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Methodology of Using Case-Study Educational Technology in Teaching the Subject of Creating Images in Lenses

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Abstract:

In this article, the features of using case-study methods during pedagogical activities have been developed. The main purpose of the case-study technology is to develop their scientific and creative abilities by solving educational didactic tasks and existing problem situations. One of the educational methods to connect the knowledge in the optical department of physics with everyday lifestyle, to increase the thinking ability of students, and to increase the effectiveness of teaching, the "Case-study" method is mentioned, and examples of it are given.

Keywords: lens, focal length, image, Case study, Phet program, problem situation, evaluation criterion, optical system.

INTRODUCTION

Today, the interest and attention to increase the effectiveness of education using interactive methods (innovative pedagogical and information technologies) in the educational process is growing day by day. Classes using modern technologies are aimed at helping students find the knowledge they are acquiring, independently study and analyze it, and even draw their own conclusions [1,4-5].

Using modern pedagogical technologies to cover the topic, using several methods leads to an increase in the effectiveness of teaching [2]. In particular, the use of the Case study method is of great practical importance. This process of pedagogical cooperation has its own characteristics, which are:

- forcing the student not to be indifferent, think independently, create and search during the lesson;
- ensuring that students' interest in science remains constant during the educational process;

- strengthening of students' interest in science by independently approaching each issue creatively;
- cooperative activities of pedagogues and students can be organized continuously.

Therefore, it would be appropriate if we choose the most appropriate modern educational technologies that are currently used by the world's leading countries and introduce them to education in our country.

Recently, the "Case-study" method has been successfully used in the practice of education in foreign countries, and today it is becoming more and more popular in the education of our Republic [3].

METHODOLOGY

This study utilizes the Case-Study educational technology to enhance teaching in the subject of lens imaging. The Case-Study method involves analyzing specific, real-life situations to develop students' problem-solving and critical thinking abilities. The methodology includes the following steps:

1. Case Introduction: Students are presented with real-life or theoretical situations related to lens imaging, which they analyze individually or in groups.
2. Problem Identification: Students identify the main issues in the case, such as the behavior of light rays through lenses and image formation, and prioritize them.
3. Solution Development: Students work on finding solutions to the identified problems using relevant concepts from optical physics. They develop alternative solutions and assess their feasibility.
4. Presentation of Solutions: Students justify their proposed solutions, prepare creative presentations, and demonstrate the practical application of their findings.

The method encourages active learning, critical thinking, and collaboration among students, thus enhancing their understanding of the optical concepts involved. Additionally, the PHET program is used to simulate real-world scenarios, helping students visualize and understand the principles of lens imaging.

DISCUSSION AND RESULTS

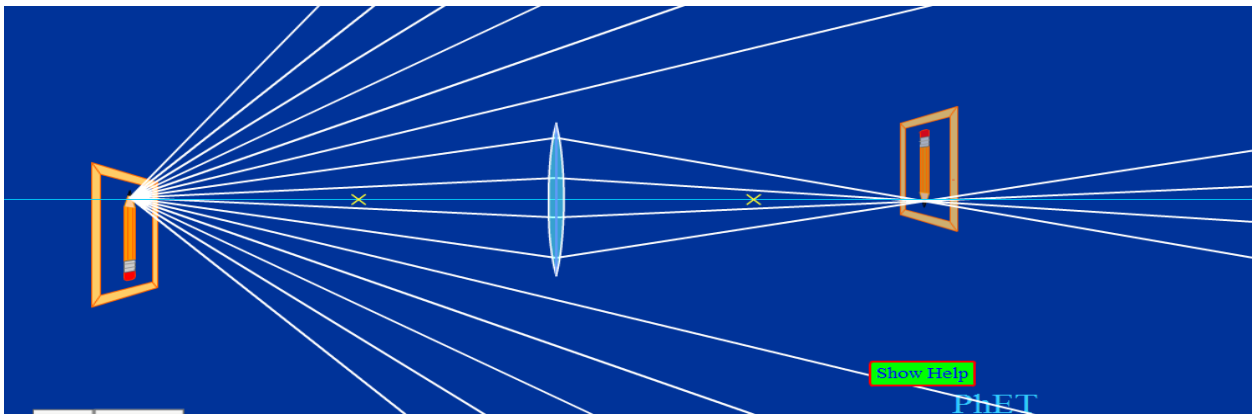
"Case-study" is a method aimed at teaching based on the study and analysis of concrete situations. In a case, open information or a specific event can be used as a situation. Case actions include: Who, When, Where, Why, How, What.

Steps of implementation of the "case method".

Work steps	Form and content of activity
Step 1: Introduction to the case and its information supply	✓ individual audio-visual work; ✓ familiarization with the case (in text, audio or media form); ✓ generalization of information; ✓ information analysis; ✓ identify problems.
Step 2: Clarify the case and set the training task	✓ individual and group work; ✓ determining the priority hierarchy of problems; ✓ defining the main problem situation.
Step 2: Searching for a solution to the educational	✓ individual and group work; ✓ development of alternative solutions;

task by analyzing the main problem in the case, developing ways to solve it	✓ Analysis of opportunities and obstacles of each solution; ✓ choosing alternative solutions.
Stage 4: Formulation and justification of the case solution, presentation.	✓ work individually and in groups; ✓ justifying the possibilities of practical application of alternative options; ✓ preparation of a creative project presentation; ✓ to highlight the practical aspects of the final conclusion and solution of the situation.

Implementation of the case in the PHET program.



In a converging lens, after the image of the object passes through the lens, the image is inverted.

Assignment: Why is the resulting image inverted?

Methodical instructions are given to students on step-by-step analysis and solution of the practical situation.

Instructions to students.

