

## **Taxonomy of Bloom as a Methodology of Obtaining Methodical Competence through Creative Tasks based on the Case Study**

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### **Abstract**

*High-quality training of teachers of a wide profile has been and remains a priority area of public life in any state. The laws of the Republic of Uzbekistan "On Education" and "On the National Program for Personnel Training" define the basic principles and directions for the implementation of state policy in the field of education and upbringing of future citizens of the country.*

**Key-words:** National Program, Training, Education and Training, Basic Principles, Synthesis, Evaluation.

### **1. Introduction**

In the context of a variety of types of lifelong education, differences in student contingents, there is a need to develop methodological work of a teacher focused on the specifics of schools, lyceums and vocational colleges. Proceeding from this, pedagogical universities have been tasked with training “teachers with a high worldview, moral education, high patriotism and developed economic thinking, creative activity and enterprise” [1, p. 35].

The growing role of education in the modern socio-economic situation leads to the fact that, along with the traditional functions of a teacher in the context of modernization of education, such professional functions as forecasting, design and organization of active educational activities are actualized. Therefore, when preparing future teachers, the effectiveness of teaching largely depends on the development and implementation of innovative methods of pedagogical technologies that are focused on the teacher and the student.

The goal of modern education is the further development of the historically established pedagogical system based on the creation of conditions for the formation of a professionally competent, socially active, creatively independent personality of a teacher. VL Shatunovsky concretizing some aspects of pedagogical activity asserts that the learning process at a university should be considered as a multifaceted and interdependent activity of students and teachers, aimed at the selection, systematization and presentation of educational information by the teacher; perception, awareness, processing and mastering of this information by students; organization by the teacher of independent, conscious, rational, active, purposeful and effective activities of each student in the acquisition of educational information and its use [7].

The organization of the learning process based on the community of trainees and students requires the following competencies of innovative pedagogy from a university teacher: diagnose goals; deep knowledge of the subject; the ability to design educational material; the ability to design and simulate an innovative learning environment based on active and interactive teaching methods and tools; organize individual, group work of students; to provide a healthy psychological environment for the cooperation of students between themselves and the teacher with the student based on the following main psychological and pedagogical factors:

- Understanding the goal and objectives of the pedagogical activity of a university teacher at the present stage of development, its social necessity and expediency;
- The ability to diagnose and predict the desired results and clearly plan the activities of learning subjects at different stages;
- The ability to select and creatively use the most effective forms and methods of activity; make your own elements of the new, original;
- The ability to constantly track the results of their work and draw appropriate conclusions from them [4, p.168].

But together with taking into account the requirements for the pedagogical activity of the teacher in the learning process, they must bring the educational and cognitive activity of students from objectivity to subjective. It is known from world practice that the main value of the existence and development of each member of society is the formation of creative skills. To this end, in the pedagogical process, all students should be motivated to the following activity and the need for knowledge:

- Logical thinking;
- Critical attitude to objects and events of the surrounding world;

- Making independent decisions;
- Creative influence on surrounding things and events;
- Independent acquisition of knowledge;
- Solving practical problems;
- Setting new tasks for the development of personality [5, p. 70].

The process of developing the creative abilities of students of a pedagogical university in educational activities will be effective when creating the following pedagogical conditions:

- Motivational conditions: substantiation of the place and role of creativity in the teacher's professional activity; awareness of the emergence of new opportunities for solving problems;
- Constructive conditions: equipping students with information about the mechanisms of creative activity; inclusion of creative tasks in the content of their education; appropriate educational and methodological support;
- Organizational conditions: the use of methods and forms of organizing educational and creative activities; the use of individual and group forms of organization of training;
- Communicative conditions: a sufficiently high level of formation of the teacher's communicative culture; using dialogue as a form of subject-subject interaction between teacher and students.

