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Digital Literacy and Resilience to Disinformation in Slovakia in Comparative Perspective: Analysis of Aggregated Data from PISA, DESI, and Eurobarometer

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Abstract

Digital literacy and the ability to withstand disinformation are among the key competencies of the twenty-first century. This article analyses the relationship between digital literacy and resilience to disinformation among students and the adult population in the Slovak Republic, in comparison with the Czech Republic, Poland, and the OECD/EU average, based on aggregated data from PISA, the Digital Economy and Society Index (DESI). The theoretical framework draws on concepts of digital literacy and models of critical thinking. The empirical part focuses on indicators of reading and digital literacy, internet use, and exposure to disinformation. In this section, we use aggregated data from international studies and the Digital Economy and Society Index (DESI), supplemented with indicators of digital technology use and exposure to disinformation. The results suggest that Slovakia records below-average scores in digital competences and that its inhabitants report a lower self-assessed ability to recognise disinformation than the EU average, with especially pronounced differences among socio-economically disadvantaged groups. The discussion identifies systemic gaps in education and society and recommends curriculum reform, teacher support, and the development of media literacy. We discuss the implications for educational policy and propose measures to strengthen critical and digital education. The study uses proxy indicators of resilience to disinformation, which constitutes a methodological limitation and requires caution in interpreting the findings. The use of proxy indicators constrains causal inference and calls for further empirical research.

Keywords: digital literacy, media literacy, disinformation, critical thinking, Slovakia

1. INTRODUCTION

Digital transformation is fundamentally changing how individuals and societies function in the twenty-first century. Access to information has become rapid, mass, and decentralised, which, on the one hand, enhances the democratisation of knowledge, but, on the other, creates space for the spread of disinformation and manipulative content [1, 2]. In a digital society, the ability to work with information is becoming an indispensable component of civic and professional competence. OECD research shows that digital skills are essential for labour-market participation, civic engagement, and the capacity to confront disinformation [3, 4]. Through the Digital Economy and Society Index (DESI), the European Commission [5] tracks indicators of digital skills across EU member states, with Slovakia consistently lagging behind the European average.

In recent years, attention to resilience against disinformation has also increased, as it has become a major social problem. According to Eurobarometer [6], 70% of Europeans report regularly encountering false or misleading information online. Slovakia belongs to the countries where trust in institutions and the media is relatively low and susceptibility to disinformation is higher than the EU average [6, 7, 8]. From an educational policy perspective, it is therefore crucial to examine how schools develop digital literacy and critical thinking, and the extent to which the education system contributes to building resilience against disinformation.

Digital literacy is closely linked to the concept of critical thinking because it encompasses not only technical skills (the use of tools and technologies) but also the ability to analyse, evaluate, and interpret information from different sources [9, 10].

The article aims to analyse the level of digital literacy and indicators of resilience to disinformation in the Slovak Republic, compared with the Czech Republic and Poland, based on aggregated international data (PISA, PIAAC, Eurostat, Eurobarometer), [11, 12].

The article first presents the theoretical framework of digital literacy and its connection to critical thinking, then analyses comparative data and discusses the implications for educational policy.

2. LITERATURE REVIEW

2.1. DIGITAL LITERACY

Digital literacy is a complex competence encompassing the technical, cognitive, and social skills required for effective and ethical functioning in digital environments. Specifically, it includes (1) the technical ability to use information and communication technologies; (2) information literacy—the ability to search for, evaluate, and verify sources; (3) communicative and creative capacities in working with digital content; and (4) safety-related and ethical habits in the use of digital services [13, 14, 15, 16, 17]. This broader perspective corresponds to the Media and Information Literacy (MIL) framework, which also emphasises the ability to recognise manipulative techniques and assess source credibility [16]. In the European context, digital literacy is operationalised through the DigComp framework, which identifies five domains of digital competence: information and data literacy, communication, content creation, safety, and problem-solving [18, 19].

Critical thinking is a key component of resilience to disinformation: it involves analysing arguments, identifying logical fallacies, and evaluating evidence, while dispositions (such as scepticism and openness) and media habits moderate whether these abilities translate into actual verification behaviour. Psychological and cognitive studies indicate that a combination of cognitive abilities and digital skills reduces susceptibility to disinformation, although dispositional factors (e.g., ideological biases) may weaken this effect [20, 21].

