METHODOLOGY OF TEACHING INFORMATICS IN PEDAGOGICAL UNIVERSITY

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Abstract
What is informatics? What are its main contributions, and which results of informatics are fundamental knowledge about the functioning of our world? Why should computer science be part of the school curriculum and which topics should be introduced? How does teaching informatics contribute to the pupils' way of thinking? In this article, we search for possible answers to these questions.

Keywords: Informatics, teaching of informatics, higher education, results, Computer, peoples, studedents.

Computer science and informatics are the most common terms used to name the science, whose fundamentals and contributions we will discuss here. Everybody studying or practicing this scientific discipline should every now and then think about how one would define computer science, and contemplate its contributions to science, education and daily life. It is important to realize that learning more and more about a scientific discipline and going deeper and deeper into the understanding of its nature always results in the development of our opinion on the role of this particular science in the context of all sciences. Hence, it is especially important for teachers and students to consistently review their perception of computer science. We have one more reason to think about contributions of informatics to science. We are required to convince society that there are good reasons to teach computer science in schools. And we cannot do this without first understanding its fundamentals in the context of all scientific disciplines. Informatics has a very serious, special problem. Too many people relate computer science to the ability to "drive" a computer: to surf the internet and to use different software like Microsoft Word for text editing. Despite the fact that softwares change from year to year, and hence the ability to use them does not provide any essential value for the general education, several western countries exchanged computer science for Information and Communication Technology (ICT) in schools. In this way we, as computer scientists, are also responsible for this big misunderstanding, and especially those of us who argue that the main reason for teaching computer science is the availability of ICT in almost all families. Many families also own cars, but yet we do not attempt to teaching the skill of driving a car in schools. The main problem is in viewing computer science through its applications. If that is to be the case, how would physics then be defined? The development and construction of all kinds of technical equipments including computers is based on the physical laws. In this extreme view, almost everybody is a physicist because most are certainly knowledgeable in the operation of products

built upon the knowledge of physics, such as TV, cars, mobile phones, etc. Am I going too far? Has the use of computers become an exception because of its complexity?
The answer is clear. We cannot define a science and judge its contributions by its commercial products. We cannot even do so by listing its main research results, because a science is not a sum of its achievements and discoveries. Scientific disciplines spawn new ones at the very fundamental level, where the notions are created and new goals are formulated. To understand our own discipline and its fundamental contributions to science, knowledge and general education, we must go to this level. A more detailed discussion on this topic is presented in [3,4]. We will not hesitate to provoke a conflict between your current opinion of computer science and the viewpoints presented here so as to initiate a discussion that could lead to the development of your understanding of informatics. Let us first attempt to answer the question "What is computer science?"
It is difficult to provide an exact and complete definition of a scientific discipline. A commonly accepted definition is:
Computer science is the science of algorithmic processing, representation, storage and transmission of information.
This definition presents information and algorithm as the main objects investigated in computer science. However, it neglects to properly reveal the nature and methodology of computer science. Another question regarding the substance of computer science is
"To which scientific discipline does computer science belong? Is it a meta science such as mathematics and philosophy, a natural science or an engineering discipline?"
An answer to this question serves not only to clarify the objects of the investigation, it also must be determined by the methodology and contributions of computer science. The answer is that computer science cannot be uniquely assigned to any of these disciplines. Computer science includes aspects of mathematics, and natural sciences as well as of engineering. We will briefly explain why.
Similar to philosophy and mathematics, computer science investigates general categories such as determinism, nondeterminism, randomness, information, truth, untruth, complexity, language, proof, knowledge, communication, approximation, algorithm, simulation, etc.
The active use of modern information technologies, both in the professional sphere and in society as a whole, presupposes the presence of deep knowledge and practical skills in this area among graduates of higher education. In this regard, the role of training young specialists in the field of computer science and information technology is increasing [1, 2]. This training should not be limited to teaching the basic skills of working in the software packages most used in the professional environment of a future specialist, but also to the formation of an information culture in the student as a whole.
The goal of the educational environment of higher education is to create conditions for the assimilation of the required educational material by every student who is willing and able to learn. In accordance with this, self-education and self-control, as well as the development of such technological teaching aids that help such an organization of the educational process, have become a priority. This approach is characterized by the transition from an orientation towards the average student to differentiated and individualized training programs
Problems in Teaching Computer Science in Higher Education

