

Author applied the next methodic of fulfillment of the lessons taking into account pedagogical interaction «teacher-student»:

1. Mutual analyses of situation in the beginning.
2. Definition of the common (teacher and student) aims of education.
3. Planning the work (for teacher and student).
4. Selection of educational literatures.
5. Fulfillment of the educational operations, organization of the educational process.
6. Check and correction of the process of the work.
7. Analysis and evaluation of the results of education.

One can say that the optimal method of designing and organization of educational process of the practical works on physics is the next:

- the main accent of the action of the teacher is aimed on the cognitive actions of students;
- the teacher is the educationist-organizer and producer of education, who can propose to students the necessary selection of the means of education not only render educational information;
- educational information is used as the means of the organization of cognitive action;
- trainee is the subject of the action altogether with the teacher and his personal development is the main aim.

Applying of the citing method allows to intensification of the educational process.

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SOCIO-ECOLOGIC EDUCATION OF STUDENTS IN CONTEXT OF THE BOLOGNA AGREEMENTS: THE CONTENT ASPECT

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The purpose of the Bologna declaration, signed also by Russia, is to create the common European higher education area, as well as to develop new goals, content and conditions of its functioning.

This also refers to the socio-ecologic education of young people, addressed by the Magna Charta Universitatum (18 September 1988, Bologna). This document calls for the universities to provide such education of the future generations, which would develop respectful attitude towards the environment and life, and their harmonization (1).

Our studies let us define *the multi-level structure of goals (strategic, tactic, operative) of the socio-ecologic education of students*: education, upbringing,

development. *A particular place among the goals* takes the development of socio-ecological readiness at students, i.e. readiness to establish effective relations with the environment during the professional activities. Moreover, if students also learn some basics of teaching, then they will be able to provide socio-ecologic education to the next generations themselves: in the family, at school and professional education institutions, at the stage of self-education (2).

In order to fulfill the goals, we should talk about another element of the educational process – *content of the socio-ecologic education of students*. Considering this question, we took into account the opinions of V.A. Slavenin and A.I. Mishenko who stress, that it is necessary to distinguish the concepts of «content» and «process» (4). In our case and in general, the *content* is represented, firstly, by a system of knowledge about the relations between people, society and nature; about the ways that let develop an integral idea about the surrounding world and learn the methods of cognition of a socio-ecologic reality and practice. This system includes the knowledge about the main environmental objects: nature, society, human and technique. Secondly, the content includes intellectual and practical skills that help establish relations with all environmental elements and form a basis of one's future activity in this environment. Thirdly, it includes accumulated creative experiences, determined by the diversity of the reality, which calls for extraordinary approaches to its understanding and development. The fourth element is the experience of emotional, evaluative and determined attitude to the socio-ecologic reality, its elements and himself. Learning of the above mentioned elements will make a personality psychologically ready for an optimal interaction with nature, convince a person of the necessity to preserve and restore nature, teach socio-ecologic values.

It is significant, that, currently, there is a need of a further ecologization of the *content*. It means, that the idea of socio-ecological relations should penetrate different sciences, as, in one way or another, it is related to a human, his health and health of the humanity in general. It should also be mentioned, that ecological ideas are revealed in natural sciences: geo-ecology, bio-ecology, technical sciences related to environmental management. At this point, we also agree with Mamedov N.M., that the social aspect of ecology has not been studied yet, with exception of ecology law and ecology economics. Though today, the biggest part of ecological education should be given to social ecology, which reveals the laws of a sustainable development of the society-nature system (3). This, in its turn, requires to include other scientific disciplines into the *content* of the socio-ecologic education (motivational, cognitive and active parts). The potential of other branches of science with respect to teaching youth a balanced interaction with nature and a stable functioning of the socio-environmental system, is at

the moment hardly being used (or isn't being used at all).

In this respect, it is essential to introduce different ecological courses into the content of professional education, including the higher education. This can be confirmed by the results of the experiment, aimed at analyzing the educational content at the Belgorod State University. Its results showed, that the majority of ecology courses are present in the curriculums at the biology and geological geography departments. Curriculums at other departments sometimes contain one ecology-related course. These facts prove, that there is a need of further ecologization of the higher education, it is essential to use the potential of all study courses, develop special courses, optional courses, ecology practicums and other forms of teaching. This will let students to attend not only the courses related to their future profession, but also learn from professional science to optimize the socio-ecologic relations.

As for the *process* of the socio-ecologic education, it includes teaching and upbringing. **Teaching**, as we know, is one of the main elements of an integral education, and is determined by cooperation between a teacher and students. Its goal is, first of all, to gain knowledge and skills provided by study programs. The learning process is always bilateral and consists of teaching and learning, which assumes active participation of the both sides. The peculiarities of learning in universities are relatively fully studied by the science, including its different aspects: historical, personal, active, managerial, professional, creative, innovative and etc. Recently, technologies take a particular place in professional education: computer, educational, research, organizational, module and others.

On our context, ecologization of the higher education's *content* requires an appropriate organization of its learning, i.e. an optimal combination of methods, tools and forms. This combination includes the methods and tools from the toolkits of other sciences. For example, an effective cooperation between a teacher and students is only possible, if both sides have a clear idea about each other. It can be formed, if at the pre-communication stage psychological methods are being used, which let reveal student's personality, his individual reactions, and develop a successful cooperation. The established understanding is a basis for the future cooperation, aimed at learning the society-nature-system, studying its past and planning its future. Among the educational methods, dialogue, discussion and research are the most suitable for this cooperation. At the era of global computerization, computer and media technologies are also a must.

