Critical thinking disposition as a factor in creating problem-based learning

Popovska Nalevska, Gorica ✉

Internacional Slavic University, St. Nikolas, Republic of Macedonia (popovska.g@gmail.com)

Abstract

The importance of the development of critical thinking in a contemporary context stem from the demand for democratization of society, which implies active citizens who think, question, evaluate and make decisions. The general aim of this study is to identify students' disposition towards critical thinking in the secondary school in the Republic of North Macedonia. Its contribution would help educators decide what areas of critical thinking need improvement in student education. The research sample consists of 114 randomly selected students. Students filled out Critical Thinking Disposition Inventory, based on seven dimensions of critical thinking: (1) truth-seeking, (2) open-mindedness, (3) analyticity, (4) systematicity, (5) CT self-confidence, (6) inquisitiveness and (7) cognitive maturity. The descriptions of each of the scales and sub-scales and the frequency of representation among students can be suggestions for possible teaching or assessment strategies. Teachers are seen as carriers of information rather than facilitators, mediators, and teaching strategies are also seen as conventional. In an educational context, critical thinking is a resource that allows students to adopt an analytical and evaluative attitude towards their learning, thus improving the quality of the learning process. Problem-based learning should be performed in today's school to a higher level - from acquiring knowledge towards the development of students' creative abilities, which means that the teaching process should to be a process of students' thought activity.

Keywords: critical thinking, students, problem-based learning, secondary education

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1. Introduction

Critical thinking is the development of the ability to form one's own judgment based on arguments supported by evidence. Critical thinking encompasses a variety of complex skills associated with higher-level thinking. It is independent thinking that generates new and innovative ideas and solves problems. It involves reflecting critically on experiences and learning processes and making effective decisions by avoiding common pitfalls, such as taking a one-sided view of an issue, dismissing new evidence that refutes ideas, reasoning from passion rather than logic, and failing to support statements with evidence. In its basic form, it is based on universal intellectual values that transcend subject-matter divisions: clarity, accuracy, precision, consistency, relevance, solid evidence, good reasons, depth, comprehensiveness, and fairness. Providing a single definition for critical thinking is difficult because this process involves complex activities, such as: setting goals for thinking, drawing conclusions, and analyzing solutions.

According to Yinger (1980), definitions of critical thinking can be grouped into 2 categories: broader, which equate it with problem solving or reflective thinking, and narrower, which present it as a special type of thinking, the main feature of which is the evaluation of the products of thinking. In the Encyclopedia of Educational Research, critical thinking is defined as "the process of evaluating or categorizing the relationships and conditions of some previously adopted rules or standards. It is a logical examination of data and facts, where false judgment and emotional basis of judgment are avoided." For Brookfield (2012), critical thinking is an intellectual and practical attempt to reexamine, reevaluate, modify, or completely reject existing structures of thought and life. This broad definition does not treat critical thinking only as an intellectual quality or ability, but as a life activity of adulthood; linking critical thinking to rationality and principle, but also to certain dispositions, habits of thought, and character traits. To think critically means to be guided by arguments, to understand them, and to accept their value and probative force.

A group of American authors (Temple et al., 1997) defines critical thinking as a complex cognitive process by which ideas and their implications are considered with a dose of skepticism, opposing viewpoints are carefully weighed, questions are asked and answers are systematically sought, and positions are taken or formed based on sound arguments. The analysis of the definitions, which are complex and multifaceted, shows that they are dominated by the following activities: considering problems, checking the value, finding alternatives and evaluating statements. Hence, critical thinking is engaged thinking, which takes nothing for granted and whose main goal is to check the accuracy and adequacy of a statement. We begin to think critically only when we begin to check, evaluate, expand and apply new ideas. However, critical thinking does not always have to be original. A person who thinks critically can also adopt or agree with someone else's idea or belief, but still feel that they are completely their own. It is important to think and make decisions independently of others, and not to strive at all costs to be different from others. Critical thinking comes to its full expression when a problem needs to be solved. It allows the person to see that there is more than one solution, to come up with their own solution, and to try to show others why their solution is logical and practical. All of this is based on a previous analysis of good and convincing arguments.

