Eastern Journal of European Studies
DOI: 10.47743/ejes-2025-0109 • June 2025 • VOLUME 16, ISSUE 1

Development of youth information and media literacy: analysis of non-formal educational activities

Marina Drushlyak ✉ [a], **Olena Semenog** [a], **Nataliia Ponomarenko** [b], **Myroslava Vovk** [c], **Dmytro Budianskyi** [a], **Olena Semenikhina** [a]
[a] Sumy State Pedagogical University named after A. S. Makarenko, Ukraine; [b] Machine Building College of SSU, Ukraine; [c] Ivan Zyazyun Institute of Pedagogical and Adult Education, Ukraine

Abstract: The development of information and media literacy among young people is particularly crucial in the context of hybrid warfare, disinformation, and growing digital threats. This study focuses on identifying the most effective forms of non-formal educational activities that contribute to strengthening youth competencies in this area. The research is based on the results of the "MEDIA & CAPSULES" project, implemented within the global IREX initiative "Learn and Discern: Media Literacy – National Deployment". The project included webinars, master classes, and information and media workshops, involving students, teachers, and lecturers. To assess information and media literacy, three key indicators were used: information literacy, media literacy, and digital security. Statistical methods (Student's t-test, ANOVA, and regression analysis) indicated that webinars most effectively improve information literacy, master classes enhance digital security, and workshops strengthen media literacy. The findings can inform the development of educational programs and confirm the effectiveness of integrating media education with the principles of digital citizenship in modern educational practices.

Keywords: information and media literacy, digital security, educational activity form, webinar meetings, master class, youth, non-formal educational activities

Introduction

In today's context of hybrid warfare, disinformation, and growing cyber threats, one of the most important skills for young people is the ability to think critically. They need to learn how to ask questions and look for well-reasoned, verified answers. Young people should be able to recognize fake news, manipulative content, and hostile information attacks. They must also learn to avoid cyber risks, distinguish between facts and opinions, check information sources, and understand the potential dangers of the digital environment (Abrams, 2024). These skills are especially

✉ Professor, Department of Mathematics, Physics and their Didactics, Sumy State Pedagogical University named after A. S. Makarenko; e-mail: marydru@fizmatsspu.sumy.ua.

important now, given the active use of information as a weapon against democratic societies, including Ukraine.

The global focus on media literacy is driven by the scale of fake news, disinformation campaigns targeting youth, and increasingly sophisticated forms of cyberbullying (Boston University College of Communication, 2024). For example, the spread of false information on social media can influence political decisions. It can also promote radical views and lower public trust in democratic institutions (The European Digital Media Observatory, n.d.). In this context, information and media literacy have strategic importance. They help shape responsible citizens who are capable of making informed decisions and taking part in democratic life. Integrating these skills into education is a key step toward building a resilient and informed society.

Information and media literacy are viewed as interconnected components of digital literacy. Media literacy involves understanding the role of media in society. It includes the ability to critically analyse content and interact with media while respecting ethical standards. Information literacy refers to the ability to find, verify, evaluate, and effectively use information. Both components help develop digital skills (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020).

At the level of international and European strategies (Commission of the European Communities. Directorate-General for Education and Culture, 2002), the development of information and media literacy is recognized as a key priority for the 21st century. In practice, this is reflected at both formal and informal levels. In academic institution, special courses are recommended as part of educational programs. These focus on skills such as fact-checking (Herrero-Diz et al., 2022), safe internet surfing (Torres-Hernández & Gallego-Arrufat, 2023), and information hygiene (Rudenko et al., 2023). Informal education is gaining special popularity. It offers a flexible and adaptive environment for developing information and media literacy (Vrabec et al., 2023).

Informal education is becoming particularly important in the context of rapid digitalization. This creates an urgent need for scholarly reflection and the search for effective forms of informal learning. Such forms should be capable of ensuring meaningful progress in youth information and media literacy development. The originality of this study lies in its focus on combining digital tools with interactive formats of non-formal education. These are aimed at developing youth information and media literacy in the context of current security challenges. Unlike most studies that focus on formal education or general media education strategies, the proposed approach addresses an existing gap. It analyses targeted non-formal learning practices in the context of information threats.

1. Literature review

The development of information and media literacy (IML) can take place within formal, informal, and non-formal education (Colley et al., 2003; UNESCO Institute for Lifelong Learning, 2012).

Formal education is institutional and structured, typically leading to certification or a diploma. In the context of IML, it includes the development and implementation of courses within the curriculum (Boateng, 2022; Kurt, 2015). It also involves elective media literacy courses introduced in educational institutions (Kurt, 2015). Additionally, it includes the integration of media literacy elements into official school subjects and disciplines (Brites et al., 2019).

For example, in Ghana, Boateng (2022) observes that teachers combine active learning methods (brainstorming, discussions) with creative tasks (presentations), which promote practical media knowledge acquisition. In Turkey, Kurt (2015) notes that media literacy courses are optional, indicating a variety of approaches within the formal education system. In Japan, researchers studied blended learning using LMS, where the analysis and discussion of media content contribute to the development of critical thinking (Zhang et al., 2020). This suggests the absence of a unified approach to IML development within formal education.

A generalization of media literacy practices shows that they are now based not only on media content but are also viewed through the lens of an interdisciplinary approach. Hobbs and Tuzel (2017) point out that teachers from different disciplines "value" and focus on the formation of media literacy in various ways. Korona and Hutchison (2023) highlight the importance of considering critical media consumption in the context of curricula. They stress the need for appropriate teacher training to integrate media literacy across subject areas. They provide examples of how media literacy can be formed in English learning, science learning, and social studies. In Seuferling et al. (2023), the authors emphasize the importance of including diverse geographical and socio-cultural contexts in the development of media literacy. The scholars also draw attention to the involvement of media, communications, or journalism professionals in various educational activities.

Informal education is unstructured learning that takes place through daily activities, interactions, self-education, and life experience. Informal education includes creating digital content independently (videos, blogs, infographics). It also involves informal commenting or analysing media content in personal social media spaces or media groups. Discussions of media products in communities or online forums (improvised actions, situation modelling, role-playing exercises) are also part of informal education (Errabo et al., 2019).

