Action Research Topic:

Implementing project and problem-oriented learning methods for development of students' research skills

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The relevance of research:

To improve the students' research skills

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Research questions:

- How does project work affect students' content knowledge?
- Does the problem-oriented teaching method influence the formation of students' research skills?
- Does the project teaching method influence the formation of student's research skills?

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Research methodology:

- Survey
- Forming of focus group
- Using psychological portraits
- Observation

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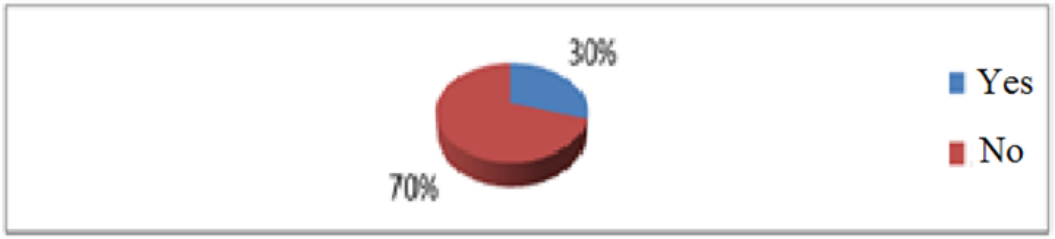
Research hypothesis:

It is possible to improve students' research skills through organization of the project works and using problem-oriented teaching methods at the mathematics lessons.

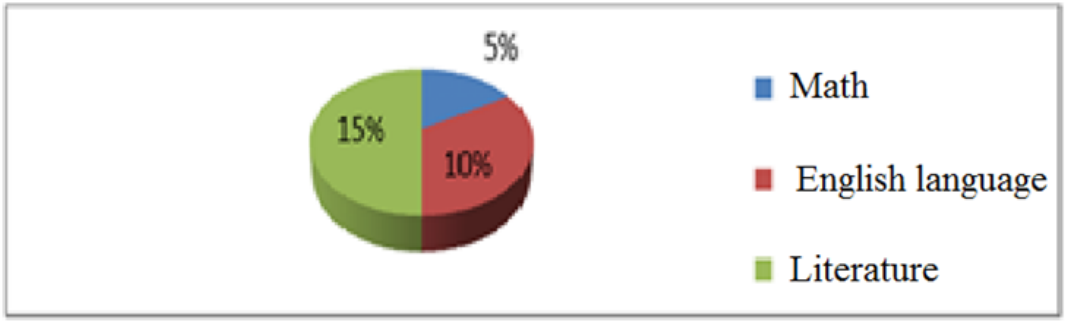
Survey results

Questionnaire for 7th grade pupils in October

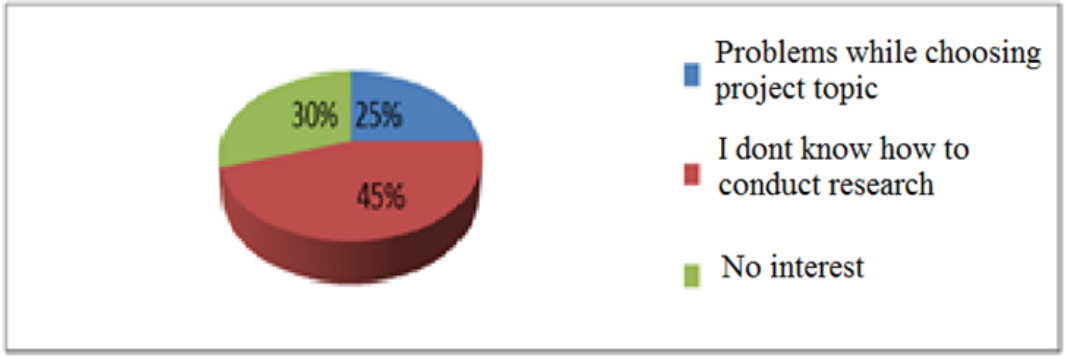
1. Have you ever had a project work at school?



2. Which subjects did you participate?



3. What was the problem while doing project work?



Using psychological portraits

Intelligence type	
Logical intelligence	Mathematical and science-research intelligence
65%	**58%**

The theoretical basis of the research work

Project research is an educational technology that predisposes the creative and research tasks of students to scientifically-cognitive methods.