The importance of developing critical thinking in a contemporary context stem from the demand for the democratization of society, which implies active citizens who think, ask, evaluate, and make decisions. In addition, the visible technological progress of society, which is accompanied by constant and rapid changes and the expansion of the corpus of available information, favors the development of critical thinking. However, critical thinking should not only be seen as a response to the needs of modern society, but also as the mission of education. Facione (2000) explains critical thinking dispositions as the characterological attributes of a person, which are consistent yet malleable. Attributes are the characteristics, inherent qualities or traits of a person's

object. Dispositions could be considered as traits of a person. These dispositions would thus result in certain attitudes and actions associated with a strong critical thinker. The Delphi team initially identified 19 dispositions (APA 1990). From the original 19 dispositions, seven dispositions were identified through a process of factor analysis.

2. Critical thinking in education – relevant research

Research shows how an approach to education based on critical thinking contributes to the development of learning and teaching, which as a result brings more long-lasting, deeper, more useful, and therefore more valuable knowledge. In support of the importance of developing critical thinking in education are the leading research of foreign authors in which the connection between the various aspects of critical thinking and the key factors of the education system is examined. Within this framework, several groups of research can be highlighted that problematic and mentioned aspects. The first group of studies focuses on examining the relationship between individual characteristics of the teacher and critical thinking (Boonjeam et al., 2017; Chee Choy & San Oo, 2012; Emir, 2013; Innabi, 2003; Moeti, et al, 2017; Warburton & Toff, 2005). The second group consists of studies that focus on the relationship between the didactic-methodical aspect of teaching and critical thinking, which refers to teaching methods and activities that involve the active approach of students in teaching (Fung, 2014; Lewine et al., 2015; Piergiovanni, 2014; Shim & Walczak, 2012; Tiruneh et al., 2014). In addition to the above, there is a third group of research related to approaches to teaching critical thinking, which follows the author's discussion of directly teaching critical thinking skills in class (Alwehaibi, 2012; Cotter, 2009; Wallace & Jefferson, 2015; Marin & Halpern, 2011). Shim and Walchak (2012) studied the relationship between different teaching practices that involve guiding students and developing critical thinking skills. A significant result of this research is that asking challenging questions to students during class contributes most to the development of their critical thinking.

Marin and Halpern (2011) investigated whether critical thinking skills can be learned, practiced, and transferred if they are taught directly (through explicit instruction). Directly teaching students critical thinking skills in class has been shown to be more effective than other teaching approaches. Wallace and Jefferson (2015) also addressed the question of whether students' critical thinking skills are enhanced in class when they are given direct instruction, examining the differences between two groups of students, where one group of students used a manual to practice and develop critical thinking skills when solving problems set in class. The group of students who used the manual showed better results on a test measuring critical thinking skills compared to the group of students who did not use the manual. In addition, research has shown that the successful development of students' critical thinking in class is facilitated by cooperative forms of work between students and methods of work and activities in class that imply an active approach of students in the teaching process, such as discussions, debates, case studies, problem-based tasks, essay-type tasks, as well as students' reflection on their own performance in class (Piergiovanni, 2014; Razei et al., 2011). According to the results of the presented research, to develop students' critical thinking in class, it is desirable for the teaching process to include those activities that will include various methods of active learning and teaching. Additionally, for more successful teaching of critical thinking skills, teachers are recommended to directly teach students these skills.

