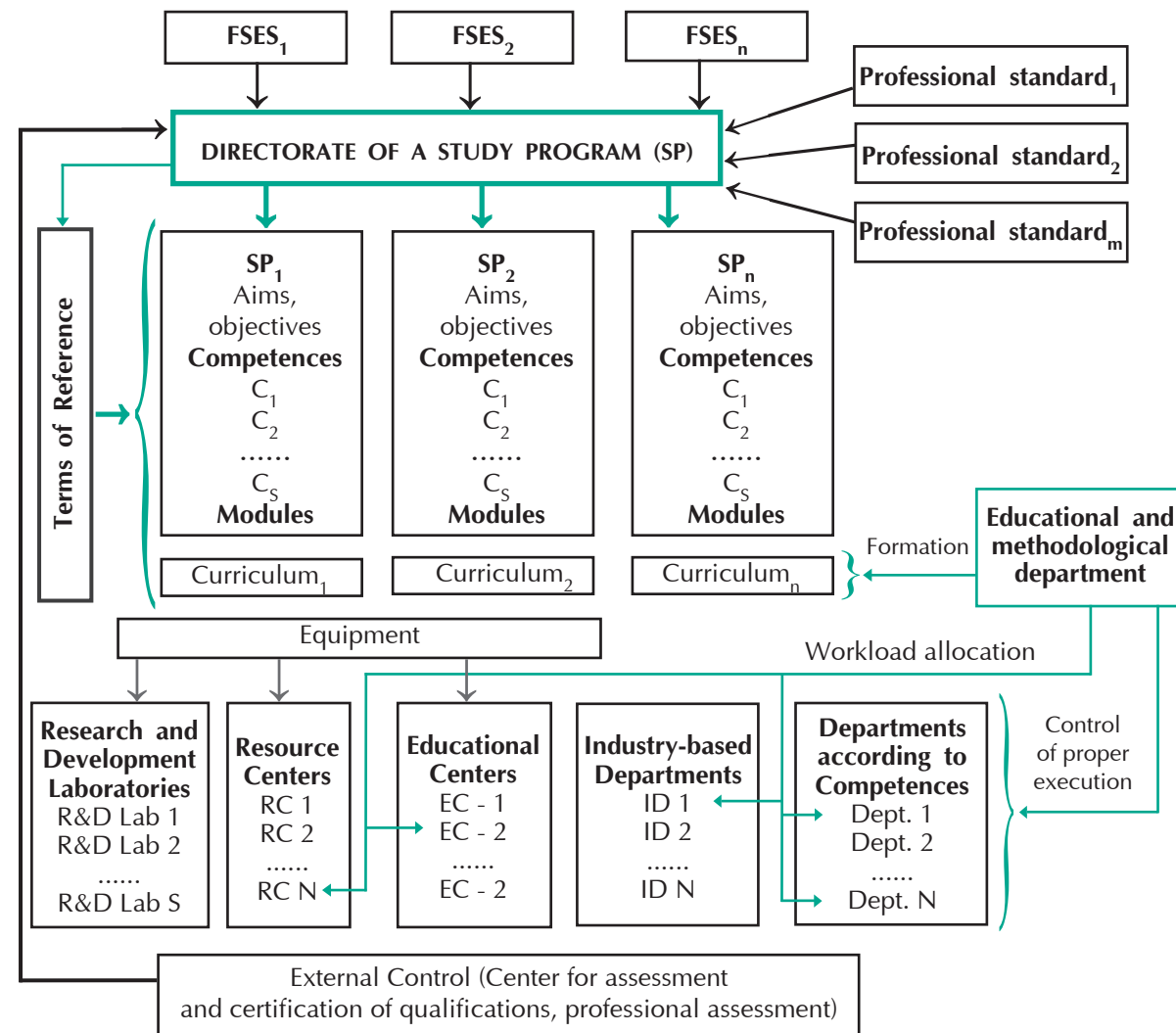


Fig. 1. Model for organization of educational process



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UDC 378.147:678.5.002.6

Interdisciplinary Approach and Interactive Self-Learning

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The paper considers theoretical and methodological bases for interdisciplinary approach to interactive self-learning and principles of academic process organization via interactive learning techniques.

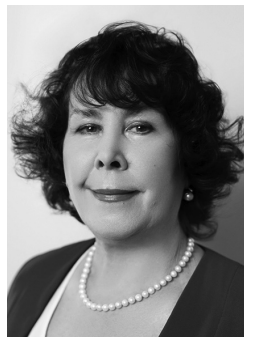
Key words: interdisciplinarity, self-education, interactive self-learning, nature-aligned learning.