Project work teaching theory

Shamova I.P.

Facilitate the gradual development of the student's basic physiological and psychological functions

Mastering basic knowledge through use in different situations

Developing creative potential of a student

Educational process aimed to enhance the student's motivation to learn

The requirements of using project work teaching Polat AS

- Having a problem question solved by research
- Practical, theoretical, cognitive significance of the results
- Personal activity of a student
- The content structure of the project
- Application of research methods
- Determination of the problem and the study task it generates
- Creating hypothesis
- Choosing research methods
- Analyzing and concliding

https://nsportal.ru/user/667/page/metod-proektov-istoriya-i-praktika-primeneniya

The Project work classification according to typological features:

- Priority of the method in the project
- Content Subject Area
- The nature of the contacts
- Nature of coordination
- Number of participants
- Duration

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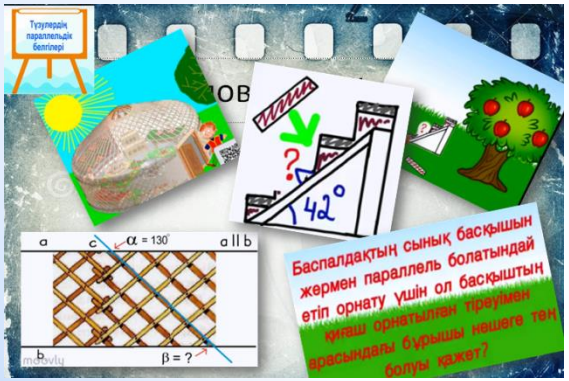
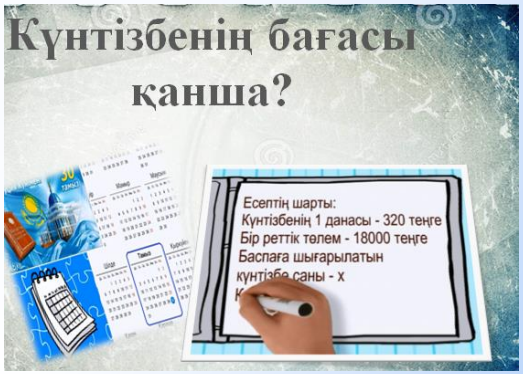




The Use of «Triangles Similarity »

pair №	The method used in practice	Advantages	Disadvantages
1	Why did Thales use the shadow to determine the height of the pyramid?		
2	How to know the height of a tree using a mirror?		
3	What is the method called in Jules Verne's ‘’The mysterious island”?		
4	Do triangles help to find the distance to an inaccessible point (determining the width of the river)?		
5	Describe how to use a pin to measure height.		

Project work stages:

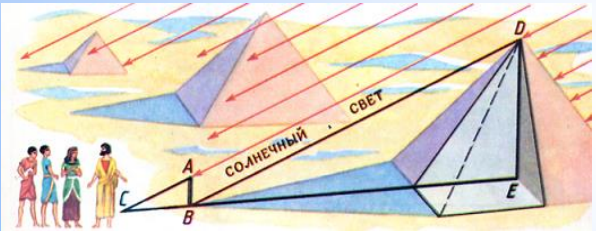
1. Define the problem
2. Discussion of research methods
3. Actualization of advanced knowledge
4. Planning
5. Research
6. Analysis of results
7. Conclusion

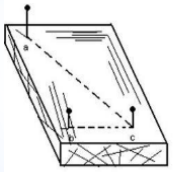
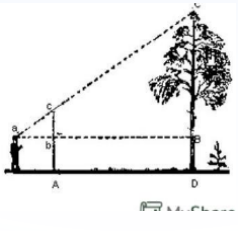
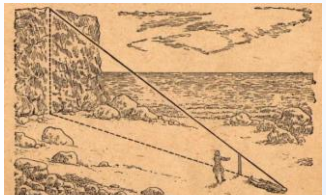
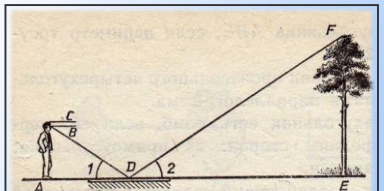
By typological criteria:

Applied oriented
Interdisciplinary (Physics)
Students of one class
Couple
Short term

Evaluating:

Product
Formative Assessment of the student's own activities
Work report



The Research project task:

Topic: The ratio of circular length to its diameter.