2.2. RESILIENCE TO DISINFORMATION

We conceptualise resilience to disinformation as a multidimensional construct encompassing (a) cognitive skills—the ability to analyse and evaluate arguments and evidence; (b) digital skills—the ability to verify sources and use fact-checking tools; and (c) dispositional and social factors—such as media habits, willingness to question one's own beliefs, and trust in institutions [2, 22]. This conception draws on psychological and cognitive studies [23, 24, 25, 26, 27, 28] and on media-literacy frameworks [15, 16], which emphasise the interconnection of skills, attitudes, and behaviour in shaping resilience.

Digital skills, digital reading, and the ability to verify facts represent key dimensions of this resilience because they enable the effective processing, evaluation, and filtering of digital content. In our study, we operationalise resilience to disinformation as a composite index of critical media literacy that includes assessments of source credibility, identification of logical fallacies, and frequency of fact-checking [11, 6, 29].

According to an analytical report on disinformation in the V4 countries, 56% of Slovaks report a tendency to believe conspiracy theories or disinformation, the highest share among the countries compared [30, 31], which poses a risk to information security and social stability. This figure underscores the need for further education and media literacy, as

highlighted in European strategies.

2.3. MODELS AND FRAMEWORKS FOR ASSESSING DIGITAL LITERACY AND RESILIENCE TO DISINFORMATION

Measuring digital literacy and resilience to disinformation poses a methodological challenge because these are multidimensional and dynamic constructs. Several international institutions have therefore developed frameworks and indicators that are used in practice to compare countries and monitor trends.

2.3.1 UNESCO Media and Information Literacy (MIL) Framework

UNESCO proposes a framework that integrates media literacy, information literacy, and digital skills into a single concept. Particular emphasis is placed on the individual's ability to recognise disinformation, understand manipulative techniques, and use information ethically [16]. The MIL framework links digital skills with critical thinking and civic competencies, thereby creating a basis for assessing resilience to disinformation in a global context.

2.3.2 PISA (OECD)

Through the PISA programme, the OECD has gradually expanded the assessed domains towards digital and higher-order cognitive competences. PISA 2022 and 2024 explicitly include frameworks related to media and digital literacy, such as the ability to work with electronic texts, search for and verify information, identify sources and assess their credibility, check facts, and distinguish between reliable and unreliable information [4, 12].

2.3.3 Eurostat and the DESI Index

The European Commission monitors the population's digital competences through the indicators of the Digital Economy and Society Index (DESI). This index includes indicators such as basic and advanced digital skills, internet use, the use of online services, and the ability to work with information in digital environments. DESI provides data that are comparable across EU member states and are frequently used to track the progress of digital transformation, including aspects of resilience to disinformation [5].

2.3.4 National and Regional Approaches

In addition to international frameworks, national initiatives for measuring digital competences and media literacy are increasingly being developed. For example, the Czech Republic has developed its own digital competence framework. It has incorporated a digital competence framework derived from the European DigComp model [32] into its curriculum. In contrast, Slovakia and Poland rely primarily on the results of international surveys, such as PISA, and on statistically based indices, for example DESI, in their assessments of digital competences and readiness [5].

3. METHODOLOGY

3.1. SAMPLE SELECTION

This study uses a comparative secondary analysis of aggregated data. The empirical analysis draws on international data sources from the OECD and the European Union, based on representative, stratified samples. For the adolescent population, we use results from the PISA 2018 and 2022 international assessments, which included items on reading literacy, evaluation of source credibility, and use of digital technologies [3, 11]. For the adult population, we supplement these data with the PIAAC 2023 survey [33], which measures adults' skills and competencies in information processing and problem-solving.

Data on the population's digital competences are drawn from the Digital Economy and Society Index (DESI, Digital Skills Indicator) statistics [5] and from the Eurobarometer 2022 survey [6] on perceptions of disinformation. The primary sources were OECD PISA international assessments from 2018 and 2022, as well as the most recent data available from the PISA cycle at the time of writing [3, 11, 12, 34].

