E-ISSN: 2997-9439

American Journal of Education and Evaluation Studies

https://semantjournals.org/index.php/ AJEES

| Research Article

Check for updates

Solving Issues Through Logical Thinking

Rashidov Anvarjon Sharipovich

Associate Professor, Department of Mathematics and Informatics,
Bukhara State Pedagogical Institute, Email:anvar.rashidov@bk.ru

Hasanova Dilafro‘z Bo‘ronovna

Buxoro davlat pedagogika instituti o‘qituvchisi, Email:dilafruzhasan89@gmail.com

Annotation: one of the requirements for the organization of education to date is to achieve high results in a short period of time, without the need to exert spiritual and physical effort. The delivery of certain theoretical knowledge to students between short periods of time, the formation of skills and competencies in them on specific activities, as well as the control of the activities of students, the assessment of the level of knowledge, skills and qualifications acquired by them, requires a high pedagogical skill from teachers and a new approach to the learning process. Why exactly a short time? Because the student cannot focus his attention on the lesson for too long, quickly gets bored and quickly becomes distracted. For this reason, the teacher must initially be able to attract the attention of the student, be able to explain the essence of the topic to the student in a short period of time.This article describes ways to shape students ' logical thinking skills in math classes. Biological models as well as a mathematical model of the epidemic are compiled and performed using examples.

Keywords: mathematics, logical thinking, textual issue, biological models, mathematical model of the epidemic.

This is an open-access article under the CC-BY 4.0 license

Introduction.

The process of solving problems is a key structural link in the study of mathematics. Mastering mathematics without problems cannot be imagined at all. Solving problems in mathematics lessons is the most effective and easy way to put theoretical knowledge into practice. Only a dry theory, without practice, cannot go far. But it is worth noting separately that each logical rule of mathematics has its place in practical life. These seats are manifested only through issues. Simple and complex issues serve to assimilate knowledge, strengthen and perfect the knowledge gained. Mathematical issues are an effective means of developing student thinking skills, often involving "hidden information". Solving this problem requires abilities from the problem solver, such as analysis and synthesis, independent appeal, fact comparison, generalization. In the process of solving problems, interest in mathematics increases. Qualities such as Independence, free thinking, exactingness, hard work and striving for a goal develop. At the stages of Community

Development, the importance and place of issues have been assessed in different ways. Currently, methodological methods and tools for organizing the process of mathematical education have been developed by solving issues and examples, which are detailed about these methods in many scientific and methodological and didactic literature. Introducing mathematical concepts using issues or examples and explaining their true nature to students is a complex pedagogical process. Therefore, each teacher should pay special attention to the selection or compilation of the issues that will be used in the course of the lesson. The application of the structured issues in the course of the lesson should be taking into account the students ' mastering abilities. The issue or example used in each lesson should be appropriate for the purpose of the lesson. If during the lesson the teacher wants to teach students a new mathematical concept, the issue or example to be drawn up should be aimed at revealing exactly the essence of this concept.

Literature analysis.

[3] the article provides information on the use of person-oriented technologies of education in mathematics lessons.

[4] the article considers that a historical approach to the study of educational subjects to some extent brings the educational process closer to scientific knowledge, and that the teacher, familiarizing himself with the concepts of mathematics, talks about their history and development (mainly the services of our great ancestors) in the course of the lesson, increases students ' interest in science,

[5] the article analyzes the question of the use of didactic games in the process of teaching mathematics. It has been noted that to what extent the classes are organized, it also depends on the creativity of the teacher. It was said that students will strengthen the knowledge gained from the lesson, prepare to be able to bring them to life.

[6] the article notes that the role of Independent Education in strengthening the knowledge of students during the development of today's science and technology is of particular importance. In this context, it is emphasized that in the performance of independent education, it is very important today for students to increase self-confidence, gain independent knowledge, work independently and teach to work on oneself independently. Also briefly mentioned are the aspects that should be paid attention to in the organization of Independent Education of students, the instructions that should be given to students.

[7] the article presents brief insights into the mantle issues of work and what types they are divided into, the stages of their solution, the Basic Laws found in such issues. Summarizing the considerations of what affirmations we should pay attention to when solving textual arithmetic problems for work, solutions to issues on the topic are presented as an example. It has been argued that the issues addressed by the affirmations and considerations will help students as well as independent learners of science to master textual issues without difficulty.

