BILINGUAL PUBLISHING GROUP

Forum for Linguistic Studies

https://journals.bilpubgroup.com/index.php/fls

ARTICLE

The Role of Multimedia Resources in the Development of Critical Comprehension of Texts in Teaching of Language and Literature in Higher Education Institutions

***Alla Nikitina*[1], *Nadiia Karlova*[1*], *Marcharita Kravchenko*[1], *Olena Lapko*[2], *Halyna Barylova*[1], *Juliia Kotienieva*[3]**

[1]*Department of Ukrainian Language, Educational and Research Institute of Philology and Journalism, State Institution "Luhansk Taras Shevchenko National University", Poltava 36000, Ukraine*

[2]*The Ukrainian and Foreign Literature Department, Educational and Research Institute of Philology and Journalism, State Institution "Luhansk Taras Shevchenko National University", Poltava 36000, Ukraine*

[3]*Separate Structural Subdivision "Starobilsk Professional College", State Institution "Luhansk Taras Shevchenko National University", Poltava 36000, Ukraine*

ABSTRACT

The aim of the article is to determine the possibilities of using multimedia technologies for the development of critical thinking of students of higher education institutions (HIEs) in the philological context. The research used L. Starkey's test of critical thinking, observation, and conversation to study the ability to comprehend texts critically. Such criteria as the ability to argue a position, the depth of the analysis, the independence of the analysis, the level of difference between the results of one's own cognitive search and theoretical constructs from textbooks, and the quality of reflection were studied. Each of the criteria was evaluated at three levels—low, medium and high. The formative experiment made it possible to test the formulated hypothesis. The experiment's independent variable is a system of exercises aimed at developing critical thinking, which involves the use of multimedia technologies. The

*CORRESPONDING AUTHOR:

Nadiia Karlova, Department of Ukrainian Language, Educational and Research Institute of Philology and Journalism, State Institution "Luhansk Taras Shevchenko National University", Poltava 36000, Ukraine; Email: lingnlinguistic@gmail.com

ARTICLE INFO

Received: 27 March 2024 | Revised: 20 April 2024 | Accepted: 28 April 2024 | Published Online: 6 September 2024
DOI: https://doi.org/10.30564/fls.v6i4.6668

CITATION

Nikitina, A., Karlova N., Kravchenko M., et al., 2024. The Role of Multimedia Resources in the Development of Critical Comprehension of Texts in Teaching of Language and Literature in Higher Education Institutions. Forum for Linguistic Studies. 6(4): 71-81. DOI:https://doi.org/10.30564/fls.v6i4.6668

dependent variable is the critical thinking of education seekers. In general, the research hypotheses were confirmed, as the experimental programme demonstrated effectiveness depending on the students' year of study. A gradual increase in the values of the studied components during undergraduate studies is recorded. The developed programme began to partially demonstrate effectiveness starting from the second year, and the greatest positive effect was recorded in the fourth year. The use of multimedia technologies provided additional developmental opportunities for the development of critical thinking in students' work with text material. At the same time, critical reading of texts turned out to be more sensitive to pedagogical influence, compared to critical thinking in general. The obtained data can be used to strengthen the developmental effect of educational programmes of HEIs. In particular, experimental data will help to optimize the teaching of educational components in the context of developing students' critical thinking and active civic position in the information field. The practical aspect of increasing distance learning opportunities is especially important. Further research prospects are to determine the effectiveness of using multimedia technologies for the development of students' critical thinking when studying different academic subjects.

Keywords: Educational process; Thinking; Reading; Text analysis; Students

1. Introduction

Modern education is focused on developing the ability to adequately and productively use available information tools, which implies the relevance of critical thinking (Raj et al., 2022). Moreover, critical thinking enables stabilizing the emotional sphere, optimizing social relations (Bhat et al., 2018), and developing the skills of needed to be a conscious member of civil society (Westheimer, 2019). These trends determine the exceptional social significance of the phenomenon of critical thinking in the educational system. In this regard, the development of critical thinking in education should become consistent and regular, which involves exerting such an influence at different educational subjects (Ennis, 2018). In the higher education system, the development of critical thinking is one of the main learning outcomes in US and UK universities, but the academic justification of this problem is still insufficient (Bellaera et al., 2021). The situation is complicated by the fact that most students have problems with the realization of critical thinking and generally do not know how to use the tools for its development (Stupple et al., 2017).