All of these sources employ two-stage stratified sampling, ensuring representativeness of the populations in the individual countries. In the first stage, schools are selected randomly to represent regions, school size, and school provider type. In the second stage, 15-year-old students are randomly selected. In both PISA 2018 and PISA 2022, approximately 6,500 students from 302 schools were tested in the Slovak Republic; similar sample sizes are available for the Czech Republic and Poland. In PISA 2024, the sample size differs slightly, but the stratified selection principle remains unchanged. Representativeness in these surveys is ensured through weighting coefficients that correct for unequal selection probabilities and account for incomplete response rates [3].

Similarly, PIAAC uses two-stage stratified random sampling of the adult population aged 16–65; households are selected in the first stage, and respondents are selected at random in the second. Weighting coefficients are applied in the evaluation to correct for unequal selection probabilities and minimise bias caused by nonresponse, thereby ensuring the statistical reliability and representativeness of the results [3, 33].

These methodological procedures mean that the results of PISA and PIAAC are comparable across countries and across measurement cycles, which is essential for comparative analyses [11]. The analysis is predominantly descriptive, supplemented by comparisons between countries and the identification of trends.

3.2. VARIABLES AND OPERATIONALISATION

A key step in this study is the precise definition of dependent, independent, and control variables, which enables empirical testing of the relationship between digital literacy and resilience to disinformation. The operationalisation is based on available data from the OECD (PISA 2022, PISA 2024, PIAAC 2023), Eurostat [35], and Eurobarometer [6].

The main objective is to examine indicators related to digital literacy and resilience to disinformation. Given that no single direct indicator of "resilience" exists, we use proxy indicators that are regarded in the scholarly literature and in OECD/EU methodologies as suitable approximations. Proxy indicators are indirect measures of higher-order cognitive processes: they do not directly assess the ability to think critically or digitally, but they enable estimation of such abilities through behaviour and performance on related tasks [12, 21].

For this study, we define "resilience to disinformation" as the integrated ability to:

- cognitively process and critically evaluate information, including the assessment of source credibility;
- identify manipulative or misleading elements in media content; and
- apply these skills in everyday interactions with media and digital platforms.

This approach corresponds to media and information literacy frameworks that emphasise the cognitive, affective, and behavioural dimensions of competence [15, 16]. A dependent variable defined in this way allows not only comparisons among countries (Slovakia, the Czech Republic, Poland, the OECD average), but also the analysis of individual- and school-level factors that may influence resilience to disinformation.

In this research, resilience to disinformation was operationalised through proxy indicators of cognitive and metacognitive abilities required to evaluate source credibility and verify facts. However, these indicators do not capture the affective (e.g., emotional reactions, trust) or dispositional (e.g., tendencies towards scepticism, openness to evidence) dimensions of resilience that are important for a comprehensive understanding of the phenomenon. This indirectness of measurement constitutes a methodological limitation that must be taken into account when interpreting the findings and underscores the need for further research employing multidimensional, direct measurement tools (e.g., vignettes, behavioural experiments, longitudinal tracking).

3.3. STATISTICAL ANALYSIS

Because PISA 2022 microdata were not yet fully available at the time of analysis, the study is based on aggregated officially published indicators [11] and complementary data from Eurostat and Eurobarometer. PISA and PIAAC data are constructed using Item Response Theory (IRT) models and weighting coefficients that ensure representativeness and international comparability [3, 4].

Data from Eurostat and Eurobarometer are processed into descriptive statistics (percentage shares and means). The Digital Economy and Society Index (DESI) [5] provides indicators of the population's digital skills, whereas Eurobarometer [6] captures citizens' attitudes and behaviour regarding information verification and perceptions of disinformation.

At the aggregated level, we apply:

- descriptive analysis (percentage shares, means, trends);
- comparative analysis (Slovakia vs the OECD average; Slovakia vs the Czech Republic and Poland);
- time trends (2018–2024).