In modern post-industrial society, education is a kind of anthropological and social project planning. The foundation of adequate education rests on the social project implying correlation between an individual's ideals and social structure. In social perspective, education fulfils an important function of socialization – an individual acquires knowledge and develops relevant skills, as well as learn social standards and values which stipulate successful life and development in a given society over a definite period of historical time. As for static societies, education is transmission of knowledge, and self-education is a kind of traditional practice. In dynamic societies, which are focused on development, education deals with ideas and practices which have neither become traditional nor been regarded as social and practical standards. Such education implies testing and research, as well as new practices implemented by their creators – fresh graduates. Therefore, education becomes an institution which secures activity development [1].

Education, even reduced to simple acquisition of knowledge in a certain sphere, has impact on an individuals' worldview. Being a complex system itself, the personality is a component of another system – social group, which, in its turn, is included in the system of social relationships. Education deals with psychology and considers existence as polysystemic,

with due regard to the integrity of human qualities and particular characteristics. Therefore, the systemic approach to the analysis of education and self-education is the most adequate one. In philosophy, system is "a totality of elements correlated and interconnected with each other to make a unity" [2, p. 584]. The notions and principles of the systemic approach are as follows: unity, links, structure and organization, a number of levels and their hierarchy, management, target and target behavior, self-organization, performance, and development [3]. Systemic integration of new knowledge into the world model is only possible via interdisciplinary links. The interdisciplinary approach to education allows developing the level of thinking and forming holistic worldview. This approach is also contributive to improve professional, worldview, communicative, and cross-cultural competencies. It is a well-known fact that scientific and technological breakthroughs occur through crossing boundaries in science, as a result of integrated research [4].

The system of today's education is focused on new achievement, which can be proved by the correlation of knowledge and skills within educational process. Knowledge is currently losing its fundamental status since today it is easily available while the methodology is becoming disputable. What society today needs more than anything is skills, and they



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are intensively developing and increasing in number [5]. Under these conditions, the disciplinary structure of educational process is inadequate since it is focused on transmitting knowledge and formalized assessment. Interdisciplinarity, which implies systemic integration of acquired knowledge into the individual's worldview, allows transforming abstract information into applicable skills and competencies.

It is important to note that a student may play different parts depending on the stage of the educational process, however, self-learning, self-organization, and self-management take priority over other educational activities. Didactic systems and technologies developed by experts should encourage self-education, i.e. contribute to acquisition of knowledge in general or in a particular field.

Self-education is an intrinsic mechanism of any educational process. Without being interested and determined, the student fails to reach the expected learning outcomes, whatever the didactic forms are. Self-education is even more significant when the education makes a shift from transmitting knowledge to project-based learning, i.e. dealing with non-standard situations and solving complicated and hand-on tasks, which used to be neglected. Dealing with hand-on tasks (especially in engineering) stipulates interdisciplinary approach, since real life goes beyond the framework of a particular discipline and necessitates taking into account a wide range of factors: technological, scientific, social, ecological, etc. There are no "correct" answers, therefore, traditional transmitting channels fail to work (for example, the situation when the teacher works with the audience in class).

The significant role that self-learning plays in education is undisputable. All teachers agree on the point that professional communication with colleagues is essential to efficiently perform professional activities. Student's academic success and other students' respect are only possible beyond the classroom, and self-study encourage

students to conduct scientific and creative research.

"Development and education cannot be gifted or passed. Everyone who wants to learn something should step up efforts to reach his or her aim. The only thing which can be obtained from outside is impulse...

Therefore, independence is a tool and an outcome of education" [5].

Education at any level, i.e. acquisition of knowledge, can be provided only via self-learning. This is a fundamental didactic principle, which the foundation of education rests on, and it is adequate to develop any didactic and/or educational system.

Today, there are no doubts that education is a complex process depending on an individual's psychology and his/her ability to self-learning. In compliance with this general didactic principle, knowledge, unlike an object, can never be passed (or gifted, or sold, etc.) from one individual to the other without participation in educational process or unless the "recipient" comprehends and processes the knowledge provided. This knowledge can only be acquired by means of the recipient's intellectual efforts and via interiorization, i.e. incorporation of knowledge into one's mind and inner life [6].

It is only self-learning that allows acquiring practical knowledge, developing creative abilities and practical skills. There is no educational process if a student does not take an active part, no matter how active the teachers and parents are.

As a result, we have a model of self-education and self-monitoring, which allow adjusting the educational process to reach the expected learning outcomes with due regard to interdisciplinary links and cooperation between educator and student.

The didactic system of interactive self-learning implies that the interactive self-learning model is intensively used at a certain stage of educational process.

