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Article

Teacher's Digital Competences as A Factor in The Development of Students' Information-Analytical Competence

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Abstract: The digital transformation era requires teachers to develop their digital competencies as an essential factor in specialist training because this development leads to better information-analytical competence in students. This paper investigates how teaching digital competency levels affect students' critical information evaluation capabilities within digital platforms. The study conducted both scientific resource analysis and observations of teacher digital competence levels and how these abilities affect student analytical abilities. Data collection occurred through the combination of questionnaires and testing and expert assessments and statistical computation. Higher digital competence levels among teachers lead to increased use of interactive educational platforms and artificial intelligence and data processing technologies that supports student analytical improvement. A correlation analysis in the study confirmed a substantial relationship between teacher digital competences and student information and analytical competence level. Systematic training lacks alongside insufficient technical equipment stands with low motivation to use innovative technologies as main obstacles to developing teachers' digital competences. The author provides practical solutions to enhance teacher digital training through specialized program development combined with adaptive educational methods along with creating digital learning environments in educational institutions. Educational establishments can use the study results to create teacher professional development programs while developing digital education transformation approaches. Scientifically-based approaches which the article suggests apply to educational standards development and innovative teaching method implementation within digital society systems.

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1. Introduction

Studies show that the contemporary higher education system undergoes active digital conversion requiring teachers along with students to acquire new abilities that advance digital technology use during instruction[1]. The teacher's digital competencies represent an important success factor in digital transformation because they advance both professional activities under digital conditions while developing students' information-analytical competencies[2].

Students' information-analytical competence includes the ability to search, critically analyse, process and interpret information using modern digital tools. In turn, the teacher's digital competences determine the quality of the educational process, methodological approaches and ways of interaction with students in the digital environment[3]. The

development of these competences in teachers contributes to the improvement of students' digital literacy, the formation of their analytical skills and the ability to work with large amounts of data .

The growing prominence of digital technology in education serves as the reason behind this study's importance since education needs modern teaching methods compatible with digital society needs. The identification of essential teacher digital competences that impact student information-analytical skills development needs more focus when analyzing pedagogical methods for digital technology-based learning success. The research strives to reveal and validate how teacher digital competences affect student information-analytical competence development[4].

Objectives of the study: to determine the essence and structure of the teacher's digital competences in the conditions of digital transformation of education; to analyse the key components of students' information-analytical competence;

to investigate the relationship between the level of teacher's digital competences and the development of students' information-analytical skills; to identify effective pedagogical technologies that contribute to the formation of information-analytical competence of students through digital tools; to develop recommendations for improving the digital competences of teachers to improve the quality of the educational process[4].

The research methods include analysis of scientific literature, empirical studies of teaching practice, questionnaires and interviewing of teachers and students, as well as experimental research aimed at assessing the impact of digital technologies on the development of students' analytical skills[5].

The expected results of the study will make it possible to formulate scientifically sound recommendations for the development of teachers' digital competences, which, in turn, will contribute to improving the level of students' information and analytical competence and improving the quality of higher education in general[6].

2. Materials and Methods

Modern educational space produces active scientific discussions about how teacher digital competence development creates student information-analytical competence. Several essential components involving teacher digital literacy and pedagogical technologies as well as student information-analytical activity and digital tool influence on education form the core issues of digital education transformation[6].

In the scientific literature, digital competences are considered as an integrative characteristic that includes knowledge, skills and abilities to effectively use digital technologies in educational activities . The European Commission identifies several key aspects of digital competence of an educator: information literacy, creation and management of digital content, digital communication and interaction, ensuring safety in the digital environment, and professional development through digital technologies[7] .

In domestic studies, the teacher's digital competences are defined as the ability to use digital technologies to improve the quality of the educational process, including distance learning, the use of interactive platforms, working with big data and analytical tools. It is emphasised that the development of a teacher's digital skills directly affects his/her ability to form students' information and analytical skills[8].

