

FORMATION OF RESEARCH COMPETENCE OF STUDENTS ON THE BASIS OF INFORMATION TECHNOLOGIES

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Annotation

In modern society, the skills of working with information technology are becoming one of the most important factors in training future specialists in any field of activity. The use of a competence-based approach in the educational process contributes to the achievement of the main goal of higher education. One of the main goals of using information technologies in education is determined by the fact that they are most effectively implemented such didactic principles as science, accessibility, visibility, consciousness and activity of students. Information technologies open up wide opportunities for activating the formation of students' research competence. The article deals with the place and effectiveness of using information technology for the formation of research competence of students.

Keyword: information technologies, research competence of students, formation of research competence of students, the place, forms and stages of using information technologies for the formation of research competence of students.

Introduction

Modernization of the University's education system in the light of improving the quality of training of highly qualified specialists: qualified, able to effectively perform work in the specialty, striving for constant professional growth, mobile, able to work in a team and independently make responsible decisions is associated with the introduction of information technologies in the educational and research work of students.

In modern conditions of rapid development of science and technology, rapid accumulation and updating of information, it is important to awaken a person's interest in the accumulation of knowledge, teach them to learn, develop initiative, creativity and independence of students. The basis of this work is the formation of research competence of students based on information technology.

Research competence of students is an integral quality of personality, which is expressed in the readiness and ability to independently solve research and creative tasks, possession of research technology, recognition of the value of research skills and readiness to use them in professional activities.

Currently, the University is tasked with forming a graduate not only a system of professional knowledge and skills within the clearly defined boundaries of requirements for future specialists, but also professional competence that allows him to solve actual practical problems in the broad context of professional situations.

Information technologies occupy a special place in the educational process, the development of its educational system and culture. A modern specialist should be prepared to independently, quickly and economically find and use new scientific data, organize new research, use modern sources of information, as well as see, understand, theoretically justify and practically solve professional problems.

At the same time, the needs of society for specialists with a qualitatively new level of training will constantly increase. It is necessary to prepare a creative, dynamic specialist who can independently master new computer technologies and solve professional problems using scientific research methods. In this regard, the importance of research activities in the professional training of specialists who are able to think critically, independently identify and effectively solve problems, and act in unexpected professional situations increases.

Research competencies should be considered as a special type of intellectual and creative activity generated as a result of the functioning of search activity mechanisms and based on research behavior.

Research competence fulfills a person's needs for activity, for fresh impressions, for getting new information and serves as the basis for learning the world, other people, and self-knowledge necessary for personal development.

Research competence helps to expand the range of knowledge, activate cognitive interest, develop the ability to independently find and analyze information, plan their activities, monitor and evaluate their actions, form their own judgments.

The organization of the educational process, during which the student would develop the ability to explore emerging problems of various types, is an important pedagogical task. These skills in higher education are formed in the course of educational and research work of students. When performing educational research, students learn to independently conduct experiments of a particular nature, apply their knowledge to solving specific scientific problems. Since research work is a very important and integral part of the educational process, the presence of research skills in the future specialist is a prerequisite for his high professionalism. In this regard, the problem of forming research competence of University students becomes urgent. E. F. Zeer, I. A. Zimnaya, A.V. Khutorskoy, I. A. Yanyuk, V. G. Sotnik, O. V. Fedina, N. Saidakhmadov, A. A. Abdukadirov, N. I. Taylokov, F. Zakirova and others

devoted their works to this problem.

Method of Research

The solution of this task at the present stage should be accompanied by taking into account the achievements of information technologies. A more complete implementation of various possibilities of using personal computers will significantly increase the effectiveness of the formation of research competence of students.

Modern information technologies serve as a means of developing such qualities of a student as:

- ✓ system-scientific;
- ✓ structurally-shaped;
- ✓ algorithmic thinking;
- ✓ contributing to the variability of thought processes;
- ✓ development of imagination and intuition;
- ✓ formation of information and communication and research skills.

All types and forms of educational and scientific work at the University should be aimed at forming these qualities of activity. Therefore, the method of teaching at the University assumes such an organization to teach students the ability to independently acquire and Supplement knowledge, to think in an original way and make independent decisions with the consulting and guiding role of the teacher [5].

The new qualification model of the future specialist assumes such requirements for the graduate as:

- possession of skills of independent acquisition of knowledge and qualification;
- ability to translate the knowledge gained into innovative technologies and specific solutions;
- Readiness for social and professional mobility.