Informal education is often spontaneous (such as self-education, watching videos, or discussions on social media). It is less regulated but can have unexpectedly high potential. For example, Vanek (2021) shows that extracurricular activities, such

as running a school newspaper or participating in a journalism club, can promote the development of IML.

Pattnaik et al. (2023), based on the results of social media analysis, identified the actual topics discussed by non-expert users. These topics included digital security issues such as passwords, user authentication, viruses, distinguishing between fraud and genuine requests, secure Wi-Fi, security of web browsers on PCs, clearing cache memory and cookies, fighting adware, using VPNs, and privacy of smart home devices.

Findings confirm the effectiveness of training and special events aimed at developing educators in media education (Brites et al., 2019; Errabo et al., 2019). The practices vary from multimedia presentations to role-playing and simulation exercises.

Non-formal education is organized learning outside the formal education system. It does not always lead to a certificate but has a cohesive pedagogical design. Such learning includes: web quests as an interactive form of training (Sosniuk & Ostapenko, 2023); media literacy contests with educational goals (Pereira et al., 2017); teacher training sessions and workshops (Brites et al., 2019); interest-based clubs (journalism clubs, school websites, editorial offices) (Vanek, 2021); and educational events in the form of masterclasses, workshops, intensives, etc.

Scholefield and Shepherd (2019) describe the use of gamification methods to raise general awareness of digital security as part of IML. Practices for the informal development of information literacy are outlined in (Lundh et al., 2018). The authors confirm the experience of implementing informational reading as an interaction among students during the reading of popular science texts. The training involves individual and group work with tables following a developed methodology. Coiro (2009) emphasizes the differences in text understanding between "reading on paper" and reading on the Internet. He argues that, to work with online content, students must be able to generate search queries, critically assess the reliability of information, and synthesize the most reliable and relevant information from texts. He highlights the practicality of organizing informal educational activities to develop information literacy. Wu and Peng (2016) recommend focusing on cognitive abilities related to text comprehension and developing navigation skills as important predictors of information literacy in interactive interaction.

In Ukraine, the most common informal events for developing media literacy are online and offline training on digital platforms. According to the statistics of the Academy of Ukrainian Press Charitable Foundation (https://www.aup.com.ua/), 536 events were held in 2023. These events included webinars, presentations, round tables, online bridges, and offline training. They were attended by 99,731 people.

The analysis of the literature shows that various educational activities can be used to develop IML in young people. However, no studies clearly identify which form of non-formal education is most effective for developing youth IML. Thus, the article goal is to compare the impact of different educational activities on the development of youth IML.

The achievement of this goal led to the solution of the following tasks: (1) to describe the educational activities used to develop youth IML within the "MEDIA & CAPSULES" project (https://rctpd.sspu.edu.ua/). This project is part of the global initiative "Learn and Discern: Media Literacy – National Deployment" by IREX in Ukraine; (2) to study the impact of different non-formal educational activities on the development of youth IML.

2. Data and materials

The study was conducted within the framework of the "MEDIA & CAPSULES" project (the Project) during 2020-2021. The goal of the Project was to develop IML among young people through non-formal education.

The Project targeted different audiences:

- students majoring in Secondary Education (Ukrainian Language and Literature), Philology (Ukrainian Language and Literature), Primary Education, and Journalism – a total of 256 participants;
- university lecturers and researchers from the following institutions: Sumy State Pedagogical University named after A. S. Makarenko, Hluxiv National Pedagogical University named after Oleksandr Dovzhenko, Vasyl' Stus Donetsk National University (Vinnytsia), National University of "Kyiv-Mohyla Academy", the Ukrainian Lingua-Information Foundation of the National Academy of Sciences of Ukraine, Lutsk Pedagogical College of the Volyn Regional Council, Ivan Franko Pryluky Pedagogical College of the Chernihiv Regional Council, Machine-Building College of Sumy State University, and Mykhailo Hrushevskyi Bar Humanitarian-Pedagogical College – a total of 256 participants;
- teachers of linguistic educational institutions, including Sumy Gymnasium No. 1, Demyanivka School (Donetsk region), Divska General Education School, and institutions under the Sukhopolovianska Village Council in the Chernihiv region – a total of 158 participants.

Within the Project, various educational activities were conducted. These were accompanied by participant surveys to assess the development of IML. Due to COVID-19 restrictions, academic activities were limited. Only webinars, workshops, and masterclasses were held. More than 1,000 participants attended these events. Each event made it possible to collect different types of materials for analysis. These included methodological, didactic, and empirical data (Project "MEDIA & CAPSULES" – https://rctpd.sspu.edu.ua/, MEDIA&TEACHER Campus – http://surl.li/bwsae, http://surl.li/afnub).

3. Research methodology

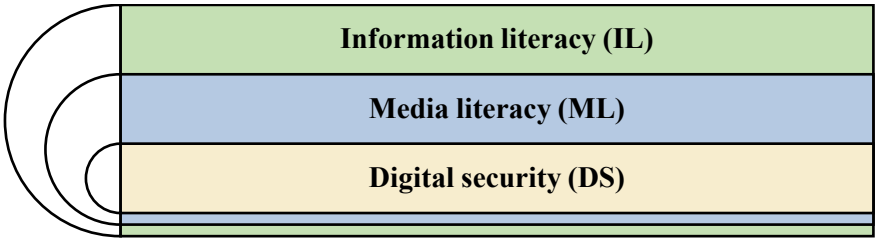
Different indicators are used to describe the development of IML (Arke & Primack, 2009; Drushlyak et al., 2022). These include critical thinking, media literacy, social tolerance, resistance to manipulation, digital security, and both information and visual literacy.

We focused on three indicators that we believe best reflect the essence of IML (Figure 1). Information literacy (IL) refers to the ability to search for and organize information effectively. It includes working with sources and primary documents, distinguishing facts from opinions, and evaluating alternative viewpoints.

Media literacy (ML) is the ability to think critically about media. It involves understanding how media influence people and interacting with media content in a responsible way.

