

Development Of Methods And Tools For The Objective Control Of Cultural And Professional Students' Skills To Meet The 3rd Federal State Educational Standard Requirements

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Abstract - The project is aimed to develop electronic textbooks which provides the tools for the analysis of experimental results from representative databases and the actual knowledge base to help to discuss those results. Then student writes a research article in accordance with the scientific journals requirements. New and verified methods for objectively control of cultural and professional student's skills (Federal State Educational Standard cultural skills 3, 6; professional skills 6, 8, 9, 13, 16) during their work with an electronic textbook are going to be developed.

Keywords - Electronic textbook, General cultural and professional skills, Methods and tools to control skill development, Students' self-training, Tutoring

I. INTRODUCTION

The study of the mechanisms of the students' abilities, skills and competencies development by enrollment in educational programs for the development of sensory, sensorimotor and cognitive professional algorithms is one of the major problems in pedagogy, psychology, physiology and ergonomics. Because of widespread penetration of computer and information technologies in the educational process up to the specific professional environment simulators creation (in particular, workstations, virtual simulators, electronic textbooks, etc.), it is necessary to establish approaches and methods to evaluate the efficiency of professional skills acquiring with help of electronic educational resources variety that involve audio-visual perception of current information about modeled process, decision on the its adequacy and keyboard and/or mouse input during tasks solving and/or navigational commands to the graphical user interface. It is possible to estimate student activities speed and quality characteristics and functional state of the student as a characteristic of the "psychophysiological price" of his activities during developing and implementing professional algorithms (competencies). The set of electronic resources, the list of required professional competences, and the collection of objective methods and criteria to evaluate those competences levels could form the technology basis of the new learning environment supporting individual student work, which is the priority of general education programs of the 3rd

generation Federal State Educational Standard (3G FSES).

On the other hand, the 3G FSES requires the competence-based approach to be deployed in the modern educational process. The competence-based approach aims to create common cultural, professional, and special students' competencies, which are rather rigidly defined for various educational programs.

Competency requirements and their evaluation methods are set in competency passports and carry largely qualitative and subjective characteristics, based on expert tutor's estimates of student's theoretical knowledge and practical skills. The Section 8 of the FSES "Training quality assessment of basic Master degree educational programs" states that the student's training quality is guaranteed by the development of objective procedures for assessing the level of student's knowledge and skills, as well as graduate's competencies. Universities must create and approve assessment tools, which should include interdisciplinary issues, case studies, tasks with comparative assessment, rationale for the studies means choice and other, which allow to control the quality of students' competencies and assess the graduates' readiness for the professional work.

The authors has developed an electronic learning environment that meets the basic 3G FSES requirements: interactivity, credit-modularity, individual learning trajectory, tutoring, problem-based education which are aimed to form common cultural and professional competencies to create scientific reports.

At the first time the objective methods for assessing of required common cultural and professional competences level were developed. Among these competencies there are: general computer skills and specific software environment knowledge (GC-6, PC-6, PC-13), ability to analyze experimental results (GC-6, PC-3, PC-11), which are extracted from the representative databases (PC-15) as well as the modern knowledge base framework with access to full-text sources of relevant articles, writing a scientific report or article (PC-9, PC-16) in accordance with the requirements of Russian and international scientific magazines (GC-3, PC-9).

The work is based on the results of several fundamental research projects: 1) time budget allocation

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assessment system to estimate students' efforts during individual work at the computer [1], 2) method to control the structure and duration of mental operations during arithmetical tasks solution [2], 3) method of assessment of behavioral events by students' gaze direction during self-paced work [3], 4) method of operator's attention level estimation during the computer testing [4], 5) integration of certificated electronic resources with open education system Moodle [5]. The projects resulted in 5 invention patents and more than 15 publications, and 18 electronic registration certificates.

Based on the splitting of a normative competencies into subcompetencies approach, which can be described by quantitative efficiency and quality parameters and represent some of the professional activities that are characterized by specific assessment algorithms. For a given stereotype implementation efficiency parameters characterize the degree of student's skills development, and the number of errors - the quality and reliability of its normative activities.

Proposed electronic educational resources are designed for individual work of enrolled on the natural sciences faculties students and develop a set of competencies required for a particular specialty. Electronic resources are used at addressing a number of important objectives: the development of theoretical knowledge (online tutorials, knowledge base), specific problems solution (taskbooks, experimental databases), training to work with modern equipment (virtual simulators) etc.

II. CONCLUSION

The environment where students can conduct their educational research works include: display class, local area network, digital learning environment that supports students' individual work with learning resources, 8 stands imitating elements of educational and professional activities with electrophysiological equipment.

The results were approved in a pilot Master Educational Program of the Department of Human and Animal Physiology of Southern federal university, as well as in the international interdisciplinary project 159313-TEMPUS-I-2009-1-FI-TEMPUS-JPCR «Post-graduate Training Network in Biotechnology of Neurosciences» (2009-2013).

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