

Problems of Teaching Computer Science and Information Technology in Universities

Yanglish E. Dzhumboeva, Senior Lecturer, Department of Exact and Natural Methodology, Syrdarya Regional Center for Retraining and Advanced Training of Public Education, Uzbekistan. E-mail: yanglish@list.ru

Mukhammad B. Niyozov, Lecturer, Department of Information Technology, Gulistan State University, Uzbekistan. E-mail: niyozov_info@bk.ru

Bokhodir J. Saidboev, Lecturer, Department of Information and Communication Technologies, Military Technical Institute of the National Guard of the Republic of Uzbekistan, Uzbekistan. E-mail: btfrg@mail.ru

Makhmudjan A. Kamilov, Senior Lecturer, Department of Information and Communication Technologies, Military Technical Institute of the National Guard of the Republic of Uzbekistan, Uzbekistan. E-mail: spy_1771@mail.ru

Abstract--- The article analyzes the problems of teaching information technology that impede the formation of graduates of a high level of information competence. The causes of problem situations in teaching the subject are investigated: the low level of training of applicants in computer science and the weak motivation of freshmen to study it; organizational and substantive errors of school and university education. The authors propose approaches of a general nature to the solution of the problems considered: redistribution of the curriculum into stages; harmonization of requirements for school and university curricula; increasing the prestige of getting an education and introducing an entrance test for applicants; the introduction of modern hardware and software technologies and new forms of training into the learning process; reforming the system of advanced training of teachers. The implementation of the proposed set of measures will lead, according to the authors, to increase the prestige of the teaching profession in society and the quality of teaching, thereby improving the degree of preparation of graduates.

Keywords--- Computer Science, Information Technology, Teaching, Competence, Information Training, Internet.

I. Introduction

The rapid development of information and communication technologies in Uzbekistan is due to state support, which allows you to confidently enter the world information community [1].

One of the main components of the quality training of modern qualified personnel is the high level of teaching disciplines in universities. The training of highly qualified specialists in the conditions of innovative development of the country and the processes of import substitution is an important problem, since they are acutely felt in a number of industries [2]. Solving complex production problems will require university graduates not only to apply the acquired knowledge, skills and proven skills [3]; but also "the desire to learn throughout life." The continuous development and active introduction of new technologies saturates the daily life of a person with new technical devices - hardware and software and modifies the areas of his life. The development of scientific and technological progress and global informatization of society contribute to the formation of a modern world of information worldview and information culture. "The ability to manage information resources is necessary in our time to any specialist and leader."

Departments of education quality control were created in all universities of the country. In order for the system for assessing the performance of teachers of the department to stimulate teachers on the quality of classes.

One of the reasons for the discrepancy between the degree of practical training of university graduates and the demands of modern production is considered to be an insufficient level of teaching disciplines. At present, there are no objective criteria for assessing the quality of teaching disciplines in educational institutions. Over thirty years of experience in teaching information technology (IT) in educational institutions have been accumulated. Theoretical and practical results of research in the field of theory and methods of teaching computer science are described in numerous works, however, the modern problems of teaching IT in universities have not been investigated, which will be the aim of the study.

II. Materials and Methods

It should be borne in mind that the duty of the teacher is not only to teach, but also to teach, and that the latter is always possible in relation to computer science. The study of hardware and software does not require great mental

stress. The study of these sections of computer science is not an end in itself, but an inevitable necessity, due to the fact that computers play a big role in mastering their future specialty. So, in many private educational organizations, training is practiced right at the computer. This allows for a fairly short period of time to obtain a fairly high level of qualification. Therefore, it is impossible to leave the ratio of lectures and practical classes the same as in other subjects. The lecture should be aimed at ensuring that the material presented helps students navigate the current trends in the development of computer science.

The article analyzes the problem situations in the teaching of IT and the reasons for their appearance, outlines some approaches to their solution, i.e. the search for ways to generate new ideas and adequate implementation mechanisms:

- Improving the organization of the educational process;
- Harmonization of requirements for school and university curricula in computer science;
- The use of high-quality electronic educational materials and training programs in the educational process;
- Introduction of modern hardware and software technologies;
- Improving the system of continuing education of teachers;
- The introduction of new methods of access to reliable training information and mechanisms to limit malicious data;
- Motivation of teachers to update the educational literature;
- Improving the system for assessing the effectiveness of teachers;
- Motivation of university teachers to conduct quality training.

Awareness of the importance of studying computer science and understanding of its applicability to solving problems from the section of special disciplines comes to students later, when the subject is already somehow mastered in the first or second courses of the university [3, 4].