Digital security (DS) means using modern information technologies and software safely and ethically. It also includes privacy management, awareness of one's digital footprint, and basic cybersecurity skills. These skills include avoiding fraud, malware, and recognizing online threats such as cyberbullying and grooming.

Figure 1. Indicators of information and media literacy



Source: authors' representation

In this study, we track the development of IML using these indicators. The research tool was a questionnaire that included closed-ended questions based on (Vakulenko et al., 2017) and sources from the Internet. The questions changed but were the same type for each event and the answer options included typical mistakes (the questionnaire was updated for each event to ensure that participants in several events did not know the questions in advance). In this way, we protected ourselves from irrelevant assessments. We provide the questionnaire in Appendix A. Questions 1-5 assess information literacy, questions 6-10 assess media literacy, and questions 11-15 assess digital security.

We conducted the survey twice – at the beginning and at the end of each event. Each correct answer was given one point. Every indicator was assessed using five questions, with a maximum score of 5 points per indicator. We grouped the results according to the type of educational activity. For statistical analysis, the answers of the participants of the events were used (Table 1).

Table 1. Quantitative distribution of participants

Event Form	F1	F2	F3
Total number of participants	201	202	188
Total number of questionnaires (before and after responses)	402	404	376

Source: authors' representation

To standardize the calculations and ensure comparability of the results, we formed a representative sample of surveys for each learning format (before and after each educational activity). The selection was made randomly from fully completed surveys that contained answers to all questions before and after testing. We collected 300 such surveys from 150 participants for each type of activity (F1, F2, F3). In doing so, we aimed to maintain parity in the surveys from different participants aged 30 or younger: 100-110 students, 25-30 lecturers and researchers, and 15-20 teachers. This approach ensured a sufficient volume for statistical analysis while maintaining balance between the groups.

We used several statistical methods to analyse the results. These included the Student's t-test for independent samples, ANOVA (analysis of variance) to compare mean values between groups, and ordinary least squares (OLS) linear regression to examine the relationship between the event format and changes in scores of IML indicators. Importantly, we treated the score increase (post-test minus pre-test) as the dependent variable. This allowed us to assess the effectiveness of each format.

To evaluate the impact of educational interventions on IML development, we used ANOVA to test the hypothesis of group differences. We also applied the independent samples Student's t-test, as respondents were not identified before and after the intervention. This approach ensured that the assumptions of parametric analysis were met and that conclusions remained valid. Such analysis made it possible to assess the effectiveness of the intervention based on the assumptions of normal distribution and sample independence.

To analyse the relationship between the learning form and the effectiveness of developing specific components of IML, a linear regression model was applied. This approach allowed us to assess how changes (gains) in scores for each indicator depend on the format of non-formal learning (webinar, masterclass, workshop). For each indicator (IL, ML, DS), a formalized model was constructed:

$$Y_i=\beta_0+\beta_1 D_{F2,i}+\beta_2 D_{F3,i}+\varepsilon_i, \text{ where:}$$

Y_i – score gain for a given indicator (IL, ML, DS);

β_0 – the intercept, corresponding to the form F1 (webinar);

$D_{F2,i}$, $D_{F3,i}$ – dummy variables were used, taking the value of 1 for the corresponding format (F2 – masterclass or F3 – workshop), and 0 otherwise;

- β_1, β_2 – the difference in the average gain between formats F2 and F3 relative to F1;
- ε_i – error for a given indicator.

Thus, the coefficients β_1 and β_2 are interpreted as the difference in the average score gain of participants in formats F2 or F3 compared to format F1. This approach allowed us not only to compare the effectiveness of the formats but also to identify statistically significant advantages.

For the calculations, we used the spreadsheet software MS Excel. We computed the mean values and tested the significance of differences using the t-test and ANOVA. Additionally, we performed regression analysis using the LINEST function, which implements the least squares method.

4. Results

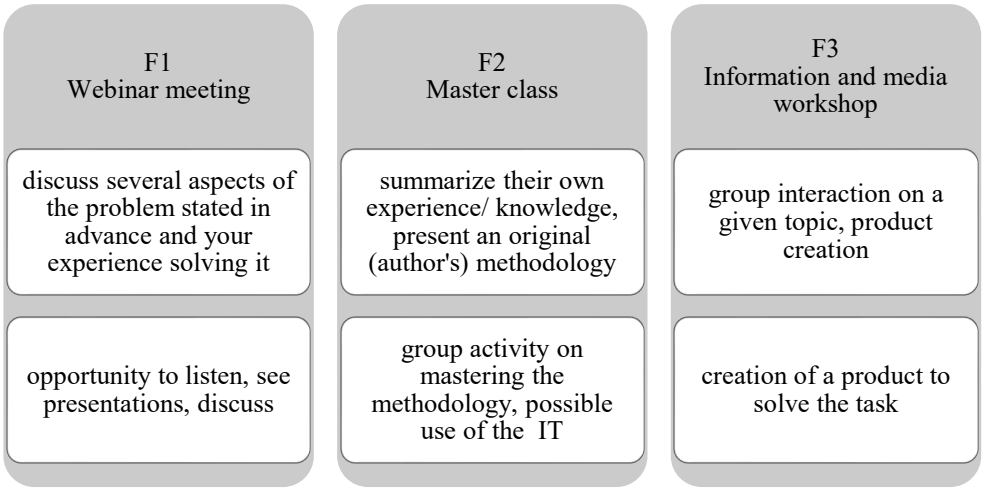
4.1. Educational activity forms used for the development of IML within the Project framework

In general, the activities took the following educational activity forms:

- (F1) Webinar meeting is a type of educational activity that takes place in real time on the Zoom platform. During the webinar, several aspects of a pre-defined issue are discussed, along with experiences related to solving it. Participants can listen to main speakers and view their presentation materials. After the presentations, they can ask questions or share their own experiences;
- (F2) Master class is a real-time Zoom-based meeting where the speaker shares personal experience and structured knowledge on a selected topic. The speaker presents an original (author's) method that they aim to promote for broader use. During the event, participants are divided into groups. Under the guidance of the speaker or following step-by-step instructions, each group tries to apply the presented method, technique, or technology;
- (F3) Information and media workshop is a real-time group interaction session on Zoom. At the start, each group receives a task focused on a specific topic. The task involves creating a digital product that is later presented as a solution to the assigned problem;
- (F4) Online Media Marathon is also conducted in real time via Zoom. Unlike the previous formats, it combines various elements such as speeches, discussions, project presentations, mini-master classes, and mini-workshops. It also has a longer duration.