Mastering critical thinking skills may bring a number of benefits, including more control over own knowledge or even empathy for other people's viewpoints (Styers, M. L. et al., 2018; Saidin, N. D. et al., 2021). Notable research gaps have been identified in teaching critical thinking in higher education. For example, viable approaches to critical thinking training that promote high performance on standardized tests have not yet been identified, given teachers' concerns that focusing on critical thinking would take away time from standardized test preparation (Ongesa, 2020). Belluigi and Cundill (2017) also note a gap in the absence of enough discussion on critical disposition. The only way to teach critical thinking is by modelling critical thinking behavior. They note that more discussion is needed on ways to address this shortcoming.

One of the commonly quoted sources of the educational approach to critical thinking is Bloom's Taxonomy

which was created to classify the thinking acts that result from educational experiences Bloom's taxonomy highlights the different levels of higher-order thinking that learners should experience as they go through higher levels of education (Calma & Davies, 2021). In order to unify the goals and outcomes of education and, to a greater extent, to standardize the assessment of student abilities and learning outcomes, Benjamin Bloom and a team of experts in the field of education worked on a project that was published in 1956 under the name Taxonomy of Educational Goals - Classification of Educational Goals, Volume One: Cognitive Domain (Bloom, et al., 1956). Although it was initially poorly understood due to its large scope, complexity, and level of abstraction, since then, expert analyses and interpretations have become indispensable literature for all those involved in education.

The creator of the taxonomy of cognitive goals, identified six basic categories of goals. The categories have their own subcategories that are cumulatively arranged, from the simplest to the most complex: knowledge, understanding, application, analysis, synthesis, and evaluation. The category of knowledge means memorizing and reproducing certain contents (e.g. knowing characteristics, knowing concepts, knowing facts). The category of understanding means having the ability to interpret the lessons in one's own words and from different aspects (e.g. interpreting material linguistically, making assumptions). The category of application means the ability to use knowledge and its interpretation in specific conditions (using concepts, laws, rules). A student who can analyze can examine the content of the components and study the smallest parts to get to know the whole in detail. The goals in the category of synthesis ensure a quality of cognitive development of students that is equal to creative and productive thinking. This means that the student can create without respecting previously set and defined frameworks, to create sentences, compositions and works, to transfer knowledge, etc. Evaluation or assessment is the highest category that reflects the mental maturity of students to judge and make decisions and conclusions regarding the quality of knowledge and the previously mentioned categories.

The hierarchical structure means that each higher cognitive function implies and includes lower functions, and they expand and become more complex, moving from simple to complex and from concrete to abstract. What do students think about while teachers teach? What thought processes do teachers encourage in students? Why do they force factual knowledge (overemphasize the need for memorization in the learning process) and neglect the need to activate higher cognitive processes? How can learning, teaching and assessment be improved in the teaching process? Are some of the issues that can be resolved by properly applying taxonomy in the process of planning, implementing and evaluating teaching. From this it can be concluded that in order to have successful teaching and quality learning, it is necessary to provide students with: 1) sufficient activities that enable the acquisition of essential knowledge and the practice of the cognitive functions that are responsible for retaining and retrieving that knowledge and 2) teaching that abounds in the practice of those cognitive functions that can be used in new situations, and these are more cognitive functions that enable the transfer of learning and thus together represent the development of critical thinking.

3. Methodology of research

Research objectives and tasks - this study is relevant to explore the Macedonian reality of public high school students' disposition towards their critical thinking. The general aim of this study is to identify students' disposition towards critical thinking in the secondary school in the Republic of Macedonia. Its contribution would help educators decide what areas of critical thinking need improvement in secondary school education. The realization of this goal is done through the realization of the following tasks:

- Examining the degree of truth-seeking among students;
- Examining the degree of students open-mindedness;
- Examining the degree of students analyticity;
- Examining the degree of students systematicity;
- Examining the degree of students CT self-confidence;
- Examining the degree of students inquisitiveness;
- Examining students' opinion how much the teaching methods used by teachers are focused on problem

solving.