One of the strategic directions of pedagogical influence in higher education is a multidisciplinary approach to the development of the studied cognitive process (Golden, 2023). It is the systematic pedagogical influence that ensures the positive dynamics of critical thinking. The educational components that involve the analysis and comprehension of texts are especially promising (Kemertelidze and Giorgadze, 2021). Work in this direction involves the search for effective formative tools that would meet the requirements of modern education. The use of multimedia learning technologies in universities does not duplicate the teachers' work, but helps to optimize their activities and increase the overall effectiveness of education (Riznyk, 2021). This creates the need to optimise teacher training in the context of mastering modern technologies. Multimedia tools are becoming increasingly subject-oriented (Deineko et al., 2022), enabling the individualization of educational trajectories and increasing their developmental potential. It has been established that the effectiveness of using multimedia technologies depends on the awareness of their usefulness and ease of use (Tang et al., 2023), as well as on the readiness of teachers to use these tools in the educational process (Sudarsana et al., 2018). The use of modern technologies has also positively proven itself in the development of learners' critical thinking (Gökçearslan et al., 2019). The effectiveness of multimedia technologies in developing critical thinking has been confirmed at various educational levels (Saputra et al., 2023). However, the issue of using multimedia technologies for the development of critical thinking in language and literature classes in higher school requires empirical clarification. It is appropriate to conduct such research in the context of clarifying the possibilities of developing the students' ability to critically analyse texts at different years of study.

The aim of the article is to determine the possibilities of using multimedia technologies for the development of students' critical thinking in HEIs in the philological context.

The aim involves the fulfilment of the following research objectives:

(a) analyse the state of knowledge on the problem of the development of critical thinking in the context of education;

(b) identify the level of the students' critical comprehension of texts;

(c) determine the effectiveness of the use of multimedia resources for the development of students' critical comprehension of texts at different years of study.

Literature review

Summarizing the results of the theoretical review conducted by Lai (2011), the following main features of critical thinking can be singled out: stable orientation to problem-solving; reasoning; rational doubt; focus on obtaining true knowledge; sensitivity to context; self-regulation of the process. A central aspect of critical thinking is metacognition, which is carried out through reflection (Bensley and Spero, 2014). Pnevmatikos (2014) notes the importance of self-confidence and cognitive maturity for effective problem solving. Effective critical perception of reality requires a clear concentration on the cognitive analysis criteria (Grafstein, 2016). Relevance, authorship of information, reliability, credibility, and completeness can be the basis for understanding information (Heard et al., 2020). The functioning of critical thinking involves certain competencies that help reveal the true essence of information (Wilson, 2017). The formulation of questions that provide an adequate cognitive effect is of great importance in this context (Rayan, 2017). There are studies confirming the connection between critical thinking and creativity (Tsai, 2019).

In the higher education system, the development of critical thinking is often focused on the applying acquired theoretical knowledge in practice (Indrašienė et al., 2023). Observing the integration of theory and practice, students develop metacognition and the ability to objectively analyse reality (Sagun and Prudente, 2021). A factor that significantly hinders this process is the students' position who are used to simple accumulation of information and do not have the ability for effective and independent reasoning (Burns et al., 2018). This is due to the fact that training and education in secondary school is focused on the consistent development of conformism (Hooks, 2010). At the same time, targeted work on the development of argumentation skills is an effective strategy for the development of learners' critical thinking (Perez et al., 2021).

Literature classes have a powerful developmental potential in the context of the studied issues, as they provide sensitive material for a comprehensive analysis, argumentation of one's own opinion and critical evaluation (Stepanenko et al., 2022). In this regard, the development of critical thinking in philology students is a promising academic and educational direction (Foka, 2020; Khomiak, 2019). An important aspect of the formation of critical thinking in literature classes is the active participation of the student in the analysis of the meaning of the work (Bobkina and Stefanova, 2016). At the same time, the reader becomes not just a receiver of information, but a person who actively interprets the text (Stefanova et al., 2017). The effectiveness of this work is related to the use of problem discussion questions that serve to develop the ability to argue one's own opinion. Student's work with texts can be carried out in the context of information literacy and content analysis of online media (O'Halloran et al., 2017).

Bringing higher education into line with the current requirements involves the active integration of digital, multimedia technologies (Akour and Alenezi, 2022). Multimedia resources are computer-based products that help to optimize interaction: presentations, animations, game applications, video and audio files, multimedia galleries, network applications (Sayidova and Do'sanova, 2022). Multimedia games are particularly popular in the pedagogical environment, satisfying the need for new experiences, relieving stress, and creating favourable conditions for the achievement of educational goals (Kartika et al., 2019). The positive impact of using multimedia presentations for the development of critical thinking in literature lessons (Shamboul, 2022) and civic education (Syafawati et al., 2022) was proved. The use of multimedia technologies, namely electronic mind maps, is relevant for the development of critical thinking (Hidayati et al., 2020). A positive aspect of this process is the possibility of students constructing the educational course independently (Akramova, 2019). Multimedia technologies stimulate critical thinking through activation of creativity and cognitive interest (Gayatri et al., 2018). Problem-based learning is a powerful element of influencing critical thinking in the context of a multimedia space (Abdullah et al., 2021). Considering the realities of our time, researchers are working on the creation of multimedia programmes for the development of thinking for smartphones (Chen et al., 2019). At the same time, other researchers do not confirm the pos-

itive role of multimedia resources for the development of critical thinking (Jodoi et al., 2021).

