

Features of non-algorithmic methods in the teaching of elementary mathematics and their role in solving problems

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ABSTRACT

This article is devoted to non-algorithmic learning methods. The article describes situations where the degree of certainty of the question posed requires students to be creative and independent.

Keywords: Determinism, algorithmic and non-algorithmic method, elementary operation, algorithmic concept, algorithmic instruction, degree of uncertainty

Introduction

Unlike algorithmic methods, non-algorithmic methods completely determine the actions of the executor without a single value. The guidelines, which include non-algorithmic methods, have one or more levels of uncertainty and lead to different actions of the executors (or one executor) in the same situation. In this case, for example, there may be the following cases: 1) the commands that are included the instructions do not lead to any result (it does not activate), because it does not have a mass character; 2) Each (or at least one) of entered commands can be performed by various actions that result in different changes to the objects in the initial state. However, there may be different situations, for example: a) No specific action has been given with this instruction b) There are specific actions that you can follow to perform this instruction, and the executor can choose one of them etc.[1.48-p]

Let's give a few examples of instructions for the non-algorithmic type.

1-example.

Let's imagine that a student who could not solve some mathematical problem had the following instructions on what to do to solve it:

1. read the case condition carefully;
2. pay attention to how the data is connected;
3. draw all the conclusions based on these given.

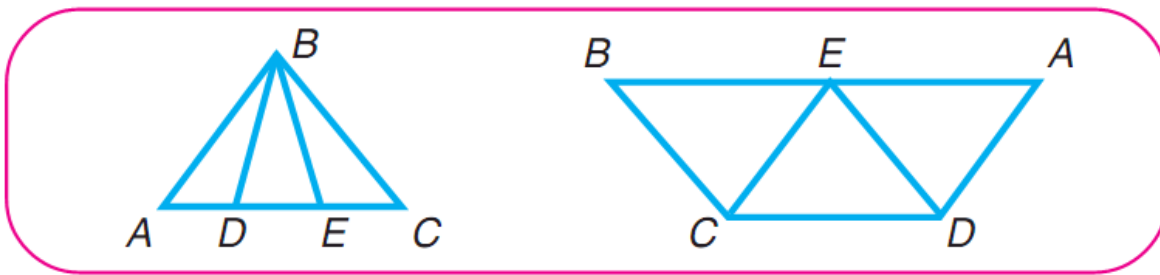
Main part

These instructions are not algorithm, because the operations and elements shown here are not mass, therefore the student does not know how to read and think the condition carefully, as well as how to draw conclusions (does not understand), etc. In order to convert this instruction into an algorithm, each command must be allocated to simple initial commands that the student knows and can execute. Only then the guidelines will activate the necessary operations and can come up with a thinking process that will provide a solution to the issue.

2-example. [2. P:18]

When studying geometrical concepts, sometimes the student given such instructions for mastering these concepts: "compare the selected element of the picture with other elements and draw conclusions about its properties." This type of instruction is non-algorithmic, since different students can perform it in different ways, comparing the selected item with different elements, as a result they draw different conclusions.

For example: say the name of the forms shown in the picture:



How many triangles are there in each form?
 (N.U.Bikbayeva, E.Yangabayeva, K.M.Girfanova
 4-th class mathematics textbook.
 „O‘qituvchi“ publishing-printing creative house
 2017y. P: 18)

3-example.

68. make a short note and solve it:

Umbrella — 4 260 sum

Gloves —?, 690 sum cheaper

Cloak —?, how much

(in the belowing provides a schematic of how to calculate the problem).

we draw up an algorithm for solving the problem:

1. write the umbrella’s price
2. subtract the gloves price from it (...sum is cheaper-less)
3. calculate the cost of the cloak (????)

When compiling the algorithm for solving the given problem, the instructions are interrupted without result when it comes to calculating the number of 3-object. (not according to the scheme in the belowing).

4-example. [2.P:24]

Instructions for determining the direction of some games include the following commands:

1. go to the bookshelf, where there are three books;
- 2 take the book in the middle ;
3. Open on the page that ends with the number 5;
4. find the first word on this page;
5. mark the first letter in it;
6. if this letter belongs to the first half of the alphabet, then without it A perform the action and finish your actions;

7. if this letter belongs to the second half of the alphabet, then perform the action B and finish your actions;

If we admit that all the operations described in this manual are sufficiently elemental and people who refer to it know how to perform these operations, then this will not be an algorithmic one anyway, because it contains vague instructions in it - "open the page that ends with the number 5 of the book". With this guide, different people can open different pages and achieve different results by performing different actions. That is, the process of activity is not entirely deterministic: 3 –the command has uncertainty, because it can be done in different ways.

As can be seen from the above, non-algorithmic methods require an independent finding of the sequence of actions from it and solving the problems of independent decision-making, without which the performer did not fully determine all the actions (without full determination) in the process of solving the issue. Here it is understood that the concept of independent activity is that a person himself (in this sense, acting according to an algorithm is also independent) can discover actions, find them, decide on the correctness of the action, without having a ready instruction on how to act, and not in the sense of performing actions.

Using algorithm conceptions, independent activity can be described as non-deterministic or not fully deterministic activity with appropriate guidelines.

Taking into account the different non-algorithmic methods, one can conclude that the degree of

uncertainty of the instructions for action is different in different cases. For example, if the instruction contains only one command that is ambiguous (or has not one meaning) (in this case, it is not entirely deterministic, so the independent or creative part of the process, perhaps, consists of only one step). Another situation, if more than one or even the majority of the guidelines be unclear. In this case, many steps will be independent or creative. The nature of each step and the degree of determinism may also not be the same. This means that the level of independence or creativity required to take the appropriate step is also not the same.

Thus, if the instruction indicates a large number of operations in which several commands can be executed, then the choice of the desired operation from a set of such operations is not determined, and the selection is easier than in the case in which it is necessary to perform from memory (here the case included in the algorithm "memory" is excluded). Finding the desired operation with a high degree of uncertainty will be more difficult than with a lower degree of uncertainty, because the selection area will also be larger when the degree of uncertainty is high. Thus, the degree of uncertainty of the instruction can be one of the indicators of the "degree of independence" necessary for the implementation of this instruction.

Some of these difficulties - as we said above, the difficulties of independent activity or the difficulties of creativity under certain conditions - are measured. So it can be said that as long as it is possible to establish some kind of criteria that assess how much independent thinking in a matter, how much creative research is required (at least according to some parameters).

What is the need to develop and use algorithms in the process of solving problems of methods of non-algorithmic character, as well as methods?

This is due to the fact that it is impossible to predict all the conditions and operations that should be used in solving many issues, the sequence of operations, such cases as the connection of some operations with certain conditions. And the construction of the algorithm involves the selection of a complete system of such conditions and operations. Solving many issues is not only the application of certain knowledge and methods of influencing a particular situation, but also the study, discovery of unknowns. This is due to the fact that when solving many issues, it is impossible to take everything into account in advance, to build algorithms for their solution in advance. Therefore, it is possible to indicate some methods of approach to the solution, in which the performer (executor) diverted the part and did not fully determine its actions. The performer (executor), who uses such methods, will have to determine the algorithmic sequence in which the situation in the process of solving the issue is required and the solution process itself is invented.

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