At the aggregated level, we conducted descriptive analyses of percentage shares and means for selected indicators of digital literacy and resilience to disinformation for 2018, 2022, and the preliminary 2024. We conducted a comparative analysis of Slovakia, the Czech Republic, Poland, and the OECD average to trace the development of these indicators over time and identify key trends at both the national and international levels.

3.4. RESEARCH LIMITATIONS

- Aggregated data: the analysis is based on available PISA and Eurostat aggregates; micro-level data (student–school) are not always directly accessible.
- Proxy indicators: resilience to disinformation is not directly measured in PISA and therefore must be constructed from a combination of items.
- Temporal limitation: the analysis uses data from the 2018 and 2022 cycles and preliminary 2024 data, which may still be revised.
- Generalisability: the results are comparable within OECD countries, but they may not be applicable outside the context of advanced economies.
- Sample differences and ecological inference: PISA focuses on 15-year-old students, whereas Eurobarometer addresses the adult population; the results of aggregate analysis cannot be directly inferred to individuals.

Despite the use of robust aggregated data, it is also necessary to emphasise the need for more detailed micro-level research using individual microdata. Such research should include multilevel modelling and longitudinal tracking, enabling better capture of causal relationships among digital skills, socio-economic factors, and resilience to disinformation at the individual and school levels.

4. RESULTS

The following results are primarily descriptive and based on aggregated indicators from international databases.

In this section, we present the results of a comparative analysis of digital literacy and resilience to disinformation based on available aggregated data from the Digital Economy and Society Index (DESI) [5], Eurobarometer [6], and PISA. The graphical analyses reveal systematic differences between Slovakia, the Czech Republic, Poland, and the OECD/EU average.

Digital skills (DESI, 2023): According to data from the Digital Economy and Society Index (DESI) for 2023 [5], approximately 51.3% of the population aged 16–74 in Slovakia has at least basic digital skills, which is below the EU average (≈55.6%). The Czech Republic reaches approximately 69%, whereas Poland reaches approximately 44%.

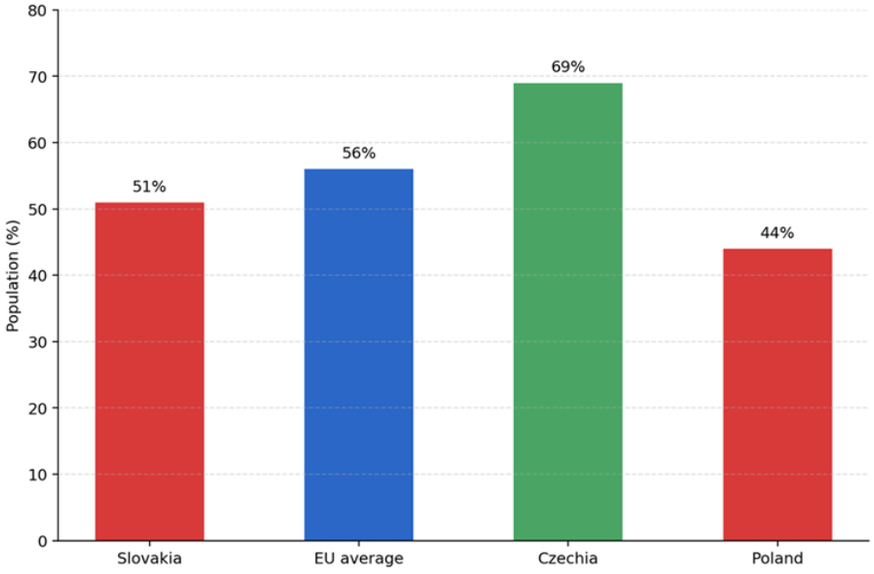

Figure 1. *Comparison of the share of the population with at least basic digital skills in selected countries (DESI 2023)*

Comparison of the proportion of the population with at least basic digital skills across selected countries (DESI 2023) is given in Figure 1. With approximately 51% of the population possessing basic digital skills, Slovakia lags behind the EU average (56%). Compared with neighbouring countries, the Czech Republic has approximately 69% of its population with basic digital skills, whereas Poland has approximately 44% [35]. This difference points to persistent inequalities in the population's digital readiness, which may affect individuals' ability to navigate digital environments, evaluate information critically, and use digital technologies effectively in everyday life and the workplace [11]. Eurostat data also indicate that Slovakia saw gradual improvements in digital skills indicators between 2018 and 2024. The gap relative to the EU average,

however, persists [35]. This trend points to the need for systematic support for digital education across schools and lifelong learning.