Because the online media marathon combines features of the first three formats, it was excluded from the data analysis. Only the first three formats (see Figure 2) were used as the basis for the empirical and statistical analysis. The goal was to identify which forms are the most effective for improving IML.

Figure 2. Characteristics of different forms of IML development



Source: authors' representation

Webinar meetings (F1) were attended by digital security specialists. They addressed the issues of safe Internet surfing and digital communication. Journalists also participated and revealed the problems of the profession's media nature and journalistic standards. Teacher participants shared their experience in the formation of media literacy. They explained how to distinguish between facts and judgments about a writer from a textbook. They also demonstrated how to write a resume on behalf of a writer in Canva. Additionally, they taught how to ask open-ended or closed-ended questions, create memes, stickers packs, comics, advertising, covers, etc. Using the example of working with literary texts, the speakers described practices for developing IML in the lessons of the Ukrainian language and literature.

Participants of the workshops (F2) joined the mastering of technologies for recognizing manipulations in the media. They discussed stereotypes on common media cases and well-known examples from fiction. Participants learned to analyze their own perception of the media. They assessed the impact that the media has on their beliefs, opinions, and priorities. During the group work, the participants characterized their own information bubbles. They also gained experience verifying the accuracy of sources, fact-checking, and safely working with online content. Participants deepened their knowledge of digital corpus technologies and their importance in countering fakes and disinformation. They developed digital security skills, including proper use of social networks, setting complex passwords, using antivirus programs, and enabling double authentication. They also learned how to protect against online fraud and malware.

During the info-media workshops (F3), groups of participants created original media products. They then presented them to other participants. Group activities

were related to textual materials to identify markers of disinformation, narratives, hate speech, and analysis of examples of newspeak. Participants demonstrated their own media products and didactic materials, such as a didactic case on the Padlet online board and interactive exercises for developing critical thinking and media literacy.

4.2. Statistical analysis of results

The results of the calculations using Student's t-test (before/after) are presented in Table 2.

Table 2. Results of the Student's t-test (before/after)

Learning Activity	Indicator	Mean (before)	Mean (after)	t-statistic	p-value
F1 (webinar)	IL	2.7	3.7	-5.75	<0.001
	ML	2.6	2.7	-0.54	0.59
	DS	2.3	2.5	-0.93	0.35
	IML	7.6	8.8	-3.98	<0.001
F2 (master class)	IL	3.0	3.18	-1.38	0.17
	ML	2.5	3.9	-7.01	<0.001
	DS	2.7	3.8	-8.02	<0.001
	IML	8.2	10.9	-9.50	<0.001
F3 (workshop)	IL	2.4	3.1	-4.21	<0.001
	ML	2.4	3.9	-8.17	<0.001
	DS	2.4	3.2	-4.67	<0.001
	IML	7.2	10.14	-11.19	<0.001

Source: authors' representation

The analysis of the calculations shows that F1 (webinar) is effective only for the "information literacy" indicator, F2 (master class) is effective for the "media literacy" and "digital security" indicators, and F3 (workshop) is effective for all three indicators. The increase in mean values indicates the overall development of the respondents' knowledge and skills, which we interpret as evidence of the effectiveness of specific forms of non-formal education in improving the IL, ML, and DS indicators. The results of the analysis of variance (ANOVA) are presented in Table 3.

The analysis of Table 3 shows that the learning form affects the gain in knowledge and skills across all indicators. The highest F-statistic value was recorded for ML. This indicates the greatest differentiated effectiveness of the formats specifically for this indicator. The reduction in variance and the increase in mean values after participation in the events indicate a leveling of participants' preparation levels.

Table 3. Results of ANOVA

Indicator	F-statistic	p-value	Conclusion
IL	5.36	0.0050	Significant
ML	15.64	<0.001	Highly significant
DS	8.50	<0.001	Significant
IML	11.35	<0.001	Significant

Source: authors' representation

The analysis of the values in this table also shows that the form of learning activity significantly influences the development of IML indicators. The largest differences (more stable results) are observed for the ML indicator. The statistical analysis results indicate positive shifts for all indicators (IL, ML, DS) after the training, regardless of its format. At the same time, the decrease in variance along with the increase in the average level (as observed, in particular, for DS after the master class) suggests that the participants' preparation levels have been aligned. This dynamic indicates that the chosen form of educational activity was effective for respondents with different initial levels. It contributed not only to the overall growth but also to reducing the gaps between participants. This is a sign of inclusivity and methodological adaptability of the learning process.

To clarify the nature of the relationships between the form of learning activity and the development of IML, we applied multiple linear regression analysis. The goal was to determine which form of learning activity (webinar – F1, masterclass – F2, workshop – F3) provides the greatest increase in each indicator: information literacy (IL), media literacy (ML), digital security (DS).

The model allowed us to assess the relative contribution of each format according to the different indicators (see Table 4).

Table 4. Results of the regression analysis

Indicator	F (model	p (model)	Conclusion	β_0 (F1)	p	β_1 (F2)	p	β_2 (F3)	R^2
IL	5.36	0.005	The model is significant	+0.91	<0.001	–0.70	0.002	–0.21	0.031
ML	15.64	<0.001	The model is significant	+0.11	0.578	+1.35	<0.001	+1.30	0.065
DS	8.50	<0.001	The model is significant	+0.17	0.295	+0.96	<0.001	+0.60	0.036

Note*:* F1 – webinar (base form), F2 – masterclass, F3 – workshop. The values of the coefficients β indicate the change relative to the base form.
Source: authors' representation

Table 4 presents the results of multiple regression analyzing the gain for each indicator across different learning formats. For the information literacy (IL) indicator, the average gain in the webinar group (F1) is +0.91 ($p<0.001$). The masterclass (F2) is associated with a decrease in this gain by –0.70 ($p=0.002$). Participation in the workshop (F3) changes the gain by –0.21 ($p=0.331$), which is not statistically significant. Thus, the webinar format shows the strongest association with improvements in information literacy. The coefficient of determination, $R^2 = 0.031$, indicates a weak but statistically significant explanatory power of the model.

