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FORMATION OF CRITICAL THINKING OF PRIMARY SCHOOL STUDENTS THROUGH AN EFFECTIVE SURVEY

Abstract

The article deals with the problem of the formation of critical thinking in primary schoolchildren through a judicious application of effective inquiry techniques. To determine the relevance of the topic, the concept of the development of education and science and the State Mandatory Standard of Primary Education are analyzed.

A review of the research of domestic and foreign scientists who studied the concept of "critical thinking" is presented. It is confirmed that this is one of the skills that allows the student to develop freely in the educational space.

Since the object of the study was primary school students, experimental work was carried out with students. Three stages of the experiment have been implemented. Tasks aimed at forming students' critical thinking at the formative stage are developed based on the educational goals of the 4th-grade curriculum. The effectiveness of the developed tasks aimed at the problem of research has been proved in the course of experimental research.

As a result of the use of pedagogical technology for the development of critical thinking, students make mistakes at the first stage, freely express their thoughts without fear of teacher correction; update their knowledge and experience; solve large-scale problems on the topic, make common decisions; at the second stage, they understand the content of new information, compare existing knowledge and experience, pose questions aimed at finding effective and solvable ways, express their own opinion about new information, argue their positions; at the third stage, the ability to independently determine tasks, make forecasts, and make decisions develops.

Keywords: critical thinking, technology, primary class, effective question, decision-making, analysis, comparison, reflection, experiments.

Introduction. Central to our educational objectives is the cultivation of a student persona characterized by the cultivation of advanced critical thinking capabilities, an autonomous aptitude for information analysis, the generation of innovative ideas, a proclivity for pioneering endeavours, honed linguistic competencies, adept digital proficiency, and proficient research acumen within the academic framework. These objectives align seamlessly with the pivotal consideration of enhancing the intellectual reservoir of academia, as expounded in Section 2 of the concept for the development of Higher Education and Science in the Republic of Kazakhstan 2023-2029". Consequently, the imperative emerges to foster tailored proficiencies and aptitudes that drive intellectual advancement.

In this context, the comprehensive obligatory educational framework of primary education stipulates that the mastery of critical thinking skills occupies a seminal position in facilitating unhampered scholastic growth. Thus, within the pedagogical milieu, an imperative arises to construct scenarios conducive to deliberate decision-making, individualized research initiatives, analytical contemplation, and the substantiation of viewpoints. Collaborative endeavours in this vein stand to yield elevated outcomes, given the contemporary educational landscape's demand for the cultivation of cogitative scholars (Sormunen et al., 2023). Indeed, the endeavour to mould a student endowed with the capacity for incisive thought represents an ongoing and multifaceted undertaking within the modern educational milieu.

While there exists a corpus of research addressing the advancement of critical thinking within domestic academic discourse, its extensiveness remains limited. For instance, Kelgembaeva et al., (2023) probed the integration of critical thinking methodologies into secondary-level subject instruction, Bekbaeva (2021) elucidated pathways for instilling critical thinking in students, Seitkazy et al., (2016) delved into the scientific underpinning of utilizing media resources for cognitive development, and Iskakova (2022) explored the enhancement of primary school educators' intellectual capacities through critical thinking paradigms. Further, Taybolatov (2022) introduced an adaptive curriculum aimed at nurturing critical thinking within general secondary education. Zair-Bek & Mushtavinskaya (2011) delved into contemporary pedagogical techniques fostering critical thinking within the learning milieu. Complementary to this, Tikhonova (2017) a Russian scholar, investigated the nexus between critical thinking and the cultivation of leadership qualities, a facet also explored by the American psychologist (Halpern 2000).

Additionally, international scholarship on the topic was exhaustively investigated. The works of Silva et al., (2023) as well as the comprehensive insights presented by Wijnen et al., (2023).