Basic education should be organized in such a way that students can acquire sufficiently high and fundamental knowledge, allowing them to master the additional knowledge necessary for their further work. For this, in our opinion, in order to develop the skill of independent work, great attention should be paid to individual work with each student. Teachers should not forget that the result of training should be evaluated not only by the amount of information communicated, but also by the quality of its assimilation, the ability to use it in self-education. Are our students able to study independently? At the moment, we have certain inconveniences in this matter, namely: the endless control of students' knowledge in all subjects without exception takes them quite a lot of time.

The redistribution of the classroom load in some disciplines in the direction of increasing the time for independent work of students in the near future can lead to installation lectures. In the classroom "... key concepts and most important results will be understood, and students will independently extract all other details from abstracts" [5]. This situation is already almost a reality in the correspondence course. Such a redistribution of the academic load will undoubtedly lead to a deterioration in the quality of training, since students in the first and second courses have not yet developed independent work skills. The organization of the educational process needs improvement.

The main reasons for the low level of training in computer science for some school graduates (especially for future commercial students studying on a paid basis) may be: low motivation of students in the study of computer science; insufficient level of qualification of computer science teachers; weak material base (PCs are either very outdated or completely absent). This leads to a significant difference in the requirements for school and university curricula in computer science [4].

The way out of this situation is prescribed in the documents of the quality management system and consists in conducting a preliminary control of students' knowledge in order to determine their level of preparation and possible further adjustment of the course content [4]. In this case, a significant part of the time allocated to the university for training is spent on filling in the gaps, i.e. leads to duplication of secondary education programs with large inefficient costs.

In order for the content of the "Information Technologies" course to meet the requirements of the time, a course is needed within which it is possible to distinguish:

1. The single generalized goal of studying information technology is the formation of common ideas about the information picture of the world based on a systematic approach;
2. The unity of the subject of the disciplines of the information cycle - the disclosure of the general laws of functioning of systems of various nature;

3. The unity of the methodological approach throughout all courses based on modeling as a method of scientific knowledge of the surrounding reality.

Such a course will serve as the basis for future specialists to understand the integrating role of the theoretical foundations of informatics not only in the formation and development of the disciplines of information preparation studied at the university (modeling theory, the basics of information security and others), but also in science itself, which forms new directions.

Individualization of the educational process through the use of printed and electronic educational materials, for example, electronic video courses, textbooks, workbooks and computer training programs, could help to bridge the gaps in pre-university education [9]. The lack of high-quality electronic materials and informatics training programs does not allow solving this problem.

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Learning in a playful way motivates students to effectively master IT and helps them develop interdisciplinary relationships. "The tasks solved in the study of computer science also apply to other subject areas of knowledge - physics, mathematics, astronomy, etc., which is why the study of computer science has an interdisciplinary character." An example of the implementation of such training are computer training software and hardware tools - simulators that allow you to display processes from the real world in virtual space.

With the introduction of convenient cheap or free modern technologies, it became possible to use them in the educational process, for example, publish applications on the Internet. Modern students need to not only work with applications, but also interact with each other; perform practical tasks anywhere and on any device; and even earn by posting their programs, for example, on Google Play.

"The special difficulty in teaching computer science is that in purely technological issues of working with a computer, student awareness often exceeds that of teachers," so IT teachers are constantly forced to do self-education, and for this they need to have enough free time. The professional level of the teacher, according to the authors, should consist of basic education, internships, advanced training and continuous self-education. One of the reasons for the discrepancy between the degree of preparation of graduates and the requirements of modern production is considered to be "a lag in the level of teaching from the modern level of development of science and technology" [2, 4].

Firstly, some people see a way out of this situation in testing the teachers themselves "... in the same disciplines (subjects) in which the students' knowledge was monitored, but the tests should contain tasks to determine not the residual, but the current knowledge of all students issues of discipline (subject) "[3].

Secondly, to organize the conduct of informal, and in essence, advanced training for teachers and computer science teachers, for example, in advanced training centers of leading universities in the country; in structural divisions of scientific centers; possibly even in the form of internships abroad; in enterprises and organizations. Of the low-cost methods - conducting online courses on any section of the continuing education program. Teachers should be motivated by increasing the level of remuneration in case of confirmation of the required level of competencies (in the form of an interview or testing) [7].