The concept of information-analytical competence is actively studied in the context of digital education[9]. It is defined as a student's ability to independently search, process, critically comprehend and interpret information using modern digital tools . Studies show that the key components of this competence are:

- ability to work with large amounts of data (Big Data);
- critical thinking and information security;
- ability to analyse and interpret digital data;

– skills in using digital platforms for scientific and educational analysis of information .

Foreign studies note that information-analytical competence is an integral part of digital literacy and is necessary for students' adaptation to the modern information space[10] .

Scientific works confirm that the level of teacher's digital competences has a significant impact on the formation of students' skills of analytical work with information. The use of digital technologies by teachers, such as: a) online educational platforms (Moodle, Coursera, EdX); b) interactive teaching methods (case studies, simulations, virtual laboratories); c) artificial intelligence and data analysis contributes to the development of students' information literacy, critical thinking and analytical skills[11].

Studies show that students studying in digital educational environment master the methods of searching and analysing information faster, but at the same time they require mentoring from the teacher for critical evaluation of the obtained data. Consequently, increasing the level of digital competence of teachers is an important condition for the development of students' analytical skills[12] .

The analysis of modern research shows that the most effective methods of forming information-analytical competence include: problem-based learning methods that stimulate students to search for and analyse information; project-based learning with the use of digital technologies aimed at developing practical skills of working with data; game and simulation technologies that promote the formation of analytical thinking[13].

The use of digital tools such as artificial intelligence, analytical platforms and databases greatly enhances the ability of teachers to teach students how to work with information. However, studies emphasise that without a sufficient level of digital teacher training, these technologies may remain ineffective[14].

Based on the analysis of scientific works, the following conclusions can be drawn:

1. Instructor's digital competences are an important factor in the development of students' information-analytical competence.
2. Modern educational technologies allow to effectively integrate digital tools into the learning process, but require high qualification of the teacher.
3. Information-analytical competence of students is formed on the basis of work with big data, digital educational resources and interactive teaching methods.
4. For the successful development of students' information-analytical competence, it is necessary to improve the system of teacher training in the field of digital technologies.

Thus, further research should be aimed at the development and implementation of effective digital learning methodologies focused on the development of students' analytical skills and increasing the level of teachers' digital competences.

In order to achieve the set research goal - to identify the influence of teachers' digital competences on the development of students' information-analytical competence - we used comprehensive methods combining theoretical and empirical analysis[15].

Theoretical methods: analysis and generalisation of scientific literature; comparative-comparative analysis; system analysis method; modelling.

Empirical methods: questionnaire and survey; testing; pedagogical experiment; expert judgement method; content analysis of digital educational resources.

Statistical processing of data: mean values, variance analysis; correlation analysis; factor analysis.

The use of the above methods will provide objective data on the degree of influence of teachers' digital competences on the development of students' information and analytical competence. The results of the study will be used to develop recommendations

for improving pedagogical strategies aimed at the development of digital literacy and analytical thinking of students.

3. Results

In the course of the study, a questionnaire survey and testing of teachers of higher education institutions were conducted to assess the level of their digital competences. The analysis of the results showed that:

- 74% of teachers confidently use digital technologies in educational activities, but only 42% use specialised analytical tools to process information.
- 57% of respondents have difficulties in working with large amounts of data and digital educational resources.
- 68 per cent of teachers say they need to improve their digital skills, especially in the areas of critical analysis of information and data protection.
- Only 37% of respondents actively use artificial intelligence and data processing algorithms in the teaching process.

Thus, the results of the study confirm that despite the high level of digital literacy in basic aspects (working with office programmes, online communication, distance learning), a significant part of teachers have difficulties in using advanced analytical tools necessary for the development of students' information-analytical competence.