Recognizing critical thinking, creative ideation, problem-solving acumen, and analogous higher-order cognitive proficiencies as integral components of holistic student maturation, extant research underscores the potential of technology as a catalyst for stimulating advanced thinking capabilities (Alade & Kuku 2022). Nonetheless, a conspicuous discrepancy persists wherein educators, for the most part, do not fully harness novel technological tools to invigorate higher-order cognitive engagement (Agbo et al., 2023). To address this lacuna and augment pedagogical practice, it is imperative to gain an informed understanding of educators' attitudes toward the incorporation of novel technologies to foster and amplify higher-order cognitive thinking within the educational milieu.

Purpose of study. In a broader context, it is evident that the examination of critical thinking skills finds its prominence within the investigations of psychologists, pedagogues, and methodologists. Aligned with the evolution of the educational framework, these inquiries undergo a process of systematic categorization and adaptation.

Literature review. The pertinence of the conceptual framework and standards pertinent to the cultivation of critical thinking among primary school students facilitated through efficacious inquiry-based approaches, was substantiated (Gómez & Suárez 2020). In pursuit of this, a comprehensive theoretical examination of both domestic and international scholarly contributions was undertaken. The investigations conducted by domestic scholars were meticulously scrutinized, employing methods encompassing data collection, comparative analysis, and systematic categorization.

Bekbaeva & Asaubaeva (2013) in their research, expounds on critical thinking as the faculty to dissect, amalgamate, and assess information, thereby endowing the individual with the ability to gauge its authenticity and pertinence. This cognitive process, as delineated by the scholars, empowers individuals to not only formulate their viewpoints but also to forge concepts and convictions. The concept of evaluation-reflective thinking, as postulated by their engenders, is prudent decision-making grounded in pre-existing knowledge (factual data). To inculcate such a cognitive faculty, Bekbaeva & Asaubaeva (2013), and Du et al., (2022) advocate the orchestration of

unconventional tasks and investigative ventures that necessitate distinct decision-making and imaginative competencies, thereby culminating in the cultivation of critical thinking.

Of particular interest is Kelgembaeva et al.'s, (2023) discourse on the integration of critical thinking technologies within subject pedagogy. Kelgembaeva et al., (2023) posit critical thinking as a pedagogical modality that endeavors to elevate educational content to a level where students can engage with information critically and autonomously, eschewing traditional didactic and reproductive-explanatory methodologies. This instructional approach involves discerning innovative thoughts and ideas within artistic creations, thus engendering critical thinking application in curriculum planning (Egana-delSol 2023; Abrahams et al., 2021). The methodological orientation emphasizes opinion articulation and its subsequent analysis, event, and character comparisons, and the execution of tasks aimed at elucidating the motivations behind revisions and improvements.

The scholars Iskakova & Esmuratova (2021) unveil a multifaceted facet of critical thinking, denoting it as an intricate process culminating in the amalgamation of ideas about a specific quandary and culminating in decision-making. Iskakova & Esmuratova (2021) further asserts that this cognitive phenomenon entails the extraction of pertinent and indispensable knowledge from an array of dilemmas and resolutions, while simultaneously discerning novel insights from pre-existing wisdom. Such an ability is pivotal in guiding the quest for solutions (Iskakova, & Esmuratova 2021).

In the exploration conducted by Kubrushko & Bekbaeva (2023), the spotlight is cast upon the orchestration of innovative pursuits that foster critical thinking acumen. The authors proffer inquiries tailored for university educators, aimed at gauging their receptiveness to educational technologies conducive to critical thinking development. Through their study, they discern a predilection among instructors for methodological guidance. As a consequence, the research advocates an enriched comprehension of students' critical thinking in both theoretical and practical dimensions, along with the systematic integration of critical thinking principles and technological knowledge. This initiative culminated in the introduction of a specialized module titled "Technology of Utilizing Critical Thinking Strategies in the Learning Process." The aforementioned insights are poised to be instrumental in informing our practical approach as well.