Regarding the media literacy (ML) indicator, the baseline gain in the webinar group is +0.11 ($p=0.578$) and is not statistically significant. In contrast, participation in the masterclass (F2) shows an additional gain of +1.35 ($p<0.001$), and the workshop (F3) shows +1.27 ($p<0.001$). Therefore, both alternative learning formats are statistically significantly associated with higher development of media literacy compared to the webinar, with the masterclass having a slight advantage. This model demonstrates better explanatory power compared to the others ($R^2=0.065$).

For digital security (DS), the baseline gain in the webinar group is +0.17 ($p=0.295$), which is not statistically significant. Participants in the masterclass (F2) showed a gain of +0.96 ($p<0.001$), while those in the workshop (F3) had a gain of +0.65 ($p=0.011$). Thus, the most substantial gain in digital security is associated with the masterclass format, which demonstrates a significant increase over the baseline. The explanatory power of the model in this case is $R^2=0.036$.

Summarizing the regression analysis results, it can be stated that the webinar format is associated with a higher gain in information literacy. The masterclass format corresponds to a more pronounced increase in digital security. Meanwhile, the workshop showed the strongest association with the development of media literacy. These differences are statistically significant and may indicate a potential influence of the educational format on the respective components of information and media literacy.

5. Discussion

The development of IML across all indicators, regardless of the form of the event, was expected. No matter the format of the educational activity, the material used was accompanied by examples and tasks aimed at developing critical thinking, the ability to identify manipulation markers, fake news, and disinformation, as well as fostering informational and emotional resilience. We took into account the recommendations of Hobbs and Tuzel (2017), Korona and Hutchison (2023), Seuferling et al. (2023) on varying different contexts, which proved to be effective. In the final survey, respondents noted that they were able to better understand the positive and negative sides of social media. They became more educated media consumers and felt more confident when searching for information and interacting with manipulative content. These results align with the conclusions of Jeong et al.

(2012), whose meta-analysis confirms the effectiveness of media literacy programs in shaping knowledge, attitudes, and behavioral intentions. Moreover, active participation and discussion, as key components of programs mentioned in Dongxue and Nagappan (2024), proved effective in our study as well.

At the same time, it is important to note that the quantitative measure of IML development is not yet established. Pereira and Moura (2022) emphasize the need for methodological convergence and the identification of valid and reliable indicators that should be context- and subject-dependent. Our choice of indicators – information literacy, media literacy, and digital security – for the development of IML is based on their conceptual complementarity and alignment with international approaches to defining media and information competence. Information literacy provides the basic level of orientation in the information environment, including the ability to search, evaluate, and ethically use information (Livingstone et al., 2008). Media literacy enables critical thinking, recognizing fake news and manipulation, and creating one's own media content, which forms the foundation of active information citizenship (Mihailidis & Thevenin, 2013). Digital security is essential for the sustainable use of digital technologies, protecting personal data, and ensuring safe interaction in the digital space, which is especially emphasized in updated international programs on media and information literacy (UNESCO, 2021). The integration of these three indicators allows for the assessment of IML across various dimensions.

We agree with the emphasis by researchers (Kosheliuk et al., 2021) on using group learning formats, where discussions and tasks require interaction. This approach aligns with student-centered pedagogical strategies, which are justifiably implemented in the study (Dongxue & Nagappan, 2024). As a result of the Project, participants gained skills in interpreting interview texts and reports, considering their specifics and structure. They learned to distinguish information from one or more media sources, identify topics and subtopics, and differentiate essential and secondary details in media messages. They also learned to identify the relationships between content, structure, and language in media texts from different styles and genres. Participants were able to compose texts in various types (TV, radio) and genres (news, notes, reports, interviews, essays, features) while considering structural, semantic, linguistic, and stylistic features. They learned to select, use, and create pedagogically appropriate media texts according to the topic or stage of the lesson. They worked with facts and arguments, analysed photos, posters, and infographics, and created media texts in different genres. They were able to explain their own interpretation of the received information, recognize typical verbal and non-verbal cues that indicate manipulation, propaganda, or hidden content in a message. They mastered communication techniques for interacting in online spaces and developed skills to combat fake news and hate speech. They also developed interpersonal communication skills and effective interaction with others. This confirms readiness for constructive dialogue regarding the formation of media values

in young people. It is especially important in the context of manipulative influence from the aggressor country and the rising levels of conflict.

The results of our study are consistent with the findings of the international project (Belgium, Finland, France, England, Italy, and Portugal). Ranieri and Bruni (2018) highlight the most interesting learning scenarios for preschool teachers: webinars, resource searching and editing, media analysis, media activity, group work, web discussions, and collaborative work via wikis. These strategies align with the results of our research, where the effectiveness of webinars and group interaction in developing information media literacy was noted.

Additionally, our study observed positive dynamics in the growth of mean values for all components of media literacy, which is in line with the results of studies on adolescent media education programs (Maness et al., 2022). The integration of media literacy into interdisciplinary learning, as noted by Korona and Hutchison (2023), confirms the relevance of our approach to contextual content delivery in education. Furthermore, the results of the systematic review by Cogitatio Press (d'Haenens et al., 2025) emphasize the importance of a structured approach to measuring media education outcomes, which aligns with our methodological principles.

The obtained regression coefficients confirmed that workshops are a significant predictor of improved digital security, while webinars show a positive, though less pronounced, association with the development of information literacy. Although regression analysis allows identifying statistical relationships, its results do not provide conclusive evidence of a causal impact of non-formal education formats on the development of IML. We believe that to confirm these conclusions, a different experimental design with control groups and additional variables (e.g., baseline knowledge level, participant motivation, cognitive styles) would be needed.