1. Choose circles.

Measure the length of the circle with the thread.

Define the length of the thread by the ruler.

Write the results of the measurements in the table.

2. Measure diameter of the selected circle using the thread.

Determine the length of the string by the ruler.

Write the results of the measurements in the table.

3. Divide the circular length into the diameter.

Write the fraction in the decimal separator as the incorrect and unlimited fraction.

Hypothesis: The ratio of circular length to its diameter is ..... and is called .....

Requirement for the use of project learning:

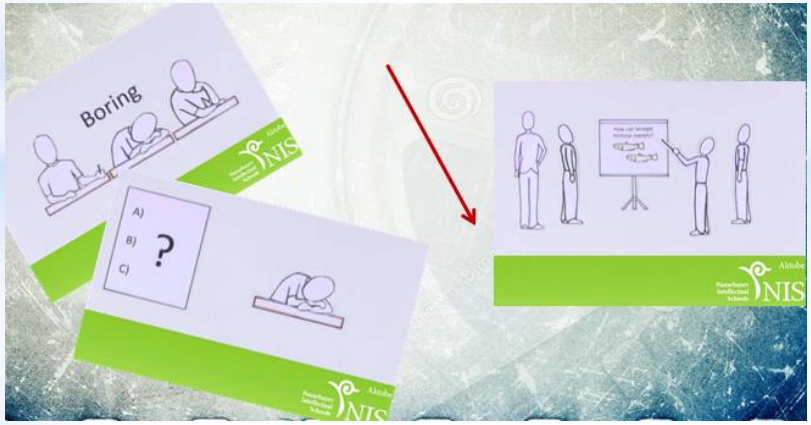
- Students show interest in research
  - Practical significance($C/D=\pi$, $C=\pi \cdot D$)
  - Cognitive significance(introduction π)
  - Using research methods (experiment)
  - Analysis of the work done
  - Conclusions, summing up

Project learning – part of PBL.

Professor A.I.Chuchalin

PBL (Problem-based Learning) is a learning approach that is based on a specific life-long situation for searching the knowledge.

Howard Brouth,
American doctor, teacher
in the field of medicine



The main stages of PBL process organization

Stage 1: Creating Groups (Building Teams)

Phase 2: Setting the Problem (Sending a Problem)

Stage 3: Implementation of ideas (problem analysis)

Stage 4: Problem Solving (Problem Analysis)

Step 5: Self-study

Stage 6: Synthesis and Application (Presentation of Solutions)

Stage 7: Reflection and Feedback (Reflection and Assessment)

Table FILA

FACTS	IDEAS	LEARNING ISSUES	ACTION PLAN
Information extracted from the problem scenario Group according to topics where possible	Ideas are established based on facts Hypotheses accepted without discussion	Formulated as questions Questions should help solve the problem	The action plan should be implemented in such a way that it helps to solve the problem, conduct research, organize interviews

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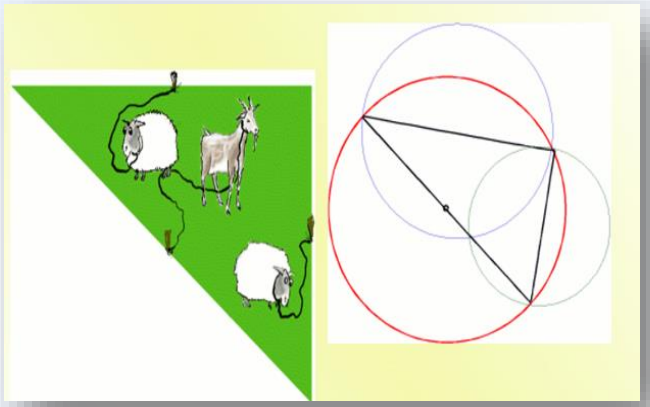
Problem oriented teaching

