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# ADVANTAGES AND PRACTICAL SIGNIFICANCE OF USING CASE STUDIES TECHNOLOGY IN TEACHING COMPUTER SCIENCE

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## ABOUT ARTICLE

**Key words:** computer science teaching, case-study technology, innovative pedagogical approach, problem-based learning, practical learning, interactive methods, student activity, independent thinking, analytical thinking, educational effectiveness, information and communication technologies, competency-based approach, practical significance.

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**Abstract:** This This article highlights the main issues of the advantages and practical significance of using case study technology in teaching computer science, which allows moving to a qualitatively new stage of pedagogical activity, significantly increasing its didactic, information, methodological and technological capabilities. Currently, the use of modern, interactive and innovative pedagogical technologies in the educational process, along with traditional methods of teaching, is gaining relevance. Such technologies serve to form students' independent thinking, analytical approach, and practical skills. Since computer science, by its very nature, involves practical issues, algorithmic thinking, and technical details, it is especially important to use innovative approaches in teaching. In this regard, case-study technology is considered one of the effective teaching tools in computer science.

**Introduction.** Case study technology (English "case study" - "case analysis") appeared at the beginning of the 20th century at the Harvard Business School in the USA. Although it was initially used in the fields of management, law and economics, it later yielded effective results in such fields as pedagogy, medicine, engineering and information technology. From a pedagogical point of view, case study is a method that teaches students to make independent

decisions and think analytically by analyzing real or hypothetical learning situations. In this technology, the student becomes not a passive listener, but an active participant, a problem solver. The basis of the case-study method is problem-based learning, an activity-oriented approach, and reflection.

**Materials and methods.** The uniqueness of computer science is that theory and practice are inseparable. Therefore, in computer science classes, students are exposed to real-life situations using case-study technology. For example, through tasks such as finding errors in a program, ensuring network security, and optimizing an algorithm, students learn to apply their knowledge in practice.

Computer science is, by its very nature, a problem-based and practical science. Therefore, the use of case study technology:

real IT problems;

programming, algorithmics, information security, artificial intelligence, and databases;

develops creative and logical thinking in students;

teamwork, role-playing, and decision-making skills.

For example:

"Identify and recover from errors in the information system when they occur"

"Ensuring the security of cloud technologies"

"Software Fault Analysis"

like this develop practical thinking in students.

Stages of case study technology in computer science

Problem selection: A real-life situation related to computer science (e.g. password security, data transfer errors).

Information gathering: Students use textbooks, the internet, and software resources.

Analysis and group discussion: Groups analyze the problem and develop solution options.

Solution Justification: They select the most appropriate solution and explain it technically and theoretically.

Presentation of the result: The groups defend their decision, and the teacher gives the final conclusion.

Advantages of case study technology in computer science

logical, algorithmic, and analytical thinking in students.

theory and practice, that is, it allows you to apply knowledge in real-life situations.

teamwork, responsibility, and leadership skills.

Prepares students to solve real-world problems in the IT industry.

Allows the teacher to organize the lesson process interactively.

Advantages and disadvantages of case study technology

Goal: To develop students' creative thinking and combine theoretical knowledge with practice in the process of teaching computer science.

Main tasks:

1. Incorporating real-world problems in computer science into the learning process;

the skill of independent analysis of problem situations;

3. Develop a culture of teamwork;

4. Develop critical thinking in decision-making;

5. Formation of information culture.

4. Stages of applying case study technology in computer science

Case selection and preparation: The teacher selects a topical issue in the field of informatics (for example, “protection against computer viruses”).

Problem presentation: The case is presented via text, video, or presentation.

Problem Analysis: Students discuss and identify the causes and effects of the problem.

Developing solution options: Groups justify their ideas and propose solutions.

Discussion and reflection: The teacher summarizes the results, and conclusions are drawn.

and disadvantages of case-study technology

Advantages:

- Develops independent thinking and problem-solving skills;

- Allows you to apply theoretical knowledge in practice;

- Forms a culture of teamwork and communication;

- Increases motivation and makes the lesson interesting.

Disadvantages:

- Requires a lot of preparation from the teacher;

It takes a lot of time to analyze;

- Student activity may not always be the same.

Types of case study technology

| Case type | Description | Scope |
|---|---|---|
| Analytical case | In-depth analysis of a given situation, | Information security, economics, management, computer science. |

| | | |
|---|---|---|
| | determining cause and effect. | |
| Training case | To develop thinking and collective decision-making skills. | Pedagogy, psychology, educational technologies. |
| Research case | Independently study the problem and propose a new solution. | Programming, artificial intelligence, scientific projects. |
| Practical case | Learning to make decisions in real situations. | Computer science, business, marketing, engineering. |
| Diagnostic case | Diagnosing the problem and choosing an effective solution. | Medical, technical maintenance, information systems security. |

**Results and discussion.** Currently, the use of modern, interactive and innovative pedagogical technologies in the educational process, along with traditional methods of teaching, is gaining relevance. Such technologies serve to form students' independent thinking, analytical approach, and practical skills. Since computer science, by its very nature, involves practical issues, algorithmic thinking, and technical details, it is especially important to use innovative approaches in teaching. In this regard, case-study technology is considered one of the effective teaching tools in computer science.

