Actual Issues of Cognitive Self-Sufficiency Development in Students

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Abstract: Students’ research work is the most effective method of advanced professional quality training in higher education institutions. It develops critical thinking of students to the greatest possible extent, as well as their individual abilities and research skills. It allows one to train self-motivated specialists, develops scientific intuition, in-depth critical thinking, creative approach to the perception and practical application of knowledge to address the organizational, engineering, applied and scientific problems.

Key words: Professional training, Professional knowledge formation, Skills, Abilities, Brain building, Tutorial preparation, Educational system, Educational process, Course of activity and training methods

INTRODUCTION

As is well known, professional training is defined as "the combination of special knowledge, abilities and skills (KAS), allowing one to perform the work in a particular field of activity" [1]. Professional training requires proper basic education, is improved in the course of labor activity and results in the development of professional abilities [2].

Tutorial preparation, as part of professional training of future engineering-based teachers has some peculiarities [3]. Independent creative work of students can be considered as a minor educational system within the training system in high school institutions [4]. It can be represented as a set of structural and functional components, subordinated to mentoring, education and training of students. In turn, structural components, being the main basic features of the pedagogical system, include educational purpose, information, pedagogical communication means, students and teachers. Distinguish the main composition of the structural components of the pedagogical system as "Creative self-instructional students' work", which includes training of specialists for work in the field of computer-aided design, knowledge about professional problem solving methods, tools, students’ design coterie organization forms and methods when implementing educational and research-and-development works, as well as term projects and graduation papers [5].

Educational process in the studied pedagogical system is presented as a group of related targeted types of self-instructional work, characterizing by educational, scientific and professional unity. These include: teaching, labor, communication and cognition [6].

The main training methods include the following: scientific methods (independent research in a new poorly explored branch of science using modern methods of computer-based scientific research, sequential implementation of all research phases; simulation methods (creation of simulation models needed for computer-based solution of set tasks and production situations); descriptive tools (display of modeling results on computer output devices in the form of graphic information, i.e. characteristic curves and schemes), providing an association between specific and abstract concepts in knowledge and facilitating the analysis of the results of simulation modeling in the course of solving a given problem; practical implementation of techniques (students’ independent research as part of contractual projects) [1,2,7,8].

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The combination of these training methods promotes students’ creative thinking, which is needed them for follow-up work in constantly evolving and renewing processing design and engineering.

Functional components of pedagogical system, such as "students’ self-instructional work", include gnostic designing, constructive, communicative and organizational components of students’ activities [8].

Noted functional components in exploring pedagogical system are in a complex interaction; they are presented with varying degree of completeness in each type of students’ self-instructional work.

Therefore, significant role in the educational process should be given to the development of students’ attitude toward active learning, development of positive motivation for training [9]. In this regard, it is natural to consider the issues concerned to formation of a special professionally significant motives in students’ creative self-instructional work [5].

The formation and release of motives occurs in the course of students’ activities. It is established that learning activity is induced not by one, but many elements of various motives that are in a complex relationship. Combination of motives, specific to a particular kind of educational activity, will be called further the system of motives [6]. In order to focus the educative process on developing of cognitive self-sufficiency, it is necessary to study the reasons of activity towards subsequent influence on them. One of the ways to enhance the cognitive self-sufficiency and increase its level is to change the motives that determine its development.

Student’s professional motives need to be developed and strengthen through the process of mastering the profession. The success of this effort depends largely on the professional motivation, developed while studying at the university [10].

Identification of motives, inherent in creative self-sufficient work, allows one to evaluate the general features of the students’ motivation, correctly identify ways of forming and strengthening socially important motives in the educational process at the university. Cognitive self-sufficiency is most evident in the creative activity of students in the course of execution independent works such as term projects (TP), educational and research work (E andR), as well as research-and-development (R andD) work.

We used questionnaires as the main research method. Respondents were asked to separate the dominating motives that guided them when implementing term projects, education and research and research-and-development works and to assess them on a scale [11].

