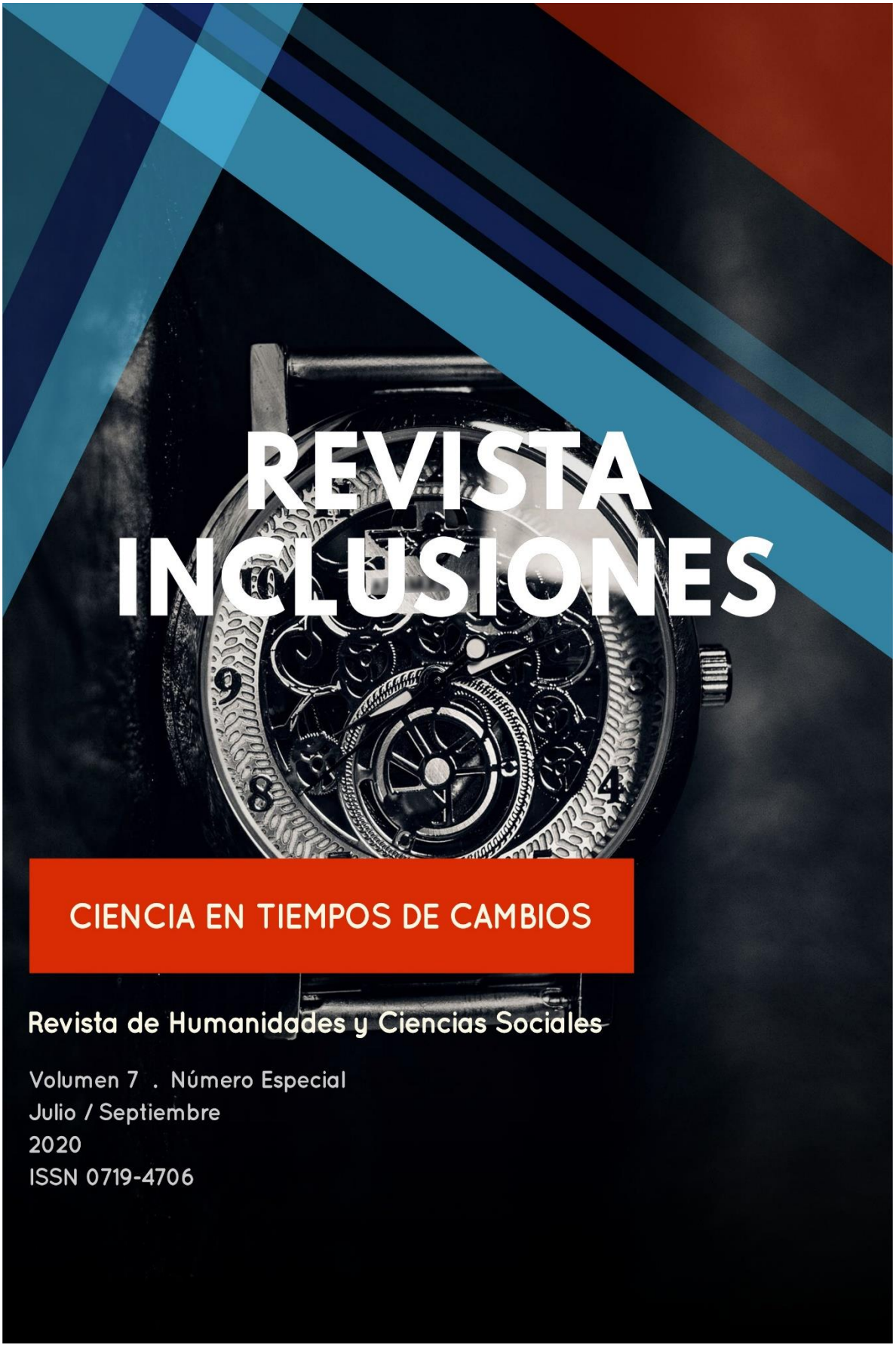

REVISTA INCLUSIONES

CIENCIA EN TIEMPOS DE CAMBIOS

Revista de Humanidades y Ciencias Sociales

Volumen 7 . Número Especial
Julio / Septiembre
2020
ISSN 0719-4706

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CUADERNOS DE SOFÍA EDITORIAL

ISSN 0719-4706 - Volumen 7 / Número Especial / Julio – Septiembre 2020 pp. 509-514