To achieve the creative competencies of future mathematics teachers, we considered a design lesson based on Bloom's taxonomy using case study technology, where the goal is to form and develop students' ability to independently analyze theoretical and methodological literature, the ability to organize and conduct various situational tasks: didactic, role-playing, business and others; the formation of the skills of communicative interaction between the teacher and the student, the ability to conduct oriented teaching of children with individual data; organization and ability of students to transfer theoretical knowledge into the field of practical use of the possibilities of situational tasks; the formation of methodological competence, the future teacher of mathematics using different case technologies aimed at the formation and development of students' knowledge, skills, personal qualities based on the analysis and solution of a real or simulated problem situation, presented in the form of a case.

Topic: Designing Mathematics Lessons Based on Pedagogical Technologies

Lesson result: project of a mathematics lesson using case study technology.

Educational questions discussed in the lesson.

1. Model of a situational task.
2. Task constructor LS Ilyushin.
3. An example of a situational task on the topic "Squares".
4. Evaluation sheet of the situational task.

The case itself can consist of five blocks: theoretical part, informational part, reference part, case tasks, homework. The theoretical part (it is optional) includes the theoretical material in mathematics that will be used to solve the tasks of the case. The informational part contains information about the life situation, which will need to be solved by means of mathematics. The reference part contains reference material, with the help of which it will be possible to solve the proposed life situation. The fourth part contains the specific task of the case, and in the fifth part, the homework is formulated, similar to the task of the case solved in the lesson.

Independent work of students before the lesson: to collect theoretical material on the topics: Geometry Grade 10: "Polyhedrons", "Rectangle area", "Bodies of revolution: cylinder, cone and ball", Mathematics grade 6: "Scale", "Percentage". Then, in groups, students work together on a case study. Each case must meet the requirements of Bloom's taxonomy, which addresses six categories of goals. Taxonomy is an ordered system of six sequential goals that a teacher must realize in order to achieve complete assimilation of knowledge by a student. (*Attachment 1*).

### Attachment №1

Learning Objectives Category	Their brief description
<b>1. Introduction</b>	Memorization and reproduction of the studied material. A common feature is the recall of relevant information from facts to theories.
<b>2. Understanding</b>	Conversion of material from one form to another, interpretation of the material by the student, assumption about the further course of events.
<b>3. Application</b>	Ability to use the learned material in specific conditions and new situations. Application of rules, methods, concepts, laws, principles, theories.
<b>4. Analysis</b>	The ability to break the material into its components so that its structure appears clearly. Calculation of parts of a whole, identification of relationships, awareness of the principles of organization of the whole.
<b>5. Synthesis</b>	Ability to combine elements to create a new product. Message, action plan, diagrams.
<b>6. Evaluation</b>	The ability to assess the value of a particular material according to clear criteria. Criteria can be determined by the students themselves or asked from the outside.

When formulating these six tasks of the situational task, it is recommended to use the task constructor of the St. Petersburg scientist Leonid Sergeevich Ilyushin (Doctor of Pedagogy, Head of the Education Modernization Department of the Committee on Education) ( Attachment 2).

## Attachment №2

### 1. Task constructor (L. S. Ilyushin)

Familiarization	Understanding	Application	Analysis	Synthesis	Evaluation
1. What are the main parts...	8. Explain the reasons why...	15. Display information graphically	22. Uncover the features...	29. Suggest a new (different) option...	36. Rank and justify.
2. Group everything together..	9. Outline the steps required to.	16. Suggest a way allowing.	23. Analyze the structure in terms of.	30. Develop a plan that allows (discourages).	37. Determine which solution is optimal for.
3. Make a list of concepts related to.	10. Show the connections that you think exist between.	17. Sketch the drawing (diagram) that shows.	24. Make a list of the main properties that characterize in terms of.	31. Find an unusual way that allows.	38. Rate the relevance for
4. Arrange in a specific order.	11. Build a development forecast.	18. Compare and then justify.	25. Build a classification based on...	32. Come up with a game that.	39. Determine the possible evaluation criteria.
5. State in the form of text.	12. Comment on the position that.	19. Conduct (develop) an experiment to prove that.	26. Find in the text (models, diagrams, etc.) what.	33. Suggest a new (your) classification.	40. Express critical judgments about.
6. Remember and write	13. State (reformulate) the idea that	20. Give a presentation	27. Compare points of view on and	34. Write a possible (most likely) development scenario	41. Assess the opportunities for
7. Read it yourself	14. Give an example of what (how. Where)	21. Calculate based on data on	28. Identify the principles behind	35. State your opinion (understanding) in the form	42. Conduct an examination of the condition