So, the theoretical analysis of the problem indicates the relevance of studying the issue of the development of critical thinking in higher education. At the same time, we note that the developmental possibilities of multimedia technologies in the context of teaching philological subjects in poorly studied.

2. Materials and methods

The study was carried out in the period from January 2023 to June 2023 and included the following *stages*.

The theoretical stage involves the study of the information on critical thinking, features of its development in higher education. The components and criteria of students' critical thinking were clarified. The analysis of theoretical sources became the basis for the advancement of two hypotheses:

(a) the use of multimedia technologies in language and literature classes in HEIs improves the quality of critical thinking and the level of the skills of critical comprehension of texts;

(b) the effectiveness of the multimedia technologies in language and literature classes in HEIs for the development of critical thinking differs depending on the students' year of study.

The research planning stage provided for determining available resources. Consideration of organizational and administrative aspects of the research.

The primary diagnostic test—determining the level of critical thinking and the skills of critical comprehension of texts.

The stage of experimental influence is the implementation of a critical thinking development programme using multimedia resources at the language and literature classes. The classes were based on the use of philological material and were held outside of school hours.

Re-diagnostics of critical thinking and the skills of critical comprehension of texts involved revealing the post-experimental dynamics of the studied phenomena.

The stage of data processing and interpretation is the establishment of quantitative and qualitative patterns of students'critical thinking and drawing research conclusions.

The research employed the following methods: general theoretical method; testing, interview, observation, formative experiment, statistical methods.

2.1 Instruments

The testing was used to find out general indicators of the level of critical thinking. Starkey's Critical Thinking Skills Success was used — the validity of this tool is proven and confirmed (Lutsenko, 2014). The test comprises 27 questions, each with four answer options. Intellectual tasks are aimed at stimulating critical thinking. The overall indicator of the studied process ranges from 0 to 27 points. The time limit for the test is 30 minutes.

Observation and conversation made it possible to find out the specifics of the level of the critical comprehension of texts. The main criteria are the ability to argue a position, the depth of the analysis, the independence of the analysis, the level of difference between the results of one's own cognitive search and theoretical constructs from textbooks, and the quality of reflection. Each of the criteria was evaluated at three levels — low, medium, high. These instruments were applied by presenting fragments of fictional and journalistic texts. The task was to analyse the situation in the text for objectivity, morality, direction of the characters' behaviour.

The formative experiment made it possible to test the advanced hypothesis. The independent variable of the experiment is a system of exercises aimed at critical thinking, which involved the use of multimedia technologies. This approach was implemented in experimental groups. In the control groups (CGs), a system of developmental exercises was implemented without the use of multimedia technologies. The dependent variable is the students' critical thinking.

2.2 Sample

The sample was formed from students of Luhansk Taras Shevchenko National University. Two groups were formed in each year of study among undergraduate students: experimental (EG) and control (CG). Quantitative composition of the samples: 1st year—37 students of EG and 35 students of CG; 2nd year—32 students of EG and 33 students of CG; 3rd year—39 students of EG and 36 students of CG; 4th year—35 students of EG and 35 students of CG. The quantitative composition of the samples corresponds to the lower limit of representativeness.

2.3 Data collection

The authors of the article carried out research and diagnostics in two stages. The experimental influence was realized in the context of Ukrainian language and literature classes according to the educational plans. Formative influence involved the following stages: stimulation of actions, selection of a problem, study of initial data, evaluation of results, definition and implementation of a cognitive strategy for understanding the situation (Vong and Kaewurai, 2017). These stages were implemented in accordance with the specifics of the literature, taking into account the results of similar studies (Stepanenko et al., 2022). Problematic situations were proposed that stimulated the cognitive interest of students during the lesson. The main material was considered with the active involvement of game-based methods, in particular, role-playing, acting out plot elements, joint analysis of the events of the work. The subjects were offered the opportunity to argue the actions of a literary character from a position that contradicts the traditional approach in literature. It was emphasized that the analysis of literary events should be based on a system of criteria. The lesson necessarily included a reflective stage.

So, in general, the development programme was implemented on the basis of the following aspects: formation of a favourable emotional atmosphere, stabilization and strengthening of cognitive interest, formation of justified criticality, development of reflection. This structure of classes is typical for both groups. At the same time, multimedia resources were actively used in the experimental group. The main aspects of such work were the use of multimedia presentations, the use of video files with adaptations of read works (in literature classes), the introduction of online quizzes (language and literature classes), and the comparison of information from various Internet resources. Multimedia resources were used to demonstrate visibility and activate feedback and cognitive interest. Tools such as Padlet and communication platforms (Zoom, GoogleMeet) reflecting the capabilities of Web 2.0 technologies have been implemented. The tools used in this way strengthen the effectiveness of traditional educational methods and tools. A total of 20 classes were held during five months, 1 hour each.