Main part. Furthermore, it is prudent to delve into the perspectives of notable foreign scholars. In a comprehensive inquiry, Grau & Turula (2019) delved into the ramifications of employing lectures, collaborative learning modalities, and concept mapping techniques to foster the maturation of critical and creative thinking proficiencies. Through their meticulous investigation, they convincingly demonstrated that the amalgamation of diverse pedagogical approaches culminated in noteworthy outcomes, thereby substantiating the potency of integrated instructional methodologies. Consequently, we shall incorporate their valuable insights into our pragmatic selection of methods during the forthcoming pedagogical practice.

Similarly, the work of Wijnen et al., (2023) explored the dispositions of primary school educators towards the integration of emerging technologies to engender higher-order thinking capacities in students. Their findings underscored a prevailing tendency among teachers to underutilize novel technologies as catalysts for nurturing critical thinking. This observation underscores the imperative of fostering critical thinking skills within students and highlights the recognition of specialized pedagogical technologies as indispensable for their holistic development.

In alignment with this discourse, we intend to adopt the "Pedagogical Technology of Cultivating Critical Thinking through Reading and Writing," as conceptualized by Temple et al., (1998). This approach is intentionally designed to instil and refine critical thinking abilities within the educational milieu.

Furthermore, the approach of fostering critical thinking through questioning finds its roots in the philosophical inquiries of luminaries such as Socrates, Plato, and Aristotle. The "Socratic questioning" method, aptly attributed to Socrates, entails orchestrating discussions centred around strategically formulated queries to guide discourse toward specific objectives

(Kaldybekova et al., 2023). By adeptly posing discerning and impactful questions, we aim to foster a student persona characterized by an elevated realm of critical thinking.

Alice King's methodical utilization of tailored interrogations in dialogue with her students is equally illuminating (Turehanova & Abdrahmanova 2016). She posits that the capacity to pose reasoned and efficacious questions is a hallmark of well-developed cognitive faculties. This perspective aligns seamlessly with our aspiration to nurture students' adeptness in critical thinking, thereby fostering the ability to frame questions that are incisive, cogent, and purposeful.

Collectively, our exploration discerns that the notion of "critical thinking" is of multifaceted import, enlisting diverse conceptualizations across disparate domains of scholarly inquiry. The synthesis of these diverse perspectives substantiates the multi-dimensional nature of this seminal construct.

Materials and methods. *Participants.* In the pursuit of investigating the development of critical thinking skills among primary school students, our empirical study was conducted within the premises of School-Lyceum No. 23 named after Z. Kosmodemyanskaya. The experimental cohort comprised students from the 4 "V" and 4 "G" classes, with a total of 58 participants.

Data collection tool. The focal objective of this endeavour was to foster critical thinking acumen through the strategic deployment of effective questioning techniques. To operationalize our research pursuits, a series of tasks, meticulously tailored in alignment with the pedagogical objectives of the "Kazakh Language" curriculum, were introduced every week from January to March during the 2022-2023 academic year.

Data collection procedure. A preliminary stage of verification was instituted to establish a baseline for the participants' critical thinking proficiencies before engaging with the experimental interventions. This assessment phase encompassed the administration of a comprehensive questionnaire, the outcomes of which yielded discernible indicators indicative of the initial cognitive aptitudes of the students in both the experimental and control classes.

Results and discussion. The ensuing results, summarized in Table 1, serve as a substantive foundation for the subsequent analyses.

Table 1 - *Initial Critical Thinking Proficiency Assessment*

Levels	Control class n=28	Experimental class n=30
1	3	4
high	3,6% (1)	3,3% (1)
medium	35,7% (10)	30% (9)
low	60,7% (17)	66,7% (20)

A graphical representation of these findings is shown in Figure 1 below.

