking and problem-solving skills, which leads to improved learning outcomes and educational sustainability.

In order to determine the impact of specialized training in media education, a t-test was conducted (Table 2), which revealed significant differences in the levels of media literacy and critical thinking depending on the courses taken.

Table 2: Results of the t-test for media literacy and critical thinking based on media education courses

Results						
<i>Independent Samples T-Test</i>						
	Test	Statistic	df	p	Effect Size	SE Effect Size
media_score	Student	-16.199	505.000	< .001	-1.567	0.113
	Welch	-18.163	381.623	< .001	-1.654	0.115
	Mann-Whitney	6541.000		< .001	-0.758	0.056
critical_score	Student	-16.215	505.000	< .001	-1.569	0.113
	Welch	-18.704	409.203	< .001	-1.677	0.115
	Mann-Whitney	6792.000		< .001	-0.749	0.056

*Source: Compiled by the author

Note. For the Student t-test and Welch t-test, the effect size is given by Cohen's d. For the Mann-Whitney test, the effect size is given by the rank biserial correlation

The independent Student's t-test revealed statistically significant differences between the groups for both indicators: $t = -16.215$ ($p < 0.001$) for media literacy and $t = -16.199$ ($p < 0.001$) for critical thinking. In addition, the difference in means is quite significant, and the effect is significant (Cohen's $d = -1.567$ and -1.569 , respectively). In this context, Martin *et al.* (2021) emphasize the need for teacher-student interaction in the digital environment, emphasizing that structured learning involving interactive technologies is a factor in the development of higher cognitive skills. The obtained t-test values indicate the existence of a real, rather than random, effect of the influence of educational programs on cognitive performance. The high Cohen's effect confirms the power of the impact, which is consistent with the theory of cognitive constructivism, according to which the assimilation of information in a structured learning environment promotes deeper integration of knowledge. In addition, Jaboob, Hazaimh and Al-Ansi (2025) found that the level of cognitive skills development is directly influenced by the use of new technologies, including artificial intelligence, which is mediated by students' behavioral factors ($t = 4.963$; $\beta = 0.478$). Such results strengthen the argumentation about the effectiveness of educational innovations that integrate modern technologies in accordance with the theoretical provisions of the constructivist approach to learning.

The results are also confirmed by the Mann-Whitney test, which demonstrates similar statistical significance with a large effect (biserial correlation rank: -0.758 and -0.749 , respectively), which indicates the sustainability of the impact regardless of the type of statistical analysis used and indicates the consistent advantage of media literacy education programs in the context of critical thinking. In particular, the results of the study presented in Park *et al.* (2021) show that media literacy education significantly increases the level of cognitive characteristics such as critical thinking, recognition and response to media content, as well as media interpretation and creation skills. At the same time, Lee, Cho and Kim (2023) notes that media education practices have an indirect impact on youth involvement in social and political life by activating motivation for information consumption, reflection, and engagement in public discourse. Therefore, the data from the t-test indicate that taking media literacy courses is a powerful factor in improving the cognitive competence of citizens. The high degree of effectiveness of such courses proves the feasibility of their widespread implementation in educational and outreach programs, especially in the context of information threats and hybrid warfare; which confirms the hypothesis (H1), demonstrating that participation in media education programs serves as a catalyst for the development of critical thinking and media literacy, increasing the cognitive stability of individuals in a complex information environment.

4.2 Dependence of the Level of Media Literacy and Critical Thinking on the Level of Education

The intellectual and cognitive capital of a person is largely determined by the educational trajectory, so a comparative analysis of the levels of media literacy and critical thinking depending on formal education (Table

3) will help to establish whether there is a relationship between increasing educational level and better information handling.