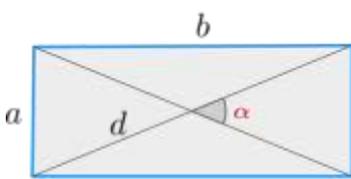
The final answer to the personally significant question of the situational task. It often involves the student's "going out" of the educational process into the space of social practice: this happens when students are asked to develop a project that includes them in active activity (Attachment 3).

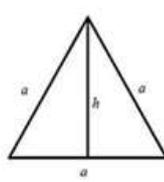
### Attachment №3

#### Algorithm for developing students' interest in cognitive activity (recommendations of L.S.Ilyushin)

Components of the structure of cognitive activity	Definition, Meaning	Student actions	Teacher actions	Verbs for constructing tasks by the teacher
Familiarization	Reproduction or locating of specific items of information	Answers Remembers Remembers Recognizes Expresses Characterizes Describes	Leads Manages Directs Tells Informs Shows Checks	Make a message, list, describe, reproduce, establish what it is, where it is, etc., formulate, learn, remember, tell, state facts, repeat, define
Understanding	Assimilation of the meaning of the stated material	Explains Interprets Interprets Proves Reveals Отождествляет	Proves Listens Asks Compares Compares Interrogates Checks	Change, transform, reformulate, describe, explain do a review, tell, summarize, tie together, explain make a conclusion, a conclusion, state the main idea
Application	Using rules, concepts, principles, theories, ideas in new situations, "transfer"	Solves new problems Proves Selects Organizes Initiates Produces Constructs	Shows Facilitates Renders assistance Supports Observes Criticizes Discusses	Apply, try in practice, use, use, decide, prove, Show, illustrate, make a report.
Analysis	Separation of information into its component parts, identification of relationships	Discusses Reveals Enumerates Analyzes Divides into parts Analyzes critically	Explores Leads Stimulates observes Provides resources	Analyze, divide into parts, seek, find, define, distinguish, check, compare, classify, refute
Synthesis	Creation of a new or unique product or plan from various ideas	Discusses Summarizes Binds Compares Summarizes Summarizes	Organizes feedback (reflection) Expands Evaluates Develops an idea Debates	Create, invent, predict, construct, design, change, imagine, improve, suggest
Evaluation	Evaluating the value of material or ideas based on specific criteria or standards	Judges, evaluates Discusses, questions Forms, composes Expresses his opinion	Accepts, admits agrees admits Reveals criteria Harmonizes, agrees	Make an opinion Come to the conclusion select, select, rate, disassemble, discuss, check, argue, recommend, define, justify, convince

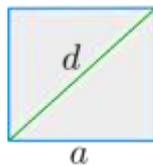
### An example of a situational task on the topic "Polygon area"