According to the OECD [3], digital literacy is a key precondition for competitiveness and adaptability in the labour market, which means that Slovakia risks widening its gap relative to other countries in the region [36]. Insufficient digital skills may lead to reduced labour-market competitiveness, limited access to information and online public services, and a higher risk of vulnerability to disinformation and online fraud [37].

Information verification (Eurobarometer, 2023): Only 27% of Slovaks report "always" verifying information from online sources, whereas the EU average is 37%. In the Czech Republic, this share is 33%, and in Poland it is 31%. Figure 2 visualises these differences.

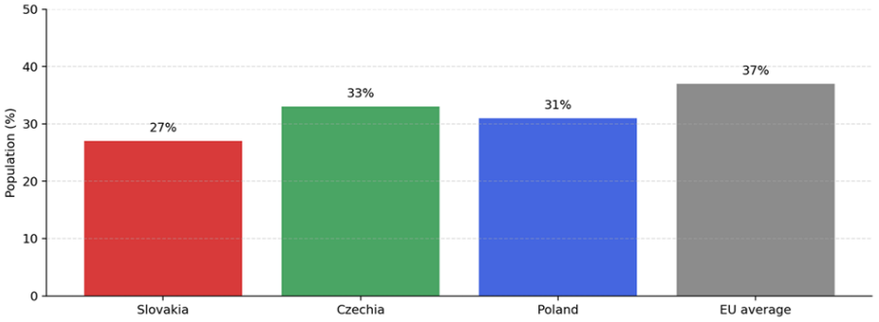

Figure 2. *Share of respondents who always verify information online (Eurobarometer 2023)*

The results show that only 27% of Slovaks declare that they always verify information from online sources. This share is considerably lower than the EU average (37%) and also lower than that of neighbouring countries (Czech Republic: 33%; Poland: 31%). The weak embedding of a culture of information verification has direct consequences for resilience to disinformation, because systematic source verification is one of the key predictors of critical media literacy, which enables the recognition of false and manipulated messages and supports responsible and informed decision-making [38, 39].

This situation suggests a higher susceptibility among part of the Slovak population to the spread of inaccurate or misleading information, which may further undermine trust in relevant information sources and weaken the quality of public discourse [40].

PISA digital reading (2022): Slovakia achieved a below-average score (≈460 points) in digital reading, compared with the OECD average (≈476 points). The Czech Republic scored 474 points, and Poland scored 478. The trend is illustrated in Figure 3.

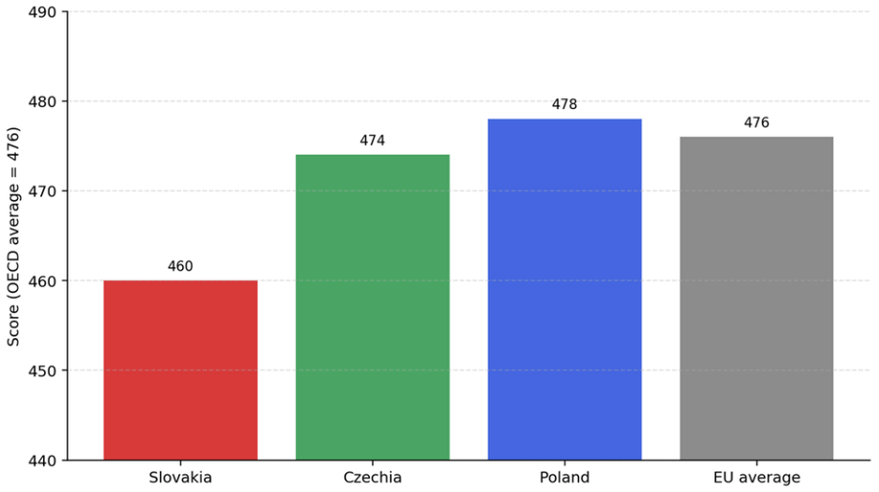

Figure 3. *PISA digital reading results in selected countries (2022)*

Slovak 15-year-old students scored approximately 460 points in digital reading, which is below the OECD average (476 points). Czech students scored 474 and Polish students 478 points [11, 41]. Compared with 2018, the score declined by 11 points, pointing to persistent challenges in the development of digital and reading literacy. Insufficient digital reading competencies affect students' ability to search for, evaluate, and process digital information and may reduce their adaptability to digital environments [11, 42].