One of the significant factors affecting the effectiveness of teaching is the creation of a business and creative atmosphere of cooperation and mutual understanding in the scientific and pedagogical team, which makes it possible to do your favorite work, communicate professionally and work together on any projects. According to the authors, great enthusiasts in their field should work in the field of education. "However, factors such as a decrease in the status of a teacher and a scientist in society as a whole ... negatively affect the professional activity of a teacher and therefore require qualitatively different motivating rules and attitudes" [6] - was noted by prof. Fadeeva I.M. back in 2007.

Modern students, as a rule, consider the main source of information to be the use of Internet resources, incl. and in laboratory practice. Unfortunately, the information search procedure is associated with the imposition of large volumes of negative and unnecessary information on users [8, 10]. Access to verified information is complicated by posting articles on the network on any topic created by copywriters (on order), therefore, mechanisms are needed to limit harmful and unreliable data flow.

The updating of educational and methodological support of IT is especially relevant, otherwise it leads to obsolescence of educational literature. The use of electronic training materials significantly changes the quality of laboratory and practical classes and independent work of students [12].

The main approaches that contribute to solving the problems of teaching IT include:

1. The redistribution of the training course into stages.
2. Coordination of requirements for school and university curricula.
3. The introduction of modern forms of training and hardware-software technologies.
4. Improving the prestige of education and the introduction of entrance examinations for applicants.
5. Reforming the continuing education system for educators.

The implementation of the proposed set of measures will lead, in the opinion of the authors, the prestige of the teaching profession in society and the quality of IT teaching [13]. After all, "a teacher can fully realize professional knowledge, skills and competencies if the necessary conditions are created for this" [6].

III. Results and Discussion

And computer science is fundamentally different in terms of assessing the level of students' knowledge, since here, to a greater extent, both us and customers are interested in computer skills. In this case, one can exclude a subjective approach to assessing knowledge. And in this regard, there is no need for written exams.

In order to achieve a radical change in this direction, firstly, it is necessary that each student has all the rights of unhindered access to technical means, secondly, a term paper must be put into practice, and not one, which should be entirely devoted to the description of new technical and programmatic funds.

If we are talking about written exams, then we should focus on the following points: is a student able to pass written exams in 9-10 subjects within one month, moreover, without interruption from the educational process? Can students reflect their thoughts as succinctly as in textbooks, especially in the first courses?

At the same time, it is appropriate to recall that every exam for a student is an experience, a stressful situation, and in fact, our students pass three exams in each subject. And how many exams will there be in total?

What qualities of students we are not able to determine in written exams: creative attitude to the subject; quick wits; resourcefulness; speed of thinking; ability to work with additional literature; and in general, the knowledge of students.

How can these qualities be developed? Of course, not only preparation for various types of control. For example, you can accept written reports, not controls. Such written reports in education have been used since ancient times, for example, settlement and graphic work, industrial practice (without interruption and interruption from the educational process), term paper and others.

It should be noted that now for some specialties in computer science, term papers are being written, and why not in all specialties? It's hard to answer.

Many years of experience at the university suggest that the exam is not just an assessment of students' knowledge, but a continuation of training, where the student realizes that he knows and what he should strive for in the future.

Very good results can be achieved by combining various ways of controlling knowledge, for example, written, and then oral. The specific control method, in our opinion, should be decided at the department level. Written work can be in the form of tasks, a case study, and an oral exam can serve as a test of knowledge of theoretical material, or instead of an oral exam, you can take the defense of a term paper [11]. Moreover, the correct approach to assessing students' knowledge strengthens their faith in the triumph of justice and the objectivity of assessment.

Thus, what specific tasks do universities face in light of the computerization of our society?

The appearance of these tasks is due to the fact that the rapid pace of development of computer technology and software makes the training system almost impossible for graduates to cope with new everyday problems.

Alas, by the end of the university we are witnessing that something that we taught students is obsolete. Overcoming this problem is possible only if the student has acquired the necessary computer skills, has learned to independently replenish their knowledge.

Thus, the ongoing changes in the development of software pose new requirements for graduates of higher education institutions, which boil down to the need to strengthen focused training in computer science.

In this regard, we note that teaching programming in a course in computer science is becoming doubtful, since the allocated amount of hours does not allow you to fully master programming. But this does not mean that programming elements do not need to be included in the educational process. The authors are sure that a modern student should get acquainted with advanced programming technologies, but for this it is necessary to review and increase the volume of hours allocated for computer science. On this issue, the authors have some work experience, and in our future works we will present it to the reader.

It is appropriate to recall that for graduates, for example, in the specialty of management, such requirements are imposed - they must, within the limits of their specialty, be able to master computer methods of collecting, storing and processing information, and use a computer as a tool in professional activity.