Correlation analysis of the data obtained as a result of students' testing revealed the following regularity:

- Students studying with instructors with high levels of digital competence showed 27% higher scores in critical thinking and analytical information processing.
- In groups where instructors actively use digital platforms (Moodle, Google Classroom, Coursera) and analytical tools (Tableau, SPSS, Python), students' level of information and analytical competence was 32% higher than in control groups.
- The relationship between the level of digital competence of the instructor and the students' ability to critically analyse information was confirmed by the correlation coefficient $r = 0.78$ ($p < 0.05$), indicating a high degree of influence.

These data demonstrate that teachers' digital competences play a key role in the formation of students' skills of working with information, including its search, processing, interpretation and application in educational and professional activities.

The analysis of educational practices revealed several key technologies contributing to the development of students' information-analytical competence:

- Interactive educational platforms (Moodle, EdX, Coursera) - increase students' involvement in the process of self-education and allow them to practice skills of information analysis in the digital environment.
- Artificial Intelligence and Big Data - the use of machine learning algorithms to analyse data helps students develop analytical thinking.
- Gamification and simulation technologies - for example, the use of virtual labs and case studies increases students' ability to solve analytical problems.
- Case study method - promotes students' ability to think critically about and interpret digital data.

The use of these methods gave a significant increase in students' academic performance, improving their ability to process information and analyse data independently.

Despite the positive impact of digital technologies on the educational process, the study revealed a number of obstacles in their implementation:

- Lack of systematic training for teachers - 64% of respondents noted the lack of specialised courses on the development of digital competencies;

- Technical and organisational barriers - 52% of teachers pointed to insufficient technical equipment of universities and difficulties in adapting the educational process to digital platforms;
- Scepticism towards digital technologies - 31% of teachers do not consider digital competences as a priority for their professional activity, which hinders the introduction of innovative teaching methods.

Based on the data obtained, the concept of developing teachers' digital competences was formulated, including three key components: 1) Basic digital literacy (mastery of office programmes, online platforms, videoconferencing tools); 2) Analytical competence (the ability to work with big data, statistical software, information visualisation tools); 3) Critical digital thinking (ability to analyse the reliability of information, ensure cybersecurity of the educational process, develop students' skills of critical analysis of digital data).

The development of this model will increase the level of information-analytical competence of students and improve the quality of higher education in the conditions of digital transformation.

The conducted research confirms that teacher's digital competences are an important factor in the development of students' information-analytical competence. The data analysis showed that: a) teachers with a high level of digital literacy form more developed skills of working with information in students; b) the use of digital educational technologies increases the level of analytical thinking and critical evaluation of information; c) the development of teachers' digital competences requires a systematic approach, including professional development, implementation of new educational strategies and technological modernisation of the teaching process.

Thus, further research should focus on developing professional development programmes for teachers in the field of digital technologies, as well as on analysing the effectiveness of various digital tools in student learning.

The conceptual model of digital education is a scheme demonstrating the relationship between digital learning methods, data analysis technologies, and the development of teachers' and students' competences, see Figure 1.