Task name	"Jeweler"
<p>Personally significant cognitive question</p>	<p>Sofya Nikolaevna decided to give three granddaughters for their wedding beautiful bracelets with emerald stones. Dasha, Marina, Karine. When my grandmother talked to them, she realized that each granddaughter likes stones with different shapes: Dasha prefers square stones, Marina likes rectangular stones, Karina said that she would choose stones in the shape of a triangle. The length of the bracelet for girls was also different: Dasha - 19.5 cm, Marina - 18.5 cm, Karina - 18 cm. The width of the item is 3 mm, without stones. After another 10 days, a family event was planned, Dasha's wedding. Sofya Nikolaevna decided to order a gift in a jewelry store. The grandmother has an amount of 60,000,000 soums. In which store can grandmother order bracelets cheaper?</p> 
<p>Information on this issue, presented in various forms</p>	<p><b>Text 1. Area. To find the area of a rectangle, multiply its length by width.</b></p>  <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <math display="block">1. S = ab</math> <math display="block">2. S = \frac{1}{2} d^2 \cdot \sin \alpha</math> </div> </div> <p>1 mm<sup>2</sup>  1 sm<sup>2</sup> = 100 mm<sup>2</sup>  1 dm<sup>2</sup> = 100 sm<sup>2</sup>  1 m<sup>2</sup> = 1 dm<sup>2</sup> = 10 000 sm<sup>2</sup>  1 km<sup>2</sup> = 100 000 m<sup>2</sup>  1 are (1a) = 1 are = 100 m<sup>2</sup>  1 hektar (1 ga) = 10 000 m<sup>2</sup></p> <p><b>Text 2. Area. To find the area of an equilateral triangle, you need to multiply the square of its sides by <math>\sqrt{3}</math> and divide by four.</b></p>



$$S = \frac{\sqrt{3}}{4} a^2$$

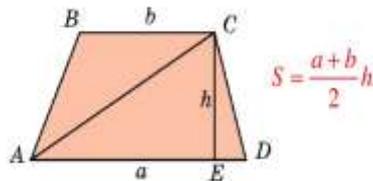
Text 3. Square area. To find the area of a square, you need to square the length of its side.



$$1. S = a^2$$

$$2. S = \frac{1}{2} d^2$$

Text 4. Area. The area of the trapezoid is equal to the product of the half-sum of the bases and the height



$$S = \frac{a+b}{2} h.$$

Text 5. Consumables

Material	Dimensions (edit)
Emerald	from 0.385 ka
Gold	rat
Diamond	Product - 18 cm from 5 grams

Text 6. Weight is in carats. Gem carats

The word "carat" is a unit of weight for natural and synthetic precious stones, corresponding to 1/5 of a gram. That is, 1 carat is equal to 0.2 grams. This value was established in 1907 by the IV General Conference on Weights and Measures in Paris. 1 carat = 0.2 grams.

#### DECORATED COLORED STONES

Cut form	FORMULA FOR DETERMINING THE MASS OF STONES (IN KARATS)
Round	diamatr <sup>2</sup> x height x density x 0.0018
Oval	length x width x height x density x 0.0020
Emerald or octagon	length x width x height x density x 0.00245
Rectangular	length x width x height x density x 0.0029
Marquis, shuttle, boat	length x width x height x density x 0.0016
Pear or stone	length x width x height x density x 0.00175
Square	length x width x height x density x 0.0023



Text 7. The ratio of the weight of a diamond to its diameter and size

Sifting a diamond (number of diamonds in 1 carat)	Diamond diameter, mm	Diamond weight, carat
400-200	0.90-1.10	0.002-0.005
200-120	1,15-1,25	0.005-0.008
120-90	1,30-1,43	0.008-0.011
90-60	1.45-1.64	0.011-0.0166
60-40	1.65-1.88	0.0166-0.025
40-30	1.89-2.05	0.025-0.033



Text 8. Gold price per gram - 343 200 sum

*Tasks for working with this information*

Familiarization	Using the calculations of the bracelet, find the area of the stone according to the selected geometric shape.
Understanding	Find out how much materials you need to create a bracelet.
Application	Calculate the number of carats of emeralds and diamonds required for a bracelet, if there are 5 emeralds in one diamond: 1-central from 6 mm <sup>2</sup> , 4-middle from 5 mm <sup>2</sup> ; diamonds - 4 from 0.2mm <sup>2</sup> -0.5mm <sup>2</sup> ; gold needs to be made of 12 rectangular parts and two trapezoidal parts where at the larger base you need to insert 2 diamonds, a gap of 0.1 mm between the parts, a clasp of 1 cm. Count how many emerald, diamonds and gold stones you need for a bracelet for each shape.