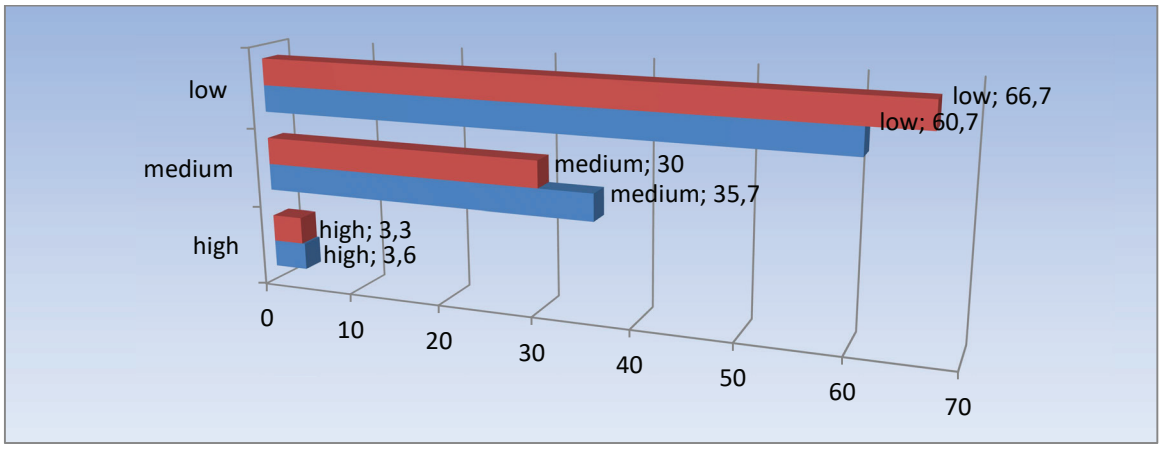

Figure 1 - Initial Critical Thinking Proficiency Assessment

During the meticulous scrutiny of the findings delineated in Table 1, a discernible trend emerges, indicating a notable deficiency in the critical thinking acumen of both participant classes. As such, it becomes imperative to employ the meticulously devised tasks within the instructional framework of the experimental group, thereby setting the stage to empirically substantiate their efficacy.

The formative stage entails the active formation of critical thinking prowess within the experimental class. To this end, we intend to adopt the pedagogical framework formulated by Temple et al. (1998); a multifaceted structure geared towards the cultivation of critical thinking through the nexus of reading and writing activities. The architecture of this pedagogical construct is meticulously structured across three distinct stages, each contributing substantively to the holistic development of critical thinking aptitude, as expounded in Table 2.

Table 2 - *Structure of critical thinking technology*

Stages	Description	Activity	Methods
1	2	3	4
I Stage	*Initial knowledge:* Cultivation of curiosity and self-directed learning inclinations; setting personalized learning objectives;	Encouragement towards engagement with novel information, fostering topic curiosity; promoting open exchange of perspectives;	Development of a list of known facts; formulation of predictions with supportive context; structured organization of true and false assertions; intricate logical exploration, and more.
II Stage	*Grasping the Content*: Assimilation of new knowledge; refinement of learning objectives	Acquisition of fresh insights concerning the subject matter; classification of acquired knowledge based on distinct knowledge categories; sustained topical interest.	Active learning approaches such as the INSERT method, double diary, mind mapping, cluster method, and others.
III Stage	*Reflective Engagement:* Reflection, internalization, and augmentation of knowledge; refinement of individual educational goals	Deliberative discourse on newly acquired insights; cultivation for continued exploration; alignment of novel information with pre-existing knowledge; formulation and assessment of personal perspectives.	Consolidation of information through clusters, tables; establishment of causal links, creation of creative literary compositions, and more.

In the course of the instructional session, we employed methodologies predicated upon the technological framework elucidated earlier. Commencing with the I stage, we directed our pedagogical efforts towards the realization of the learning objective denoted as "4.2.3.1 Formulating and addressing queries aimed at unravelling textual connotations" within the context of Kazakh language instruction (Jūmabaeva et al., 2019). This pursuit necessitated the cultivation of students' curiosity and imaginative faculties.