Data analysis was carried out using percentage data analysis and calculation of the Student's t-test, which made it possible to reasonably determine the experimental programme. SPSS statistics was used for data processing.

The ethical aspect of the research was ensured by signing the consent to participate in the research, where the students were informed in detail about all aspects of the experiment.

3. Results

The results of the experiment separately for each year of study are analysed below. **Table 1** presents the dynamics of changes in the indicators of critical thinking of the first-year students. The primary diagnostics showed that the studied group has low and medium indicators of critical thinking. At the same time, the percentage of people with a high level of the studied parameter is 11.43% in CG and 16.22% in EG. The ability of critical comprehension of texts is less developed than critical thinking in general, as this component requires special competencies. Low indicators were found in more than half of the students. The indicators for the two components did not change significantly after the completion of the programme for the development of critical thinking in philological classes. In the process of completing tasks, first-year higher education students experienced difficulties manifested in the lack of a critical, analytical approach to completing tasks. A reproductive cognitive strategy dominated among the first-year students, which changed little during the programme implementation. Moreover, the results were not affected by the use of multimedia resources.

Table 2 shows the dynamics of changes in the components of second-year students. There is a significant predominance of medium indicators of critical thinking (more than 80% of the subjects). Extreme values are presented insignificantly. Critical comprehension of texts is represented by better indicators compared to the first year. The share of students with a low level is decreasing and the medium values are increasing. At the same time, there is only five people with a high level of this component. No significant transformations of both parameters were found in CG. The changes in critical comprehension of texts are recorded in EG. In particular, the share of students with a high indicator of this parameter increased by 18.75%. The representation of low indicators in the sample decreased significantly after the experiment (by 25.01%). Therefore, multimedia technologies in this sample played the role of a factor that strengthened

Table 1. The dynamics of the level of critical thinking and critical comprehension of texts among first-year undergraduate students.

Studied components	Levels of development	Control group				Experimental group			
		Primary diagnostics		Secondary diagnostics		Primary diagnostics		Secondary diagnostics	
		%	Q-ty	%	Q-ty	%	Q-ty	%	Q-ty
Critical thinking	Low	40	14	40	14	40.54	15	37.84	14
	Medium	48.57	17	45.71	16	43.24	16	40.54	15
	High	11.43	4	14.29	5	16.22	6	21.62	8
Critical comprehension of texts	Low	51.43	18	51.43	18	54.05	20	48.65	18
	Medium	40	14	34.28	12	35.14	13	40.54	15
	High	8.57	3	14.29	5	10.81	4	10.81	4

Table 2. The dynamics of the level of critical thinking and critical comprehension of texts among second-year undergraduate students.

Studied components	Levels of development	Control group				Experimental group			
		Primary diagnostics		Secondary diagnostics		Primary diagnostics		Secondary diagnostics	
		%	Q-ty	%	Q-ty	%	Q-ty	%	Q-ty
Critical thinking	Low	6.06	2	3.03	1	6.25	2	6.25	2
	Medium	81.82	27	75.76	25	87.5	28	84.38	27
	High	12.12	4	21.21	7	6.25	2	9.37	3
Critical comprehension of texts	Low	24.24	8	18.18	6	28.13	9	3.12	1
	Medium	69.7	23	72.73	24	65.62	21	71.88	23
	High	6.06	2	9.09	3	6.25	2	25	8

cognitive interest and activated development mechanisms. This statement is confirmed by the results of observations of students' activities during the experiment.

Table 3 presents the results of third-year students. Analysis of the tables revealed no significant differences in the level of critical thinking of third- and second-year students. The medium indicators still continue to prevail, and a percentage of students with low indicators of critical comprehension of texts remains stable. No significant changes in components were found in both studied groups for the component of critical thinking. Critical comprehension of texts changed in EG after the experiment. In particular, the percentage of students with a high level of the component increased by 25%. At the same time, the number of subjects with a low level changed insignificantly. Positive changes in critical comprehension are also observed in the experimental sample. The use of multimedia technologies contributed to the change in the number of persons with a low level of the component (decrease by 12.82%). There is also a significant increase in the percentage of students with a high level of the parameter (increase by 43.59%). In general, the observation showed that the students' interest in developmental classes and the use of multimedia resources in education did not change significantly compared to the previous year of study.

Table 4 presents the dynamics of the studied components in fourth-year undergraduate students. The primary diagnostics showed that the studied samples had high indicators of critical thinking and the ability to critically analyse texts. In general, the fourth year shows the best indicators of component development compared to other samples. Positive changes in both parameters are observed after the implementation of the development programme. High indicators of critical thinking in CG increased by 39.43%, and in EG—by 37.14%. High indicators of the ability to critically comprehend texts increased in the control group by 34.29%, and in the experimental group—by 54.28%. Therefore, despite the positive changes in both groups, the development programme using multimedia technologies demonstrates greater

Table 3. The dynamics of the level of critical thinking and critical comprehension of texts among third-year undergraduate students.

