- ability to speak one of foreign languages at the level sufficient to obtain and assess information in the sphere of professional activity from the foreign sources (CC-10).

Whereas the current HE FSES 3+ of engineering profiles updated by the Orders of the RF Ministry for Education and Science of 12.03.2015 specify the following cross-cultural competencies:

- ability to communicate orally and in written form in Russian and foreign languages to solve interpersonal and cross-cultural interaction problems (CC-5);
- mastering foreign language at the level sufficient to communicate (CC-12) [6].

As is seen, the main purpose of the foreign language course in engineering universities is to master communicative competence in foreign language for solving communicative problems. Foreign language course at university is of communicative character. Based on the analysis of university education programme one can conclude that as a result of foreign language mastering education engineering programmes, development of cross-cultural competencies (ability to communicate orally and in written form in Russian and foreign languages to solve interpersonal and cross-cultural interaction problems (CC-5); and mastering foreign language at the level sufficient to communicate (CC-12)) was provided.

REFERENCES

1. Kontseptsiya modernizatsii rossiiskogo obrazovaniya na period do 2010 goda [Elektronnyi resurs] [The concept of modernization of the Russian education for the period up to 2010]. Innovatsii v obrazovanii: spetsializirovannyi obrazovatel'nyi portal [Innovations in education: specialized educational portal]. 2005–2017. URL: http://sinncom.ru/content/reforma/index1.htm, free. Tit. screen (accessed: 28.11.2017).
2. O predostavlenii materialov [Elektronnyi resurs] [On providing materials]. A letter from 06.07.2016 № AK-1872/05. Min-vo obrazovaniya i nauki RF [Ministry for education and science of the RF]. URL: http://fgosvo.ru/files/files/fgosvo/AK-1872-05.pdf, free. Tit. screen (accessed: 28.11.2017).
3. FGOS VPO po napravleniyu podgotovki 140302 Yadernye fizika i tekhnologii (uroven' bakalavriat) [Elektronnyi resurs] [HPE FSES in the field of training 140302 Nuclear physics and technology (Bachelor degree)]. URL: http://fgosvo.ru/uploadfiles/ProjectsFGOSVO/BAK/140302_B.pdf, free. Tit. screen (accessed: 28.11.2017).
4. FGOS VPO po napravleniyu podgotovki 050100 Pedagogicheskoe obrazovanie (kvalifikatsiya (stepen') «bakalavr») [Elektronnyi resurs] [HPE FSES in the profile 050100 Pedagogical education (Bachelor degree)]. URL: http://fgosvo.ru/uploadfiles/fgos/5/20111207163943.pdf, free. Tit. screen (accessed: 28.11.2017).
5. FGOS VPO po napravleniyu podgotovki 011800 Radiofizika (kvalifikatsiya (stepen') «bakalavr») [Elektronnyi resurs] [HPE FSES in the profile 011800 radio Physics (Bachelor degree)] (Order of the Ministry for Education and Science of the RF of 31.05.2011 № 1975): appr. by the Order of the Ministry for Education and Science of the RF of 18 Junuary 2010 № 51. URL: http://fgosvo.ru/uploadfiles/fgos/28/20111115114254.pdf, free. Tit. screen (accessed: 28.11.2017).
6. FGOS VPO po napravleniyu podgotovki 11.03.04 Elektronika i nanoelektronika (uroven' bakalavriata) [Elektronnyi resurs] [HPE FSES in the profile 11.03.04E and nanoelectronics (Bachelor degree)]: appr. by the Order of the Ministry for Education and Science of the RF of 12 March 2015 № 218. URL: http://fgosvo.ru/uploadfiles/fgosvob/110304.pdf, free. Tit. screen (accessed: 28.11.2017).

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Pedagogical Conditions for Research-Technical Creative Activity in Technology Training

M.K. Romanchenko[1]
[1]Novosibirsk Industrial-Power-Engineering College, Novosibirsk, Russia

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Abstract
The article is concerned with the study in the issue of development teachers' creative potentials engaged in students' technology training.
Having analyzed the practice of research-technical creative work, the author shows the dynamics of students' achievements from the fifth to the eleventh form, observes the changes in general awareness of process technology and understanding the essence of these processes and their perspective improvement.
The work defines pedagogical conditions for research-technical creative activity in technology training consisting in the idea of students' special attitude towards labour, development of profile skills and features, such as: civil liability, patriotism, and need for labour activity. The principle aim of this development is to involve students in labour activity based on their in-born individual abilities, to teach them to apply modern scientific achievements.
Studying the dynamics of transforming a student's cognitive interest and the results of research in the sphere of pedagogy, the author justifies a number of concepts stated in the article to provide efficient technology training.

Key words: research-technical creative work; pedagogical conditions; technology training; conditions of creative activity organization.

The basic professional quality of a teacher is considered to be his/her potential ability to participate in teaching research-technical creativity within the framework of technology training. Creative pedagogical activity implies creativity, which is a result of a teacher's personal creative work and his/her creative abilities.

