SOME EDUCATIONAL CASE ASSIGNMENTS THAT ARE USED TO TEACH SUBJECTS OF ELEMENTS OF FUNCTIONAL ANALYSIS

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ANNOTATION

In given clause the tasks of problem training of the module elements of the functional analysis and creation modern didactical materials are considered. The typical examples from didactical of materials such as the non-standard tests and cases are given. Some scientific - methodical conclusions are made.

Keywords: functional analysis, technology of training, problem training, pedagogical technology, technology "Case-Study", test, non-standard test, case.

INTRODUCTION

Training of highly qualified personnel in the field of mathematics requires the use of teaching technologies with high efficiency in the educational process and the effective and operational use of a wide range of information and communication technologies. In addition, thorough training of students in the basics of scientific knowledge, the formation of a broad outlook and a scale of thinking in them are relevant issues.

The module of elements of functional analysis the methodology of teaching mathematics consists of the main module of the subject of mathematical analysis, which is taught in educational areas, has a wide theoretical and practical significance. Therefore, one of the urgent issues is to provide students with in-depth knowledge of the elements of functional analysis using didactic tools created on the basis of modern pedagogical technologies. Therefore, the creation of didactic tools that illuminate the theoretical and practical content of the module of elements of functional analysis, including the creation of lesson developments for lectures and practical classes; it is necessary to create slides, a set of tests, a set of keys, enrich topics based on materials from foreign sources.

Methodology for the implementation of research. In this article, we will talk about some methods, technologies and some non-standard didactic tools designed to control the knowledge of students, designed to provide students with in-depth knowledge based on modern pedagogical technologies on the theory of functions and elements of functional analysis. Problematic teaching technology is one of the main modern pedagogical technologies used for Mathematical Sciences [6, 7].

The application of problem teaching consists in putting the problem in the course of the lesson and finding the answer to it. In the process of cognition, a clearly posed question or complex of questions is usually called a problem, while finding an answer is said to know, and using an answer found in one question, a second question consists of a sequence of transitions to an answer.

The purpose of problem learning – an issue proposed by the teacher, which serves to gain special knowledge – is to solve the problem with the intelligence of students themselves.

In problem teaching, as in other modern pedagogical technologies, colorful didactic materials play an important role, which are prepared in the organization of teaching, activate the cognitive activity of students.

Didactic tools created on the basis of modern pedagogical technologies should be able to activate the cognitive activity of avvvalo students. For this, in combination with standard tests, non-standard tests are considered important. Non-standard tests include open and closed tests, tests for establishing compatibility, tests compiled on the basis of a creative approach, and hokazos. For example, let's see the following 2 issues.

1) select parameters a, b, c to reflect the axis of numbers itself reflecting $f(x)=ax2+bx+c-2sinx$ in such a way that the resulting reflection has a single fixed point.

2) select parameters a, b, c to reflect the axis of numbers itself reflecting $f(x)=ax2+bx+c-2sinx$ in such a way that the resulting reflection has three fixed points.

As you can see, although these issues are the same in terms of appearance, their condition is different. The problem of these issues lies primarily in the fact that its solution is not of one value. It can be used both by drawing up closed tests, and by drawing up standard and non-standard tests. Keys assignments for the analysis of parameters related to determining the number of excitable points of reflection can also be formulated.

As one of the techniques used in problem teaching technologies, the "Keys-stadi" method can be cited. The method of "Keys-stadi" is a method used in the practice of education of foreign countries, and today it is also becoming more and more popular in the education of our republic. We will briefly talk about this method [4, 5].

The Keys-stadi method is a technique that serves to form in students the skills to find the most suitable situations through the analysis of a specific, Real problem situation. Indeed, the" Keys-stadi " method teaches students to study and analyze a situation with any content.

The technology "Keys-stadi" was originally used in the course of education at the Law School of Harvard University in the United States in 1870.

The main didactic tool of the" Keys-stadi " method is keys assignments. There are also ready-made options for keys used in education, which can be sold. However, the most effective way is to achieve independent creation of keys in each subject. As long as 700 keys are developed per year at Harvard University alone. Their cost is $ 10, but it turns out that some keys can cost from $ 500 to $ 1,000.

It should be noted that since the method "Keys-stadi" was originally used in the fields of law and economics, keys in this direction, theoretical information about them, can be found in many ways. Due to the fact that the method of" Keys-stadi " justified itself as the technology of teaching in these areas, experiments with the application of these technologies to teaching other disciplines have also appeared. In the Russian educational system, examples and issues related to the parameter were used as the main didactic tool for the method of "Keys-stadi" in mathematics. Indeed, parameter-dependent examples and issues meet the requirements set for case tasks, that is, when solving parameter-dependent examples and issues, students study, analyze, draw conclusions about the situation with the example and the content of the issue.

The structure of keys in mathematics will consist of a situation for keys, a case task, an instruction to students on solving keys, Recommended resources.

Now let's give examples of keys according to the module" elements of functional analysis".

1-keys. (T.A.Garlic Casey).

X get a set of stops of some transport routes as a set. X determine the metric that represents the fee paid to go from station to station.

Case assignment.

1) Determine the appearance of the metric.

2) prove to be a metric.

3) determine the name of the metric space and determine its properties.

Instructing students. 1) sufficiently clarify the essence of Keys. 2) pay attention to the theoretical information on the topic covered in the module. 3) Give analyzes and base them with examples. 4) try to solve the case assignment in full, relying on the recommendations and resources provided.

Recommended resources.