The method and model of interactive self-learning aim to develop nature-aligned and individual-focused method and model of self-learning which make professional education available and ensure that:

- the quality and level of education correspond to the student's educational background and potential (IQ, basic training, etc.);
- educational process is efficient due to being based on the mechanism of self-development, self-education, and improved ability to learn.

Interactive self-learning is a method and model of self-education based on interaction and cooperation between the educator and students, with timely feedbacks and monitoring of nature-aligned and individual-focused self-learning [7].

In the course of our research, we determined the major principles to design the system of interactive self-education and self-learning for higher professional education. These principles are as follows:

1. Self-learning and self-management are predominant over the other types of educational activities.
2. Nature-aligned learning is ensured through the method and model of self-learning, in which learning is predominant over teaching and the educator's part is to contribute to effective learning.
3. Interdisciplinarity is supposed to develop a way of thinking, which implies multi-faceted approach and the discipline taken as a system comprising a bulk of connected components and being itself an element of the metasystem, namely, the knowledge about the world and particular phenomena. This approach is implemented through setting hand-on tasks which necessitate considering many different factors and finding solutions beyond the framework of a particular discipline.

4. The educator's contribution to effective learning, i.e. comprehension and speculating on the information received, is provided via specially designed, adapted, and appropriately structured interactive self-learning tools.

5. The measure to secure the efficiency of self-learning is implementation of multi-level monitoring (entry, interim, final).

6. Self-management mechanism being a part of the didactic system of interactive self-learning induces self-development and self-education, with the educational process nurturing intelligence and shifting priorities from teaching to educating.

7. In compliance with the concept of activity-based learning, practical activities are predominant within educational process and provide fundamental knowledge to be obtained. In combination with improved comprehension of educational materials, it boosts self-learning.

The intensive development of IT systems in Russia, and in Russian education, in particular, facilitates interactive e-learning via implementation of cutting-edge digital and information technologies.

The didactic system of interactive self-learning for professional education stipulates implementation of e-learning, as well as the design of open e-learning resource.

The system of interactive e-learning developed with due regard to the principle of interdisciplinarity allows:

- achieving the expected learning outcomes in group learning environment;
- implementing technologies into educational process, which, in its turn, ensures achievement of expected learning outcomes;
- reducing the number of poor results (or even avoiding any) at the end of the academic term;
- providing high quality professional training within short period of time due to the reduced number of lectures, activity-based learning, and integrated classes;
- improving the potential for continuous professional development via self-development and self-education, which is stipulated by well-developed learning skills.

## Interdisciplinary Interaction in ISO 9001-2015 Standards

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The article is devoted to the analysis of quality management system of interdisciplinary interaction and trends in university QMS improvement in accordance with the requirements of the new implemented edition of International ISO 9000 standards, in particular, the requirement for risk management.

**Key words:** quality management system, interdisciplinary interaction, risk management, positive and negative risks.

Significant innovation potential and highly negative risks of interdisciplinary interaction further the pressing need in considering the International ISO 9001-2015 standard requirements [1], in particular, risk management.

It should be noted that the quality management system (QMS) has been formally implemented into most universities and, in most cases, it lacks high effectiveness. At the same time, the unreasonably imposed scope of documentation does not improve the quality of education. Only a few universities have succeeded in fulfilling the requirements stated in the earlier standard edition, i.e. implementation of approach process into the T&E activity and, thus, achieve effective QMS. Adopted and implemented on November, 1, 2015, the newly edited standards GOST R ISO 9000-2015 and GOST R ISO 9001-2015 [1,2] specified two aspects: firstly, solving the more complicated problems within specified transition period to September, 2015; and secondly, implementing the developed requirements to improve the education program (EP) quality at a totally new level.

Management risks in the QMS structure, being included in the new ISO 9001-2015 standard edition, could be the response to the dynamic external and internal realities of this or that university. Under conditions of unpredictable changing, constant opportunities and challenges, high risk and

subjectivity in evaluating an organization status and its surroundings, probability to achieve the stated goals, the approaches that are applied in high school management require improvement, i.e. implementing the process of management risk. Basically, risk management, within QMS of any company, is a development tool providing the transfer to a more qualitatively conceptual level "preventive action" and relevant documentation procedures, which have been excluded from the described standard requirements.

In accordance with the existing regulatory documents [1-5], the operational definition could be: **risk is the consequence of an uncertainty action on achieving specified goals. "Consequence of uncertainty action"** is any inclination from expected result and/or event, both positive and negative (i.e. not only emerging possibilities but also risks with negative consequences). "Uncertainty" is complete and/or partial absence of information and/or knowledge needed to understand the events, their consequences and probabilities.

In this case, goals as desired result, presently absent, are in good agreement not only with the concept "goal in quality, but also exactly reflect its specific nature "education program goals". The education program path from the stated goal and planned learning outcomes to

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