The distinguishing feature of research-technical activity is an effective result. An object of teaching creative activity is a student. The potential teaching creative abilities include not only development of its structural elements, but also establishing potential interactions between the creative elements, identifying uniform factors.

If targeted at qualified specialists' training, the institutions of higher vocational training are required to find the leverage influencing the formation of students' motivation for creative activity.

The classes delivered at the teachers upgrading course do not reveal the formation of interaction among the creative elements or, if so, it is performed inefficiently. The teaching creative experience does not focus teachers' attention on development of creative search skills.

The issues of creative activity organization do not consider the urgent necessity of a teacher's involvement. The lack of some teachers' understanding the essence of teaching the bases of creative activity results in inconsistency between the expected results and existing expectation of society related to the issues of training

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highly qualified creative specialists. Some educational institutions do not form teachers' positive motivation for research-technical activity. The requirements for teachers' organization of learning cognitive activity do not take into account differentiation of teachers' potentials with different creative skills. No attention is paid to teachers' and students' age peculiarities, teachers' creative experience, and desire to solve this problem[4].

The contemporary education theory is focused on development of integrative conceptual view of the environment. The market requirements do not include the demand for students' creative experience. This situation has led to the necessity of reforming the content of the existing education system.

The concept of teaching a course of technology at secondary school suggests the solution of the urgent problem under the condition of innovative production development, consideration of world experience in the sphere of research-technical creative activity, its application in vocational training. The focus is made on the applied trend of training process. Students are taught to practically applied knowledge of basic concepts of studied disciplines directly in creative activity ensuring the continuity of skills when transferring the next stage of professional education.

The idea of technology creative training is to develop a student's social attitude to labour, mastering professional skills and personal features, such as: civil liability, patriotism, and desire to work [5].

School vocational education is based on study in effective application of new technologies using practical examples. It became a support base to form pupil's individual qualities [3].

The primary objective of such development is to involve students in labour activity with the support on their in-born individual abilities, to teach students to apply contemporary scientific achievements.

The goal of educational institution is to ensure the conditions for mastering practical skills in using all possible transformation methods, taking into account the expected consequences of technogenic production, to teach the techniques of advancing a professional path.

Training is suggested to be focused on the solution of the following problems:

- forming viewpoint, understanding the significance of individual labour, involvement in general labour discipline based on technology requirements;
- creating a technology systematic base, teaching practical experience demanded by modern society covering all spheres of human activity;
- ensuring the conditions of broadening the scope of interests, applying knowledge of creativity acquired within theoretical course in practice;
- developing knowledge including computer skills;
- building on the experience of applying various forms of activities, developing skills including business communication;
- studying the basic elements of economic education including business activity;
- forming information database on existing and perspective jobs and requirements of contemporary labour market;
- fostering patriotism by the examples of Russian specialists' activities in the sphere of new technology implementation and engineering innovation [1].

Given the importance of monitoring the dynamics of changes in a pupil's learning interest, results of pedagogical research to provide efficient technology training, it is based on a number of principles:

- the range extension of technological production methods, study of current scientific and technological level;
- focus of learning process on practical creativity, enhancing visual forms of studying technological methods;
- classification and structuring creative techniques used to solve the problems set in the course of social, team, and individual activities.

The content of training course covers: fragments of production, options of using power and information resources.

In the course of technology training based on introduction of creativity, pupils acquire the following set of skills:

- to reason an individual professional path;
- to find, comprehend, and apply relevant information, correctly perform the functions according to technical requirements;
- to arrange creative activity based on the qualities facilitating production;
- to perform common technological operations observing safety regulations by means of tools, devices, and engineering equipment;
- to search for necessary information sources and use the information to acquire knowledge of operation technology;
- to choose effective and cost-efficient methods of technological process;
- to define an elementary impact of production on environment;
- to make and analyze suggestions of improving technology, update knowledge of business regulations;
- to match the level of his/her own professional skills and inclination for performing some activity, plan his/her life and professional path;
- to work individually, in tandem, in small and large teams [5].

Based on the analysis of pupils' age they were divided into three groups in terms of their development and ability to acquire technology knowledge:

a) Junior group, pupils of the fifth – seventh forms characterized by small scope of technical and professional knowledge, lack of skill to analyze their abilities, absence of skills to search for necessary information, low capacity of operation performance related to product improvement, limited by manual labour skills. The expected results of the given group are development of imitating function, confidence in choosing a profile and definite product, a large number of trials and errors, focus on high performance achievements.

b) Intermediate group, pupils of the eighth and ninth forms characterized by elements of self-esteem, desire to criticize statement of definite problem, refusal of help during his work, desire to work separately from a team, careful approach to profile selection, fear of failure in work performance, formation of manual skills. The expected result is search for an item of production unknown before, search for original technological solution for work performance, strive for success, curiosity.

c) Senior group, pupils of the tenth – eleventh forms characterized by sufficient scope of technical and professional knowledge of production process, ability to apply practical experience for his/her activity, desire to reduce production activity and safe material, challenges in selection of production item, dependence of pupil's opinion on team opinion, possibility of disagreement with problem statement, preference to mental activity over manual one. The expected result: focus on complete understanding of physical and technological processes of labour activity, development of pupils' interest in checking their abilities, striving to personal success[2].