For Slovakia, this situation represents a serious challenge given the need to develop digital competences not only within

the education system but also in wider society as a foundation for lifelong learning and participation in an increasingly digitalised labour market. The PISA results therefore underscore the need for comprehensive reforms, including stronger support for digital competences, expanded availability and quality of digital learning materials, and greater attention to students' psychological well-being during the implementation of digital tools in teaching [11].

The empirical findings are consistent with the theoretical framework. The comparative analysis suggests that a higher level of individual digital skills, including digital reading and information verification, may be associated with lower susceptibility to disinformation. This result is in line with hypotheses formulated in the existing literature [21, 26].

4.1. LIMITATIONS OF THE STUDY

The use of proxy indicators constitutes a methodological limitation. First, resilience to disinformation is measured only indirectly through proxy indicators (digital literacy, critical media literacy), which do not capture the full breadth of the phenomenon, including affective and dispositional factors [21, 43]. Critical media literacy and resilience to disinformation are multidimensional constructs that encompass not only cognitive abilities but also attitudinal and value dimensions [15, 16, 21]. Neither PISA nor Eurobarometer fully captures these aspects. The analysis, therefore, provides only a partial picture and should be interpreted as an indication of trends and Slovakia's international position rather than as a detailed psychometric diagnosis.

Second, the analysis is based on aggregated data, which limits the ability to test causal relationships. In this study, the dependent variable (resilience to disinformation), the independent variables (digital skills and access to technology), and the control variables (sociodemographic and school factors) were precisely defined to operationalise the key concepts and analyse relationships. However, the presented results are based on aggregate indicators from international databases (PISA, PIAAC, Eurostat, Eurobarometer) and do not include direct modelling of these variables at the individual level, such as regression analyses or multilevel models. This approach reflects data availability and methodological constraints. Yet, it enables a relevant, descriptive, and comparative interpretation of the phenomena under study, and the basic descriptive comparisons are robust and suitable for formulating recommendations for educational policy. In interpreting the findings, one must bear in mind the possibility of ecological fallacy, since conclusions derived from aggregated data may not fully reflect relationships at the individual level.

Third, cultural and linguistic specificities may influence respondents' behaviour, and the translation of test items may produce differences in task interpretation [4]. In addition, differences in the samples must be taken into account: PISA measures 15-year-old students, whereas Eurobarometer targets a broader, mostly adult population, which explains why these sources are complementary rather than directly comparable.

Despite these limitations, we consider the use of aggregated OECD, Eurostat, and Eurobarometer data methodologically adequate for capturing the main trends and international comparisons. The results are therefore suitable for formulating recommendations for educational policy, although further micro-level research using multilevel models and experimental designs is needed to capture better causal relationships among digital skills, socio-economic factors, and resilience to disinformation at the individual and school levels.

5. DISCUSSION

The results indicate that Slovakia records lower levels of digital literacy and resilience to disinformation than the EU average and those of its neighbouring countries.

From a theoretical perspective, these findings confirm the validity of the UNESCO [15, 16] and OECD [11] frameworks and fit within the broader debate on digital literacy and critical thinking as key competencies of the twenty-first century. Our finding that Slovakia performs more weakly than the EU average and neighbouring countries supports the hypothesis that underdeveloped digital literacy constrains both students' and adults' ability to reflect critically on information. This is consistent with research emphasising that critical thinking develops through the application of knowledge in real-world contexts [20]. Digital environments expose individuals to new forms of cognitive load and the risks of manipulation, which require higher levels of critical media literacy [21].