Research sample - the research sample consists of 114 high school students randomly selected. From 10 high schools from different geographical regions of the Republic of North Macedonia, consent was sought for the inclusion of students in the research who voluntarily wanted to be a research sample. As the survey covers a sample of 16 to 18-year-old students, regulatory requirements that ensure protection for child research participants must be considered. According to these regulations, children are persons who have not reached the age limit for consent according to the law of the jurisdiction in which the research was conducted (in the Republic of North Macedonia, any person under the age of 18). Consent for the child to participate in the research was made by obtaining written consent from the child's parents or legal guardians.

Research methods and instruments - the research is a quantitative investigation that has got a descriptive, non-experimental, and cross-sectional design to investigate the critical thinking dispositions of secondary school students. Students filled out Critical Thinking Disposition Inventory. The validity and reliability of the Critical Thinking Disposition Inventory was previously determined by Redhana and Sudria (2020). In their research, the Data showed that seven scales and 33 subscales are valid and the reliability of the instrument was 0.887. The inventory was based on seven scales of critical thinking disposition of American Philosophy Association (Facione et al., 1995). Characteristics of inventory developed used seven critical disposition scales: (1) truth-seeking, (2) open-mindedness, (3) analyticity, (4) systematicity, (5) CT self-confidence, (6) inquisitiveness, and (7) cognitive maturity. The total number of sub-scales used to construct a critical thinking disposition inventory was 33. The responses to each statement were based on the Likert scale disagree (score 1), partially agree (score 2), agree (score 3).The validation results of Macedonian psychologist and linguist showed that the critical thinking disposition inventory developed was appropriate for measuring the students' critical thinking disposition, adapted to the Macedonian language. Validation was also conducted by pretesting 20 students to ensure that all items were understandable, culturally relevant, and did not cause confusion or misunderstanding.

Data processing - the data was processed quantitatively using the EXCEL and STATISTICS computer programs. They were grouped according to the number of matchings in certain categories and then placed into tables. The data were calculated with frequencies and mean score.

4. Results and discussion

Regarding the main objective, which seeks to identify participants' disposition towards critical thinking, a descriptive statistics analysis was carried out; this analysis addressed the frequencies and data mean score. First, 114 students answered the questionnaire, and the responses went from disagree (score 1), partially agree (score 2) and agree (score 3) as show in Table 1 below. The results are presented by frequency of responses for each statement of the seven scales and a total frequency was calculated for each of the three scores.

Table 1

Scales and sub-scales of The Inventory of Critical Thinking Dispositions

Scales	Subscales	Disagree	Partially agree	Agree	Mean
1.Truth-seeking	a. Trying to find out the truth clearly	5	38	71	2.57
	b. Having spirit to ask questions	6	43	66	2.54
	c. Being objective/honest toward information	26	57	31	2.04
	d. Trying to understand something well	9	49	56	2.41
	e. Using trusted sources	9	40	65	2.49
Total		52	191	289	2.41
2. Open mindedness	a. Considering other ideas in making their own decisions	33	51	30	1.97
	b. Being tolerant of different ideas	5	49	60	2.48
	c. Changing opinions when they are refuted by strong facts/evidence	8	49	57	2.42
Total		46	149	147	2.29