Analysis	<p>Which of the three stores will be the most profitable for shopping bracelet for Sofia Nikolaevna?</p> <table border="1" data-bbox="427 286 1412 1283"> <thead> <tr> <th rowspan="2">Material</th> <th colspan="9">Shop price</th> </tr> <tr> <th colspan="3">«Crystal»</th> <th colspan="3">«Avangardo»</th> <th colspan="3">«Pandora»</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Emerald</td> <td>Carat</td> <td>Diameter</td> <td>Price</td> <td>Carat</td> <td>Diameter</td> <td>Price</td> <td>Carat</td> <td>Diameter</td> <td>Price</td> </tr> <tr> <td>0, 385</td> <td>2,1 mm</td> <td>1360782,5</td> <td>0, 385</td> <td>2,1 mm</td> <td>1306278,5</td> <td>0, 385</td> <td>2,1 mm</td> <td>1330000</td> </tr> <tr> <td rowspan="2">Diamond</td> <td>Carat</td> <td>Diameter</td> <td>Price</td> <td>Carat</td> <td>Diameter</td> <td>Price</td> <td>Carat</td> <td>Diameter</td> <td>Price</td> </tr> <tr> <td>0,2</td> <td>1,7 mm</td> <td>106 035</td> <td>0,3</td> <td>2 mm</td> <td>165255</td> <td>0,5</td> <td>5 mm</td> <td>259450</td> </tr> <tr> <td rowspan="4">Gold</td> <td>Try</td> <td>Price</td> <td>Try</td> <td>Price</td> <td>Try</td> <td>Price</td> <td>Try</td> <td>Price</td> </tr> <tr> <td>585</td> <td>344692</td> <td>585</td> <td>329778</td> <td>585</td> <td>364002</td> <td>585</td> <td>364002</td> </tr> <tr> <td>750</td> <td>449154</td> <td>750</td> <td>454242</td> <td>750</td> <td>431945</td> <td>750</td> <td>431945</td> </tr> <tr> <td>999</td> <td>588560</td> <td>999</td> <td>591445</td> <td>999</td> <td>566120</td> <td>999</td> <td>566120</td> </tr> </tbody> </table>	Material	Shop price									«Crystal»			«Avangardo»			«Pandora»			Emerald	Carat	Diameter	Price	Carat	Diameter	Price	Carat	Diameter	Price	0, 385	2,1 mm	1360782,5	0, 385	2,1 mm	1306278,5	0, 385	2,1 mm	1330000	Diamond	Carat	Diameter	Price	Carat	Diameter	Price	Carat	Diameter	Price	0,2	1,7 mm	106 035	0,3	2 mm	165255	0,5	5 mm	259450	Gold	Try	Price	Try	Price	Try	Price	Try	Price	585	344692	585	329778	585	364002	585	364002	750	449154	750	454242	750	431945	750	431945	999	588560	999	591445	999	566120	999	566120
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The case provides an opportunity to get closer to practice, to take the position of a person who really makes decisions, to learn from the mistakes of others.

During the training, the following are formed: Analytical skills. Ability to distinguish data from information, classify, highlight essential and non-essential information and be able to recover them. Practical skills. Putting academic theory, methods and principles into practice. Creative skills. One logic, as a rule, is a case - the situation cannot be solved. Creative skills are very important in generating alternative solutions that cannot be found in a logical way.

The advantage of case technologies is their flexibility, variability, which contributes to the development of creativity in the teacher and students.

The question arises of how and when to offer students creative assignments. You can give creative homework. You can conduct lessons on solving creative tasks. Such activities can be systematic. Can be used when repeating or consolidating the material studied.

Thus, creative tasks have educational functions (provide students with the opportunity to receive an educational product, deepen and expand knowledge of the subject, gain experience in creative activity); educational functions (allow you to be active, accurate, independent, develop attention, control your knowledge and skills in the subject, develop self-organization skills); developmental functions (allow students to form thinking and communication skills, the ability to independently seek solutions to educational problems, creativity). All these functions are components of the "Requirements for the results of mastering the material».

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