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Development of Critical Thinking in the Context of Digital Learning

Abstract

The aim of this scientific article is to investigate and analyse the use of digital technologies in designing lessons to promote critical thinking among primary school students. It highlights the importance of this research in the context of today's information-driven society and educational demands. *Methodology*. The study takes a comprehensive approach to research and analysis. It includes a review of relevant literature on critical thinking, digital technologies and their integration in education. The researchers examine various digital tools and techniques that are suitable for promoting critical thinking in young learners. In addition, the study includes a qualitative evaluation of sample critical thinking lessons designed for primary school students, with a particular focus on blended and distance learning environments. *Results*. The research findings demonstrate the benefits and opportunities of digital technologies in developing critical thinking skills in young students. It shows the effectiveness of specific digital tools and methodologies in developing critical analysis, problem solving and reasoning skills. The study also highlights the positive impact of digital technology integration on student motivation, access to information and the development of critical thinking skills in the context of distance learning. *Practical implications*. The article provides practical insights for educators and curriculum developers in designing engaging lessons that promote critical thinking in primary school students through the integration of digital technologies. It suggests best practices for selecting appropriate digital tools and techniques to achieve optimal results in developing critical thinking skills. It also provides guidance on how to integrate digital technologies into the educational process to enhance the quality of teaching and learning, especially in the context of distance learning. *Value/originality*. This research contributes to the existing body of knowledge by shedding light on the specific benefits of using digital technologies to promote critical thinking in young learners. The study provides original insights into the effective integration of digital tools and methodologies in the development of critical thinking skills in primary school students. It highlights the importance of embracing digital literacy as an integral part of fostering a culture of critical thinking, thereby enhancing the overall learning experience in the digital age.

Keywords

digital tools, digital applications, critical thinking, methods of developing critical thinking, lessons for developing critical thinking, distance learning

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1 Introduction

During the COVID-19 crisis, the importance of digital technologies and infrastructures in everyday life has come to the fore, revealing their critical role in supporting the economy, education, and society with digital solutions. In addition, Russia's ongoing aggression against Ukraine has exposed the vulnerability of digital supply chains, highlighting the urgent need to strengthen cybersecurity measures and promote digital literacy in society. As highlighted by the European Commission in 2023, strengthening the European Union's digital capabilities becomes even more imperative in the face of these challenges (European Commission, 2023).

In today's information-driven world, where the internet allows anyone to create and share information effortlessly, critical thinking has become a crucial skill for every individual. The ability to think critically enables individuals to distinguish between genuine information and fake news, to evaluate it from multiple perspectives, and to make informed judgements.

The education system has a vital role to play in fostering this skill, as it must equip every student with the ability to think independently, adapt to unconventional circumstances and solve various challenges effectively.

One of the most effective ways to achieve this goal is to incorporate critical thinking techniques into the educational process. Moreover, the development of critical thinking is a priority task in the concept of the New Ukrainian School, which takes into account global trends in education and addresses the needs of Ukrainian society (Bibik, 2019; Kozyra, 2017; Pometun, 2020).

Given the changes in the educational landscape as a result of the COVID-19 pandemic and the wider conflict initiated by Russia against Ukraine, it is imperative to explore effective methods of fostering students' critical thinking in distance learning. Remarkably, with the pervasive integration of digital technologies into various aspects of life, including education, they hold immense potential as valuable tools for stimulating students' critical thinking skills.

Analysis of the development of the problem shows that critical thinking has attracted the attention of scholars both internationally and within Ukraine. Notable foreign researchers, including A. Crawford, V. Saul, S. Matthews, J. Makinster (Crawford, 2005), R. Duran, B. Limbach, W. Waugh (Duran, Limbach, Waugh, 2006), P. Facione (Facione, 2000), and D. Kolb (McLeod, 2023), have extensively addressed the theoretical foundations of critical thinking technology.

To gain a full understanding of the evolving perspectives on critical thinking, it is worth exploring the research of Professor Matthew Lipman, founder and champion of the Institute for Critical Thinking (1987-1997). This distinguished scholar pioneered the practice of teaching critical thinking, emphasising the need for intelligent citizenship beyond mere rationality within society. Lipman introduced the "Philosophy for Children" programme, which promotes critical, creative and empathetic thinking in students from primary school through to high school (Lipman, 1988).