In comparisons between Slovakia, the Czech Republic, and Poland, we have shown that Slovakia's lower level of digital preparedness translates into weaker resilience to disinformation. This condition has systemic roots—from the insufficient integration of media literacy into curricula to the limited capacity of teachers to develop students' critical evaluation of information [11, 17]. Our findings support the argument that digital competences cannot be reduced to the technical mastery of technologies, but must be understood as interconnected with complex cognitive and dispositional aspects of thinking [43].

The absence of a habit of verifying information also points to a substantial need to develop educational programmes focused on media and digital literacy, strengthening individuals' ability to evaluate content critically and increasing resilience to disinformation [39, 44]. Such measures may contribute to greater trust in digital environments and to

better-informed societies at a time of growing information overload.

International comparisons show that countries such as Singapore and Estonia achieve higher results in digital reading, which is linked to their emphasis on integrating digital technologies into education and systematically developing digital competences [11]. From a scholarly standpoint, the Slovak situation is troubling, since weaknesses in the education system—above all, limited integration of digital technologies and inadequate teacher preparation—may contribute to differences in educational outcomes [41]. These findings underscore the need for a strategic focus on developing digital skills and adapting educational methods to reflect the demands of the digital era and prepare young people for life in a technologically interconnected society.

The combination of DESI, Eurobarometer, and PISA data points to three key challenges:

- Digital skills deficit: DESI and PISA results indicate that Slovak students and adults struggle to use digital technologies and competences effectively, which weakens their ability to confront disinformation [3, 20].
- Weak culture of source verification: Slovakia has one of the lowest shares of the population that systematically verifies information, which is an important precondition for resilience to disinformation [6].
- Regional differences: differences between Slovakia, the Czech Republic, and Poland suggest that educational policies and support for digital literacy can significantly influence resilience to manipulation.

The identified systemic shortcomings in digital competences have serious consequences for social inclusion, economic performance, and the pace of digital transformation. From a policy perspective, this implies the need for coordinated educational interventions and programmes to develop digital skills across age groups [36].

In practical terms, these findings have far-reaching implications for the Slovak educational environment. They confirm the need to explicitly incorporate the development of digital and media literacy into curriculum documents, not only as a cross-curricular theme but also as a distinct educational area. Programmes such as DigCompEdu [17] or OECD recommendations [12] can serve as a basis for designing modules that systematically develop the critical evaluation of online sources and support responsible behaviour in digital spaces. In addition, priority should be given to continuous teacher education, since teachers play a crucial role in developing critical media literacy [44, 45].

Lower levels of digital skills and weaker resilience to disinformation signal the need for a systematic approach to media literacy development, already at the primary and secondary levels of education. OECD [46] recommends that digital competences should not be taught in isolation, but integrated across subjects, with an emphasis on the critical evaluation of information and the creative use of technology.

The Slovak context also highlights a high level of student exposure to disinformation content [6]. Students who lack developed strategies for verifying sources are more vulnerable to manipulative narratives, which confirms the importance of integrating media literacy and critical thinking into the curriculum as an integral part of teaching.

Teacher preparation is equally important—the availability of ICT technologies in itself does not guarantee their effective use in developing digital and media literacy. It is essential to strengthen teachers' professional development and focus on methodological approaches that support reflection, argumentation, and information verification [17, 47]. Slovakia can draw inspiration from the Czech Republic and Poland, where programmes of systematic support for digital and media literacy have been introduced [5]. Aligning national strategies with UNESCO frameworks and OECD recommendations could help overcome Slovakia's lag in this area.

Based on these results, we support UNESCO's [16] recommendations for the integrated development of digital and media competences as key strategies for increasing resilience to disinformation. Our analysis shows that strengthening critical thinking and media literacy should be a priority of educational policy.

Slovakia faces a double challenge: increasing the digital skills of the population while simultaneously developing critical media literacy as a defence against disinformation.

Based on the study's findings, we recommend:

- Integrating media and digital literacy into the curricula of all levels of education and developing source verification as a routine student competence.
- Strengthening teacher programmes focused on digital technologies and the development of critical thinking.
- Supporting lifelong learning in digital skills for older adults and other vulnerable groups.
- Expanding monitoring and research, including longitudinal data that make it possible to track long-term trends in resilience to disinformation.