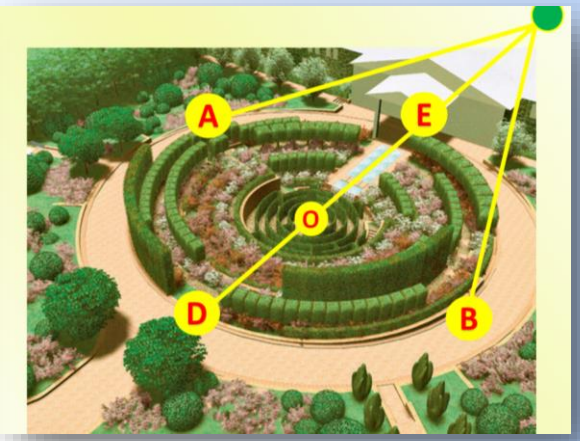
The strategy of the problematic question

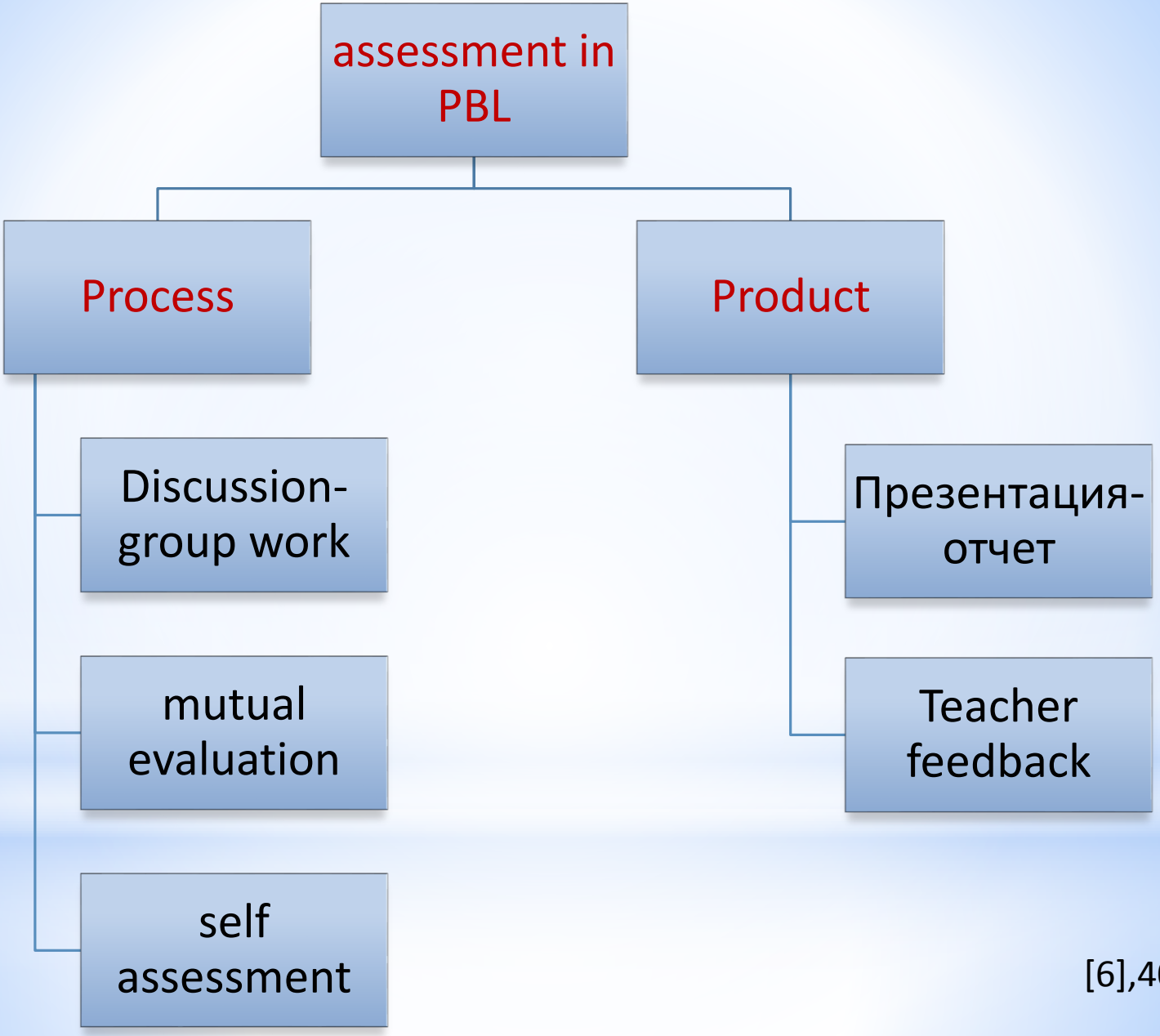
"Why are hatches on the street are round shaped?"