The first problem faced by a computer science teacher is a huge spread in the initial knowledge in this discipline received at school. There are many reasons for this - this is the shortage of informatics teachers in individual schools, and the transfer of informatics hours to teachers of those subjects for which the Unified State Exam is massively passed and other reasons. One of the solutions to this problem in higher education can be the approach of personalityoriented pedagogy.
Another problem, not only in teaching computer science, but also in any other discipline, is the different level of learning of the students themselves. Moreover, some students lack the very desire to learn. In the modern realities of higher education, the teacher is placed in tough conditions for the preservation of the contingent of students, no matter how weak he is. How can both requirements be met simultaneously: to ensure the quality of training while maintaining the contingent? And here the solution can be the approach of student-centered pedagogy.
The success of teaching is ultimately determined by the attitude of students to learning, their desire for knowledge, the ability to consciously and independently acquire knowledge, skills, and activity. A student is not only an object of educational influences, he is a subject of specially organized cognition, a subject of the pedagogical process.
It is necessary to comprehensively implement all components of the content of education and to focus the educational process on the comprehensive creative self-development of the student's personality.
Methods of teaching informatics in higher education
To implement the system of individualized learning into the educational process [3], it is required:
- individualization and differentiation of students based on available indicators;
- development of training materials based on a modular principle;
- organization of students' independent work;

To maintain interest in the subject, both for well-prepared and insufficiently prepared students, we individualize the educational process. The theoretical course is read to all students in full. We will introduce the following changes into the laboratory work plan: for insufficiently prepared students, it is enough to complete a certain number of laboratory work, ensuring the mastery of the minimum skills and abilities required for this discipline. Thus, they carry out the number of works for the assessment "satisfactory". If these students wish and their active work, by increasing the number of independent work, they can perform a more advanced level of work, thereby filling the gaps in knowledge acquired at school. For students wishing to have a "good" and "excellent" grade in the discipline, the number of works increases and the material presented in them becomes more complicated.
The student determines the level of knowledge, abilities and skills that he wants to get in the discipline, be sure to close the minimum level that is required in this subject. Thus, the student himself participates in the differentiation of his grade in the discipline.
Students perform laboratory work at home using specially developed educational materials [10], containing a detailed explanation of the order of work and the requirements for the

protection of each work. The student's questions and difficulties are considered with the teacher in laboratory classes.
Each work, in addition to practical work, also includes a small theoretical block of questions on the discipline. The practical part of the work and the theoretical part are defended separately. Thus, a student has two credits for each job.
The breakdown of large theoretical material on the discipline into small fragments and the defense of these theoretical issues in laboratory work during the semester allows you to strengthen and systematize the theoretical knowledge of the student. This is especially true in connection with the peculiarities associated with the clip thinking of modern youth. The most important questions on the discipline can be repeated in the section of theoretical material of different laboratory works.
Thus, the work with each student is individualized and interest in learning new techniques and skills in the discipline is not lost among all students.
This technique allows students to get an early assessment in the discipline, subject to all the requirements related to the protection of the practical and theoretical parts of laboratory work and the time of their defense. Thus, the student receives an additional incentive to submit all work on time.
Self-education and self-control on the part of the student and on the part of the teacher, the development of such technological teaching aids that help such an organization of the educational process, acquire a priority importance in such a system of the educational process.
Conclusion
The introduction of non-traditional pedagogical technologies has significantly changed the educational and developmental process, which made it possible to solve many problems of developmental, student-centered learning, differentiation, humanization, and the formation of an individual educational perspective of students.
All technologies are characterized by certain common features: awareness of the activities of the teacher and students, efficiency, mobility, integrity, openness; independent activity of students in the educational process is 60 - 90% of the study time; individualization.
This technique can be used in the study of any discipline in the presence of the appropriate educational and methodological material.
The introduction of the considered system into the educational process provides the practical possibility of individualizing the educational process, correcting gaps in the structure of individual knowledge, and contributes to improving the quality of knowledge of both well-trained and insufficiently trained students.

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