As for the interaction ways during the socio-ecologic education of students, individual forms are being actively used nowadays, although the collective forms are not an exception. Another important element of the interaction between a teacher and students is its monitoring and results control. It involves a

number of educational, psychological, mathematical and evaluation methods, modern computer technologies and technique.

Beside the general sides of the educational process at the universities, one should take into account specific parameters of the professional education aimed at getting professional skills (or retraining) according to their interests and abilities. Ecology is an important aspect of professional training, as any professional activity is to some extent related to nature and changes it. That is why students should learn to bear responsibility for the nature in the framework of their professional activities, preserve it for the coming generations.

Another component of the process of the socio-ecologic education is **upbringing**. Recently, components of the ecologic upbringing are being actively developed. The upbringing of students in the sphere of the environmental communication is not simple to define. *As a social function, the socio-ecologic upbringing of students* prepares them to establish optimal relations with the environment during their professional activities; it is a process of social ecologization, integration of an individual into socio-ecologic relations, learning the norms and rules of these relations, learning the main socio-ecologic values (natural, economical, labor, social, psychological, educational, ethnic and other). *In the broad sense, the socio-ecologic upbringing of students* is a purposeful activity of educational institutions. *In the narrow sense*, this process means a specially organized upbringing activity aimed at development of socio-ecologic skills at students: responsibility, economical attitude towards nature; kindness to all living beings; wise use of natural resources; desire to preserve nature for today and future generations; socio-ecologic world view. *The socio-ecologic upbringing of student is regarded not only as a process* of getting socio-ecologic experience from older generations, but also as a process of getting their own. It includes harmonization of their needs with those of nature, needed for a sustainable development of the society and environment.

It is obvious, that "the socio-ecologic education of students" is a complex and a many-sided term. Its diverse character is determined by the complexity of the existing socio-ecologic reality, the way the experience of relations between the society and nature is being learned and transferred from older to younger generations, taking into account the peculiarities of professional activity.

To sum up, considering the multi-level goals of the socio-ecologic education, its content and principles of its organization and management, let the students learn professions, as well as develop a balanced socio-ecologic relations today and tomorrow.

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COMPUTER ALGEBRA SYSTEM AND THE MATHEMATICAL TRAINING FOR STUDENTS OF TECHNICAL HIGH SCHOOLS IN RUSSIA

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I. Introduction. This paper is based on results of article [1]. As noted in the book [2], international competition, the increasing numbers of experienced and high quality requirements compel to automate owners the design and manufacture. Modern enterprises are unable to survive in the global competition if they do not produce new products of better quality, lower cost and in less time.

These words are fair and in the preparation of technical specialists. As it follows from the article [3], with the introduction in 1992 multilevel system of higher education problem of entering to the education system begin is solved. This system adopted in many countries around the world. Earlier the specialists with diploma were issued in 5-6 years, i.e. there was an one-stage scheme.

And now the scheme is multistage. Many state high schools both prepared and prepare specialists only. Some high schools, except for the traditional scheme, have also the multilevel scheme. Till now intensity in a question of prestige of the bachelor's degree is kept. Employers are not always wanted to take they for the job. There is a difference in programs of training. Specialists are prepared on a concrete specialty, as though in unique area. Programs of a bachelor degree have general scientific and general professional character. The bachelor receives fundamental preparation without any narrow specialization and spends for training only 4 years. Not belittling advantages of preparation of specialists, we shall tell on advantages of preparation of bachelors in our country.

The first advantage becomes more and more actual in modern Russia. The person receives the diploma and finds economic independence in 4 years after receipt in high school. Further, fundamentality of

preparation, its general training allows to replace a job easily if necessary. From here one more advantage follows. For office work person is needed in next qualifications: formed person, able to work with the information, with the people, capable to prepare every possible documents.

II. Computer algebra systems. (CAS) The rapid development of all computer mathematical applications [4] led to a paradoxical situation is not yet properly assessed. On the one hand, the computer solutions are faster. Analytical computation of many standard, but cumbersome problems can no longer be regarded as rational. On the other hand, the computer solutions are not accepted as full. We want to show the advantage of an integrated approach in studying the foundations of higher mathematics of students technical skills. If there is a possibility, we get the solution of mathematical problems with CAS. The proof of the correctness of the solution we carry out analytically in the first stage. When you experience the connection of computer solutions and analytical evidence, it is possible to carry out the proof with CAS, or a combination of CAS and analysis. But the final word always rests with the person. About the transition from technical problem to the mathematical model it is detailed in [5].

III. Examples of applications.

1. Fundamentals of Algebra. You can obtain the solution of linear algebraic systems of equations with a computer. Then you can obtain the values of residuals vector solutions analytically or with a computer.

2. Mathematical Analysis. You get more convenient initial solutions of tasks to the limits, the point of break and continuity of functions, graph functions, calculate the sums of convergent series and infinite products with CAS. Then you get a rigorous mathematical solution. The next, you will again receive computer solutions based on analytical solutions already found. Calculation of indefinite and definite integrals is difficult, not only among students but also professionals, especially when it is required to obtain an analytical solution. CAS simply are irreplaceable in this problem. Initially, you receive analytic solution with CAS (assuming it exists). Then, using the inverse operation of integration, i.e. on the basis of differentiation you sure the correctness of the obtained solutions.

Particular technical difficulties (laboriousness and the time spent) are the decision of the initial and boundary value problems for differential equations. In this case you can be recommended the following scheme solutions. Initially you apply the theorem of existence and the theorem of uniqueness of the solution if the problem is allowed. Then you define the required solution on the basis of CAS. The third stage is linked to the verification of the obtained solutions. This verification can be analytical or using CAS.

3. Linear Programming. The traditional problems of linear programming, such as canonical form,