FILA table

FACTS	IDEAS	LEARNING ISSUES	ACTION PLAN






assessment in PBL
Process
Product
Discussion-group work
mutual evaluation
self assessment
Презентация-отчет
Teacher feedback

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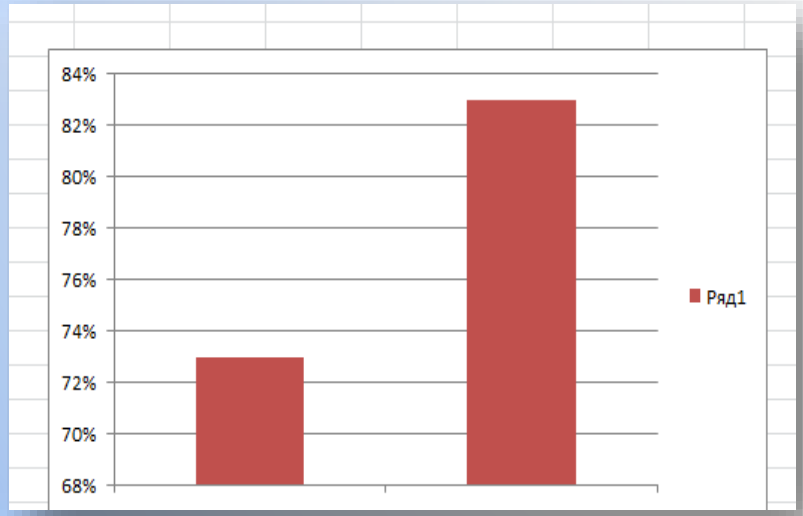
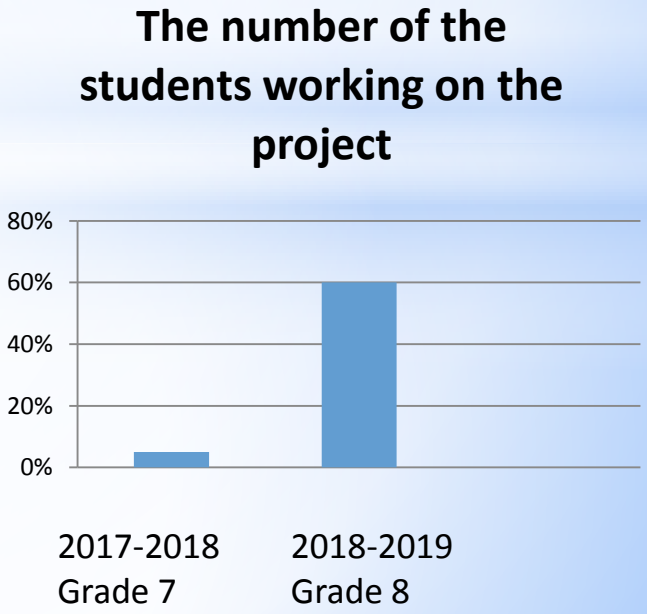
Research results