In addition, Ukrainian researchers have shown interest in the development of critical thinking as an educational innovation. Scholars who have worked on this topic include V. Kozyra (Kozyra, 2017), O. Pometun (Pometun, 2020), O. Budnyk (Budnyk, 2019), N. Vukina, N. Dementiievska, I. Sushchenko (Vukina, Dementiievska, Sushchenko, 2007).

At present, it is crucial to recognise the lack of sufficient research on the design of digitally oriented lessons to promote critical thinking in young learners as part of language education. Therefore, the aim of this article is to highlight the potential of digital technologies for developing critical thinking in young learners and to suggest specific strategies for integrating them into language teaching.

The aim of this article is to explore the current state of teachers' use of digital technologies in the process of constructing lessons to develop critical thinking in younger students within the language education system. In today's rapidly evolving educational landscape, digital technologies have become increasingly prevalent and offer various opportunities to enhance teaching and learning practices. With the aim of fostering critical thinking skills in primary school students, particularly in the context of language education, it is crucial to examine how teachers incorporate digital tools into their lesson planning and delivery. Through an in-depth investigation of the practices and strategies used by teachers, this article seeks to shed light on the extent to which digital technologies are being used to develop critical thinking in younger students. This research will analyse the types of digital tools used, the frequency of their use and the effectiveness of their integration into language teaching. The research will aim to identify both the successes and the challenges teachers face in integrating digital technologies into their teaching. It will explore the benefits of digital tools for developing critical thinking, such as encouraging active learning, promoting engagement and enabling personalised teaching. Conversely, it will also look at the barriers encountered, such as technological constraints, lack of training or resistance to change.

To achieve this goal, the following tasks had to be solved:

1. To study and analyze teachers' experience of using digital technologies in building lessons aimed at developing critical thinking skills. This involved studying different methods, tools and approaches used in practice.
2. To identify the key principles and criteria for the successful use of digital technologies to build lessons that promote the development of critical thinking skills in younger students.
3. To conduct an experimental study on the use of digital technologies in the process of designing lessons aimed at developing critical thinking skills. This involved collecting data, analyzing the results, and evaluating the effectiveness of the approaches used.
4. To draw conclusions about the state of use of digital technologies in the process of designing lessons for the development of critical thinking skills of primary school students. In addition, to present recommendations for practicing teachers and identify potential areas for further research in this area.

The aim of this article is to justify the importance of developing critical thinking in younger students, not only during regular face-to-face learning, but also during blended or distance learning, especially in the context of a state of war. Such conditions demand greater autonomy and independence from students in the learning process, making the development of critical thinking particularly crucial in today's realities.

2 Research Methodology

This study of the experience of using digital applications in the development of critical thinking lessons was conducted in the educational institutions of the Buska territorial community. A group of 60 respondents was selected for the diagnostic survey, which ensures the required minimum sample size and adequately represents the general population.

In order to address the defined tasks, a survey was conducted at the beginning of the experimental work as an empirical method of scientific research. A content analysis of information sources was used, together with an analysis of teachers' opinions on the choice of digital applications and methods for developing critical thinking skills in the classroom.

The results presented in the article are presented as a synthesis of different scientific and methodological investigations: an analysis of publications to substantiate the relevance of the research problem, the organisation of the pedagogical experiment (by O. Huzar); the development and validation of methodological tools (by M. Lionenko); the design of a questionnaire to assess the effectiveness of the proposed digital and methodological tools (by O. Huzar and M. Lionenko); the development of a questionnaire to assess the formation of skills in selecting digital applications and methods for developing critical thinking (by M. Lionenko); the conceptual idea, statistical analysis of empirical data and overall editing of the article (by M. Lionenko).

3 Research Results

A survey was conducted to explore the use of digital applications in pedagogical practice and the ability to select specific applications for individual lessons. The survey results show that most teachers (76%) use basic applications such as Mentimeter, LearningApps and Jamboard in their work, while some rely solely on PowerPoint presentations (16%). A small percentage (8%) of teachers use online collaboration tools such as Padlet.