Studied components	Levels of development	Control group				Experimental group			
		Primary diagnostics		Secondary diagnostics		Primary diagnostics		Secondary diagnostics	
		%	Q-ty	%	Q-ty	%	Q-ty	%	Q-ty
Critical thinking	Low	11.11	4	11.11	4	10.26	4	10.26	4
	Medium	75	27	75	27	74.36	29	71.79	28
	High	13.89	5	13.89	5	15.38	6	17.95	7
Critical comprehension of texts	Low	22.22	8	16.67	6	17.95	7	5.13	2
	Medium	75	27	55.55	20	76.92	30	46.15	18
	High	2.78	1	27.78	10	5.13	2	48.72	19

Table 4. The dynamics of the level of critical thinking and critical comprehension of texts among fourth-year undergraduate students.

Studied components	Levels of development	Control group				Experimental group			
		Primary diagnostics		Secondary diagnostics		Primary diagnostics		Secondary diagnostics	
		%	Q-ty	%	Q-ty	%	Q-ty	%	Q-ty
Critical thinking	Low	11.43	4	11.43	4	14.29	5	14.29	5
	Medium	54.29	19	22.86	8	57.14	20	20	7
	High	34.28	12	65.71	23	28.57	10	65.71	23
Critical comprehension of texts	Low	14.29	5	11.43	4	17.14	6	5.71	2
	Medium	57.14	20	25.71	9	57.14	20	14.29	5
	High	28.57	10	62.86	22	25.72	9	80	28

effectiveness for the studied components.

Preliminary conclusions about the effectiveness of the studied programme were verified using the Students' t-test (**Table 5**). The obtained results are analysed below. No statistically significant changes in two parameters were found in the first-year samples. In the second year, the group using multimedia technologies had a shift in critical comprehension of texts at the significance level of $p = 0.05$ ($t = 2.654$). Statistical differences in the parameter of critical comprehension of texts are also observed in the samples of third-year students. In CG, the significance of changes is at $p = 0.05$ ($t = 2.429$), and in EG—at $p = 0.01$ ($t = 3.122$). Significant changes in the parameter of critical thinking were recorded in fourth-year students: in CG ($t = 2.452$) and EG ($t = 2.423$). The significance level is $p = 0.05$. Changes in critical comprehension of texts were also found in CG ($t = 2.339$, $p = 0.05$) and EG ($t = 3.981$, $p = 0.01$).

The obtained data indicate the effectiveness of the use of multimedia technologies for the development of students' critical thinking in language and literature classes. The determined effectiveness has specific features that depend on the students' year of study.

4. Discussion

The research results indicate a gradual increase in the level of the studied indicators of students during their undergraduate studies. The first-year students have markedly low indicators of critical thinking and the ability to critically analyse texts. The medium-level indicators of the studied components are recorded In the second and third years of study. In the fourth year, an increase in the share of students with a high level of critical thinking components was found. The developed programme began to partially demonstrate effectiveness starting from the second year in the context of developing critical comprehension of texts. In working with fourth-year students, the pedagogical developmental influence turned out to be the most effective, but the use

Table 5. Table of Student's t-test values in the control and experimental samples.

Studied components	Year 1	Year 2	Year 3	Year 4
Critical thinking in CG	1.008	1.223	1.111	2.452*
Critical thinking in EG	1.555	1.099	1.118	2.423*
Critical comprehension of texts in CG	1.523	1.232	2.429*	2.339*
Critical comprehension of texts in EG	1.723	2.654*	3.122**	3.981**

of multimedia technologies provides additional opportunities for improving the programme. The low sensitivity of the first-year students to developmental influences can be explained by the lack of systematic work on the development of critical thinking in the system of general secondary education, which is confirmed by the conclusions of other researchers (Stupple et al., 2017). A more pronounced impact of the programme confirms the opinion that critical thinking consists of a system of competencies that help to obtain the most objective information (Wilson, 2017).

The positive impact of multimedia technologies on critical comprehension of texts is primarily related to the stimulation of cognitive interest and the possibility of providing an effective individual approach (Deineko et al., 2022). Therefore, we support the opinion regarding the prospects of using multimedia resources in education for the development of critical thinking (Gökçearslan et al., 2019). We consider the use of multimedia games in the educational process especially positive (Kartika et al., 2019).