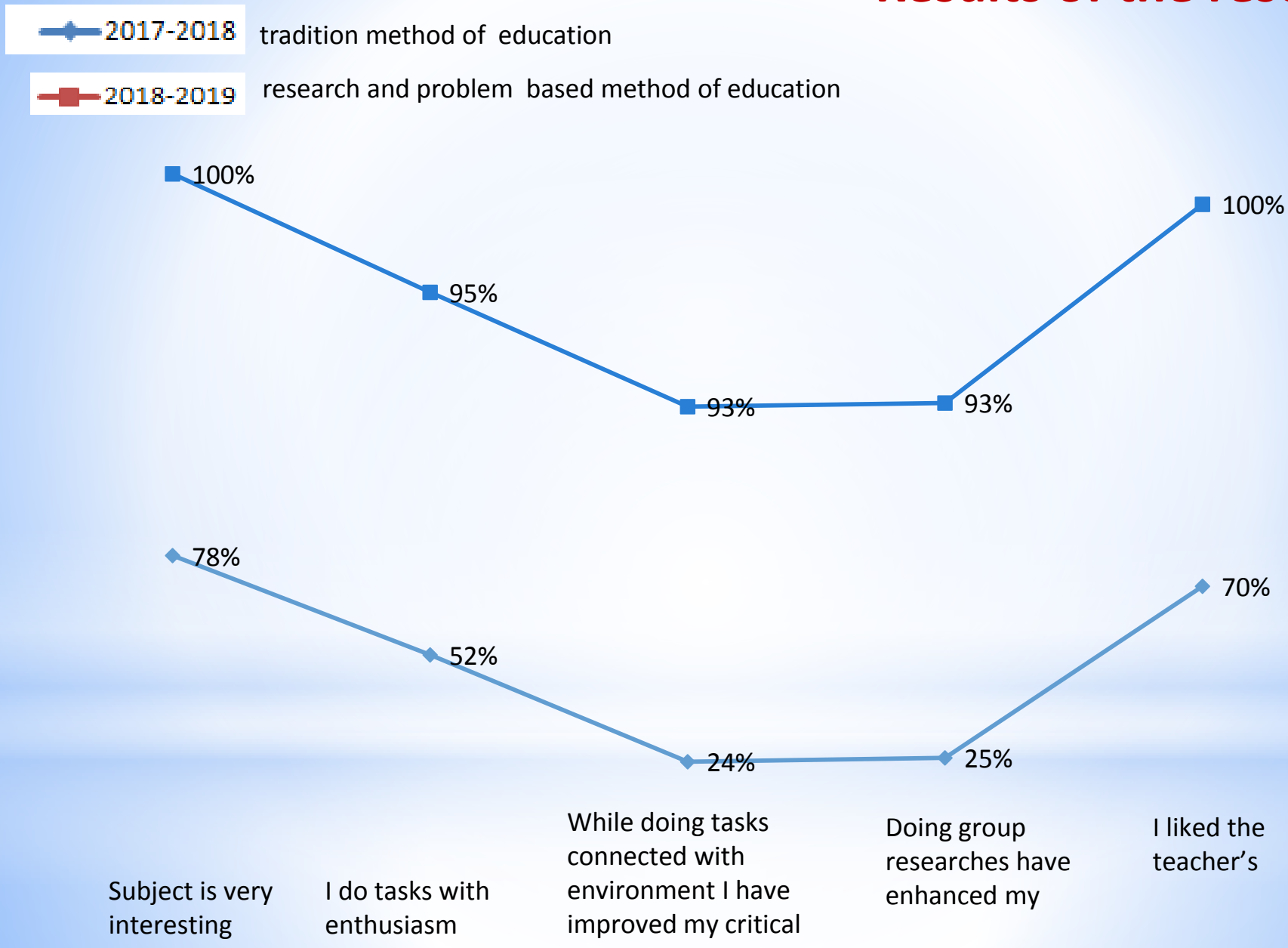
- It was seen that the students with low mathematical science-research intelligence in the focus group have improved their content knowledge of the chapter as a result of research project work and summative assessment.



- The number of pupils willing to work on mathematics project has increased.



Results of the research



Difficulties in the research process:

- There is a shortage of time to work on a small project during the lesson.
- The frequent use may lead to the creation of a project template, loss of research novelty.
- Using for complicated topics is ineffective, otherwise the principle of accessibility of learning is disturbed.
- Methodological resources are insufficient to create research. assignments.

Recommendations for a teacher :

- Eliminate the deficit of time through the organization of integrated project work on similar themes in subjects.
- Avoiding the loss of research novelty by organizing problem situations in the context of the topic and purpose of the lesson.
- Determination of topics that are appropriate for the organization of research using the international experience, increasing methodological resources.

Conclusion

- To develop learners' skills in modeling real situations in the language of geometry, researching the constructed model using geometric concepts and theorems, the apparatus of algebra, solving geometric and practical problems;
- To develop learners' algorithmic thinking necessary for professional accomplishments in modern society; to develop learners' skills to compose and write an algorithm for a specific doer; to form knowledge about algorithmic constructions, logical values and operations;

https://knowledge.allbest.ru/pedagogics/3c0a65625a3ac78b5c43b88421216c36_0.html

- Consideration of research activity as a strategic direction of educational process development based on intellectual development of the student;

http://urok.1sept.ru/%D1%81%D1%82%D0%B0%D1%82%D1%8C%D0%B8/512107/

- Encouragement of creativity and initiative;
- Active and creative position of the student.

Literature

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