The analysis of research-technical creative practice has shown the dynamics of pupils' development from the fifth to eleventh form, from general knowledge of production technologies to understanding the essence of this process and comprehension of perspective improvement.

The principle forms of technology training include performance of production tasks, search for solution options of problems, doing practical and lab-practical works, planning professional path, performing creative activity influencing the development of creative skills. This process aims at multi-aspect results: all-round development of a pupil's individual qualities, production of actual item as a result of technological activity in the form of particular tangible product.

The content of technology curriculum is focused on developing continuous pupils' demand for technological knowledge and desire for self-education. Technology

training should not be a goal, but a condition for learning process radically different from subject-oriented approach realized before. In this case a teacher has to be a technical assistant with organizational and consultant functions in joint labour [3].

The urgency of determining pedagogical conditions for potential application of creative activity in technology training shows the necessity of conducting research in this area.

REFERENCES

1. Luk'yanova, M.I. Netraditsionnye metody, obespechivayushchie sozdanie na uroke lichnostno-orientirovannoi situatsii [Non-traditional methods that ensure the creation of a lesson-oriented personal situation]. Zavuch [Assistant Principle]. 2006. № 2. pp. 35–43.
2. Murav'ev, E.M., Simonenko V.D. Obshchie osnovy metodiki prepodavaniya tekhnologii [General principles of methods of teaching technology]. Bryansk: Publ. BGPU im. Petrovskogo B. G., 2000. 235 p.
3. Romanchenko, M.K. Motivaziya tvorcheskoy deyatel'nosti uchaschihsya: problemy i perspektivy [Motivation of creative activity of students: problems and prospects]. nauchno-metidicheskiy jurnal Sibirskiy uchitel'. – № 4 (113). Novosibirsk. 2017. pp. 46-49.
4. Filatova, L.O. Razvitie preemstvennosti shkol'nogo i vuzovskogo obrazovaniya v usloviyakh vvedeniya profil'nogo obucheniya v starshem zvene srednei shkoly [Development of succession of school and University education in the conditions introduction of profile training of senior pupils of secondary school]. Moscow: Binom, 2005. 192 p.
5. Chernova, M.A., Chibizova, A.M. Tvorcheskaya deyatel'nost' kak sredstvo razvitiya lichnosti uchashchikhsya [Creative activity as a means of development of students ' personality]. Kemerovo, 1995. 105 p.

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Experience in Design and Implementation of Educational Software within Strength of Materials and Structural Mechanics Disciplines, TSUAB

B.A. Tukhfatullin[1], L.E. Puteeva[1], F.A. Krasina[2]

[1]Tomsk State University of Architecture and Building , Tomsk, Russia

[2]Tomsk State University of Control Systems and Radioelectronics ,Tomsk, Russia

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Abstract

The article presents the results of software implementation into education process provided by the department of "Structural Mechanics", TSUAB. These software packages are intended to solve problems in the disciplines "Strength of Materials" and "Structural mechanics". They allow checking the correctness of manual calculations, rapidly finding and eliminating the mis-takes being made, avoiding a great number of typical calculations. The de-veloped software packages are characterized by advanced interface; the ini-tial data are presented in a way that is familiar for students; the software packages are free.

Key words: strength of materials, structural mechanics, educational software, generator of "bending" problems.

Modern higher education could hardly be imagined without application of computing techniques. At civil construction universities, delivery of the disciplines related to material strength issues should be always supported by software LIRA-SAPR, SCAD for civil and structural engineering [1, 2]. Unfortunately, time is always required to examine and properly apply the mentioned and analogous software packages. In most cases, discipline curricula do not include time to study these software tools. In addition, the software packages provide the final calculation results based on the initial data without showing the whole calculation process. This fact impedes stage-by-stage evaluation of students' knowledge. Due to the mentioned facts, a number of universities have developed their own software packages for problem solving within such disciplines as "Strength of materials" and "Structural mechanics" [3–6]. As a rule, these software packages are available only for students of these universities. Mathcad, Microsoft Excel and etc. allow solving only those problems for which solution templates have been preliminary developed [7, 8].

Since 1995, in the Department of Structural Mechanics, TSUAB, free educational software for engineering calculations and graphical design has been developed [9–12, 14–18]. These software packages are aimed at problem solving within certain blocks of the above-mentioned disciplines, therefore, students need little time to familiarize with them; as a rule, for this purpose an educator should show the way initial data are prepared and calculations are done based on the example of one typical problem. All input data are not different from the information studied within the course and graphically shown including

B.A. Tukhfatullin

L.E. Puteeva

F.A. Krasina