The analysis of responses confirmed expectations that many educators (even after three years of remote work due to the COVID-19 pandemic and the full-scale war with Russia) do not fully use digital applications, and in some cases are not even aware of the wide opportunities offered by the digital space.

As observed, teachers mainly use quizzes and tests, to a lesser extent interactive presentation, very few use interactive sheets, and there is no use of online whiteboards for collaboration between respondents.

Based on the results of the survey, a digital profile of the educator was created and is shown in Figure 1.

The graph shows that teachers use digital applications such as Qwizlet, Jamboard, LearningApps, MentiMeter, PowerPoint and Padlet. However, they do not use online whiteboards (Milanote, Mural, Canva), interactive sheets (ThingLink, Canva, Genially), interactive presentations (Prezi, Canva, Emaze) or mind mapping applications (Mindomo, Coggle, Canva).

Based on the results of the test and survey, the authors developed and conducted a workshop for

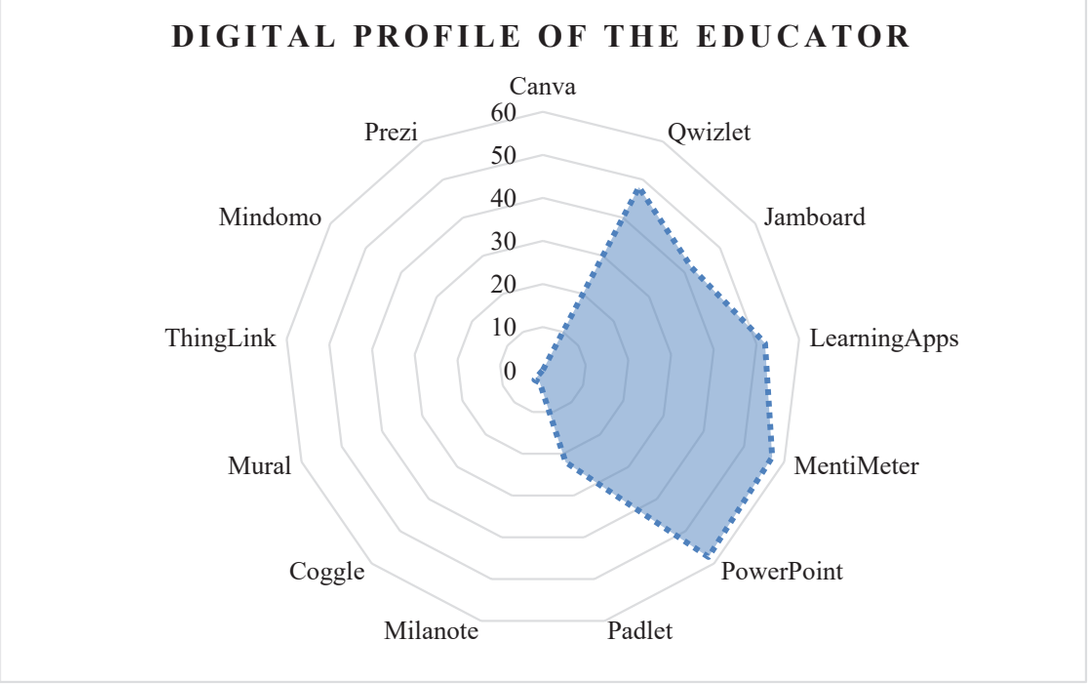

FIGURE 1 Digital Profile of the Educator

educators entitled "Digital Applications for Critical Thinking Lessons". During the workshop, teachers were presented with a digital critical thinking lesson for junior high school students and modeled it as an example.

By clicking on the links or scanning the QR codes in Table 1, educators can access lessons using different methods of developing critical thinking skills and applying various digital tools.

It is worth mentioning that the development of critical thinking depends on the application of different methods and teaching techniques, which should be chosen depending on the educational objectives, the content of the lesson, the level of preparation of the students, the available teaching resources and the defined type and structure of the lesson. For the successful organisation of the educational process in the conditions of distance learning it is essential to choose digital tools for teaching appropriately. For example, the use of interactive whiteboards and online communication platforms can be beneficial in fostering critical thinking and increasing digital literacy among students.