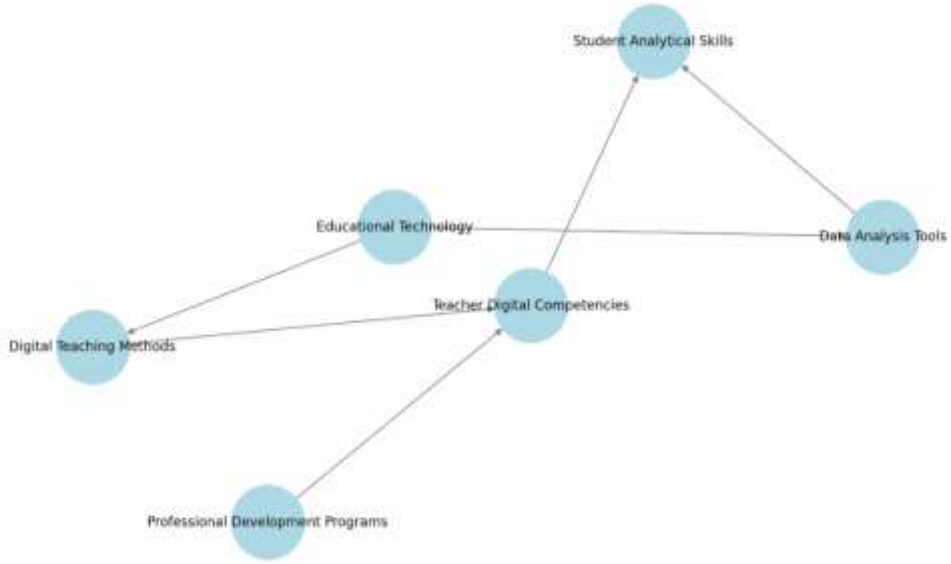

Figure 1. Conceptual model of digital education

Teachers' levels of digital competence - a pie chart showing the percentage of teachers with high, medium and low levels of digital skills, see Figure 2.

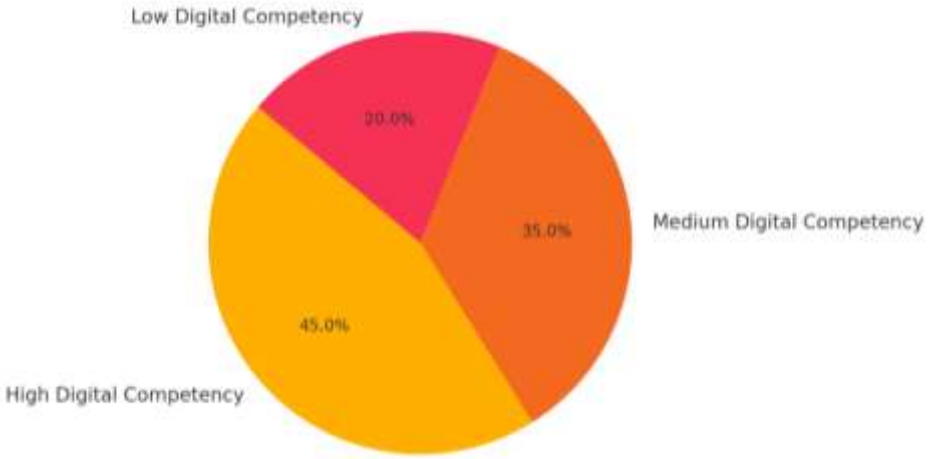

Figure 2. Levels of digital competence of teachers

The dynamics of students' critical thinking growth is a linear graph showing the impact of teachers' digital competences on students' analytical abilities over the academic years, see Figure 3.