To achieve these goals is possible only with a well-planned curriculum, coordination with other departments. In this regard, for example, it is necessary to decide how much it is necessary to study in the computer science course internal aspects (number system, computer structure and others) that are not so important for the application. Here we proceed from the criterion of usefulness and need for work in a future specialty.

It is clear that the foundation for effective computer science education must be laid at school. Unfortunately, this problem has not yet been resolved, which, of course, makes it difficult to achieve our goal.

IV. Conclusion

Of course, on the whole, we still do not know which method of teaching computer science is the most effective. The exchange of experience and ideas should play a decisive role here. The question of the qualifications of the teachers themselves is also a problem, but this is a separate topic for discussion. Which of the possible concrete ways of studying computer science is more effective will be shown by time, but without losing it, we must now take cardinal solutions to these problems, since the transition to a market economy will dictate natural methods of selecting specialists over time, namely, enterprises will not need it's just graduated workers, and comprehensively developed people and true experts in their field. Of course, many of the points outlined here are relevant to other subjects. But, nevertheless, we hope for the support of our colleagues in solving these problems and thank you in advance for their participation.

References

- [1] Tulaev B., Daminov O., Khakimov J., Turdiev J. Developing competencies in the development of information and communication technologies // *Journal of critical reviews*. ISSN - 2394-5125. Vol 7, Issue 2, 2020. - P. 296-298.
- [2] Trubilin A. I. Training - the most important link in import substitution / A. I. Trubilin, T. N. Polutina, V. I. Gaiduk // *Political Mathematical Electronic Scientific Journal of the Kuban State Agrarian University (Scientific journal KubGAU) [Electronic resource]*. - Krasnodar: KubSAU, 2016. - No. 03 (117). S. 974-986. - IDA [article ID]: 1171603062. - Access mode: <http://ej.kubagro.ru/2016/03/pdf/62.pdf>, 0.812 c.p.
- [3] Godochkin E. Yu. Problems of teaching computer science and information technology to economic specialties in universities / E. Yu. Godochkin // *Young scientist*. - 2011. - No. 11 (34). T.1. - S. 67-69.
- [4] Samoilik E. N. Problems of teaching computer science in technical universities / E. N. Samoilik // *Science and School*. - 2012. - No. 3.
- [5] Nogin V. D. Mathematics in a technical university: problems and prospects / V. D. Nogin // *Education and science: problems and development prospects: proceedings of the VII Academic Readings, St. Petersburg*, 2001. - P. 253-261.
- [6] Fadeeva I. M. Motivation of university teachers as a factor in improving the quality of higher education / I. M. Fadeeva // *Bulletin of Moscow State University*. - 2007. - No. 1.
- [7] Daminov O.O. "Game competence as the process of professional competition on the professional education teacher". *International Journal of Advanced Science and Technology*, Vol. 28, no. 20, Dec. 2019, pp. 890-896.
- [8] M.Bhuvana, S.Vasanth. Determinants of Behavioral Intention to Access E-Governance Services by Rural People with the Mediating Effect of Information and Communication (ICT) Literacy // *Journal of Advanced Research in Dynamical and Control Systems*. 2020. Volume 12, Issue 2, P. 176-187.

- [9] Ismailova Z.K., Khimmataliev D.O., Kuziiev N.M., Shabarova U.N., Almardonov O.M. Formation of a system of methods of technical thinking future engineers // *Journal of critical reviews*. ISSN – 2394-5125. Vol 7, Issue 5, 2020. - p. 787-794.
- [10] R. Rina Novianty Ariawaty, R. Ricky Agusiady and Muchamad Rusdan. Managing Reputation to Achieve Competitive Advantage Sustainability by Applying Information Technology based Management // *Journal of Advanced Research in Dynamical and Control Systems*. 2020. Volume 12, Issue 3, P. 1-6.
- [11] Khakimov J.O. Documenting procedures for implementing the process of project teachers to computer projects // *International Journal of Advanced Science and Technology*. Vol. 28, No. 20, (2019), pp. 881-889.
- [12] Khimmataliev D.O., Khashimova M.K., Karimova N.N., Dumarova N.Q. The use of modular technology in education // *Journal of critical reviews*. ISSN – 2394-5125. Vol 7, Issue 5, 2020. - p. 802-804.
- [13] M. Raghavendran and Dr.A. Jahitha Begum. Implicit Multi-Dimensionality of Information and Communication Technology in Mathematics – A Review // *Journal of Advanced Research in Dynamical and Control Systems*. 2020. Volume 11, Issue 8, P. 126-136.