This study indicates that digital literacy and resilience to disinformation must be understood as a strategic priority of Slovak educational policy in the context of the global challenges of the information society.

The analysis is descriptive and does not include causal testing. Methodologically, it is necessary to note the study's limitations. The data are drawn from aggregated sources (OECD, Eurostat, Eurobarometer) and represent proxy indicators—that is, indirect operationalisations of more complex cognitive and social competences. These are "indirect indicators of higher-order cognitive processes" that reflect behaviour (e.g., source verification, digital interactions) as a manifestation of deeper mental abilities [26, 40]. It follows that, although these data allow international comparisons, they do not allow causal relationships to be tested at the individual level or the use of advanced statistical models (e.g., multilevel modelling and individual-level regression analyses). These limitations also entail a risk of ecological fallacy, since relationships observed at the aggregated level may not hold at the individual level. Nevertheless, aggregated data provide valuable insight into trends and cross-country differences, and they make it possible to formulate empirically grounded hypotheses for subsequent microdata studies aimed at better understanding the causality and mechanisms underlying resilience to disinformation [11].

A further limitation is the operationalisation of "resilience to disinformation", which is not directly captured as a separate variable in existing measurements. In this study, it was therefore approximated using a combination of proxy indicators regarded in the scholarly literature and OECD methodologies as suitable approximations of resilience. Specifically, these included items from the PISA 2022 and 2024 questionnaires focused on the critical evaluation of sources, the recognition of argumentative fallacies, and the self-assessment of the ability to identify false or manipulative information. Although this approach is theoretically grounded [48, 49], it provides only an indirect estimate of resilience to manipulation and should, in the future, be verified through micro-level data analysis. The investigation was also supplemented by Eurobarometer 2023 data on the frequency of fact-checking when working with online content and respondents' subjective confidence in their ability to recognise manipulative messages. The composite index of critical media literacy constructed in this way represents a validated approach to capturing behaviours and attitudes associated with media resilience.

Further limitations include the absence of individual-level PISA 2024 microdata, which would allow multilevel modelling and control for within-school differences, as well as linguistic and cultural specificities that may affect item interpretation. Despite these constraints, aggregated data are methodologically adequate for identifying the main trends and indicating areas for targeted intervention. At the same time, future research should use microdata and experimental designs to verify causality and the effectiveness of interventions.

6. CONCLUSION

The study offers a new perspective on the relationship between digital literacy and resilience to disinformation in the Slovak context, comparing it with selected EU and OECD countries through the integration of international data from the OECD, Eurostat, and Eurobarometer, thereby creating a basis for evidence-based educational policymaking. The article contributes to the scholarly discourse on digital literacy by integrating OECD, Eurostat, and Eurobarometer data into a single analytical framework and by highlighting the need for systematic media education as a tool for preventing disinformation.

Based on the findings, it can be concluded that Slovakia faces a persistent deficit in digital skills, which directly affects the population's ability to recognise and critically evaluate false information.

A major contribution of the study lies in linking empirical data (PISA, DESI, Eurobarometer) with theoretical frameworks (DigComp, DigCompEdu, UNESCO Media and Information Literacy Framework), thereby enabling a better understanding of digital literacy and opening space for educational policy proposals aimed at developing digital resilience.

For practice, this means the need to:

- integrate media and digital literacy into the school curriculum as a distinct competence area;
- strengthen teachers' didactic preparation for the development of critical thinking and digital ethics;
- systematically measure the digital competences of students and adults through a combination of quantitative and qualitative indicators.

From a theoretical perspective, the study contributes to the discussion of the interconnection between digital competences and critical thinking as mutually conditioning domains. From a practical perspective, it can be concluded that strengthening digital literacy and critical thinking is a necessary condition not only for educational success but also for the democratic resilience of society in the face of information manipulation. From a methodological perspective, the study emphasises the need to expand international assessments to include indicators reflecting media and information resilience. We recommend that the government and the Ministry of Education introduce a national programme to integrate media and digital literacy into the compulsory curriculum, with dedicated funding for teachers' professional development and regular monitoring of the impact on student competencies.

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