We cannot state the unequivocal effectiveness of the critical thinking development programme using philological material, which was proven in other studies (Stepanenko et al., 2022). The researchers focused on school students, while our study involved students, which may explain the differences in results. We note that the existing technologies for the development of students' critical thinking using the opportunities offered by literature require improvement (Foka, 2020). It is also advisable to review and optimize the structure of classes aimed at the development of critical thinking in order to improve the effectiveness of the carried out work (Vong and Kaewurai, 2017). The possibilities of a multidisciplinary approach should be mentioned (Golden, 2023). Improvement of the programme is also possible by strengthening of the reflective component, which is the main part of the studied cognitive process (Bensley and Spero, 2014). In this context, it is important to pay more attention to the correct and effective formulation of questions when working with students (Rayan, 2017). Students should be encouraged to think independently, not just to accumulate learning material (Burns et al., 2018). It is important to fulfil this task by establishing a clear connection between the theory and practice of the educational process (Indrašienė et al., 2023).

Limitations. The major part of the students in the studied samples were female, which reflects the specifics of their majors. Therefore, it is necessary to achieve a more even distribution in the formation of the studied groups in order to obtain more accurate data. It is also worth expanding the quantitative composition of the samples by involving other HEIs.

5. Conclusion

In general, the research hypotheses were confirmed, as the experimental programme demonstrated effectiveness depending on the students' year of study. A gradual increase in indicators of the studied components during undergraduate studies of students is recorded. The developed programme began to partially demonstrate effectiveness starting from the second year, and the greatest positive effect was recorded in the fourth year. The use of multimedia technologies provided additional developmental opportunities for the formation of critical thinking in students' work with text material. At the same time, critical comprehension of texts turned out to be more sensitive to pedagogical influence, compared to critical thinking in general. The obtained data can be used to strengthen the developmental effect of educational programmes of HEIs. In particular, experimental data will help to optimize the teaching of educational components in the context of the development of critical thinking and active civic position of students in the information field. The practical aspect of increasing distance learning opportunities is especially noteworthy. Further research prospects are to determine the effectiveness of using multimedia technolo-

gies for the development of students' critical thinking when studying various academic subjects.

Author Contributions

Conceptualization, Nadiia Karlova and Alla Nikitina; methodology, Olena Lapko; software, Marcharita Kravchenko; validation, Juliia Kotienieva, Alla Nikitina and Nadiia Karlova; formal analysis, Nadiia Karlova; investigation, Marcharita Kravchenko; resources, Alla Nikitina; data curation, Olena Lapko; writing—original draft preparation, Halyna Barylova; writing—review and editing, Marcharita Kravchenko; visualization, Juliia Kotienieva; supervision, Olena Lapko; project administration, Halyna Barylova; funding acquisition, Alla Nikitina. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

Funding

This research received no external funding.

References

Abdulah, Mustadi, A., Fitriani, W., 2021. PBL-based interactive multimedia in improving critical thinking skills. Jurnal Pendidikan Indonesia. 10(1), 136–144. DOI: https://doi.org/10.23887/jpiundiksha.v10i1.255-21

Akour, M., Alenezi, M., 2022. Higher education future in the era of digital transformation. Education Sciences. 12(11), 784. DOI: https://doi.org/10.3390/educsci12110784

Akramova, G.R., 2019. Modern approaches to the development of critical thinking of students. European Journal of Research and Reflection in Educational Sciences. 7(10), 1384–1389. Available from: https://www.idpublications.org/wp-content/uploads/2019/09/Full-Paper-MODERN-APPROACHES-TO-THE-DEVELOPMENT-OF-CRITICAL-THINKING-OF-STUDENTS.pdf (cited 20 March 2024).

Bellaera, L., Weinstein-Jones, Y., Ilie, S., et al., 2021. Critical thinking in practice: The priorities and practices of instructors teaching in higher education. Thinking Skills and Creativity. 41, 100856. DOI: https://doi.org/10.1016/j.tsc.2021.100856

Bensley, D.A., Spero, R.A., 2014. Improving Critical thinking skills and metacognitive monitoring through direct infusion. Thinking Skills and Creativity. 12, 55–68. DOI: https://doi.org/10.1016/j.tsc.2014.02.001

Bhat, A.Z., Naidu VR, Singh B., 2018. Multimedia cloud for higher education establishments: A reflection. In: Rathore, V., Worring, M., Mishra, D., et al., (eds.), Emerging Trends in Expert Applications and Security, Proceedings of the Advances in Intelligent Systems and Computing; 20 November 2018; Singapore: Springer. DOI: https://doi.org/10.1007/978981-13-2285-3_81

Bobkina, J., Stefanova, S., 2016. Literature and critical literacy pedagogy in the EFL classroom: Towards a model of teaching critical thinking skills. Studies in Second Language Learning and Teaching. 6(4), 677–696. DOI: https://doi.org/10.14746/SSLLT.2016.6.4.6

Burns, D., Devitt, A., McNamara, G., et al., 2018. Is it all memory recall? An empirical investigation of intellectual skill requirements in leaving certificate examination papers in Ireland. Irish Educational Studies. 37(3), 351–372. DOI: https://doi.org/10.1080/03323315.2018.1484300

Chen, T., Hsu, H.M., Stamm, S.W., et al., 2019. Creating an instrument for evaluating critical thinking apps for college students. E-Learning and Digital Media. 16(6), 433–454. DOI: https://doi.org/10.1177/2042753019860615

Deineko, Z., Sotnik, S., Lyashenko, V., 2022. Multimedia systems in education. International Journal of Academic Information Systems Research (IJAISR). 6(7), 23–28. Available from: https://openarchive.nure.ua/server/api/core/bitstreams/3f786cf6-ef00-42f7-a1a9-d0e93b0f16b6/content (cited 20 March 2024).