Table 3: Indicators of media literacy and critical thinking depending on the level of education

Descriptives								
Group Descriptives								
	Group	N	Mean	SD	SE	Coefficient of variation	Mean Rank	Sum Rank
media_score	0	241	18.473	6.792	0.437	0.368	161.990	39039.500
	1	266	30.023	8.031	0.492	0.268	337.363	89738.500
critical_score	0	241	18.871	6.994	0.451	0.371	165.838	39967.000
	1	266	29.974	8.240	0.505	0.275	333.876	88811.000

Source: Compiled by the author

Based on the results of the analysis of descriptive statistics, a clear dependence of the level of development of media literacy and critical thinking skills on the level of education was found. Thus, respondents with higher education (Group 1) have significantly higher mean values ($M = 30.023$ and $M = 29.974$) compared to those without higher education (Group 0: $M = 18.473$ and $M = 18.871$). People with higher education are likely to have experience in research, critical reading and interpretation of information, which contributes to the development of their media competence. This is in line with the principles of education as a social elevator and cognitive catalyst. Higher education significantly contributes to the formation of cognitive resilience to manipulative practices in the media space. According to Tkacova *et al.* (2023), it reduces the risk of forming an illusory belief in personal “immunity” to media influences, which, according to current theoretical research, is one of the main factors of vulnerability to digital manipulation.

Thus, educational experience ensures the development of analytical skills and increases the ability to be critical and self-reflective about one's own susceptibility to information influences. However, to empirically test the assumption of the relationship between educational level and cognitive characteristics of respondents, a t-test was applied, the results of which are presented in Table 4.

Table 4: Results of the t-test for media literacy and critical thinking by level of education

Results						
Independent Samples T-Test						
	Test	Statistic	df	p	Effect Size	SE Effect Size
media_score	Student	-17.391	505.000	< .001	-1.547	0.113
	Welch	-17.534	502.654	< .001	-1.553	0.114
	Mann-Whitney	9878.500		< .001	-0.692	0.051
critical_score	Student	-16.270	505.000	< .001	-1.447	0.111
	Welch	-16.401	502.894	< .001	-1.453	0.111
	Mann-Whitney	10806.000		< .001	-0.663	0.051

Source: Compiled by the author

Note. For the Student t-test and Welch t-test, the effect size is given by Cohen's d. For the Mann-Whitney test, the effect size is given by the rank biserial correlation

The results of the Student's t-test show that there are statistically significant differences in the levels of media literacy and critical thinking depending on the educational status of the respondents. According to the data, people with higher education demonstrated significantly higher average scores in both media literacy and critical thinking than those without a complete higher education. For media literacy, the t-test value is -17.391 at $p < 0.001$, and the Cohen's effect size is -1.547, which corresponds to a very large effect. An alternative variant using the correction for unequal variances (Welch) gave a similar result: $t = -17.534$ at $p < 0.001$, with an identical effect size ($d = -1.553$), which further confirms the stability of the observed difference.

The results of the non-parametric Mann-Whitney test ($U = 9878.5$; $p < 0.001$) also show significant differences, with a rank-biserial correlation value of -0.692, which confirms a strong inverse relationship between the lack of higher education and lower levels of media literacy. A similar trend was found for the level of critical thinking: $t = -16.270$ at $p < 0.001$, Welch $t = -16.401$ at $p < 0.001$, accompanied by a significant effect ($d = -1.447$ and $d = -1.453$, respectively). The rank-biserial correlation of -0.663, according to the Mann-Whitney test ($U = 10806.0$ at $p < 0.001$), also indicates a significant association between the level of education and the level of critical thinking. These results suggest that higher education is a systemic catalyst for the formation of both media literacy and critical thinking. The high values of the effect size indicate a deep socio-cognitive differentiation that is formed in the context of academic learning. This allows us to consider formal education as a key prerequisite for a person's resistance to manipulative influences and disinformation, as well as a fundamental factor in the development of cognitive autonomy, logical thinking, and the ability to rationally analyze the information space.

The findings correlate with the results of an experimental study by Alharbi, Elfeky and Sultan (2022), according to which e-collaborative learning has a positive impact on the development of critical thinking and higher cognitive skills, in particular by stimulating hypothetical thinking, argumentation, and variable correction. A comparative analysis between the groups involved in collective and individual e-learning demonstrated a statistically significant advantage of the former in terms of the level of higher order thinking, which further confirms the importance of interactive educational practices in the cognitive development of the individual. Thus, the obtained empirical data of the t-test confirm the hypothesis (H2) about the positive impact of higher education on the cognitive characteristics of the individual, but also justify the expediency of integrating media education and critical thinking components into the curriculum at all levels of the educational system.