The premise of this stage entailed a comprehensive exploration of semantically resonant terms such as "good character," "moral disposition," "amicable demeanor," "virtuous attributes," "ethical integrity," "kind expressions," "modesty," "benevolence," "courteous conduct," "gentle disposition," "sincerity," "resolute spirit," "empathy," "tranquility," and others. Students were tasked with delving into the intrinsic rationale for the inclusion of these lexicons in the lesson's purview. An array of probing inquiries was proffered, encompassing the interconnections among these terms, their potential categorization, their relevance to preceding subject matter, inferred signification, and the substantiation of personal interpretations. These questions are: *Why are we considering these words in today's lesson? What are the connections between words? How can we Group these words? ... what is the relationship with the topics covered in the past? What is the meaning of keywords in your opinion? Why? What proof can you give him? Continue the list of keywords...*

Through this dialectic, students were actively encouraged to articulate their perspectives sans apprehension of error or undue correction by the instructor. This discursive endeavour facilitated the free exchange of ideas, contributing to a collaborative milieu wherein knowledge and experience were collectively enriched. The synthesis of diverse viewpoints engendered novel insights and captivating notions, fostering a sense of self-efficacy and a nuanced comprehension of the "values" underpinning these concepts (Colmar et al., 2019). This pedagogical endeavour was geared towards equipping students with the cognitive tools requisite for grappling with multifaceted issues aligned with the overarching theme of "Warm Word," thereby empowering them to participate in collective decision-making and inference drawing. The exercises within this framework were meticulously formulated to elicit information gathering, systematic organization, comparative analysis, critical appraisal, and the validation of pre-existing student knowledge.

Transitioning to the subsequent II stage, the engagement with newfound information is actualized. Herein, students were bifurcated into two distinct groups, each presented with a distinctly literary narrative: Y. Altynsarin's "Noble Grass" (Rustemova, 2013) and A. Sarbopin's "Sugar and Stone". Tailored tasks were assigned to each group to facilitate an in-depth understanding of the respective stories. For instance, Group 1 was tasked with explicating the rationale underlying the nomenclature of "Noble Grass," offering personal interpretations rooted in textual evidence.

Task 1 (table 3) explains the reason why the author named the story "Noble Grass" and express your opinion.

Table 3- Sample of task 1

Author's idea	Student's idea
?	?

Task 2. E. Compare the two characters using a Venn diagram.

Task 3. Answer the questions.

Why, in your opinion, is the name of the grass called "patience"?

In what situations in life can the word" patience " be used?

Task 4. Fill in each direction of the picture using the "Mind mapping" method.

Task 5. Formulate questions aimed at finding a solution to the content of the text. For example,

What are the differences in the character traits of batima and Zlikha?

What would you answer if you were in Batima's place?

Tasks proposed for group 2:

Task 1. Answer the questions that reveal the idea of the story "Sugar and Stone" by A. Sarbopin. For example,

Do you understand the properties of sweet and hard?

Do you think sweet is good or hard is good?

How much do you agree with the concept that sweet is good?

Task 2. Compare sugar and sweetness using a Venn diagram.

Task 3. Fill the table *(table 4)*

Table 4- *Sample of task 4*

Prediction	New information

Task 4. Follow up with questions about the text.

1. *1. Do you think the text can be interpreted differently? Why?*

2. ...

Tasks directed along this trajectory facilitate multifaceted cognitive processes. They engender comprehension of novel information, the ability to discern its concordance with pre-existing knowledge and experiential insights, the skill

to formulate pertinent and solution-oriented inquiries, the aptitude for meticulous analysis of emerging data, the capacity to synthesize one's viewpoint, and the competence to substantiate one's stance with cogent reasoning.