THE APPLICATION OF INTERACTIVE TECHNOLOGIES FOR TEACHING MATHEMATICAL MODELING TO STUDENTS

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Fecha de Recepción: 13 de abril de 2020 – **Fecha Revisión**: 09 de mayo de 2020

Fecha de Aceptación: 28 de junio de 2020 – **Fecha de Publicación**: 01 de julio de 2020

Abstract

The relevance of the research issue is due to the organization of the educational process based on the contemporary techniques for teaching, in particular, interactive technologies. The concept of “interactive education technologies” has assumed particular significance. It is more than just a process of interaction between a teacher and a student; it is a new stage of the educational process. In the current system of teaching mathematics to students of non-mathematical specialties, in particular future teachers of chemistry, there are a number of negative trends, among which the formalization of mathematical knowledge should be observed. The article aims at considering the use of interactive technologies in teaching mathematical modeling in educational institutions. The leading approach to the study of this issue is the main function of interactive learning capable of revealing the effective use of interactive technologies in the educational process. The key findings of the study is the solution to the problem of information and communication technologies in teaching mathematical modeling, through which students can demonstrate the improved results of their activities in the educational process of the university. The main results are indicators of interactive forms –a group work, including the work in small groups.

Keywords

Information and communication technologies - Didactic conditions - Educational activity

Para Citar este Artículo:

Sokolov, Viktor A.; Kostylev, Denis S.; Smirnova, Zhanna V.; Makeeva, Anastasiya V. y Peteraitis, Sergey Kh. The application of interactive technologies for teaching mathematical modeling to students. Revista Inclusiones Vol: 7 num Especial (2020): 509-514.

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Introduction

Mathematics is studied at universities in the first year. That period involves the development of basic learning competencies, and the students' education achievementsat the undergraduate level will depend on the way the learning process is organized and how quickly and effectively students adapt to the training during the first semester. It is noteworthy that the majority of school graduates, coming to universities, do not have sufficient fundamental competencies in mathematics. The inability of the students to operate with a large amount of information and to highlight the main thingis evident, as well as their inability to form and use the skills of independent work. In such conditions, the quality of mathematical education can be improved through the use of new forms and methods of training.

Many methodological innovations in higher education are associated with the implementation of interactive learning. The term "interactive learning" is most frequently mentioned in relation to information technology, distance education, the use of Internet resources, as well as electronic textbooks and guides. Modern computer telecommunications allow participants to have a "live" (interactive) dialogue (written or oral) with a real partner, and also make it possible to"exchange messages between the user and the information system in real time"[1].

Theoretical basis of the study. The issue under consideration was addressed by such scientists as S. Arkhangelsky, I. Ogorodnikov, M. Skatkin, B. Iogansen, E. Perovsky, S. Runovsky, N. Sorokin, N. Konstantinov.

Materials and Methods

The modern requirements for pedagogical assessment were influenced by globalization, standardization, informatization and development of information and communication technologies as the main trends in the development of vocational education. The result of training is formed competence, which is defined by the Federal State Educational Standard (FSES) and the state of preparation of the graduate to perform professional activities, established by the Professional standard, its independence in decision-making.

All technologies of interactive learning on the basis the context of professional activity are divided into non-simulation and simulation[2]. Non-simulation technologies (problem lecture, work in pairs and small groups, etc.) do not involve the modeling of the phenomena being investigated or an activity. Simulation technologies (analysis of specific professional situations, game design, etc.) are based on the simulation modeling, i.e. the reproduction of real system processes in the educational environment.

It is worth noting that the content of mathematical education should meet the principle of clarity, a systematic reliance not only on specific visual objects and their images, but also

[1] O. Vaganova; T. Medvedeva; E. Kirdyanova, and G. Kazantseva, "Technology of selection of evaluation procedures", Bulletin of Tver State University. Series: Pedagogy and psychology, num 3 (2011): 101-104.

[2] E. Aleshugina, "On the improvement of the content of language training on the basis of the opinions of graduates", Bulletin of the Kostroma State University, Vol: 13 num 4 (2007): 11-14.

on educational models (as a kind of illustration). The use of various forms of visual representations creates an opportunity to discuss them, enhances the interactive nature of education.