3.Analyticity	a. Being aware of the risks and possibilities that will occur from an event	14	69	31	2.14
	b. Being able to give a reason when faced with complicated problems	10	26	78	2.59
	c. Being able to provide objective evidence against a particular problem	8	63	43	2.30
	d. Being able to think logically	14	38	62	2.42
	e. Estimating advantages and disadvantages of phenomena	13	58	43	2.26
	f. Being able to relate results of observation with existing (knowledge) theories	6	49	59	2.46
	g. Looking for alternative solutions of problems	13	59	42	2.25
Total		78	362	358	2.34
4.Systematicity	a. Thinking and acting in organized manner	20	38	56	2.31
	b. Focusing on problems	13	23	78	2.57
	c. Using inquiry methods to solve problems	25	32	57	2.28
	d. Do not hurry to draw a conclusion from information	21	79	14	1.93
Total		79	172	205	2.27
5.CT self confidence	a. Having confidence in his own opinion and decisions	21	50	43	2.19
	b. Believing on results of self-reasoning	6	21	87	2.71
	c. Having confidence to lead other people to a rational problem solving	8	19	87	2.69
	d. Daring to take action or a decision	14	32	78	2.73
	e. Being proud of your own abilities to solve problems	10	54	50	2.35
Total		59	176	345	2.53
6.Inquisitiveness	a. Having a high learning spirit even when the application of the studied science has not been seen directly	54	12	48	1.94
	b. Having spirit to learn new things	24	30	60	2.31
Total		78	42	108	2.12
7.Cognitive maturity	a. Do not get rid of problems	5	54	55	2.43
	b. Realizing that some problems are related to each other	6	50	48	2.19
	c. Realizing that an assessment must be based on criteria	13	41	60	2.41
	d. Avoiding actions that confuse /intimidate others with critical thinking skills possessed	10	52	52	2.36
	e. Showing calm in thinking	10	62	42	2.28
	f. Understanding other people's way of thinking	4	32	78	2.64
Total		48	291	335	2.38

According to the results in Table 1 most of the students responded with "agree" to the positive statements, which shows that self-assessment regarding the dispositions for critical thinking is at a high level. The lowest frequency is the score of "disagree" with all positive statements for disposition of critical thinking. The frequency of the responses shows that the majority of students assessed the highest level of disposition for critical thinking in five areas: Truth-seeking, Systematicity, CT self confidence, Inquisitiveness and Cognitive maturity and an medium level in two areas: Open mindedness and Analyticity.

The descriptions of each of the scales and subscales can be suggestions for possible teaching or assessment strategies. According to Facione and Delphi (1990), the Truth – seeking dimension focuses on the attribute of being open and willing to seek the best knowledge in each setting, being fearless in forming questions and being honest and objective in pursing research, despite results that do not align with one's concerns or opinions. In our research Truth-seeking had its highest mean score in statement a - Trying to find out the truth clearly, having a mean score of 2.57, meanwhile, its lowest mean score was 2.04 in statement c - Being objective/honest toward information. Students tend to be interested and challenged when given a case or problem, thus motivating them to seek and collect evidence to answer the problem. Through the habit of problem-solving carried out by students, they exhibit critical thinking behavior, especially in terms of seeking the truth (Rahmawati et al., 2021)

Open-mindedness refers to being open to different points of view with openness to the possibility of one's own biases. Its highest mean score is in statement b - Being tolerant of different ideas, having a mean score of 2.48, lowest mean score was 1.97 in statement a - Considering other ideas in making their own decisions. This confirms that students who already has open-minded behavior means that is already able to think critically. Analytical dimension focuses on assessing the implementation of analysis and use of evidence to solve problems, foresting possible conceptual or practical challenges and being permanently alert to the need to act. Its highest mean score is in statement b - Being able to give a reason when faced with complicated problems, and lowest mean score was 2.14 in statement a - Being aware of the risks and possibilities that will occur from an event.

Systematically dimension assesses the fact of being systematic, orderly, focused and conscientious in research. Its highest mean score is 2.57 in statement b - Focusing on problems and lowest mean score was 1.93 in statement d - Do not hurry to draw a conclusion from information. Someone with a systematic tendency can be more objective and careful in planning and organizing a study. Self-confidence aims to assess one's confidence in one's decision-making processes. CT- self-confidence permits one to trust the strait of one's own opinions and to guide others in problem solving. In our research Self-confidence had its highest mean score 2.73 in statement d - Daring to take action or a decision. Students who have high self-confidence, are not easily discouraged, and did not afraid of being wrong in solving a problem. Students can construct their knowledge based on their experience, so they can develop thinking skills.