In order to promote critical thinking in the context of distance learning, it is necessary to use specific methods and techniques that contribute to the development of these skills. One of the most effective approaches is to use tasks that require higher-order thinking (analysis, synthesis, evaluation/creation) and problem-solving tasks that ask students to consider issues from different perspectives and seek different solutions (Bloom, 1984; Anderson, Krathwohl, 2001; Cambridge Life Competencies Framework, 2019).

It is also important to use interactive teaching methods that encourage student engagement and collaboration. For example, teachers can use virtual whiteboards to collaborate with students, create video presentations and use videoconferencing for discussion. It is also important to encourage multidirectional communication between teachers and students, where everyone can express their thoughts and participate in discussions. Such communication can be facilitated using chat, forums or online collaborative whiteboards.

It is crucial to recognise that distance learning should not simply be a transfer of traditional teaching to an online format. It has its own specificities and requirements. In order to achieve maximum effectiveness in developing critical thinking skills among younger students in the context of distance learning, it is crucial to properly integrate critical thinking methods with digital applications. The use of digital tools such as interactive whiteboards, chat platforms, forums and collaborative online projects can complement traditional methods of promoting critical thinking, such as group discussions and analysing texts from different sources. This creates a conducive learning environment where students can actively engage, exchange ideas and interact, thereby enhancing their critical thinking, communication and teamwork skills.

For example, the teacher can use various digital applications to work remotely:

1. Google Docs or Microsoft Word Online – tools that allow students to create and edit documents in real time. This allows students to collaborate and discuss their ideas and thoughts in real time, helping to develop critical thinking skills.
2. Padlet – an interactive board that allows users to add text, images and videos for discussion. Using Padlet, students can create collaborative projects and interact with each other, encouraging critical thinking.
3. Flipgrid – an interactive tool that allows students to record and discuss their ideas and thoughts through video. The use of Flipgrid gives students the opportunity to express and articulate their thoughts, contributing to the development of critical thinking.
4. Miro, Milanote, Mural, Canva, Lino, Trello – online visual collaboration applications that allow to create and edit shared notes, maps and frameworks in real time or asynchronously.
5. Google Jamboard – an online tool for collaborative work with digital whiteboards that can be used to place text, drawings, images, audio and video.

TABLE 1 Examples of lessons on the development of critical thinking with the use of digital tools

Topic of the lesson, educational subject, and grade level	The primary digital tool/ application	Additional digital tools/applications	Methods of critical thinking development	Link	QR code
Lesson on developing critical thinking skills for younger students based on Katerina Babkina's work "Mr. Jacques and the April Fish" Ukrainian language, and literary reading, 4th grade.	Milanote	Canva	Predictions Associations Multilevel Questions Fishbone (Mind Mapping or Ishikawa Diagram) Reflection	Link	
	Genially	Wordwall, Flippity, Canva, Milanote, Supercoloring	Predictions Multilevel questions Thoughtful reading (Close reading) Reflection	Link	

Indeed, Canva is an exceptional digital application that offers a wide range of features. As well as creating interactive presentations, books and online collaborative workspaces, Canva provides ready-made templates for critical thinking development methods. For example, there are templates for the Fishbone method, creating multi-level questions, De Bono's Six Thinking Hats method and more. These templates can be a valuable resource for teachers, saving time and effort while promoting critical thinking skills in an engaging and visually appealing way.

Genially is a fascinating digital tool that allows to create interactive and engaging presentations, guides, games, websites and other visual materials.

Here are some ways teachers can use Genially:

1. Interactive presentations. Genially allows the creation of presentations with additional interactive elements such as buttons, pop-ups, graphs and assignments. Teachers can use these elements to engage students in active interaction with the material and assess their understanding.
2. Interactive guides and learning materials. Teachers can create interactive guides where students interact with different elements, perform tasks, solve puzzles, etc. This can be useful for learning new material, practising skills or demonstrating concepts.
3. Data and concept visualisation. Genially provides several tools for creating charts, graphs, infographics and other graphical representations of data. Teachers can use these tools to visualise complex concepts and data, making them easier to understand and promoting active learning.