Results

One of the essential means of visualization is the computerization of education, which enables us to organize an interactive learning, to intensify the educational process using visualization tools. In particular, the use of multimedia equipment in the presentation of the lecture material under sections “Plane analytical geometry”, “Analytical geometry of space” allows the student to study the models of lines and surfaces of the second-order visually. The use of mathematical package Mathcad for the creation of lecture courses allows mathematics teachers to prepare substantive dynamic illustrations, to turn to the conceptual aspects of the issues. Lecture demonstrations are prepared in such a way that students receive as many examples as they need to understand the subject matter; lecture courses with varying degrees of volume, shape and depth can be created for the same section.

In case of the problem presentation of the lecture material, there is a situation, where the teacher encourages looking for ways to resolve differences between knowledge and the inability to apply it in practice, a cognitive practical search appears.

For example, under the topic “Power series” students considers the concept of power series, the interval of convergence for the power series, the decomposition of some elementary functions of the power series and the students’ task is to approximate the functions value.

It is possible to formulate a more comprehensive objective: it is required to calculate the function value with a given accuracy, the drawings illustrating the challenges are offered to students.

Students find themselves in a state of difficulty, as there is a contradiction between the existing knowledge, giving an opportunity to represent elementary functions in the form of power series, and new requirements for solving the problem, namely, the approximate calculation of this function value without using a calculator.

In resolving a problem situation, the teacher asks questions:

1. What expansion of elementary functions can be used?
2. Does this task have a solution?
3. Is it possible to calculate the approximate function value?
4. What are the cases when it is possible to approximate the function value?

After answering the proposed questions, the teacher summarizes.

The most common interactive forms of learning comprise group work, including the activity in small groups. The development and educational effect of working in small groups is based on the advantages of this method[3]:

- intense activity of all participants of the educational process, due to the presence of common goals and motivations, taking responsibility for the overall result, etc.;
- comfort. Working in a small group, participants are more confident,psychological barriers to learning disappear; everyone's opinions are considered and appreciated by the group;
- development of personal qualities, self-esteem. Everyone has the opportunity to learn both the leading role and the role of an ordinary participant in the situation of collective decisions, to build constructive communication;
- detailed study of the material by the participants through the repetition and application of the acquired knowledge, consideration of the issue from various perspectives.

During the course of practical training"Testing statistical hypotheses" the work of students in groups is organized. Each group is given statistical data that must be grouped, to create a relative frequency histogram, to propose a hypothesis on the law of distribution of the studied feature and to test the hypothesis at a given level of significance.

When assessing the individual and group work of students, the correctness of the task and the presentation of the result, the number of individual and group mistakes, the duration of task completion, as well as the activities of students in the group during the class (correctness, independence, culture of communication, the ability to listen, etc.) are taken into account. The use of group work in practical classes creates the conditions for the manifestation of the student's initiative and focuses on the applied aspects of the material.

Interactive learning is undoubtedly a fascinating, creative and promising area of pedagogy. It changes the requirements for the teacher's work both at the stage of preparation for the class and during the class itself. Despite all the difficulties, interactive learning is gradually gaining more and more supporters in the practice of vocational education, as it makes the learning process more motivated, productive, personal, and therefore more qualitative.

ICT as an educational and management tool can be used comprehensively only for creating an information and educational environment of the university, which fully meets the information requests related to the subjects of educational institutions and the application of appropriate learning models. Thanks to ICT, students can demonstrate the improved results of their activities in the educational process of the university.

Conclusion

Many opportunities are being developed with the help of ICT. It is possible to trace the formation of competencies students' preparedness to perform professional activities on the basis of control; modern requirements for evaluation procedures are implemented. Data on the formation of students' competencies are open and accessible. Their preparedness for professional activity is available to all concerned individuals.

[3] O. Vaganova; T. Medvedeva; E. Kirdyanova, and G. Kazantseva, "Technology of selection of evaluation procedures", Bulletin of Tver State University. Series: Pedagogy and psychology, num 3 (2011): 101-104.

The results of the evaluation acquire new understanding and information content. ICT can contribute:

- display the results of studying a particular discipline or module, the level of development of a particular competence and willingness to perform professional activities, labor actions;
- demonstration of the place of this result (discipline or module) in the structure of the professional education program;
- detail of the assessment results to the module and discipline, sometimes the topics and classes.

In addition, the use of ICT in the assessment of learning outcomes provides additional benefits in the implementation of such functions as motivational, formative and managerial, and this, in turn, increases the effectiveness and efficiency of training.

The development of information and communication means in educational institutions should be supported and stimulated by the state.

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