These requirements determine the increasing role of research work of students in the organization of the educational process of training specialists.

In this regard, the scientific creativity of students is becoming increasingly important and is becoming one of the necessary components of professional training of future specialists. From the first years of study, students should be involved in research work. And for this purpose, special scientific training for a research teacher is necessary and important. This provision determines the need for creative search for new, more effective ways to organize the educational process in higher education, which should be designed for the full development of independence in research work of students, their active involvement in the educational process as full subjects.

Let's consider the stages of formation of students ' research competence using information technology.

At the first stage, a future University graduate should realize the importance and necessity of using computers and information technologies in modern society.

In the first classes, the main task of the teacher is to form a future specialist's motivation to use computer technologies in their studies and in their later life, in their professional activities.

At this stage, the teacher uses an introductory questionnaire or diagnostic testing to identify the degree of knowledge of specific information technologies, the correctness of the use of the conceptual and categorical apparatus, etc.

Entrance testing allows the teacher to make adjustments to the organization of the research process, taking into account the capabilities of students, their preferences and interests, to plan individual independent work of students aimed at eliminating gaps in the school course [3].

The next stage is content and activity. At this stage, students must perform laboratory work aimed at acquiring practical skills in working with applications to solve educational and practice-oriented tasks in their future professional activities. The main goal of this stage is to create automatism when working with a computer: the ability to design text documents, perform calculations using formulas and functions in spreadsheets, know the basics of programming in a high-level language, work with graphical data, create presentations, search for information on the Internet, etc.

The use of Internet resources allows us to teach students to work with huge and often contradictory amounts of information, to be able to quickly search for information, analyze the information obtained and use it in educational and professional activities [1]. Of great importance is the use of information technology in laboratory work of practical tasks focused on professional activities. Students should learn to effectively use their knowledge of information technology to solve educational and professional tasks. Students at this stage are controlled by the teacher by conducting intermediate control works, if necessary, it is possible to adjust the number and level of complexity of tasks in laboratory work.

In this time of an emerging new style and way of life creates the conditions for activity. Research culture is a means of scientific and educational activity. The transformation of a student into a subject of the educational process, able to independently assimilate, evaluate and use the results of research activities in the process of professional training indicates the development of his personality, his conscious interest in education.

Research skills are General academic, because they have the property of broad transfer and can be effectively used in the study of all disciplines in higher education and in future professional activities, the basis of their formation is research activity.

Research activity of students is one of the forms of individual work of students, the most important part of the process of training future specialists and contributes to:

- independent learning of knowledge, the formation of professional skills, provides the

formation of professional competence of the future specialist;

- develops cognitive and creative abilities of the individual;
- About the research work.

Research skills can be formed during the work of University students on a diploma project, and the components of these skills [4]:

- ability to define and formulate research goals;
- ability to diagnose and analyze the theoretical state of the research problem;
- ability to plan the experimental part of the research;
- the ability to process the results of the experiment;
- The ability to generalize and evaluate the results of the experiment.

In the course of research work, the student must learn to think, analyze tasks, take into account conditions, set tasks, solve emerging problems, i.e. the process must gradually turn into a creative one.

When performing research work, the student must pass the following stages:

- definition of research work;
- to the task;
- self-assessment of readiness for research work to solve the set or selected task;
- choice of ways and means to solve the problem;
- planning research work on the solution of the problem;
- implementation of the research program;
- Implementation of management acts in the course of research: monitoring the progress of research, self-monitoring of intermediate and final results of work, adjustments based on the results of self-monitoring of work programs, elimination of errors and their causes.

Results

The levels of formation of research competencies of mathematics students were determined based on the results of questionnaires, observations, and analysis of students' work when performing research tasks. The principle of the only difference was taken as the basis for conducting the formative stage of the experiment, that is, most of the initial conditions were equalized, namely:

- 1) Senior students took part in the training;
- 2) The number of students enrolled in the control and experimental groups was approximately the same (24 in the experimental group and 26 in the control group);
- 3) Identical level of training, as evidenced by the comparability of the results of the entrance control of students in control and experimental groups. In particular, more than 83% of all students experienced difficulties on most issues related to research competencies. The only difference was that the experimental groups used computer technology to organize classes,

the classes were conducted according to the methodology developed by us, and the control groups were engaged in traditional methods.