[8] the article presents students with issues of integrodifferential equations of parabolic type. These are typical variants of equations and inequalities, as well as instructions for solving such problems.

[9] the article provides important information on what should be considered in order to have basic knowledge in solving inequalities using advanced experience in the development of the field of education and to avoid error in generalizing solutions. Using the algorithmic method, solutions to examples of inequalities for fractional-rational, irrational, logarithmic, and trigonometric functions are given. [10-13] the article is devoted to the analysis of the effectiveness of interactive technologies as a means of improving the quality of the educational process. Today it is noted that the use of interactive methods in the educational process is widely introduced, which requires the humanization, democratization and liberalization of the educational process. It was said that

interactive methods are aimed at achieving high results in a short time, without spending a lot of time and physical effort, teach the student theoretical knowledge, master skills and qualifications in certain types of activities, form moral qualities, control and assessment of the student's knowledge require great skill and dexterity.

Main part.

During each course, questions and answers are necessary to determine the degree of assimilation of science materials by students. This can be clearly observed on the example of the science of" mathematical modeling". Especially from this science "biological models. In strengthening the topic" mathematical model of the epidemic", the emphasis of students on what aspects should be focused on is of great importance by the faculty member.

Complex issues also serve to assimilate knowledge, strengthen and further perfect the theoretical and practical knowledge gained. Simple and complex issues, on the other hand, serve as an effective tool for students to develop their thinking skills.

By solving issues, students must find content in these qualifications.

1. Learning to listen to the matter and be able to read it independently. On the issue work begins with mastering its content.
2. Preliminary analysis of the issue (qualification of obtaining a certain from the unknown). Separating the known from the unknown, the important from the unknown, opening the connection between those given in the matter and those who are looking for it is one of the most important qualifications. Without such qualifications, it is impossible to get used to solving issues independently.
3. Qualification of short writing of the issue. After oral work on the text of the issue, it is necessary to transfer its content into the language of mathematical terms and specify its mathematical structure in the form of a short inscription (pictures, drawings, schemes, tables).
4. The qualification of substantiating the choice of action in solving simple issues and carrying out a complex issue analysis, and then drawing up a solution plan.
5. Qualification to complete the solution, formalize it to suit the teacher's request and answer the question of the issue.
6. Qualification to be able to check the solution of the issue. Verification of an issue solution is used in the following ways: (a) establishing a correspondence between the received response and the issue condition; (b) composing and solving the reverse issue; (c) solving the issue by other means; (d) determining the limits of the answer (chambering the answer); (e) graphical verification.

Example 1. Mathematical model of the epidemic.

To draw up a mathematical model of the development of the epidemic, we "translate"the conditions of the posed issue into a mathematical language. we define the number of sick people in time t by x(t) -; X(t), - we define the number of healthy people in Time t as such. From the terms of the matter it follows that,

$$x(t) + y(t) = N + 1 \quad (1)$$

$$x(0) = 1, \quad (2)$$

and after a while, all the people in the group get sick. We divide the time interval [0, t] into N parts, i.e. we introduce a notation as follows:

$$\Delta t = \frac{T}{n}$$

let's figure out how many patients grow at the time.

No doubt,

1.Δx~t t, i.e., the value of Δx is proportional to Δt,

2.Δx~x (t)·y(t), i.e. Δx is proportional to the number of meetings of healthy (y(t)) and infected (x(t)) people.

The above can be mathematically written as

$$\Delta x(t) = \alpha x(t) y(t) \Delta t \quad (3)$$

Where the coefficient of proportionality (proportionality), for each type of epidemic, is different and determined empirically.

(1) from the formula y (t) we express the number of healthy people

$$y(t) = N + 1 - x(t),$$

By putting the resulting expression (3) in the formula, we obtain

$$\Delta x(t) = \alpha \cdot x(t) \cdot [N + 1 - x(t)] \cdot \Delta t$$

on both sides of the last equation we divide by x

$$\frac{\Delta x(t)}{\Delta t} = \alpha \cdot x(t) \cdot [N + 1 - x(t)]$$

For the last equation Δt→0 one can obtain

$$\lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t} = \lim_{\Delta t \to 0} (\alpha \cdot x(t) \cdot [N + 1 - x(t)]) = \alpha \cdot x(t) \cdot [N + 1 - x(t)]$$

From the last munoabat we get

$$\frac{dx}{dt} = \alpha \cdot x(t) \cdot [N + 1 - x(t)] \quad (4)$$

Equation(4) is the simplest mathematical model of the development of an epidemic, which correlates the initial data of the epidemic, that is, the number of people in the experimental group - N, the coefficient of proportionality - with the output data, that is, the number of patients in time t x (t) and currently the rate of development of the epidemic *dx/dt*. This model is deterministic according to the principles of structure, descriptive according to modeling purposes, since it only characterizes the development of the epidemic.