Ennis, R.H., 2018. Critical thinking across the curriculum: A vision. Topoi. 37(1), 165–184. DOI: https://doi.org/10.1007/s11245-016-9401-4

Foka, M.V., 2020. Technologies for the Development of critical thinking of a philologist student in the process of literary education. Scientific Notes. Series: Pedagogical Sciences. 190, 53–56. (in Ukrainian). DOI: https://doi.org/10.36550/2415-7988-2020-1-190-53-56

Gayatri, T., Soegiyanto, H., Rintayati, P., 2018. Development of contextual teaching learning-based audio visual adobe flash media to improve critical thinking ability of geography learning at senior high school. IOP Conference Series: Earth and Environmental Science. 145, 012004. DOI:

https://doi.org/10.1088/1755-1315/145/1/012004

Gökçearslan, S., Solmaz, E., Coşkun, B.K., 2019. Critical thinking and digital technologies: An outcome evaluation. In: Management Association (ed.). Rapid Automation: Concepts, Methodologies, Tools, and Applications. IGI Global: Pennsylvania. pp. 1407–1433. DOI: https://doi.org/10.4018/978-1-5225-8060-7.ch066

Golden, B., 2023. Enabling critical thinking development in higher education through the use of a structured planning tool. Irish Educational Studies. 42(4): 949–969. DOI: https://doi.org/10.1080/03323315.2023.2258497

Grafstein, A., 2016. Information literacy and critical thinking: context and practice. Pathways into information literacy and communities of practice. Teaching Approaches and Case Studies. 3–28. DOI: https://doi.org/10.1016/B978-0-08-100673-3.00001-0

Heard, J., Scoular, C., Duckworth, D., et al., 2020. Critical thinking: Definition and structure. Available from: https://research.acer.edu.au/ar_misc/38/ (cited 20 March 2024).

Hidayati, N., Zubaidah, S., Suarsini, E., et al., 2020. The relationship between critical thinking and knowledge acquisition: The role of digital mind maps-PBL strategies. International Journal of Information and Education Technology. 10(2), 140–145. DOI: https://doi.org/10.18178/ijiet.2020.10.2.1353

Hooks, B., 2010. Teaching critical thinking: Practical wisdom. Routledge: OX. pp. 208.

Indrašienė, V., Jegelevičienė, V., Merfeldaitė, O., et al., 2023. Critical reflection in students' critical thinking teaching and learning experiences. Sustainability. 15(18), 13500. DOI: https://doi.org/10.3390/su151813500

Jodoi, K., Takenaka, N., Uchida, S., et al., 2021. Developing an active-learning app to improve critical thinking: item selection and gamification effects. Heliyon. 7(11), e08256. DOI: https://doi.org/10.1016/j.heliyon.2021.e08256

Kartika, Y., Wahyuni, R., Sinaga, B., et al., 2019. Improving math creative thinking ability by using math adventure educational game as an interactive media. Journal of Physics: Conference Series. 1179(1), 012078. DOI: https://doi.org/10.1088/1742-6596/1179/1/012078

Kemertelidze, N., Giorgadze, M., 2021. The significance of critical thinking in text comprehension. International Journal of Multilingual Education. 19, 182–187.

Khomiak, I., 2019. Development of critical thinking among philology students. (in Ukrainian). Available from: https://eprints.oa.edu.ua/8123/ (cited 20 March 2024).

Lai, E., 2011. Critical Thinking: A Literature Review. Research Report. Pearson education. Available from: http://paluchja-zajecia.home.amu.edu.pl/seminarium_fakult/sem_f_krytyczne/Critical%20Thinking%20A%20Literature%20Review.pdf (cited 20 March 2024).

Lutsenko, E.L., 2014. Adaptation of L. Starkey's Critical Thinking Test. (in Russian). Available from: http://nbuv.gov.ua/UJRN/VKhIPC_2014_1110_55_14 (cited 20 March 2024).