In the ensuing III stage, the salient theme of reflection takes center stage. As articulated by Bustrom (1996), reflection represents a distinct realm of cognitive engagement, characterized by focused contemplation, measurement, evaluation, and selection (Zair-Bek & Mushtavinskaya 2011). At this juncture, the recently assimilated information transforms into knowledge, paving the way for a phase of reflective analysis. This reflective analysis strives to unveil the intrinsic essence of the newly encountered material and serves as a foundational step toward charting future intellectual explorations. Guided by pertinent inquiries, students undertake the endeavour of introspection: What facets of today's discourse have been grasped? What remains enigmatic? What queries have remained unexplored? What dimensions of knowledge am I eager to delve into? The reflective process entails the harmonization of newfound information with pre-established ideas, thereby facilitating categorization into distinct knowledge domains. The culmination of this reflective analysis serves as a pivotal juncture, empowering students to autonomously formulate tasks, forecast outcomes, reach decisions, and cultivate their critical thinking capabilities.

Consequently, an array of digital resources including Kazakh fairy tales such as "Goodness and Evil" (Bismillah Tv, 2019), "The Legend of Tolagay" (Balaqay, 2020), and "The Story Without a Bullet" (SAQ Kinostudiasy, 2019) were judiciously examined. Tasks entailed the formulation of incisive questions that not only unveiled the narrative essence but also necessitated evaluative decision-making.

This overarching approach, underpinned by the structural framework of critical thinking technology, endeavours to foster students' intrinsic interest in the learning process. It encourages autonomous exploration, prompts the reinterpretation of the author's intent, facilitates immersion in character perspectives, stimulates the pursuit of problem-solving avenues, delves into the determination of connotative meanings, fosters the origination of innovative ideas, and engenders the analytical dissection of pivotal information. The tasks, meticulously tailored to resonate with the tenets of critical thinking, were seamlessly integrated throughout every phase of the pedagogical discourse.

In light of this comprehensive instructional approach, a control stage has been envisaged, designed to empirically verify the efficacy of the tasks deployed during the formative experimental stage. Replicating the methodology employed during the preliminary experimental investigation, a comparative analysis of both participant classes was undertaken before and post the experimental intervention, as delineated in Table 5.

Table 5 - *Control stage of critical thinking proficiency*

Levels	Control class		Experimental class	
	before n=28	after n=28	before n=30	after n=30
1	2	3	4	5
high	3,6% (1)	7,1% (2)	3,3% (1)	26,7% (8)
medium	35,7% (10)	42,9% (12)	30% (9)	56,7% (17)
low	60,7% (17)	50% (14)	66,7% (20)	16,6% (5)

Indicators of comparative results in the form of a chart are seen in Figure 2.

Upon meticulous analysis of the outcomes attained during the control stage, a discernible disparity emerges between the experimental and control classes after the formative stage. Notably, the control class exhibited an increment of 3.5 percent in the high proficiency level, a notable enhancement of 7.2 percent in the medium proficiency level, and a noteworthy reduction of 10.7 percent in the low proficiency level. Conversely, the experimental class experienced a substantial surge, manifesting a remarkable escalation of 23.4 percent in the