Theoretical study of the mathematical model of the epidemic:

From a mathematical point of view, the (4)-constructed model is a differential equation of order 1, by solving this equation we study the model. To do this, we introduce a new variable as follows:

$$u(t) = \frac{1}{x(t)} \quad (5)$$

Differentiating this equation we obtain

$$\frac{du}{dt} = -\frac{1}{x^2(t)} \cdot \frac{dx}{dt} = -u^2(t)\frac{dx}{dt}$$

we find $\frac{dx}{dt}$ from the last equation

$$\frac{dx}{dt} = -\frac{1}{u^2(t)}\frac{du}{dt}$$

Putting the obtained expressions into the Formula (4), we get:

$$-\frac{1}{u^2(t)}\frac{du}{dt} = \frac{\alpha}{u(t)}\left(N + 1 - \frac{1}{u(t)}\right)$$

In this equation, making some abbreviations and form substitutions, we get:

$$\frac{du}{dt} = -\alpha(N+1) \cdot u(t) + \alpha$$

The general solution to this unisexual differential equation is:

$$u(t) = Ce^{-\alpha(N+1)t} + \frac{1}{1+N}$$

Where C is a constant number. Putting the last term in (5), we find :

$$x(t) = \frac{N+1}{C \cdot (N+1) \cdot e^{-\alpha(N+1)t} + 1} \quad (6)$$

(6) - formula is the general solution of the (4)-model, to find the private solution we can define the constant C using the initial condition :

$$x(0) = \frac{N+1}{C \cdot (N+1) + 1} = 1 \rightarrow N + 1 = C \cdot (N+1) + 1 \rightarrow C = \frac{N}{N+1}$$

Then

$$x(t) = \frac{N+1}{N \cdot e^{-\alpha(N+1)t} + 1} \quad (7)$$

The function x (t) defined by the formula (7) (4) is the exact solution of the mathematical model. It follows that x(t) is an exponential function that depends on the time value t of the number of people infected with the virus. We continue to learn using the (7) model.

1. From the formula (7) it follows that with an increase in the value of t, the denominator of the fraction decreases, that is, the number of people with X(t) increases. Now let's see how long this increase will last. (7) differentiating the formula, we obtain the following expression for the rate at which an epidemic spreads: $x'(t) = v(t) = \frac{\alpha(N+1)^2 N \cdot e^{-\alpha(N+1)t}}{\left(N \cdot e^{-\alpha(N+1)t} + 1\right)^2}$ (8)

2. To know how the rate of epidemic v(t) changes, we differentiate the formula (8):

$$v'(t) = \frac{\alpha^2(N+1)^3 N\left[N \cdot e^{-2\alpha(N+1)t} - e^{-\alpha(N+1)t}\right]}{\left(N \cdot e^{-\alpha(N+1)t} + 1\right)^3} \quad (9)$$

(9) the velocity derivative from the formula is zero, i.e., for it to be, the following equality must be satisfied:

$$N \cdot e^{-2\alpha(N+1)t} - e^{-\alpha(N+1)t} = 0,$$

from here

$$N = e^{\alpha(N+1)t}$$

3. We logarithm the last expression:

$$Ln(N) = \alpha(N+1)t, \text{ from here}$$

$$t = \frac{Ln(N)}{\alpha(N+1)} \qquad (10)$$

Thus, (10) is the value V (t)=0 defined in the formula.

$t \in \left[0, \frac{\ln N}{\alpha(N+1)}\right]$ let, then (8) the formula follows that, in this range $v'(t) > 0$, that is, the function $v(t)$ it grows in the range.