4.3 Age-Specific Features of Media Literacy and Critical Thinking

The age dynamics of cognitive development in the information society requires the formation of a comparative characterization of the levels of media literacy and critical thinking among respondents of different age categories in order to identify age asymmetries and determine educational risk groups (Table 5).

Table 5: Indicators of media literacy and critical thinking in different age groups

Descriptives								
Group Descriptives								
	Group	N	Mean	SD	SE	Coefficient of variation	Mean Rank	Sum Rank
media_score	0	288	20.448	9.380	0.553	0.459	193.075	55605.500
	1	219	29.904	6.301	0.426	0.211	334.121	73172.500
critical_score	0	288	20.510	9.209	0.543	0.449	190.620	54898.500
	1	219	30.201	6.530	0.441	0.216	337.349	73879.500

Source: Compiled by the author

The results of the independent sample t-test show that there are statistically significant age differences in the levels of media literacy and critical thinking. The table of descriptive statistics shows that in the older age group

(Group 0), which includes 219 people, the average value of the media literacy index was 29.904 (SD = 6.301), which is significantly higher than the corresponding value in the older group (Group 1; N = 288), where the average level was only 20.448 (SD = 9.38). A similar situation is observed with regard to critical thinking: Group 0 demonstrates an average score of 30.201 (SD = 6.53) compared to 20.510 (SD = 9.209) in Group 1. Taking into account these results, a t-test was used to identify age differentiation in the level of development of key cognitive competencies, the results of which reflect the specifics of information perception among different age groups (Table 6).

Table 6: Results of the t-test for media literacy and critical thinking by age group

Results						
<i>Independent Samples T-Test</i>						
	Test	Statistic	df	p	Effect Size	SE Effect Size
media_score	Student	-12.872	505.000	< .001	-1.154	0.102
	Welch	-13.554	497.876	< .001	-1.184	0.102
	Mann-Whitney	13989.500		< .001	-0.556	0.052
critical_score	Student	-13.244	505.000	< .001	-1.187	0.102
	Welch	-13.855	502.677	< .001	-1.214	0.103
	Mann-Whitney	13282.500		< .001	-0.579	0.052

Source: Compiled by the author

Notes. For the Student t-test and Welch t-test, the effect size is given by Cohen's d. For the Mann-Whitney test, the effect size is given by the rank biserial correlation

Inferential statistical tests confirm these differences as statistically significant. For media literacy, the value of the Student's t-test is -12.872 at $p < 0.001$, while the Welch's t-test is $t = -13.554$ at $p < 0.001$. The size of the Cohen's effect reaches -1.154 and -1.184, respectively, indicating an extremely strong difference between the age groups. The non-parametric Mann-Whitney test ($U = 13989.500$; $p < 0.001$) also demonstrates the significance of the differences, with a rank-biserial correlation of -0.556, reflecting a significant inverse association between age and media literacy. Similarly, for the critical thinking indicator, the Student's t-statistic is -13.244 at $p < 0.001$, and the Welch's test is -13.855 at $p < 0.001$. The Cohen's effect is -1.187 and -1.214, respectively, meaning that in both cases the effect is very large. The Mann-Whitney test confirms these differences ($U = 13282.5$ at $p < 0.001$, with a rank-biserial correlation of -0.579), which also indicates a statistically significant and substantial difference between the groups. The rationale for such results can be found in the peculiarities of cognitive adaptation to the information environment: younger respondents who have been immersed in the digital context since childhood have a more developed ability to critically analyze and navigate the media flow. Older participants, on the other hand, demonstrate a lower level of these skills, which is due to both insufficient media education and less involvement in digitalization processes.