The results of the study correlate with the theoretical foundations of critical media education, which emphasizes the development of the ability to question the content of messages, analyse their sources, identify ideological positions, and form an active civic stance (Kellner & Share, 2007). According to this theory, the main goal of media education is not only to develop technical skills but, above all, to foster critical consciousness. This fully aligns with the results of our study: participants showed a significant increase in their ability to analyse information, recognize fake news and manipulations, and understand the risks of the digital environment.

The empirical data obtained follow the principles of the theory of information or digital citizenship, which states that citizens should not only have access to information but also the skills to use it ethically, safely, and responsibly (Ribble, 2015). The increase in digital security levels among project participants (confirmed by regression analysis) indicates the formation of components of information citizenship: protecting personal data, safe behaviour in the digital environment, and responsible attitudes towards online communication.

We acknowledge the limitations of the conducted study. First, the sample only included respondents who voluntarily participated in non-formal learning, and thus they may have higher motivation or prior knowledge about information and media literacy. Secondly, the study did not track the long-term effects of the project, so the stability of the results over time remains an open question. Thirdly, the participants' age and education were not considered during data collection, which may affect the generalizability of the results (today's youth typically have a higher level of digital skills than the adult population). At the same time, it should be noted that participants' ages ranged from 16 to 30 years. This range covers two adjacent age categories according to WHO and UNESCO classifications: youth (15–24 years) and young adults (25–30 years). Fourthly, the use of Excel for statistical analysis limited the ability to test several key assumptions of regression modelling. These include the normality of residuals and homoscedasticity.

Conclusions

The analysis and synthesis of international and domestic documents and scholarly sources indicate that information and media literacy, as a key life skill of the 21st century, integrates information literacy, media literacy, and digital security. Within the framework of the "Media & Capsules" project, we conducted a comparative study of the impact of three forms of non-formal education (webinars, workshops, and master classes) on the development of these components of IML.

Statistical analysis (Student's t-test and ANOVA for independent samples, as well as regression analysis) showed a statistically significant relationship between IML indicators (information literacy, media literacy, and digital security) and various forms of educational activities. Webinars were found to be more effective for developing information literacy, master classes for developing digital security, and workshops for developing media literacy. To clarify the nature of the relationships between the form of learning activity and the level of IML formation, we applied regression analysis. The obtained regression coefficients indicate that masterclasses can be considered significant predictors of gains in media literacy and digital security. In contrast, participation in webinars is associated with an increase in information literacy, although to a lesser extent.

The results indicate potential benefits for developing formal and non-formal education programs in media literacy. They point to the effectiveness of a pedagogical approach that combines media education with components of digital/information citizenship in the context of contemporary social and political challenges. In the future, it will be important to conduct a deeper analysis of the impact of new technologies, particularly artificial intelligence, on critical thinking, resilience to manipulation, and safe digital behavior in the digital society. The results also point to the need for further study of the effectiveness of other educational formats based on other indicators of IML. The study of the relationship between the

form of learning activity and the individual styles of information perception among participants is also a promising direction for interdisciplinary analysis.

References

Abrams, Z. (2024). How to teach students critical thinking skills to combat misinformation online. *Monitor on Psychology*, *55*(6).

Arke, E. T., & Primack, B. A. (2009). Quantifying media literacy: Development, reliability, and validity of a new measure. *Educational media international*, *46*(1), 53-65. https://doi.org/10.1080/09523980902780958

Boateng, A. B. (2022). New Media Literacy Education in Communication Training in Ghana: Evidence from Two Public Universities. *Media Literacy and Academic Research*, *5*(2), 196–211.

Boston University College of Communication. (2024). *Media literacy skills important to counter disinformation, survey says*. https://surl.lu/qeeqgo

Brites, M. J., Gerrard, A., Contreras-Pulido, P., & Jaramillo-Dent, D. (2019). Teachers and media literacy improvements, the relevance of specific training. In L. Gómez Chova, A. López Martínez, & I. Candel Torres (Eds.), *INTED2019 Proceedings* (pp. 1909-1914). IATED Academy. https://doi.org/10.21125/inted.2019.0535

Coiro, J. (2009). Rethinking reading assessment in a digital age: How is reading comprehension different and where do we turn now. *Educational Leadership*, *66*(6). 59-63.

Colley, H., Hodkinson, P., & Malcolm, J. (2003). *Informality and formality in learning: A report for the Learning and Skills Research Centre*. Learning and Skills Research Centre. https://dera.ioe.ac.uk/5950/

Commission of the European Communities. Directorate-General for Education and Culture. (2002). *European Report on Quality Indicators of Lifelong Learning: Fifteen Quality Indicators. Report Based on the Work of the Working group on Quality Indicators*. European Commission. https://files.eric.ed.gov/fulltext/ED481329.pdf

d'Haenens, L., Vissenberg, J., Puusepp, M., Edisherashvili, N., Martinez-Castro, D., Helsper, E., Tomczyk, Ł., Azadi, T., Opozda-Suder, S., Maksniemi, E., Spurava, G., Salmela-Aro, K., Sormanen, N., Tiihonen, S., Wilska, T.-A., Hietajärvi, L., Martinez, G., Larrañaga, N., Garmendia, M., & Sepielak, D. (2025). Fostering Media Literacy: A Systematic Evidence Review of Intervention Effectiveness for Diverse Target Groups. *Media and Communication*, *13.* 8901. https://doi.org/10.17645/mac.8901

Dongxue, T., & Nagappan, R. (2024). Pedagogical Strategies in Media Literacy Education and their Alignment with Student-Centered Learning. *International Journal of Academic Research in Business and Social Sciences*, *14*(9), 439–450. http://dx.doi.org/10.6007/IJARBSS/v14-i9/22806

Drushlyak, M. G., Semenog, O. M., Hrona, N. V., Ponomarenko, N. P., & Semenikhina, O. V. (2022). Typology of Internet Resources for the Development of Youth's Infomedia Literacy. *Information Technologies and Learning Tools*, *88*(2), 1–22. https://doi.org/10.33407/itlt.v88i2.4786

Errabo, D., Berdan, M., & Prudente, M. (2019). Elucidation of essential maps for 4Cs and information-media literacy. In *Proceedings of the 10th International Conference on E-Education, E-Business, E-Management and E-Learning* (pp. 276–280). Association for Computing Machinery. https://doi.org/10.1145/3306500.3306553