Inquisitive dimensions assess intellectual curiosity and willingness to learn, especially when the application of knowledge is not evident. Its highest mean score is 2.31 in statement b - Having spirit to learn new things. The representation of teaching methods and forms depends on which articulation part of the lesson they apply to. There are insufficiently applied methods and techniques that enable research, participatory, and experiential learning. Of concern is the fact that most active teaching methods where co-operative and active learning can be expressed and at the same time to encourage greater autonomy of students in the learning process are missing or minimally represented (Popovska Nalevska & Kuzmanovska, 2020). The participation in activities at the school influence and motivate the learning behavior of the student.

Cognitive maturity focuses on the faculty of being judicious in making decisions. The cognitively mature can be described as someone who deals with problems, research, and decision-making by considering that some problems are necessarily ill-structured, that some scenarios allow for more than one plausible choice and that many times judges must be made according to norms, settings and evidence preclude certainty. Its highest mean score is 2.64 in statement f. Understanding other people's way of thinking and lowest mean score was 2.19 b - Realizing that some problems are related to each other.

In Table 2, the Mean value for each of the seven scales is presented, with 1 being the lowest score and 3 being the highest. Based on the obtained values, we can make a ranking of each dimension. The highest mean value was obtained for dimension CT self confidence, and the lowest for Inquisitiveness.

Table 2
Statistics per dimension

Dimension	N	Max	Min	Mean
Truth-seeking	114	3	1	2.41
Open mindedness	114	3	1	2.29
Analyticity	114	3	1	2.34
Systematicity	114	3	1	2.27
CT self confidence	114	3	1	2.53
Inquisitiveness	114	3	1	2.12
Cognitive maturity	114	3	1	2.38

The results of the research are very important for drawing certain conclusions and considering the actions that can be taken. Looking at the answers in which the respondents expressed their views, it can be noted that all the above-mentioned statements are considered very important in the teaching process. The respondents in this research assessed those certain statements (related to the ways of acquiring new knowledge and the importance

of evaluating sources of information and a well-formulated argument) are very important, which points to the conclusion that working on oneself is the basis for successfully improving their critical thinking.

Students included in the research were asked how much the teaching methods used by teachers are focused on problem solving. The results of the research show that the majority of students have a positive self-perception and believe in their abilities for critical thinking, but also showed concern that education is largely based on memorizing content. Most of the students considered this approach to be repetitive, uninspiring, without intellectual power and not challenging. Students sometimes didn't express their opinions for fear of being wrong. From the student's perspective, what comes from the teacher's mouth must be correct, and regard what is written in the book as the truth, without the consciousness of critical thinking. Teachers are seen as carriers of information rather than as facilitators, mediators, and teaching strategies are also considered conventional.

Problem-based learning should be performed today's school to a higher level - from acquiring knowledge towards the development of students' creative abilities, which means that the teaching process should to be a process of students' thought activity. In its essence, the role must also be changed; the teacher should not be supplier of ready-made knowledge, but a collaborator and organizer of such classes in which students will solve problems independently and thus develop abstract thinking and overall mental capacities. Problem solving is the most effective means of developing creative thinking.

In an educational context, critical thinking is a resource that allows students to adopt an analytical and evaluative attitude towards their learning, thus improving the quality of the learning process. On the other hand, the learning process contributes to the gradual development and improvement of critical thinking skills. Furthermore, it is believed that the better the content is understood, the easier the learning outcomes will be. Quality learning, learning through understanding, consists of a process of organizing and structuring materials based on understanding the meaning. Hence, the goal of school learning is the acquisition of lasting and usable knowledge and skills. Regarding this issue, young people shared their experiences and views regarding how much the education system in our country teaches young people how to think.