Thus, the results of the t-test show a high degree of age differentiation in the levels of media literacy and critical thinking, and outline an important socio-pedagogical problem that needs to be addressed systematically. According to Budnyk (2023), in this context, it is important to take into account the principles of critical pedagogy, which emphasize the need to overcome educational and socio-cultural barriers that hinder the formation of critical thinking in older age groups. Therefore, increasing the cognitive activity of mature adults should be based on pedagogical strategies focused on problem-based, dialogic, and project-based learning, which contribute not only to the assimilation of information but also to the formation of the ability to reflect, argue, and think for oneself. The conclusion of the analysis is that younger age is associated with a significantly higher level of these cognitive competencies, which should be taken into account when developing targeted educational programs for older age groups, in particular in terms of digital inclusion and media education. Thus, the hypothesis (H3) about the association of younger age with higher levels of media literacy and critical thinking

was empirically confirmed, which necessitates the development of inclusive educational interventions aimed at bridging the cognitive and informational gap between age groups.

5. Discussion

The results of the descriptive statistics of Tommasi *et al.* (2023) confirm the conclusions drawn in the systematic review: formalized media education courses demonstrate significant potential as an effective tool for developing metacognitive competencies in the context of initial vocational education and training. At the same time, several findings of this study require a more critical reflection. For instance, the imbalance between higher critical thinking scores and relatively lower media literacy in a subgroup of respondents is somewhat unexpected, as it contradicts the dominant assumption that these competencies develop in parallel. This suggests the existence of latent cognitive resources that are not fully converted into practical skills of media navigation, which may point to shortcomings in current educational programs. Similarly, the sharp age differentiation – where younger cohorts substantially outperform older groups – highlights structural inequalities in access to digital education, raising the question of whether existing interventions are sufficiently inclusive. Rather than treating these gaps as simple correlational outcomes, they should be interpreted as signals of systemic educational fragmentation that requires targeted policy responses.

The pronounced increase in the mean values of media literacy ($M = 32.915$) and critical thinking ($M = 33.111$), as well as the decrease in variability in the training group, indicates the consistency between targeted educational interventions and the stability of the results achieved. These dynamics confirm that properly designed educational interventions have a systemic effect and can be integrated into educational strategies as a means of increasing students' cognitive autonomy. In contrast, Almulla and Al-Rahmi (2023) emphasize that the lower standard deviation and coefficient of variation in the trained group indicates the effectiveness of the course methodology, as the results were higher and more stable. This is confirmed by highly significant direct and indirect relationships between factors such as social contact ($H3: t = 2.140; \beta = 0.107$) and critical reflection ($H4: t = 2.504; \beta = 0.145$), social influence ($H5: t = 2.030; \beta = 0.103$; $H6: t = 4.318; \beta = 0.250$), social identity ($H7: t = 4.797; \beta = 0.200$; $H8: t = 4.669; \beta = 0.221$), and between critical thinking and academic performance ($H18: t = 3.159; \beta = 0.186$). Thus, taking specialized courses has a positive impact on the formation of media literacy and critical thinking, providing more stable and higher results for students. The significance of the intergroup differences is also confirmed by the Mann-Whitney test, which, despite a different approach to calculations, showed a similar level of effect (biserial correlation rank: Group 0 = -0.758 and Group 1 = -0.749), indicating the reliability of the identified patterns regardless of the analysis methodology. This result confirms the observations of Park *et al.* (2021), who proved that media literacy training significantly affects the development of the ability to critically interpret information, in particular in the field of media content. It is also worth noting that the high values of the t-statistic ($t = -16.215$ ($p < 0.001$) for media literacy and $t = -16.199$ ($p < 0.001$) for critical thinking) and the Cohen effect are fully consistent with the provisions of cognitive constructivism, according to which deep learning occurs under the condition of structured educational influence. This approach is also confirmed by the model proposed by Martin *et al.* (2021), which emphasizes the role of teacher-student interaction in the digital environment as a factor in the development of cognitive flexibility.

From an international perspective, our findings are consistent with McDougall's (2019) study in the UK and the US, which shows that media literacy education increases youth's resilience to disinformation when media literacy is integrated as a dynamic and mandatory part of curricula. Moreover, in Malaysia, a recent systematic review of eHealth & social media literacy among older adults indicates that individual, interpersonal, institutional, and social factors influence digital and media literacy, suggesting similar multi-level influences as found in our study (Zhang *et al.*, 2025). These international comparisons underscore that the structural disproportions we observe (by age, education, training) are not unique to Ukraine but part of a global challenge in ensuring inclusive media competence.

