Sciental Journal of Education Humanities and Social Sciences, Vol. 1.3, (2023)
ISSN Online: 2961-0389
Website: https://scientaljournals.com/index.php/SJEHSS/index

Submitted: September 12, 2023/ Accepted Nov. 23, 2023/ Published December 30, 2023

How can we encourage students to develop critical thinking skills?

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DOI: https://doi.org/10.62536/sjehss.v1i3.6

Abstract:

The article discusses the role and importance of critical thinking as one of the essential penetrating skills for the student's personal development. There are also examples of how to turn a simple exercise into a tool for developing critical thinking skills. With the mentioned activities, the student develops critical thinking; it is ensured that the teaching-learning process is focused on the student's personal development. The educational process is based on constructivist educational principles. A school culture focused on care and support is formed.

Keywords: critical thinking, argumentative reasoning, optimal decision, constructivism, personal development.

Introduction:

The National Curriculum is the primary document that defines the mandatory requirements for the school community in three areas: 1. Orientation of the educational process to the personal development of the student; 2. The foundation of the educational process on constructivist educational principles; 3. Creating a school culture focused on care and support.

According to the National Curriculum, teaching and learning objectives are to develop the student's discerning skills and values. Among them, one of the essential skills is critical thinking, which includes the critical consideration and analysis of facts, perceptions, and opinions; formulating questions and finding answers to them; Argumentative reasoning, i.e. substantiating one's opinion by providing suitable arguments and examples; Make an intelligent choice and justify it.

According to the Civil Encyclopedic Dictionary[1], critical thinking means curiosity, using research strategies, formulating questions, and finding answers. It involves not only stating facts but also clarifying their causes and consequences. It is a form of thinking that involves looking at a problem from different angles, weighing alternatives, and solving it. This is not a one-time and heterogeneous approach to the issue, delving into the essence of the problem

[1] http://www.nplg.gov.ge/gwdict/index.php?a=term&d=5&t=3688

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using questions, thinking and judging the means, which is a prerequisite for an optimal solution. Critical thinking is independent thinking. Thinking becomes critical only when it has an individual character. The student should have enough freedom to think and independently solve complex problems.

Developing critical thinking in students is very important. It is a tool, on the one hand, for the student's adaptation to life and, on the other hand, for the formation of civil society. Critical thinking is the most crucial skill, without which it is impossible to implement one of the main goals of teaching mathematics in a general education institution - to form an active citizen from a student who can research and analyze emerging issues. Based on the real situation, which will be creative and organized. Therefore, the teacher faces a big task: promoting the development of students' critical thinking skills.

Here are some examples of how to turn a simple exercise into a tool for developing critical thinking skills.

Task No. 1 (Cl. V): Which of the following numbers cannot be equal to the sum of three primes if one of them is equal to the sum of the other two?

a) 26 b) 38 c) 10 d) 32 e) 14

In the previous knowledge activation phase, the teacher checks whether the students remember the concept of a prime number. Most likely, the student's answer will be: A prime number is a number that has two divisors, 1 and itself. The primes are 2, 3, 5, 7, 11, 13, 17, 19, etc. It may be emphasized here that, with one exception, all primes are odd. Afterwards, the teacher should make the students wonder if all three primes can be odd. If all these primes were odd, their sum would also be odd, but among the possible answers, all numbers are even. The sum of three numbers is even only in two cases: when all three numbers are even, or one is even, and the other two are odd. The first case is excluded because there are no three even primes. Conclusion: it turns out that one of the prime numbers is necessarily equal to 2.

After that, you should draw the students' attention to the condition that one of them is equal to the sum of the other two; that is, each answer must be twice a prime number. As a result of the reasoning, students will come to the conclusion that by dividing the possible answers in half, they get a prime number, which is also the sum of two primes. If, as a result of dividing any answer in half, we get a composite number, then this is the answer to the problem:

26 :2 =13 (2+11)+13=26

38 :2 = 19 (2+17)+19=38

10 : 2 = 5 (2+3)+5=10

32 : 2 = 16 16 is not a prime number

14 : 2 =7 (2+5)+7=14

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Accordingly, the answer to the problem is 32.

Task No. 2 (III-IV grades): A three-digit number is given, one of the digits of which is hidden **4 2. Which of the** following numbers can be equal to the product of the digits of this number?

a) 18 b) 30 c) 36 d) 40 e) 80

The student's line of logical thinking is likely to be as follows: since two digits of three digits are known, their product will be 4 x 2 = 8. That is, the end result is the product of 8 and the hidden digit. That is, the product must be divisible by 8. Therefore, the numbers 18, 30, and 36 are excluded since none of them are divisible by 8. Of the remaining answers, 40 = 8 x 5 and 80 = 8 x 10. Since only one digit is revealed, 80 is eliminated. Accordingly, the answer to the problem is 40, and the hidden number is 5.