1.   Garlishakov T.A. Functional Analysis course, Tashkent, 1987. 392 b.

2.   Eyupav Sh.A., Berdigulov M.A., Turgunbayev R.M. Factional analysis. T.: 2008. 106 b.

2-keys. Let the planned city is given as in the picture below.
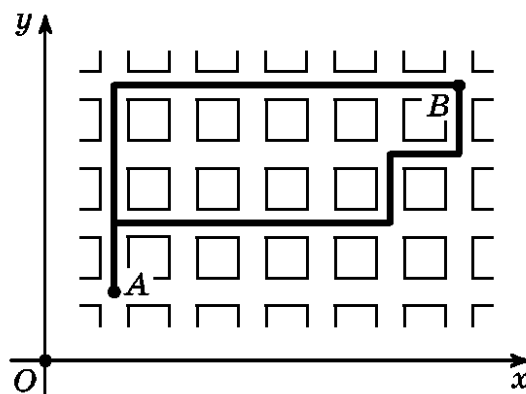
Let there be N·K quarters in the city, separated by n-1 horizontal and k-1 vertical streets. It can be seen that between intersections A and V, which is the same distance, one cannot take the length of the cross section that adjoins points A and V. In this case between intersections A and V, which is the distance A from the intersection to the intersection V it is desirable to take the shortest in length from the roads leading to the intersection.

Case assignment.

1) Determine the appearance of the distance between them, depending on whether A is a point with the coordinates of the intersection (x1, x2), V is the coordinates of the intersection (U1, U2).

2) mark the metric space formed by the determined distance.

3) Determine Which of the examples presented in the lecture corresponds to the resulting metric space.

Instructing students. 1) sufficiently clarify the essence of Keys. 2) pay attention to the theoretical information on the topic covered in the module. 3) Give analyzes and base them with

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Recommended resources.

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2.   Eyupav Sh.A., Berdigulov M.A., Turgunbayev R.M. Factional analysis. T.: 2008. 106 b.

3.   Akbarov U.Y., Arslonova N. Metric spaces. T.: Nodrabegim, -2020, 48 b.

3-keys. Let us be given a map of the place where two rivers are depicted with the line G1, G2. These two rivers must be connected by a channel, the length of the channel must be the shortest.
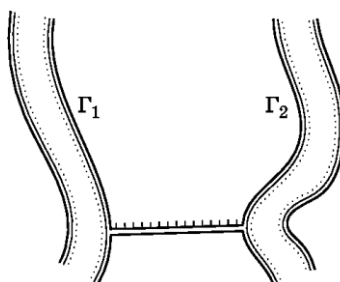
Case assignment.

1) naturally, in this we get the distance as follows

$$\rho(\Gamma_1, \Gamma_2) = \min_{\substack{X \in \Gamma_1 \\ Y \in \Gamma_2}} \rho(X, Y) \quad .$$

Show that this distance does not satisfy the axiom 3)- of the metric, although it is taken wisely.

2) if you complete the first task it follows that even a set of lines in a plane or space does not constitute a metric space in relation to the aforementioned metric. Indicate the metrics defined in a set whose elements consist of lines.

Instructing students. 1) sufficiently clarify the essence of Keys. 2) pay attention to the theoretical information on the topic covered in the module. 3) Give analyzes and base them with examples. 4) try to solve the case assignment in full, relying on the recommendations and resources provided.

Recommended resources. Literature in the 2nd case.

4-keys. We take the metric between the lines G1, G2 in the plane as follows

$$\rho_H(\Gamma_1, \Gamma_2) = \max\left(\max_{y \in \Gamma_2} \min_{x \in \Gamma_1} \rho(x, y), \max_{x \in \Gamma_1} \min_{y \in \Gamma_2} \rho(x, y) \right).$$

This is called the Hausdorf metric, which is defined in a set in which the elements of the metric consist of lines.

Case assignment.

1) collect theoretical information on the Hausdorf metric and metric space.

2) indicate the practical applications of the Hausdorf metric and the metric fazosinitng.

Instructing students. 1) sufficiently clarify the essence of Keys. 2) pay attention to the theoretical information on the topic covered in the module. 3) Give analyzes and base them with examples. 4) try to solve the case assignment in full, relying on the recommendations and resources provided.

Recommended resources. Literature in the 2nd case.

The keys presented above consist of training keys, which are composed of a problem aimed at forming a case, a case task, a source of instruction and recommendation to students. These keys are formulated based on the sources on which it was created[4.5] and personal experiences based on the nature of science. Therefore, some objections to them may also arise in specialists.

Conclusion. Thus, the task of problem-learning is to cooperate with students to effectively master the system of knowledge and methods of their mental and practical activities, to form in them the skills of creative application of the knowledge gained in a new situation, to solve cognitive independence and educational and educational problems.

Conditions of problematic teaching:

- system of improvement of educational information through didactic materials created on the basis of modern pedagogical technologies;

- selection of the method of solving the problem at the time of transfer of information to the educational task;

-the objective position of the educator is that he is able to understand and make decisions, to assess the tools he needs to solve the issue and obtain the result.

In the methodology of conducting training based on problem-learning, creative, partial-creative or heuristic, problematic statement of Information, Statement of information by problematic initiation are the main methods.

When organizing a problem situation, it is necessary to take into account the following didactic goals: to attract the attention of students to the educational material, to awaken their interest in cognition through non-standard tests, keys, to revive students ' cognitive activity, to bring them to the hardships of intellectual tension through case tasks, to be able to show that the current knowledge,, it is necessary to help determine the most rational paths in its solution.

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