The existence of a clear and statistically significant relationship between the level of formal education and indicators of media literacy and critical thinking, in particular, the results of the t-test, which showed extremely large effect sizes (Cohen's $d > 1.4$ for both variables), confirm the deep cognitive differentiation between respondents with higher education and those with secondary and incomplete higher education. Comparing these results with the scientific findings of Tkacova *et al.* (2023) allows us to consider higher education as an institutionalized safeguard against the formation of the "illusion of invulnerability" to manipulative influences. Education, which includes the stages of analysis, criticism, argumentation, and verification of information, contributes to the formation of the so-called cognitive immunity, making a person less prone to automatic assimilation of disinformation and able to maintain a reflective distance from media messages. At the same

time, according to the study by Alharbi, Elfeky and Sultan (2022), not only the availability of higher education as such, but also the nature of educational interaction (including online learning, e-collaborative learning, etc.) significantly affects the development of cognitive skills. The results of this experiment indicate the advantage of interactive educational approaches in developing a higher level of critical thinking, which correlates with our observations: education that includes active participation in discussions, case studies, and simulation models contributes not only to the accumulation of knowledge but also to the formation of the ability to perform complex cognitive operations. Our results thus both replicate and extend international findings by showing not only that education matters, but that the modality and stability of educational interventions (in-course structure, frequency, interactivity) are crucial – a nuance less emphasized in prior studies.

The empirical data authors have obtained indicate that there is a distinct age asymmetry in the formation of media literacy and critical thinking. In particular, the mean scores of the younger age group (29.904 with SD = 6.301 for media literacy; 30.201 with SD = 6.530 for critical thinking) significantly exceed the corresponding results of the older group (20.448 with SD = 9.380 and 20.510 with SD = 9.209, respectively). The statistical significance of these differences is confirmed by the results of t-tests and non-parametric methods, where the Cohen's effect exceeds the threshold of ± 1.1 , indicating a large effect strength. These results are consistent with the findings of Budnyk (2023), who notes that the development of critical thinking in older adults requires overcoming socio-cultural barriers, including limited access to digital resources and lack of prior experience with media. Its emphasis on critical pedagogy as a methodology that stimulates reflection and reasoned thinking is relevant in the context of our study, as it found a statistically significant correlation between age and media competence (-0.556 and -0.579 for both scales, respectively). However, other studies, such as Qi and Yang (2024), show ambivalent results: the authors point to an increase in the level of critical thinking among older people due to their life experience and a tendency to think analytically in an unstable information environment. However, such conclusions, according to our analysis, are not empirically confirmed in the digital information ecosystem, where not only life experience but also the ability to adapt to technology and digital navigation become decisive factors. In the context of the study by de Abreu Alecrim *et al.* (2025), which emphasizes the importance of integrating media education into adult continuing education programs, our results demonstrate the urgency of such educational interventions. The level of cognitive competencies in the older age group is critically insufficient, as evidenced by both average values and high coefficients of variation (0.459 for media literacy and 0.449 for critical thinking), which indicate uneven skills development in this category of respondents. Thus, the results of our study not only confirm but also deepen the ideas about the age determination of the development of media literacy and critical thinking available in the scientific literature.

The originality of this study lies in its simultaneous empirical assessment of both critical thinking and media literacy on large-scale data and the identification of their structural disproportions across age and education levels. While previous works (e.g., Park *et al.*, 2021; Lee, Cho & Kim, 2023; Yermachenko *et al.*, 2023) predominantly treated these constructs in isolation, our findings demonstrate the importance of analyzing them as interrelated but not fully overlapping domains. This contributes to the theoretical refinement of the cognitive-informational paradigm and provides empirical justification for integrated educational strategies. By situating our results within international literatures (McDougall, 2019; Zhang *et al.*, 2025 *etc.*), we also contribute to the comparability of findings across contexts, providing evidence that patterns observed in Ukraine reflect broader global trends. This enhances the study's impact and potential citability in the wider scientific community.