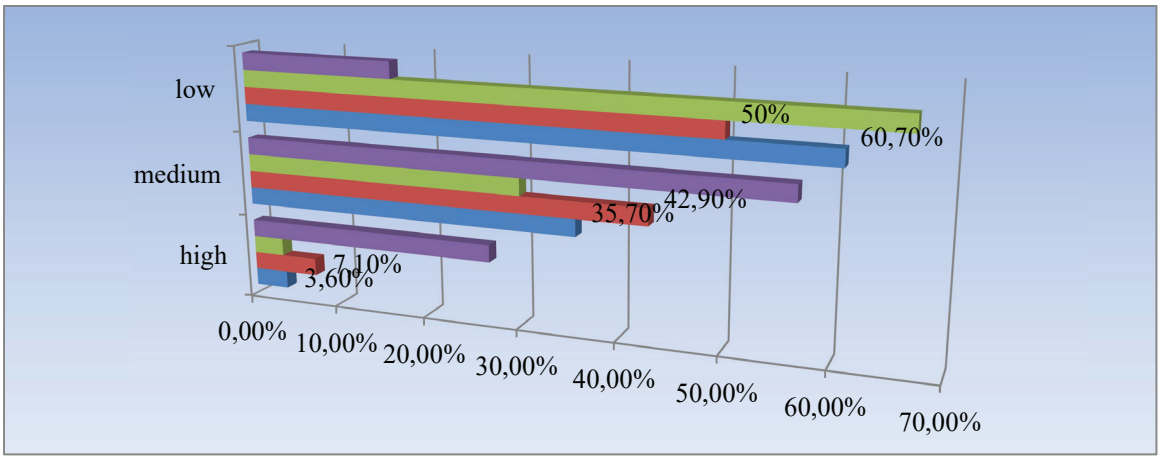

Figure 2 - Control stage of critical thinking proficiency

high proficiency stratum, and an even more pronounced advancement of 26.7 percent in the medium proficiency level, accompanied by a profound reduction of 50.1 percent in the low proficiency realm. These discernible shifts in critical thinking proficiency underscore the palpable efficacy of the meticulously developed tasks conceived within the framework of our research inquiry.

Conclusion. In summation, the ramifications of this investigation illuminate the exigency surrounding the cultivation of critical thinking competencies amongst students within the pedagogical domain. The contemporary educational landscape necessitates the cultivation of a cognitive toolkit that engenders the faculty for discernment, synthesis, and evaluation. The tripartite framework engendered through the three distinct stages, complemented by the strategic implementation of critical thinking methodologies, culminates in a cogent pedagogical approach for nurturing these cognitive attributes.

Furthermore, in the context of fostering critical thinking abilities amongst primary school students, the prescription of tasks aimed at formulating effective questions emerges as a pivotal pedagogical endeavour. These tasks not only unveil the crux of new informational substrates but also galvanize the intellectual acumen required to navigate problem-solving trajectories. The cultivation of critical thinking is contingent upon the student's adeptness in harmonizing existing knowledge, crystallizing individual perspectives, discerning thematic quandaries, decoding narrative nuances, and unravelling the instructor's underlying intent through incisive question formulation.

In essence, the potency of incisive questioning is unequivocal in its capacity to yield multifaceted outcomes in the development of critical thinking among primary school students:

- During the formative stage of the experiment, it enables the comparative analysis of characters within presented literary works, fairy tales, and stories, stimulating discourse on the author's thematic vision, fostering authentic engagement with real-world predicaments, and refining interpretative competencies.

- It imparts the capacity to effectively engage with information, differentiating principal semantic components within a given literary piece.

- It facilitates collaborative aptitude, enabling effective teamwork, and substantiating viewpoints through empirical evidence.

In conclusion, the profound implications of this investigation endorse the proposition that the orchestration of incisive questions catalyses the cultivation of critical thinking skills among primary school students. The intricate pedagogical endeavour, underscored by our tripartite model and underpinned by methodological precision, constitutes a tangible paradigm for nurturing cognitive sophistication within the educational milieu. The transformative potential of fostering critical thinking through the art of questioning is unequivocal, warranting its integration as a cornerstone of modern pedagogical practice.

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PARAMETERS AND CRITERIA OF THE SCHOOL EDUCATIONAL ENVIRONMENT EXPERTISE

Abstract

This article substantiates the relevance of the research problem, which consists in the need to solve state tasks in the field of ensuring cybersecurity of social substructures of society, which is the education system. The current legal framework of the problem under study is in urgent need of improvement and development in projection on the educational environment of the school. This is due to the clearly insufficient awareness of its subjects in matters of cybersecurity, cyber defense and cyber ethics. This is confirmed not only by the empirical observations of the