If $t \in \left[\frac{\ln N}{\alpha(N+1)}, \infty\right)$ while, then (8) from the formula $v'(t) < 0$ it follows that, that is, in this range, the function v(t) decreases. From the formulas above, we can conclude that the epidemic rate increases in the first place, of t Reaches the maximum value at the value determined by the Formula $t = \frac{\ln(N)}{\alpha(N+1)}$, then begins to decrease. This conclusion, obtained as a result of a theoretical study of the mathematical model of the epidemic, is confirmed by the life experience of mankind. All epidemics are initially developing rapidly, and then decreasing.

By putting the expression of (9) defined in the formula (7) in the formula we have:

$$x(t) = \frac{N+1}{2}$$

From this it follows that approximately half of the people in the group observed at Time t, when the epidemic level has reached its maximum, will become infected with the virus. Time

By the time it reaches $T = \frac{2Ln(N)}{\alpha(N+1)}$ (11)

however, all people in the group are infected with the virus. The time interval t determined by the formula (11) is known as the" infectious epidemic period". At its end, all the people in the group become infected with the virus, stopping the spread of the epidemic.

It is known that the research activity that cultivates the student's logical thinking consists of several stages. For example, solving any issue begins with introducing its condition and question. The student, relying on the knowledge and experience in himself and relying on the information on the condition of the issue, tries to find out the relationship of the information on the condition of the issue, that is, it is carried out in logical observation. A reflection on the conduct of the matter arises in it. With this, students receive new knowledge. This knowledge is used to solve a similar issue. In many issues and exercises, instructions are given, such as "make a question",

"make a reverse issue", "compare", "make a conclusion", which encourage students to independently search. However, it is known from experience that such instructions are not enough to increase student independence and class effectiveness due to the fact that they are in general measures. Therefore, when solving mathematical problems, it is appropriate to use methods of solving examples in the problem by directing students ' thinking and guiding them [3-13].

In conclusion, an important task of teaching mathematics is to actively think in students, to overcome difficulties in solving various problems encountered in marriage, to create the need to find rational ways to solve these parables.

LITERATURE USED:

1. Educating teachers of science, mathematics, and technology : new practices for the new millennium / Committee on Science and Mathematics. Copyright 2001 by the National Academy of Sciences. Constitution Avenue, N.W. Washington
2. Djurayev R.X va boshqalar. Pedagogik atamalar lug‘ati. –T.: “Fan nashriyoti”, 2008 yil. – 94-bet
3. A. Sh. Rashidov Matematika darslarida ta’limning shaxsga yo ‘naltirilgan texnologiyasi. Центр научных публикаций. 2021 yil. 3-son. 68-72 bet
4. A.Sh. Rashidov Ijtimoiy-gumanitar ta’lim yo’nalishi talabalari uchun matematik fanlar bo’yicha amaliy mashg’ulotlarni o’tkazish. Science and Education №9. C 283-291
5. О.О.Халлоқова. А.Рашидов Пороговое собственное значение модели Фридрихса. Молодой ученый, 2015 №15. С. 1-3
6. A. Sh. Rashidov Interaktivnyye metody pri izuchenii temy "Opredelennyy integral i yego prilozheniya". Nauchnyye issledovaniya. № 34:3. C 21-24
7. A. Sh. Rashidov Yoshlar intellektual kamolotida ijodiy tafakkur va kreativlikning o‘rni. Pedagogik mahorat 2021 yil №7. 114-116 bet.
8. D.Hasanova Kasb-hunar maktablarida axborot-kommunikatsion texnologiyalari fanini o‘qitishning o‘ziga xos metodlari.Fan, ta’lim va innovatsiyalar: nazariya, amaliyot, natijalar 1 (42), 208-212 2 2024
9. H.D. Bo‘ronovna, A Amonova.Bulutli texnologiyalar formation of psychology and pedagogy as interdisciplinary sciences 3 (30) 2024
10. H.D. Bo'ronovna, Algoritmlarni ishlab chiqish metodlari va ularning tahlili Ta'lim va innovatsion tadqiqotlar 1, 94-96.2024
11. H.D. Bo'ronovna O‘quvchilarni tadbirkorlik faoliyatiga tayyorlash orqali kambag‘allikni qisqartirish
12. H.D Bo'ronovna Use of educational methods in computer lessons Economy and Innovation 1 (52), 462-465 2024
13. H.D. Bo'ronovna Algoritmlash va dasturlash fanlarini tashkil qilishning samarali usullari Development of science 1 (3), 23-29