6. Conclusions

The study allowed us to empirically confirm that in the context of the digital transformation of the information environment, media literacy and critical thinking function as complementary cognitive and analytical constructs that ensure the ability of an individual to adequately navigate complex information flows, critically evaluate sources, recognize destructive influences, and formulate informed judgments. These findings address a significant research gap in Ukrainian scholarship, where the interrelation of media literacy and critical thinking under conditions of digital transformation has been insufficiently explored.

The study revealed the existence of deep intra-group disproportions in the levels of these competencies: almost half of the respondents demonstrate low or below average levels of both critical thinking and media literacy, which indicates the existence of a systemic deficit of information culture in the study sample. At the same time, the identified cognitive potential of some respondents indicates the possibility of successfully compensating for this deficit under the condition of systemic educational influence. This highlights the original contribution of the study: it formalizes an integrated approach to developing critical thinking and media literacy while providing empirical evidence of the effectiveness of formalized media education in fostering information resilience.

In response to the identified problems, the authors propose the introduction of comprehensive educational strategies based on the methodology of integrated development of critical thinking and media literacy. The results of the comparative analysis show that taking formalized media education courses provides significantly higher levels of formation of relevant competencies and lower variability of results, which confirms the effectiveness of such programs in increasing information resilience. Such an approach should include mastering digital skills, learning the basics of information security, developing critical communication and reflection skills, and identifying cognitive distortions and manipulative strategies in the media space. This approach not only strengthens individual information literacy but also provides a model for policy-makers and educational institutions to design targeted interventions for different socio-demographic groups.

Among the limitations of this study is the limited representativeness of the sample in terms of the socio-demographic spectrum, which limits the ability to generalize the results to a wide audience. In addition, the study focused mainly on quantitative indicators of competence formation, without covering the deep qualitative aspects of the processes of reflection, interpretation and cognitive modeling. Addressing these limitations in future research could offer a more nuanced understanding of the mechanisms through which media literacy and critical thinking develop in diverse populations.

Promising areas for further research include studying the impact of age, socio-cultural and behavioral variables on the dynamics of media literacy and critical thinking, modeling effective educational interventions in different types of learning environments, and developing indicators for assessing a person's resistance to information threats. Particular attention should be paid to the study of the long-term effect of integrated curricula aimed at the synergistic development of metacognitive skills in the context of digitalization.

Ethical Statement: This research did not involve human participants, animal subjects, or any material that requires ethical approval.

Use of artificial intelligence: The authors confirm that they did not use artificial intelligence technologies when creating the current work.