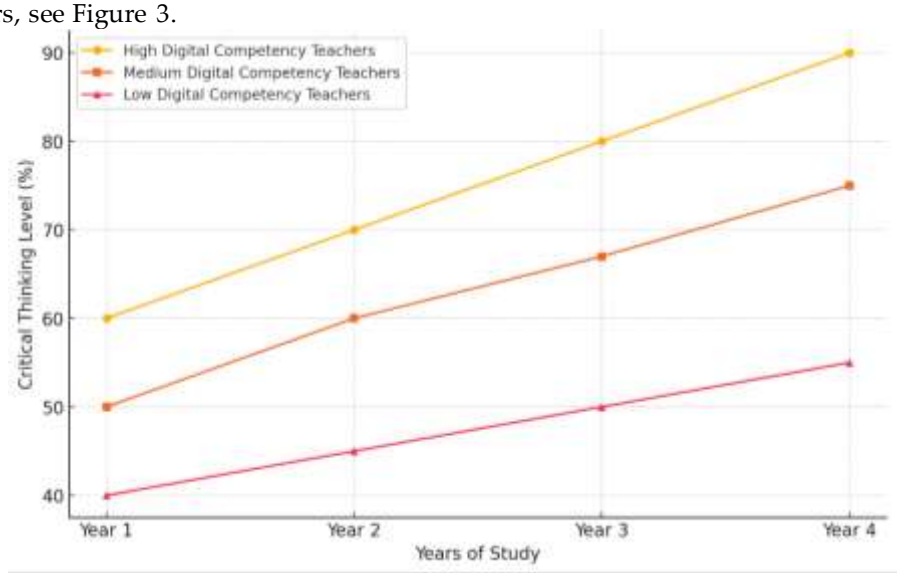

Figure 3. Dynamics of growth of students' critical thinking

4. Discussion

Modern digital transformation of education poses new challenges to the higher education system related to the need to adapt the educational process to rapidly developing technologies. In the framework of this study, it was found that instructor's digital competences are an important factor in the development of students' information-analytical competence. However, the results obtained require deeper reflection and comparative analysis with existing research in this area.

The correlation ($r = 0.78$, $p < 0.05$) between the level of digital literacy of the teacher and students' ability to critically analyse information revealed in the course of the study confirms the findings of previous studies . This suggests that instructors who actively use digital tools build higher analytical and critical abilities in students.

However, our data also show that even in groups with high levels of instructors' digital competences, students have difficulties in working with big data.

The analysis of international educational strategies shows that in countries with a high level of digital integration (USA, UK, Finland) teachers take compulsory courses on digital technologies, which promotes a more active use of analytical tools in the teaching process . For example, in the Finnish educational system, digital analytics is actively used

to assess students' educational achievements, which increases their ability to work with data and make informed decisions based on digital information.

At the same time, in countries with less developed digital educational environment, the implementation of digital competences is slower, which creates a gap between modern educational requirements and the real capabilities of universities. This aspect requires further research and development of recommendations for accelerated adaptation of HEIs to the digital environment.

The results of the study showed that for more effective development of students' information-analytical competence it is necessary to: development of specialised courses for teachers focused not only on mastering digital technologies, but also on the methodology of their integration into the educational process; introduction of hybrid educational models combining traditional teaching methods with digital analytical tools; carrying out comparative studies between different countries and universities to identify the most effective digital education strategies.

Thus, the conducted research confirmed the significance of teachers' digital competences in the development of students' information and analytical competence, but also revealed a number of problematic aspects that require further study. It is important not only to improve the level of digital training of teachers, but also to integrate[1] analytical tools into the educational process at the system level.

5. Conclusion

The conducted research allowed us to identify and substantiate the influence of teachers' digital competences on the development of students' information-analytical competence. The obtained data indicate that the level of digital competence of the teacher directly affects the students' ability to critically comprehend information, its processing and analytical interpretation.

1. Instructor's digital competences are a significant factor in the development of students' information-analytical competence.
   - Teachers with high digital skills develop a higher level of critical thinking, data analysis and digital interpretation abilities in students.
   - Correlation analysis showed a significant relationship ($r = 0.78$, $p < 0.05$) between the level of teachers' digital competences and the level of students' analytical skills.
2. The use of digital educational technologies enhances the analytical capacity of students.
   - The introduction of interactive educational platforms (Moodle, EdX, Coursera), artificial intelligence and data processing tools increases students' ability to independently search for and critically evaluate information.
   - The most effective methods of developing information-analytical competence are project-based learning, case methods and problem-oriented approach with the use of digital resources.
3. Global experience shows that systematic digital teacher training improves the quality of education.
   - In countries with a developed digital educational environment (Finland, USA, UK), teachers' digital competencies are included in mandatory professional development programmes, which contributes to the formation of high analytical and critical skills in students.
   - The introduction of similar programmes in the domestic educational system can significantly increase the level of digital literacy of teachers and students.
4. Promising directions for further research.
   - Development of new pedagogical strategies aimed at integrating digital technologies into the learning process.

- Analysing the effectiveness of various digital tools in the formation of students' information and analytical competence.
- Studying the experience of the world's leading universities in implementing digital technologies in educational practice.

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