Genially is a powerful tool that enables teachers to create engaging and meaningful learning materials. It can make lessons more engaging and interactive for students, as well as making it easier to organise and present information. These tools are just a few of the many available on the Internet. It is important to choose digital applications that best suit specific lessons and tasks, as this will help to develop students' critical thinking skills more effectively.

4 Discussion

After analyzing the results of the work with teachers and studying the feedback from those who took part in the experiment, the benefits and risks of remote critical thinking lessons for younger students were identified.

Digital critical thinking lessons have several benefits:

1. Flexibility. Critical thinking lessons using digital tools can be delivered anywhere, anytime, allowing students to learn in a way that suits them and their schedule.
2. Accessibility. Remote critical thinking lessons are available to students from anywhere in the world, enabling participation by those who are far from school or have limited opportunities to attend face-to-face classes.
3. Individualisation. Such lessons can be tailored to the specific needs of each student. Teachers can use different approaches and methods for different students, increasing the effectiveness of learning.
4. Use of digital tools. Digital teaching of critical thinking can make use of a variety of digital tools that may prove more effective than traditional teaching methods. For example, interactive whiteboards, video and audio materials, online debates and more.
5. Time and cost savings. Critical thinking distance learning can save time and money associated with commuting to school or other physical classroom locations. It also reduces transportation and other costs associated with face-to-face learning.

However, remote lessons have their own risks and limitations. The most common ones include:

1. Insufficient time. Effective development of critical thinking skills requires students to spend time learning, practicing, and strengthening their abilities.
2. Lack of interaction. Distance learning undoubtedly limits interaction between students and teachers to some extent, resulting in a loss of opportunities for discussion and collaboration.
3. Limited access to materials. Students may have limited access to additional materials and resources for developing critical thinking skills.
4. Inappropriate methods. Methods used inappropriately to promote critical thinking may prove ineffective or even detrimental to students' development.
5. Technical issues. The use of digital tools can be hampered by technical problems, potentially reducing the effectiveness of distance learning.
6. Lack of monitoring. Teachers may have limited control over the process of students' development of critical thinking during distance learning and, as a result, the assessment of their academic progress may not always be objective.

The following approaches can be used to ensure the effective development of critical thinking in younger students in distance learning:

1. Organise small groups or partnerships. Working in such groups helps pupils to develop communication skills, facilitates the exchange of ideas and opinions, and increases motivation for learning.
2. Use of interactive teaching methods and tools. The use of interactive exercises, graphic organisers, audio and video materials, virtual field trips, online research, etc. allows students to actively participate in learning, encourages critical thinking and promotes independence and self-regulation.
3. Conduct virtual investigations. Virtual experiments can help students understand complex concepts and processes and develop their research skills.
4. Fostering a culture of critical thinking. The use of videos, texts, articles, etc. related to issues

that require analysis and evaluation will help to foster a culture of critical thinking among students.

5. Provide regular individual and group feedback. Regular feedback on students' work helps them to develop critical thinking and self-assessment skills.

It is important to remember that effective development of critical thinking requires clear planning and interaction on the part of the teacher.

5 Conclusions

Based on the study and analysis of the effectiveness of using digital technologies in the process of designing lessons for the development of critical thinking of junior pupils in language education, several recommendations for pedagogical practice can be formulated:

1. It is advisable to use a variety of digital tools and resources that meet the needs and educational goals of the students.
2. Encouraging students' active participation through interactive tasks and games is essential.
3. Continuous monitoring and assessment of pupils' progress through the use of digital tools is essential.
4. There is a need to constantly update knowledge about new digital technologies and methodologies for their implementation in the educational process.

It is important to understand that the use of digital technologies in designing lessons to develop critical thinking in young students is an effective and promising direction in modern education. This process contributes to improving the quality of learning and developing students' critical thinking skills, thus preparing them for the challenges of today's information society. These technologies not only expand learning opportunities, but also encourage students to be proactive, conduct independent research and analyse information.