References

- A Bani Yassen, S. O. and Al Danani, A., 2023. Media Education and Digital Media: Nurturing Digital Literacy and Critical Thinking. *Journal of Namibian Studies*, 33, p. 604. Available at https://openurl.ebsco.com/EPDB%3Agcd%3A10%3A5727546/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A172998542&crl=c&link_origin=scholar.google.com.ua [Accessed 30 June 2025].
- Akimova, N., Akimova, A. and Akimova, A., 2022. Specificity of internet texts understanding in youth age. *Psycholinguistics*, 32(1), pp. 6–28. <https://doi.org/10.31470/2309-1797-2022-32-1-6-28>
- Alharbi, S. M., Elfeky, A. and Sultan, E., 2022. The effect of e-collaborative learning environment on development of critical thinking and higher order thinking skills. *Journal of Positive School Psychology*, 6(6), pp. 6848–6854. Available at https://www.researchgate.net/publication/368237806_The_Effect_Of_E-Collaborative_Learning_Environment_On_Development_Of_Critical_Thinking_And_Higher_Order_Thinking_Skills [Accessed 30 June 2025].
- Almulla, M. A. and Al-Rahmi, W. M., 2023. Integrated social cognitive theory with learning input factors: The effects of problem-solving skills and critical thinking skills on learning performance sustainability. *Sustainability*, 15(5), pp. 3978. <https://doi.org/10.3390/su15053978>
- Budnyk, O., 2023. Critical Pedagogy: Current Priorities and Prospects of Development. *Journal of Vasyl Stefanyk Precarpathian National University*, 10(1), pp. 7–23. <https://doi.org/10.15330/jpnu.10.1.7-23>
- Chen, L., Chen, J. and Xia, C., 2022. Social network behavior and public opinion manipulation. *Journal of Information Security and Applications*, 64, 103060. <https://doi.org/10.1016/j.jisa.2021.103060>
- de Abreu Alecrim, T. C., de Albuquerque, E. D. S., de Lira Silva, M., de Santana, J. D. L. and de Quental, O. B., 2025. Importance of continuing education in urgency and emergency practices in emergency care units. *Health and Society*, 5(01), pp. 69–80. <https://doi.org/10.51249/hs.v5i01.2389>
- Ekawati, W. and Jannah, M., 2025. Improving Students' Critical Thinking and Writing Skills: Implementation using Integrated Problem Based Learning JEMBER Model Development. *Journal of Posthumanism*, 5(5), pp. 3964–3974. <https://doi.org/10.63332/joph.v5i5.1839>
- González-Pérez, L. I. and Ramírez-Montoya, M. S., 2022. Components of Education 4.0 in 21st century skills frameworks: systematic review. *Sustainability*, 14(3), p. 1493. <https://doi.org/10.3390/su14031493>
- Hidayati, N., Suryanti, S., Rahmayumita, R. and Aisya, S., 2024. Development of Critical Thinking Skills Instruments: Cases for Essay Tests. *Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembelajaran*, 10(1), pp. 77–88. <https://doi.org/10.33394/jk.v10i1.10052>
- Jaboob, M., Hazaim, M. and Al-Ansi, A. M., 2025. Integration of generative AI techniques and applications in student behavior and cognitive achievement in Arab higher education. *International Journal of Human–Computer Interaction*, 41(1), pp. 353–366. <https://doi.org/10.1080/10447318.2023.2300016>