Herrero-Diz, P., Pérez-Escolar, M., & Aramburu, D. V. (2022). Competencias de verificación de contenidos: Una propuesta para los estudios de Comunicación [Content verification competencies: A proposal for Communication Studies]. *Revista de Comunicación*, *21*(1), 231-249. http://dx.doi.org/10.26441/rc21.1-2022-a12

Hobbs, R., & Tuzel, S. (2017). Teacher motivations for digital and media literacy: An examination of Turkish educators. *British Journal of Educational Technology*, *48*(1), 7-22. https://doi.org/10.1111/bjet.12326

Jeong, S.H., Cho, H., & Hwang, Y. (2012). Media Literacy Interventions: A Meta-Analytic Review. *Journal of Communication*, *62(*3), 454-472. https://doi.org/10.1111/j.1460-2466.2012.01643.x

Kellner, D., & Share, J. (2007). Critical media literacy, democracy, and the reconstruction of education. In D. Macedo, & S.R. Steinberg (Eds.), *Media literacy: A reader* (pp. 3-23). Peter Lang Publishing. https://surl.li/jiihrw

Korona, M., & Hutchison, A. (2023). Integrating Media Literacy Across the Content Areas. *Reading Research Quarterly*, *58*(4), 601-623. https://doi.org/10.1002/rrq.517

Kosheliuk, O., Shulska, N., & Blahovirna, N. (2021). Let's Go Virtual… How Digital Communications Affect Youth Media Literacy Education in High School: The Ukrainian Experience. *Media Literacy and Academic Research*, *4*(2), 187-204.

Kurt, H. (2015). Acritical Review to the Media which Constructed in Media Literary Course in Secondary Education. *Procedia - Social and Behavioral Sciences*, *174*, 711–719. https://doi.org/10.1016/j.sbspro.2015.01.606

Livingstone, S., Van Couvering, E., & Thumim, N. (2008). *Converging traditions of research on media and information literacies: Disciplinary, critical, and methodological issues*. Cambridge University Press.

Lundh, A. H., Dolatkhah, M., & Limberg, L. (2018). From informational reading to information literacy: Change and continuity in document work in Swedish schools. *Journal of Documentatio*n, *74*(5), 1042–1052. https://doi.org/10.1108/JD-11-2017-0156

Maness, S. B., Kershner, S. H., George, T. P., Pozsik, J. T., Gibson, M., & Marcano, D. (2022). Evaluation of a media literacy education program for sexual health promotion in older adolescents implemented in Southern universities. *Journal of American College Health*, *72*(5), 1561–1567. https://doi.org/10.1080/07448481.2022.2083917

Mihailidis, P., & Thevenin, B. (2013). Media literacy as a core competency for engaged citizenship in participatory democracy. *American Behavioral Scientist, 57*(11), 1611–1622. https://doi.org/10.1177/0002764213489015

Pattnaik, N., Li, S., & Nurse, J. R. C. (2023). Perspectives of non-expert users on cyber security and privacy: An analysis of online discussions on twitter. *Computers & Security*, *125*, 103008. https://doi.org/10.1016/j.cose.2022.103008

Pereira, L., Jorge, A., & Brites, M. J. (2017). Media Education Competitions: An Efficient Strategy For Digital Literacies? *Italian Journal of Sociology of Education*, *9/1*, 77–92. https://doi.org/10.14658/PUPJ-IJSE-2017-1-5

Pereira, S., & Moura, P. (2022). Assessing media literacy competences: Reflections and recommendations from a quantitative study. *Journal of Media Literacy Education*, *14*(3), 79–93. https://doi.org/10.23860/JMLE-2022-14-3-7

Ranieri, M., & Bruni, I. (2018). Promoting Digital and Media Competences of pre- and in-Service Teachers. Research Findings of a Project from six European Countries. *Journal of E-Learning and Knowledge Society*, *14*(2), 111-125. https://doi.org/10.20368/1971-8829/1497

Ribble, M. (2015). *Digital Citizenship in Schools: Nine Elements All Students Should Know* (3rd ed.). International Society for Technology in Education.

Rudenko, Y. O., Drushlyak, M. G., Shamonia, V. G., Ostroha, M. M., & Semenikhina, O. V. (2023). Development of Student's Ability to Resist Information Influences, *Information Technologies and Learning Tools*, *94*(2), 54–71. https://doi.org/10.33407/itlt.v94i2.5162

Scholefield, S., & Shepherd, L. A. (2019). Gamification Techniques for Raising Cyber Security Awareness. In A. Moallem (Ed.), *HCI for Cybersecurity, Privacy and Trust* (pp. 191–203). Springer International Publishing. https://doi.org/10.1007/978-3-030-22351-9_13

Seuferling, Ph., Forsler, I., King, G., Löfgren, I., & Saati, F. (2023). Diraya.media-Learning Media Literacy with and From Media Activists. *International Journal of Communication*, *17*, 901-919.

Sosniuk, O., & Ostapenko, I. (2023). The development of media literacy and competence of students in educational practice. In *13th International Conference DisCo 2018: Overcoming the Challenges and Barriers in Open Education*.