Work steps	**Tips and recommendations**
1. Getting to know the case and its information support	First of all, get acquainted with the case. In order to understand the purpose and tasks of the subject "Lens imaging", it is necessary to carefully read the information related to the subject. Do not rush to analyze the situation while reading.
2.Acquaintance with the given situation	Read the information carefully again based on the diagram.
3.Analysis of the problem situation.	Focus on major and minor issues. The main problem: What to pay attention to when making images on lenses.
4.Selection and justification of methods and tools for solving a	In order to find ways to get out of this situation, start filling out the table "Problem situation" presented below. To solve the problem, consider all situations, create an alternative situation. Choose the

problem situation.	solution to the problem from specific options, find the exact solution to the problem. Fill in the table. Attach the case study results in written form

Fill in the "Problem situation" table. It is given to students.

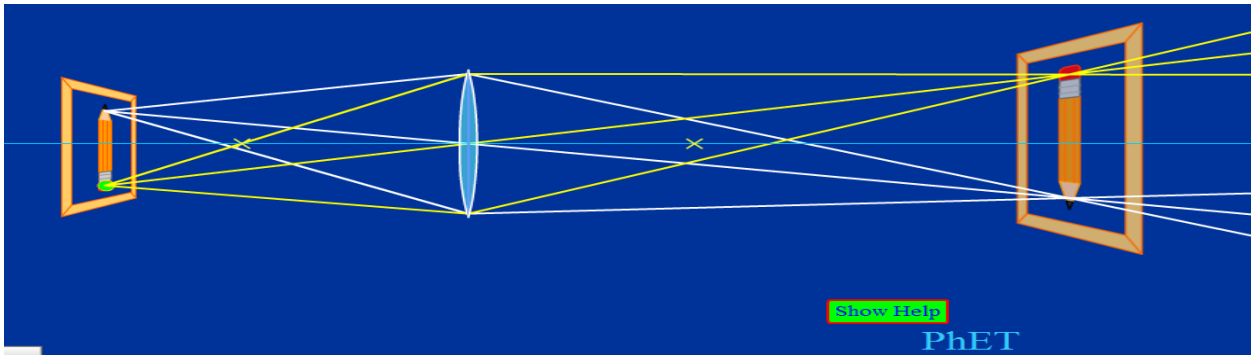
The type of problems in the situation.	Causes of the problematic situation	Out of the situation departure actions

Option to solve and analyze the case by the teacher

A problematic situation.	**Causes of the problematic situation**	**Out of the situation departure actions**
Why do rays spread along a straight line and refract at the boundary of two media?	As we know, the rays spread along a straight line, the trajectory of the ray is a straight line, experiments have confirmed this. According to the laws of geometric optics, rays are refracted at the boundary of two media.	Based on the application of the subject of imaging in lenses.

Case 2

Implementation of the case in the PHET program.



An image of the object was created using a converging lens.

Task: Why is the image reversed, real and magnified?

Methodical instructions for students on step-by-step analysis and solution of the practical situation

Instructions to students.

Work steps	Tips and recommendations
1. Getting to know the case and its information support	First of all, get acquainted with the case. In order to understand the purpose and tasks of the subject "Lens imaging", it is necessary to carefully read the information related to the subject. Do not rush to analyze the situation while reading.
2.Acquaintance with the given situation	Read the information carefully again based on the diagram.
3.Analysis of the problem situation	Focus on major and minor issues. The main problem: What to pay attention to when making images on lenses. Try to answer the following questions. - Laws of geometric optics. Provide an understanding of optical instruments; - When is the object image "abstract" or "real" in lenses? - What if the lens is diffusing?
4. Selection and justification of methods and tools for solving a problem situation.	In order to find ways to get out of this situation, start filling out the table "Problem situation" presented below. To solve the problem, consider all situations, create an alternative situation. Choose the solution to the problem from specific options, find the exact solution to the problem. Fill in the table. Attach the case study results in written form

Fill in the "Problem situation" table. It is given to students.

The type of problems in the situation.	Causes of the problematic situation	Out of the situation departure actions

Option to solve and analyze the case by the teacher

A problematic situation.	Causes of the problematic situation	Out of the situation departure actions
The object is placed at some distance from the converging lens, and an image is formed on the screen	According to the typical appearance of a converging lens, the center of the lens is thick and the edges are thin. The lens collects a bundle of rays coming parallel to the main optical axis. If the object F is placed in the distance F<d<2F with the focal length 2F, the object will be magnified, inverted, real.	Based on the application of the subject of the laws of geometric optics.

CONCLUSION

Lessons can be effectively organized with the help of the Case-study educational technology presented in the article. The use of the Case study method in teaching the subject of lens imaging helps students to develop their creative and technical potential. It is recommended to use various modern pedagogical technologies in order to increase students' interest during the training session. The use of modern educational technologies not only increases students' interest in science, but also helps them acquire deep knowledge and skills.

LITERATURE

1. Sh.Z.Djumanov.Possibilities of forming students' communication skills based on "Case" technology.(p.147-148).
2. R.J.Ishmuhamedov. Ways to increase the effectiveness of education with the help of innovative technologies. -Tashkent, 2004.
3. A.U.Umbarov. Methodology of teaching the subject of lenses in general secondary schools. "Prospects of development of science in Uzbekistan" international scientific and practical conference. Science and Innovation is an international scientific journal. 2022. p.848-851.
4. S.X.Zoirov., Yu.B.Hamrayev., M.Bahriyeva. Methodology of teaching physics using modern technologies. // Science and Education. 2023. №12. p. 515-519.
5. S.X.Zoirov., M.Bahriyeva. Methodology of using digital technologies in education. // Science and Education. -2024. №1. P.276-280.