- Kiss, I., 2024. The Role of Media Literacy in the Development of Critical Thinking. *Sarajevo Social Science Review*, 13(1-2), pp. 15–37. <https://www.ceeol.com/search/article-detail?id=1300143>
- Lee, S., Cho, J. and Kim, S., 2023. Pathways to youth political participation: Media literacy, parental intervention, and cognitive mediation. *Mass Communication and Society*, 26(1), pp. 99–121. <https://doi.org/10.1080/15205436.2022.2122846>
- Martin, F., Sun, T., Turk, M. and Ritzhaupt, A. D., 2021. A meta-analysis on the effects of synchronous online learning on cognitive and affective educational outcomes. *International Review of Research in Open and Distributed Learning*, 22(3), pp. 205–242. <https://doi.org/10.19173/irrodl.v22i3.5263>
- McDougall, J. (2019). Media literacy versus fake news: critical thinking, resilience and civic engagement. *Media studies*, 10(19), 29-45. <https://doi.org/10.20901/ms.10.19.2>
- Oliveira, A. B., Cardoso, F., Salaberri, M. and Salgado, S., 2024. AI and media literacy integration in education: supporting digital transformation with digital literate. In: *ICERI2024 Proceedings*. (pp. 5907–5912). IATED. <https://doi.org/10.21125/iceri.2024.1428>
- Park, Y. M., Chae, J. H., Kim, S. K. and Kwon, H. S., 2021. The effects of media literacy education and its influence on digital citizenship: Focusing on CMF education programs in Korea. *The Journal of Information Systems*, 30(3), pp. 113–135. <https://doi.org/10.5859/KAIS.2021.30.3.113>
- Parker, J., 2024. The Role of Higher Education in the Post-Truth Era. *Journal of Political Science Education*, 20(3), pp. 391–404. <https://doi.org/10.1080/15512169.2024.2354972>
- Qi, C. and Yang, N., 2024. Digital resilience and technological stress in adolescents: A mixed-methods study of factors and interventions. *Education and Information Technologies*, 29(14), pp. 19067–19113. <https://doi.org/10.1007/s10639-024-12595-1>
- Santamaría-Cárdaba, N., Gajardo, K., Iglesias, J. C. and Ortega-Quevedo, V., 2024. Global Education and Critical Thinking: A Necessary Symbiosis to Educate for Critical Global Citizenship. *Open Education Studies*, 6(1). <https://doi.org/10.1515/edu-2024-0010>
- Shah, N. Z., Hamid, N. S., Mariadass, M. E. and Aziz, N. S. A., 2024. Fostering Critical Thinking Skills in Tertiary-Level Students for Media and Information Literacy. *International Journal of Advanced Research in Education and Society*, 6(3), pp. 107–123. <https://myjms.mohe.gov.my/index.php/ijares/article/view/27535>
- Tazhenova, G., Mikhaylova, N. and Turgunbayeva, B., 2024. Digital media in informal learning activities. *Education and Information Technologies*, 29(16), pp. 21673–21690. <https://doi.org/10.1007/s10639-024-12687-y>
- Tkacova, H., Pavlikova, M., Stranovska, E. and Kralik, R., 2023. Individual (non) resilience of university students to digital media manipulation after COVID-19 (case study of Slovak initiatives). *International Journal of Environmental Research and Public Health*, 20(2), pp. 1605. <https://doi.org/10.3390/ijerph20021605>
- Tommasi, F., Ceschi, A., Sartori, R., Gostimir, M., Passaia, G., Genero, S. and Belotto, S., 2023. Enhancing critical thinking and media literacy in the context of IVET: A systematic scoping review. *European Journal of Training and Development*, 47(1/2), pp. 85–104. <https://doi.org/10.1108/EJTD-06-2021-0074>
- Trixa, J. and Kaspar, K., 2024. Information literacy in the digital age: information sources, evaluation strategies, and perceived teaching competences of pre-service teachers. *Frontiers in Psychology*, 15, 1336436. <https://doi.org/10.3389/fpsyg.2024.1336436>
- Truba, H., Khrapatyi, S., Harashchuk, K., Shvets, D. and Proskurnia, A., 2024. Psycholinguistic underpinnings of image formation: Suggestion and manipulation in the educational network discourse. *Thinking Skills and Creativity*, 52, 101496. <https://doi.org/10.1016/j.tsc.2024.101496>
- Yermachenko, V., Bondarenko, D., Akimova, L., Karpa, M., Akimov, O., & Kalashnyk, N. (2023). Theory and practice of public management of smart infrastructure in the conditions of the digital society' development: Socio-economic aspects. *Economic Affairs (New Delhi)*, 68(1), 617-633. <https://doi.org/10.46852/0424-2513.1.2023.29>
- Zhang, C., Mohamad, E., Azlan, A. A., Wu, A., Ma, Y., & Qi, Y. (2025). Social media and eHealth literacy among older adults: systematic literature review. *Journal of medical Internet research*, 27, e66058. <https://doi.org/10.2196/66058>
- Zou, W., Drake, A. P., Masur, P. K., Whitlock, J. and Bazarova, N. N., 2024. Examining learners' engagement patterns and knowledge outcome in an experiential learning intervention for youth's social media literacy. *Computers & Education*, 216, 105046. <https://doi.org/10.1016/j.compedu.2024.105046>

Appendix A

Questionnaire

Level of critical thinking and media literacy

Block 1: Socio-demographic characteristics

1. Age: ____
up to 20 years old
21-25 years old

26-30 years old

31 and more

2. Gender:

Male

Female

3. Level of education:

Secondary

Higher incomplete

Higher

Academic degree

3. Have you taken any media literacy courses?

Yes

No

Block 2: Critical thinking

I analyze arguments before accepting a point of view.

I am able to find weaknesses in the logic of a message.

I often question commonly accepted statements.

I am able to make decisions based on analysis rather than emotions.

I can formulate several alternative views of a problem.

I evaluate possible consequences before making a decision.

I am able to structure information logically.

I am aware of biases in my own thinking.

Block 3: Media literacy

I check sources of information before trusting them.

I know how to check facts online.

I know how to distinguish between news, facts and value judgments.

I notice manipulative techniques in the media (emotions, headlines, etc.).

I know what disinformation is and how to recognize it.

I avoid sharing questionable information on social media.

I understand the principles of social media algorithms (what forms the feed).

I can explain why it is important to protect your personal data online.