Another student can solve the problem by sampling, i.e., insert any number in turn in place of the hidden digit and compare the answer with the probable answers. For example, 4 x 1 x 2 = 8; 4 x 2 x 2 = 16; and so on until he gets the right answer. It is worth noting here that the hidden digit is not the first digit of this number, so it can be zero, but it is necessary to remind students that in the case of zero, the product would be zero, and there is no zero among the answer options.

Task No. 3 (V-VI grades): Let's say you are an "expert" at performing arithmetic operations on numbers, you are presented with a document below that describes an assignment given to students on the topic of multiplication of multi-digit numbers in the 5th grade of one of the schools and presents the work of four students. Your task is to find out whether the students completed the task correctly and prepare a conclusion that will justify your answer. Explain to each student, what mistake he has made, and advise what multiplication rule (property) he needs to know so that he does not make such mistakes again. Present the finished conclusion to your classmates.

Document to be handed over to the "expert"

1.

			7	4	6
		x	2	8	9
		6	7	1	4
+	5	9	6	8	
1	4	9	2		
1	9	4	5	9	4

2.

		4	6	4	4
	x		7	2	5
	2	3	2	2	0
+		9	2	8	8
	3	2	5	0	8
	6	5	0	1	6

3.

		3	0	6	1
	x			5	7
		2	5	2	7
+	1	8	0	5	
	2	0	5	7	7

4.

			6	5	7
		x	3	0	4
		2	6	2	8
+	1	9	7	1	0
	2	2	3	3	8

The "expert opinion" is likely to be as follows:

In example No. 1, all incomplete compositions are indicated correctly and correctly written in order, but a mistake was made in addition. In particular, 7 + 6 + 2 = 15, he wrote down 5 and should have memorized 1 and added to the sum of the digits of the next digit, which he did not

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take into account and this is not an accidental mistake, because he repeated the same thing when adding the digits of the next sequence, that is, the student forgets to add the memorized number to the sum of the next digits. The correct answer will be 215594. I would advise the student to repeat the rules of written addition of multi-digit numbers.

In Example 2, the multiplication totals are correct, but not in order. It is necessary to remind the student that 725 = 700 + 20 + 5, so the multiplication is not done by 2 and 7, but by 20 and 700. You should start writing a work with tens and hundreds of units, respectively. Tip: To make the calculations easier, you can write the multiplication in separate columns 4644 x 700 = 3250800; 4644 x 20 = 92880; 4644 x 5 = 23220, and then add the results.

In example 3, he does not consider it necessary to multiply the zero and adds the memorized digit to the product of the following digits. I would advise you to be sure to multiply zero by a factor and if there is no memorized figure, then you should write zero in the product, otherwise - a memorized figure, also when writing addition, you should separate the sum from the terms with a line.

In Example 4, the student multiplied 657 by 30 instead of 300. He probably doesn't remember that when you multiply by a number that ends in two zeros, you mean zeros in the last two digits. Tip: Repeat the rules for multiplying numbers ending in zeros and containing 0, and as in the previous case, the sum should be separated from the terms by a line.

It is worth noting that in the course of the task, several issues are comprehensively worked out: arithmetic operations on rational numbers, comparison of numbers and evaluation of the result of arithmetic operations, as well as logical reasoning and argumentation of one's opinion. In addition, the task is important in terms of increasing motivation, because presenting oneself as an expert instills in the student responsibility and the desire to complete the task flawlessly.

Conclusion

As mentioned at the beginning, the national curriculum aims to ensure that the school community cares about the student's personal development based on constructivist educational principles in order to create a school culture focused on care and support.

As can be seen from the examples considered, each task is a multifaceted task, the implementation of which requires consideration of it in different aspects, complex processing of several issues, independent thinking, and information processing. In each task, the student must present the problem, find strong and well-founded arguments in support of his opinion, prepare a written document in which the mistakes made are justified using mathematical concepts and terms, as well as recommendations are described, and in the presentation stage, he must participate in the discussion and be able to defend his work with logical reasoning, at the same time getting acquainted with the opinions of other works and accepting or criticizing different positions. In other words, with the help of the above-mentioned activities, the student

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develops critical thinking, ensures the orientation of the educational and training process to the personal development of the student; The educational process is based on constructivist educational principles; A school culture focused on care and support is being formed.

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