During the formative experiment, research was conducted on the basis of information technology, the computer workshop was implemented in the educational process, and students performed experimental tasks of this workshop. At this stage, the results of experimental and traditional teaching methods were compared in terms of their impact on the formation and development of IC.

The method of the forming stage of the experiment involved students performing laboratory work of a research nature in computer classes. Students were offered research tasks of various levels of complexity, which required the study of a variety of methodological literature and creative use of the information obtained to achieve the goal.

At each stage of the experimental work, the level of formation of research competence of students was monitored, which was evaluated in accordance with the structure of research competence developed by us in relation to conducting educational research using information technology.

To assess the degree of formation of research competence, we have identified three levels: low, medium, and high. The main criterion for determining the level was the percentage of independent work of students in conducting research.

To determine the reliability of the assessment of the results of the formation of research competencies of students, we used the χ^2 criterion, which allows us to compare not the absolute average values of certain values before and after the experiment, but the percentage distribution of data. The following hypotheses were formulated:

K_0 : there are no significant differences in the distribution of students in the control and experimental groups according to the levels of formation of research competence.

K_1 : there are significant differences in the distribution of students in the control and experimental groups according to the levels of formation of research competence components.

Using methods of mathematical statistics, it is proved that the implementation of the methodological system ensures the formation of future mathematics teachers' research competence components. At the end of the experiment, using the Pearson criterion χ^2 , the effectiveness of the proposed method was determined. Based on the results obtained $\chi^2_{\text{эксн}} > \chi^2_{\text{крит}}$ ($6 < \chi^2_{\text{эксн}} < 7,22$, $\chi^2_{\text{крит}} = 5,99$ at a significance level of 0.05), the alternative hypothesis K_1 is accepted, respectively.

Discussion

The results of the pedagogical experiment testify to the effectiveness of the methodological system developed by us for forming the research competence of a future mathematics teacher when conducting research using information technology and confirm the hypothesis of the study.

Research work refers to information and development methods of training aimed at the primary acquisition of knowledge and includes research work carried out under the guidance of a teacher. Therefore, at present, to improve the effectiveness of research competence of University students, modern means of information technology are used, which have a full set of properties that are characteristic of an effective organization of research work. The use of information technology for the formation of research competence is quite justified and implemented on the basis of modern computer technologies, and provides the opportunity to:

- organize students' research activities during the educational process;
- Make students' research activities more effective by involving all types of sensory perception of the student and arming the intellect with new knowledge.

Various means of information technology are used for effective formation of students' research competence [12]:

- e-learning complexes on the subjects studied and methodological recommendations for them;
- a variety of electronic educational and reference literature;
- Microsoft Office programs (Word, Excel, Power Point, Access, etc.);
- Electronic information resources containing educational and reference materials that students can also use: electronic tests, interactive models, various illustrations, ready-made developments, simulators and other educational and methodological materials.

Currently, electronic information resources on the Internet offer wide opportunities for the formation of research competence of students at the University, which can be called: e-mail for the exchange of information between students, teachers and educational institutions; mailing lists - for sending General information about research work and organizing their discussions; data on research grants, scholarships, competitions; the use of WWW technologies, which can currently serve as basic technologies; access to the world's information resources via the Internet, which all known types of electronic publications can serve as the basis for research work; sites of universities, scientific and educational organizations that facilitate the establishment of contacts between universities, the exchange of experience and information, scientific student conferences and seminars.

Conclusion

A set of research methods is an important element of the process of mastering information technologies, using a computer to solve educational tasks. Since the actual implementation of the task with the help of information technology includes the promotion of a hypothesis, conducting a computer experiment, identifying patterns, analyzing the result, searching for and correcting errors. This is where you can apply the main research methods-analysis, synthesis, deduction, induction, comparison, etc. In the process of interactive interaction with the software environment, the student analyzes the capabilities and functional features of in-

formation technologies, compares input and output information, works out ways to solve the tasks facing him, and is involved in genuine engineering or scientific activities.

In conclusion, we note that in complex conditions of transition to a new paradigm in the system of teacher training, the use of modern information technologies on the formation of the research competence allow us to develop the intellectual, creative abilities of students, their ability to independently acquire new knowledge, work with different sources of information, and enriches approaches to the learning of students with modern methods of obtaining information, enriching their practical experience as well as that of the above aspects, aimed at restructuring the educational process at the University will be able to solve many didactic problems associated with the professional training of a future specialist and the formation of his research competence even in the conditions of information and communication technologies.

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