Sample lesson in computer science based on case study technology

Case study: Today, cloud computing is widely used in education, business, medicine, and even government systems.

For example, services like Google Drive, Microsoft OneDrive, and Dropbox allow users to store, share, and manage files from anywhere. However, some users are hesitant to use this technology due to security concerns, data privacy, and complete dependence on the internet.

Case Study 1: “Cloud Technologies and Their Benefits”

Problematic situation (case):

A computer science teacher sends project assignments to all students in the computer class via Google Drive.

However, some students are unable to complete assignments due to slow internet connections or inability to use cloud services.

Other students can download the files but cannot share them with the teacher.

Question:

What solution should the teacher find in this case?

properly organize cloud technologies?

Assignments for students:

What is cloud technology and what are its main types?

List the advantages of using cloud technology.

What measures do you propose to solve the problem in this case?

How can security issues of cloud technologies be addressed?

Give examples of free cloud services that are convenient for a teacher.

Solution options for groups:

**Group 1** (Technical solution):

Increase internet speed or reconfigure Wi-Fi routers.

Enable offline synchronization (Google Docs Offline, OneDrive Sync).

Creating a system for storing files on a local disk in combination with the cloud.

**Group 2** (Organizational solution):

Conducting a mini-training for students on "Working with Cloud Technologies".

Create a Google or Microsoft account for each student.

Preparation of a manual (instruction) for using the cloud system.

**Group 3** (Pedagogical solution):

Introducing practical exercises in the lessons "Collaboration in the Cloud".

Divide students into small groups and assign them tasks to edit a document together.

Encourage collaborative learning by creating projects in the cloud.

**Group 4** (Security Solution):

Update passwords regularly and enable two-step authentication.

Grant "view" or "edit" permissions only to the necessary users.

Encrypt important files or store them only on trusted platforms.

Final analysis:

Students discuss each solution and choose the most effective strategy.

The teacher summarizes their thoughts and comes to the following conclusion:

Cloud technologies are one of the most convenient systems in modern education, eliminating the boundaries of time, place, and device. However, for effective use, it is necessary to harmonize technical, pedagogical, and security aspects.

**Conclusion.** Cloud technologies develop collaboration, independent learning, and responsibility skills in students.

For teachers, this is an opportunity to save resources, simplify online supervision, and support distance learning.

Thus, the proper implementation of cloud technologies into the educational process will significantly increase the effectiveness of computer science.

Case study: Information is one of the most valuable resources in today's world.

Information is being exchanged rapidly through the Internet, email, cloud storage systems, and social media.

However, due to the carelessness, misbehavior, or irresponsibility of users, Situations such as information security breaches, personal data leaks, and cyberattacks are occurring.

Therefore, each user is responsible for their own information security. It is necessary to properly understand and comply with one's responsibilities.

Case task 2: User responsibilities in ensuring information security

Problematic situation:

A student at a school gave his computer password to a friend. A day later, another student was sent an inappropriate message through his account. The teacher is investigating the incident.

Assignments for students:

Determine which information security principles were violated in the situation.

Evaluate the behavior of the student and his friend.

be taken to prevent such situations?

What action would you take as a teacher?

Solution options for groups:

**Group 1** (Technical solution):

Implement two-factor authentication for user accounts.

automatically update passwords every 3 months.

Show "login history" in the system (last login date, IP address).

**Group 2** (Organizational solution):

Conducting "Information Security Week" events at school.

Provide training to students on user ethics.

Implement a password-based login policy in the computer classroom.

**Group 3** (Legal solution):

To provide legal understanding of the consequences of improper use of information technology.

Explaining the concept of "Cybercrime" to students with practical examples.

Develop internal school regulations for each user.

**Group 4** (Moral-pedagogical solution):

Conducting conversations to build a sense of honesty and responsibility among students. Organize a debate on the topic " Who is a trusted user?" through group discussion. Analyze student mistakes and draw positive conclusions (based on the principle of learning, not blaming).

Final analysis:

Students compare each group's solutions and choose the most effective option. The teacher summarizes their thoughts and reinforces the concept of information culture.

Expected results:

Students will understand the principles of information security in practice. Independent thinking, analysis , and problem-solving skills are developed. A vision is formed of the harmony of technical, ethical and legal approaches.

So, case study technology in teaching computer science plays an important role in directing students' knowledge, skills, and competencies into practice, and in shaping them as independent thinkers, analysts, and creative individuals. This approach ensures that computer science is taught in accordance with modern requirements.

**Conclusion.** In conclusion, almost any teacher who wants to implement case-based learning can do it very professionally, having studied the relevant literature and having practical training. However, the choice of using this teaching technique should not be an end in itself: each of the above-mentioned methods of analyzing the situation should be implemented taking into account the goals and objectives of the education, the characteristics of the student group, their interests and needs, their level of proficiency, rules and many other factors. Summing up the use of case-based learning in teaching, it should be noted that this method serves to activate and develop the cognitive and creative abilities of students in computer science lessons.

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