5. Conclusion and recommendations

The connection between critical thinking and education is noticeable when the demands of modern education are emphasized. One of the tasks of modern education is to explicitly teach and develop students' critical thinking skills. Thus, the task of modern education consists not only in acquiring specific knowledge and skills inherent in the teaching content, but also in creating the prerequisites for the adoption and development of a certain style of work and style of thinking. The results of the research show that the majority of students have a positive self-perception and believe in their abilities for critical thinking. The frequency of the responses shows that the majority of students assessed the highest level of disposition for critical thinking in five areas: Truth-seeking, Systematicity, CT self confidence, Inquisitiveness and Cognitive maturity and an medium level in two areas: Open mindedness and Analyticity. Student showed concern that education is largely based on memorizing content. Most of them considered this approach to be repetitive, uninspiring, without intellectual power and not challenging. Teachers are seen as carriers of information rather than as facilitators, mediators, and teaching strategies are also considered conventional. This highlights the shift in focus in contemporary education, which is becoming a demand for critical reflection on the content of teaching, rather than its mere adoption and reproduction. Also, the task of contemporary education is increasingly becoming education for self-education, training for independent learning or independent acquisition of knowledge and mastery of the methods and techniques of acquiring knowledge and learning. It is in this context that critical thinking is one of the skills that can be applied in independent, continuous lifelong acquisition of knowledge.

The **Critical Thinking Inventory** assesses different dimensions of critical thinking skills, and teachers can use the results to identify strategies to promote these skills in their students. Here are some practical implications and actions that teachers can take to foster critical thinking in the classroom:

Encourage Questioning and Inquiry

- Create a classroom environment that encourages open-ended questions.

- Use questioning techniques like Socratic questioning, where challenge students are challenge to think critically about their responses.

- Incorporate inquiry-based learning activities where students explore and solve problems on their own.

Foster Analytical Thinking

- Provide students with complex scenarios or case studies that require analysis.

- Encourage students to identify key components, assess evidence, and draw conclusions.

- Use tools like mind maps or diagrams to help students visually organize their thoughts.

Promote Reflective Thinking

- Incorporate reflection activities like group discussions that allow students to reflect on what they've learned.

- Ask students to critique their own thinking processes and evaluate their assumptions.

- Encourage self-assessment and peer assessment to help students recognize different perspectives.

Teach Logical Reasoning and Argumentation

- Teach students how to construct clear, logical arguments supported by evidence.

- Provide opportunities for students to engage in debates or discussions where they must present reasoned arguments and critique others' ideas.

- Teach students how to identify logical fallacies and improve their ability to assess arguments critically.

Encourage Open-mindedness

- Foster a classroom climate where diverse opinions are respected and valued.

- Use activities like role-playing or debates to help students see issues from different perspectives.

- Teach students to weigh evidence from multiple sources before making judgments.

Incorporate Problem-Solving Tasks

- Design problem-solving exercises that encourage students to generate and evaluate multiple solutions.

- Incorporate real-world problems that require critical thinking to solve, such as social issues or scientific challenges.

- Use project-based learning that involves open-ended problems with no one "right" answer, pushing students to think critically about their approach.

Model Critical Thinking

- Explicitly model your own thinking process by thinking aloud during problem-solving or decision-making.

- Share examples of how can analyze and critique information, explaining reasoning to students.

- Encourage students to ask questions when they don't understand teacher thought process.

By applying these strategies, teachers can cultivate a classroom environment that encourages students to develop and strengthen their critical thinking skills.

6. Limitations and Suggestions for Future Research

Further research is recommended to examine additional mediating factors that may influence (academic

achievement, department, society, culture, economics contexts). The researchers suggest that future research should include a variety of participants, which include teachers from different contexts, as well as learners. The research sample is randomly selected and most common forms of collecting data, as it provides an unbiased representation of a group. In our research, we used high school students, but we should be cautious when generalizing the results to different school and cultural-economic contexts. One must be cautious when extending conclusions based on the results of this study. The results of the research may have implications for students and teachers, primarily in the education system of the Republic of North Macedonia. The cultivation of critical thinking may seem complicated, but a little change in the way of teaching in the classroom and student attention to the essence and logic behind the knowledge, rather than just accepting all can help in creating problem-based learning and developing dispositions for critical thinking among students.

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