Therefore, the use of digital technologies in designing critical thinking lessons for young students is a relevant and promising approach in modern education. These technologies help to increase student motivation, improve access to information and develop critical thinking skills. The use of digital tools and resources encourages students' active participation in the learning process and nurtures their intellectual potential. In addition, the practical implementation of digital technologies in education requires continuous updating of teachers' knowledge and adaptation to the needs of young students. The use of digital technologies in education not only facilitates the development of critical thinking skills, but also enhances their digital literacy, which is crucial for their success in today's world.

Integrating digital technologies into the educational process requires students to analyse, evaluate and interpret information from different digital sources. This process of navigating through vast amounts of data and identifying credible information develops their critical thinking skills and enables them to make informed judgements and decisions. In addition, students are encouraged to question assumptions, consider multiple perspectives and engage in problem-solving exercises, all of which contribute to the development of their critical thinking skills. As a result, the use of digital technologies has become a powerful catalyst for developing and assessing students' critical thinking skills in the face of the challenges of the COVID era and beyond.

References

[1] Anderson, L., & Krathwohl, D. R. (2001). A Taxonomy for Learning, Teaching and Assessin: Arevision of Blooms Taxonomy of Educational Objectives. New-York: Longman, 336 p.
[2] Bibik, N. (2019). The concept of NUSh, New Ukrainian School: a teacherOs guide. Kyiv, 208 p. (in Ukrainian)
[3] Bloom, B. S. (1984). Taxonomy of educational objectives: The classification of educational goals. New-York: Longman, 207 p.
[4] Budnyk, O. (2019). Innovative Competence of a Teacher: best European Practices. *Journal of Vasyl Stefanyk Precarpathian National University*, 6(1), 76–89. DOI: https://doi.org/10.15330/jpnu.6.1.76-89
[5] Cambridge University Press (2019) Cambridge Life Competencies Framework: Critical Thinking. Introductory Guide for Teachers and Educational Managers. E-source: https://languageresearch.cambridge.org/images/Language_Research/CamFLiC/CLCF_Critical_Thinking.pdf
[6] Cascio, Wayne F., & Ramiro Montealegre (2016). How Technology Is Changing Work and Organizations. *Annual Review of Organizational Psychology and Organizational Behavio,* 3(1) (March 21, 2016), 349–375. DOI: https://doi.org/10.1146/annurev-orgpsych041015-062352
[7] Crawford, A., Saul, W., & Mathew, S. R. (2005). Teaching and learning strategies for the thinking classroom. NewYork, 252 p.
[8] Duron, R., Limbach, B., & Waugh, W. (2006). Critical Thinking Framework For Any Discipline. *International Journal of Teaching and Learning in Higher Education*, 17(2), 160–166.
[9] European Commission (2023). Digital Europe: Work Programme 2023-2024. E-source: https://digital-strategy.ec.europa.eu/en/library/digital-europe-programmes-multiannual-work-programme-2023-2024
[10] Kozyra, V. M. (2017). Technology of development of critical thinking in the educational process: a textbook for teachers. Ternopil: TOKIPPO, 60 p. (in Ukrainian)

[11] Lipman, M. (1988). Critical thinking – what can it be? *Educational Leadership*, 46(1), 38–43.
[12] Peter A. Facione (2000). The Disposition Toward Critical Thinking: Its Character, Measurement, and Relationship to Critical Thinking Skill. *Informal Logic: Reasoning and Argumentation in Theory and Practice*, 20(1). DOI: https://doi.org/10.22329/il.v20i1.2254
[13] Pometun, O. (2020). New Ukrainian school: development of critical thinking of primary school students. Kyiv, 192 p. (in Ukrainian)
[14] Saul McLeod (2023). Kolb's Learning Styles And Experiential Learning Cycle. SimplyPsyhology. E-source: https://www.simplypsychology.org/learning-kolb.html
[15] Vukina, N. V., Dementiievska, N. P., & Sushchenko, I. M. (2007). Critical thinking: how to teach it. Kharkiv, 190 p. (in Ukrainian)

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