O'Halloran, K.L., Tan, S., Marissa, K.L.E., 2017. Multimodal analysis for critical thinking. Learning, Media and Technology. 42(2), 147–170. DOI: https://doi.org/10.1080/17439884.2016.1101003

Perez, A., Gualdrón, E., Barrera, A., 2021. Oral argumentation for strengthening critical thinking in the classroom. Revista Boletín Redipe. 10(9), 48–65. DOI: https://doi.org/10.36260/rbr.v10i9.1426

Pnevmatikos, D., Christodoulou, P., Georgiadou, T., 2019. Promoting critical thinking in higher education through the values and knowledge education (V a KE) method. Studies in Higher Education. 44(5), 892–901. DOI: https://doi.org/10.1080/03075079.2019.1586340

Raj, T., Chauhan, P., Mehrotra, R., et al., 2022. Importance of critical thinking in the education. World Journal of English Language. 12(3), 126–133. DOI: http://dx.doi.org/10.5430/wjel.v12n3p126

Rayan, J.E., 2017. Wait, What? And Life's Other Essential Question, 1st ed. Harper Collins: New York, NY. p. 144.

Riznyk, N., 2021. Use of multimedia technologies during distance learning in higher education institutions. University Economic Bulletin. 50, 12–17. DOI: https://doi.org/10.31470/2306-546X-2021-50-12- 17

Sagun, R.D., Prudente, M., 2021. Applying the plan-do-study-act (PDSA) action research model to re-structure the science classroom con- forming to the metacognitive orientation standards. Educational Action Research. 31(1), 1–17. DOI: https://doi.org/10.1080/09650792.2021.1894964

Saputra, D.I.S., Hatta, H.R., Kamila, V.Z., 2023. Multimedia as a tools to improve critical thinking: A systematic literature review. AIP Conference Proceedings. 2798, 020061. DOI: https://doi.org/10.1063/5.0154906

Sayidova, D., Do'sanova, M., 2022. Use of multimedia in education. Conference Zone. Proceedings of the International Congress on Multidisciplinary Studies in Education and Applied Sciences; 27 April 2022;

Turkey: Istanbul. pp. 165–167. Available from: https://conferencezone.org/index.php/cz/article/view/479 (cited 20 March 2024).

Shamboul, H.A.E., 2022. The importance of critical thinking on teaching learning process. Open Journal of Social Sciences. 10(01), 29–35. DOI: https://doi.org/10.4236/jss.2022.101003

Stefanova, S., Bobkina, J., Sánchez-Verdejo Pérez, F.J., 2017. The effectiveness of teaching critical thinking skills through literature in EFL context: A case study in Spain. International Journal of Applied Linguistics and English Literature. 6(6), 252–266. DOI: https://doi.org/10.7575/aiac.ijalel.v.6n.6p.252

Stepanenko, O., Bedzir, N., Demchyk, M., et al., 2022. Effectiveness of critical thinking development in high school world literature lessons. Apuntes Universitarios. 13(1), 398–414. DOI: https://doi.org/10.17162/au.v13i1.1347

Stupple, E.J.N., Maratos, F.A., Elander, J., et al., 2017. Development of the Critical Thinking Toolkit (CriTT): A measure of student attitudes and beliefs about critical thinking. Thinking Skills and Creativity. 23, 91–100. DOI: https://doi.org/10.1016/j.tsc.2016.11.007

Sudarsana, I.K., 2018 Quality improvement of early childhood education through the utilization of multimedia. Journal Penjaminan Mutu. 4(2), 174–183. DOI: https://doi.org/10.25078/jpm.v4i2.571

Syafawati, Z.L., Murdiono, M., Suyato, S., 2022. Jurisprudential inquiry based on Edmodo to improving students critical thinking in citizenship education courses. Journal of Education Technology. 6(2), 266–276. DOI: https://doi.org/10.23887/jet.v6i2.43295

Tang, X., Zainal, S.R.B.M., Li, Q., 2023. Multimedia use and its impact on the effectiveness of educators: A technology acceptance model perspective. Humanities and Social Sciences Communications. 10, 923. DOI: https://doi.org/10.1057/s41599-023-02458-4

Tsai, K.C., 2019. Investigating the empirical links between creative and critical thinking. Psychology, Society, and Education. 11(3), 267–280.

Vong, S.A., Kaewurai, W., 2017. Instructional model development to enhance critical thinking and critical thinking teaching ability of trainee students at regional teaching training center in Takeo province, Cambodia. Kasetsart Journal of Social Sciences. 38(1), 88–95. DOI: https://doi.org/10.1016/j.kjss.2016.05.002

Westheimer, J., 2019. Civic education and the rise of populist nationalism. Peabody Journal of Education. 94(1), 4–16. DOI: https://doi.org/10.1080/0161956X.2019.1553581

Wilson, J., 2017. Critical thinking: A beginner's guide to critical thinking, better decision making and problem solving! CreateSpace Independent Publishing Platform. 114. Available from: https://books.google.com.ua/books/about/Critical_Thinking_a_Beginner_s_Guide_to.html?id=sehyAQAACAAJ&redir_esc=y (cited 20 March 2024).