

RESEARCH ARTICLE

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MODELING COMPETENCIES FOR FUTURE COMPUTER SCIENCE TEACHERS

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Abstract

This article explores the improvement of modeling skills among future computer science teachers. The current methods of forming these skills are analyzed, and the need for their improvement is justified. The research methods and the results of the experiment on the introduction of a new model of modeling training are described. The article concludes with conclusions and suggestions for further improving the training of future computer science teachers in the field of modeling.

Keywords Modeling competencies, competence, model, modeling, method.

INTRODUCTION

Due to the growing importance of information technology in all aspects of modern life, specialists with advanced modeling skills are becoming more and more in demand. Computer science teachers are no exception, as they not only teach the subject, but also create models of educational processes, software and other information systems.

The necessary modeling competencies for future computer science teachers include:

- The ability to analyze and formalize subject areas
- Selection and use of appropriate modeling methods and tools
- Development and implementation of models
- Interpretation and analysis of simulation results

Traditional methods of teaching modeling to future computer science teachers often turn out to be ineffective. They usually focus on the theoretical foundations of modeling and solving standard problems. As a result, graduates are not always

ready to independently develop and apply models in practical situations.

METHODS

In order to improve the modeling competencies of future computer science teachers, an experiment was conducted with the participation of third-year students of the pedagogical University.

The students of the experimental group were trained according to a new model, which included:

The use of interactive teaching methods (projects, business games, problem-based learning);

Combining knowledge from various disciplines (computer science, pedagogy, psychology);

A practical approach to learning (creating and applying models in real projects).

The students of the control group studied according to the standard model.

Methods of improving the modeling competencies of future computer science teachers:

1. Involving students in active learning

Project activity: Students participate in complex modeling projects, applying knowledge from different fields.

Simulation Games: Students participate in simulations simulating real-world situations related to simulation.

Problem-oriented learning: Students solve problems that require critical thinking and the use of knowledge about modeling.

2. Interdisciplinary integration

Computer Science: Fundamentals of modeling, modeling languages, methods and algorithms.

Pedagogy: Theories of learning, methods of teaching modeling.

Psychology: Cognitive processes related to modeling.

3. Practical training

Model Development: Students create models to solve real-world problems using modeling tools and technologies.

Model implementation: Students implement the developed models in projects, evaluate their effectiveness and analyze the results.

RESULTS

The experiment showed that the innovative approach to the development of modeling skills turned out to be excellent in comparison with the traditional one. The participants of the experimental group demonstrated improved performance in the following areas:

- Analysis and formalization of subject areas
- Selection and application of suitable modeling methods

- Creation and implementation of models

- Interpretation and analysis of simulation results

It is noteworthy that the students in the experimental group showed increased motivation and interest in studying modeling.

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Advanced modeling skills

The new learning model has significantly improved students' skills in the following areas:

- Domain analysis and formalization: Students gained a deeper understanding of the topics being studied, including their boundaries and key characteristics.

- Selection and application of modeling methods: Students learned how to choose and use appropriate methods and tools to solve various tasks, demonstrating an understanding of the advantages and limitations of each approach.

- Model development and implementation: Students created accurate and effective models that accurately reflected the behavior of the studied systems using modeling tools and technologies.

- Interpretation and analysis of simulation results: Students successfully interpreted the simulation results, drawing valuable conclusions and making informed recommendations.

Increased motivation and interest

In addition to improving skills, the new model also increased students' motivation and interest in modeling:

- Involvement in learning: Students actively participated in discussions and practical exercises, demonstrating a high degree of involvement in the learning process.

- Understanding concepts: Students have gained a deeper understanding of the basic principles and concepts of modeling.

- Application enthusiasm: Students showed enthusiasm in applying modeling skills to solve real-world problems.

DISCUSSION

The study revealed the need to update the approach to the formation of modeling skills for future computer science teachers. The developed and tested new model proved to be effective and is recommended for implementation in the educational process.

Using active learning methods:

The use of active learning methods, including problem solving, design and role-playing games,

allowed students not only to master the theoretical foundations of modeling, but also to acquire practical skills. These methods involved students in learning, developed their critical thinking and creativity.

Integration of knowledge:

Combining knowledge from various fields such as computer science, mathematics and pedagogy helped students form a holistic view of the modeling process. The interdisciplinary approach allowed them to see the connections between different aspects of modeling and apply their knowledge in difficult situations.

Practical training for future computer science teachers

Students-future computer science teachers have gained practical experience through working on real projects and participating in workshops. They brought their knowledge to life by creating and testing models, which developed their professional skills and prepared them for their future careers.

Introduction of a new training model

The new learning model, focused on the formation of modeling skills, proved to be very effective. The students demonstrated an improved understanding of the modeling process, a more confident application of practical skills and an increased willingness to use modeling in their future work.

An effective tool for training specialists

The learning model, combining active methods, knowledge integration and a practical approach, has proven its effectiveness in developing modeling competencies for future computer science teachers. Its implementation in the educational process will improve the quality of training of specialists and ensure their readiness for modern requirements.

CONCLUSIONS

1. Rethinking approaches to the development of modeling competencies for future computer science teachers:

Traditional teaching methods are often ineffective for developing modeling skills.

It is necessary to review existing approaches and create innovative learning models.

2. The effectiveness of a new model based on active learning, an interdisciplinary approach and practical experience:

The study presented a new learning model that has proven effective in developing modeling competencies for future computer science teachers.

Active learning methods such as projects, games, and modeling stimulated active student participation.

An interdisciplinary approach combining mathematics, physics and computer science has deepened students' understanding of modeling.

The practical experience gained while working on real projects allowed students to apply their knowledge in practical situations.

3. Recommendations for integrating the new model into the educational program:

To introduce a new learning model into university curricula to improve the effectiveness of training future computer science teachers.

To train teachers in the use of active teaching methods and practice-oriented approaches.

4. Directions for future research:

Assessment of the long-term effectiveness of the new model.

Development of new methods for assessing competencies in the field of modeling.

The study of the impact of the new model on the

professional activities of future computer science teachers.

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