When developing education and research class assignments according to teaching methodology of occupational training and attaching them to a certain system, we adhered to the following requirements:

- Meeting university standards on teaching methodology of occupational training (OT).
- Be consistent with the course units providing teaching methodology of occupational training;
- Consider generalized solution techniques of typical pedagogical problems in occupational training;
- Cover different features of creative activity and different research techniques and skills;
- Take into consideration textbooks on engineering disciplines for vocational schools [7, 8].

At the same time, students develop mental set for independent systematic replenishment of their knowledge and skills when dealing with educational, scientific and production tasks.

The results obtained confirm the hypothesis that a certain organization of creative self-motivational work directs the motivational processes toward social processes [11, 12].

When a certain human activity is defined, we can speak of the appropriation of this activity. It includes the following:

- Increases the general theoretical level of students;
- Nails down the skills for practical use of theoretical fundamentals and knowledge;
- Provides each student with abilities of independent research;
- Creates favorable conditions for acquiring the skills of organizing and conducting educational research at high school;
- Develops skills to create "academic problems";
- Contributes to an objective approach in assessing the research results;
- Acquaints students with ability to generalize the advanced educational experience;
- Acquaints students with ability to analyze and find a way out of complex pedagogical situations;
- Fosters interest in the teacher’s profession, teaching subject and scientific and pedagogical inquiry;
- Reveals the potential creative talent of each student;
- Develops a speech culture [7, 8].
Solution of the above problems contributes in general to improvement of future teacher’s professional training. First, the teacher must organize educational process in a way providing the student with ability to search and find right solutions, to be able to conduct accurate generalization, to look for innovative ways in solving the problem, etc. The development of cognitive self-sufficiency and activity and creative thinking of students is currently one of the main tasks facing the vocational schools. Though only teacher, who himself can think creatively, who is experienced in the educational research and is able to engage students in scientific inquiry, can initiate creative thinking of students. Second, during the differentiation teacher will have constantly improve his/her knowledge, master new curricula and textbooks, look for the most effective methods for dealing with certain topics.

Our technique of teaching and research assignments selection and inclusion them into the system consisted of five stages.

- Analysis of university curricula on the vocational training methodology, as well as survey of programs on special technology.
- Identification of cross-curricular links between the educational methodology of occupational training and problem solving practicum, psychology and pedagogy.
- Selection and preparation of assignments taking into account a typology of pedagogical problems of engineering disciplines.
- Study and generalization of students’ common mistakes in engineering disciplines during the teaching practicum, practical and laboratory classes on teaching methodology of occupational training.
- Selection and preparation of assignments, taking into account the requirement to develop research and creative abilities and skills, i.e. to develop students’ cognitive activity [7, 8].

Experience in performing independent creative work in the field of E andR showed that a system of interrelated tasks helps to activate students thoughts, generates creativity, fosters educational and professional interests and encourages students to improve their knowledge independently [3,5,10].

Purposeful conduct of educational and research work on teaching methodology of occupational training is one of the key ideas to form and develop students’ professional cognitive self-sufficiency in the course of their instructional preparation.

Educational and research work fosters students to acquire the knowledge and constantly improve it; it amplifies engineering thinking; shows the need to improve screening techniques and ways of handling, organization and management of training process [6].

Extensive knowledge and practical experience with various categories of students, as well as methodical literature analysis, allowed us to establish the fact that in order to inspire students’ engineering creativity, the mentor should be able to:

- Possess engineering and design skills, sufficient to guide students’ engineering creativity;
- Understanding the goals and objectives of a certain educational work;
- Awareness of the students activities in a specific area of technical creativity (in the context of our research this concerns Technologies as a major course);
- Knowledge of material and technical base required for educational work with students focused on engineering creativity;
- Methodological knowledge of how to work with students on engineering creativity during the classes and extracurricular activities [6,7,8].

REFERENCES