The European Digital Media Observatory. (n.d.). *The importance of media literacy in countering disinformation*. https://edmo.eu/areas-of-activities/media-literacy/the-importance-of-media-literacy-in-countering-disinformation/

Torres-Hernández, N., & Gallego-Arrufat, M.-J. (2023). Pre-service teachers' perceptions of data protection in primary education. *Contemporary Educational Technology*, *15*(1), ep399. https://doi.org/10.30935/cedtech/12658

United Nations Educational, Scientific and Cultural Organization Institue for Lifelong Learning. (2012). *Harnessing the power and potential of adult learning and education for a viable future*. https://uil.unesco.org/fileadmin/keydocuments/AdultEducation/en/Bel%C3%A9m%20Framework%20for%20Action.pdf

United Nations Educational, Scientific and Cultural Organization. (2021). *Media and Information Literacy Curriculum for Educators and Learners* (2nd ed.). https://unesdoc.unesco.org/ark:/48223/pf0000377067

United Nations Educational, Scientific and Cultural Organization. (2020). *Media and Information Literacy*. https://www.unesco.org/en/media-information-literacy

Vakulenko, T. S., Lomakovych, S. V., & Tereshchenko, V. M. (2017). *PISA: Reading Literacy*. UCEQA. https://kristti.com.ua/wp-content/uploads/2018/04/PISA_Reading.pdf

Vanek, K. (2021). Media literacy in extracurricular activities. In V. Lubkina, L. Danilane, & O. Vindaca (Eds.), *Society. Integration. Education: Vol.2. Proceedings of the International Scientific Conference* (pp. 613-623). https://doi.org/10.17770/sie2021vol2.6218

Vrabec, N., Kačinová, V., Kitsa, M., & Majda, M. (2023). Non-Formal Education Focused on the Development of Critical Thinking and Media Literacy: The Role and Activities of Key Stakeholders in Slovakia. *Journal of Education Culture and Society*, *14*(1), 493-502. https://doi.org/10.15503/jecs2023.1.493.502

Wu, J. Y., & Peng, Y.-C. (2016). The modality effect on reading literacy: perspectives from students' online reading habits, cognitive and metacognitive strategies, and web navigation skills across regions. *Interactive Learning Environments*, *25*(7), 859-876. https://doi.org/10.1080/10494820.2016.1224251

Zhang, X., Kubota, K., & Kubota, M. (2020). Activity Design for Cultivating Students' Critical Thinking Dispositions in a Blended Learning Environment Through a Case Study of Media Literacy Course. In S. K. S. Cheung, R. Li, K. Phusavat, N. Paoprasert, & L. Kwok (eds.), *Blended Learning. Education in a Smart Learning Environment* (pp. 210–223). Springer International Publishing. https://doi.org/10.1007/978-3-030-51968-1_18

Appendix A

Example of a questionnaire

Indicator	No	Question	Answer options (one correct)
		Read the material and answer the questions *Source: https://nuschool.eu/lessons/literature/pisa/24.html*	
Information Literacy	1	Which of the following services does ACOL offer in its immunization program?	A. Daily gymnastics classes throughout the winter. B. Immunization during business hours. C. Small bonus to participants. D. Vaccination will be done by a doctor.
	2	According to that fact sheet, if you want to protect yourself from the influenza virus, the flu shot is...	A. More effective than gymnastics and a healthy diet, but riskier. B. It is useful, but it does not replace gymnastics or a healthy diet. C. It is as effective as gymnastics and a healthy diet and requires less effort. D. It is not necessary if you do a lot of gymnastics and follow a healthy diet.
	3	According to the information sheet, which of the company's employees needs to contact Iryna Mykolaivna?	A. Stanislav from a warehouse does not want to be immunized because it relies more on its natural immunity. B. Dasha, from Sales department, would like to know if immunization is mandatory. C. Elvira, from the correspondence department, would like to be immunized this winter, but in two months, she is expecting the birth of a child. D. Michael, from the accounting department, would like to be immunized but will be on vacation for a week starting November 17.
	4	Do you agree that the phrase "Who should be immunized? Anyone interested in protecting themselves from the virus" is misleading and that it should be removed from the text?	A. Yes, because she says "everyone" can, and then she lists people who shouldn't be immunized. B. The phrase is important because it will convince people. C. The phrase would have to be left because it makes highlighting the appeal to people possible. D. The authors need to put a picture instead of the title. E. The authors need to leave the phrase, it's beautiful.
	5	Iryna Mykolaivna wanted the style of the information sheet to be friendly and encouraging. In your opinion, has it achieved its plan?	A. I think she did it well. She chose pictures and interesting text. B. No, because some of the information is incorrect. C. The cartoon-style portrayal of the virus looks friendly, and the presentation style reduces tension and is informal. D. Yes, the illustrations are encouraging, and the ad style is also acceptable. E. No, it doesn't work.

Media Literacy	6	Material, essentially advertising, is presented as journalistic and has signs of being paid for. That is...	A. Advertisement B. Manipulation C. Jeans D. Censorship E. Propaganda F. There is no correct answer
	7	What is clickbait?	A. The principle of advertising, when advertising is guided by the content of the Internet page automatically B. Dissemination of distorted, incomplete, or knowingly false information C. A trend where headlines are worded to grab readers' attention to get them to click on a link D. There is no correct answer
	8	Read the article http://surl.li/msfkn). Is the article's title manipulative?	A. Yes, because the headline does not correspond to the facts stated B. Yes, because the headline is clickbait C. No, because the headline doesn't match the facts D. No E. I don't know
	9	Are the article's judgments supported by facts?	A. Yes B. No C. I don't know D. There are facts, but they are subjective E. The above facts are not supported by the opinion of experts
	10	You are sure that COVID-19 is a man-made virus. Your social media friends feel the same way. Why?	A. I'm friends with people who confirm this. B. We are in an information bubble. C. Many publications testify to this. D. That's what all reasonable people think.
Digital Security	11	Call the type of fraud that secretly redirects the victim to a false IP address	A. Click fraud B. Farming C. Vishing D. Phishing
	12	Which of the following statements characterize safe behavior on the network?	A. I have the same logins and passwords for all my online accounts to avoid getting confused. B. A password containing numbers, uppercase, lowercase letters, and symbols is the most secure. C. It is necessary to provide personal data upon request D. I open all emails that come in carefully. E. I trust information from Internet sites
	13	What signs do you think you might suspect a bot?	A. The bot account has no photos, or photos are published in the same period. B. Every day, posts on the page defend the same position. C. Bots usually have few friends. D. One bot leaves only one comment under the post and does not respond to counter comments.

14	A troll is...	A. A user who posts contradictory, controversial comments to provoke an emotional reaction. B. A unique program that automatically and according to a given algorithm performs some actions through social networks, the same as an ordinary user. C. A mythical creature D. A fairy-tale character.
15	Mass mailing of advertising or other correspondence to people who have not expressed a desire to receive it is ...	A. DDoS attack. B. Spam. C. Phishing. D. Flood. E. Flame.