

# Technologies Didactic Content of the Higher School Students Intellectual Potential Development

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## Abstract

The presence in students of required established and proven general cultural and professional competences' set is the key of the person success in his professional activities. In modern conditions of changing labor market, which is oriented on high-tech competence, a special need is determined by the costs associated with the individual intellectual potential development. Personality, as any kind of commodity, without the intellectual component or insufficient level of development, is not competitive and not demanded by the labor market. The goal of the article consists of the scientific and practical justification of technologies didactic content of the higher school students' intellectual potential development and experimental verification of their efficiency in the educational process. The article presents the theoretical and methodological basis for the design and implementation of technologies didactic content of students' intellectual potential development: the essence and structure of intellectual potential; teaching modules' content, which define a typology of technologies, criteria of technologies' productivity. The leading method of research is the technologies' didactic content modeling method of higher school students' intellectual potential development. The article is intended for higher school teachers, researchers, graduate students, undergraduates, students, deeply studying the problems of SRWS (scientific and research work of students). It is also recommended for the universities Methodists, specialists of national education authorities, the attendants of professional skill improvement system and high schools personnel retraining, school teacher training centers.

**Keywords:** intellectual potential; didactic module; a typology of technologies; labor market; competition; competence; cultural competence; professional competence; intellectual competence

## 1. Introduction

### 1.1 *The Urgency of the Problem*

The urgency of the studied problem is confirmed by the changes in the labor sphere, which are occurring under the influence of the enterprises restructuring processes, greater flexibility in production and services areas managing, the introduction of electronic communication networks, the transition to new forms of work organization and conditions. The proposals in the labor market today are represented as a work based on the contract with clearly defined responsibilities or special temporary projects (grants) performed by one expert or a group of performers. In conditions of accelerating economy the enterprises are afraid of permanent jobs creating where experts work throughout their life – because the mastered knowledge and skills very quickly become update.

Modern profession or specialty become a dynamic short-term packages of competences" by nature, in which qualifications and competencies are not opposed to each other and reflect different aspects of the intellectual potential of the individual. Most specialists are associated with flexible, short-term projects requiring a mix of skills. Versatile professionals with, "intellectual competencies" having diverse personal and social and vocational ability, which are proven by practical experience are demanded today. Instead of specific assignments the specialist has to possess the ability of tasks' creative socio - professional solving, readiness for self-organizing and self-transformation.

These socio - professional trajectory has naturally affected all spheres of educational policy in higher education because high school is a source of replenishment in the spheres of production and services with highly qualified

staff.

Over the past decade, the higher education system is in a state of continuous development, the results of which drove to substantial changes in the institutional system, the educational environment of universities, the educational process structure and content, interaction "teacher - student -study group", the "University - production" integration, etc. The most significant phenomenon in the process of modernization today becomes a reorientation of the strategic goals of the educational process to the development of a self-sufficient student's person - future specialists with a high level of intellectual potential, motivated to self-realization, self-organization, self-development and self-transformation in complex socio - professional conditions of developing mobile labor market. Under these circumstances, educational technologies are given special status, aimed at the realization of modular and competence-based approach, which to the greatest extent is relevant to the development of the individual student's intellectual potential (Requirements of the HPE FSES (high professional education federal state educational standards), 2009; Budanov, 2007; Khutorskoy, 2003). The idea of higher education students' intellectual potential development is the major goal of education in many educational systems of the world practice (Wolfson, 1999; Masalimova, 2007; Oleinikova, 2003): personal intellectual development; moral development of the personality; design thinking development; critical thinking development; divergent thinking development; creative thinking development; development of competencies for working with information, etc.

Modern society is an information society where the intelligence, knowledge and competence are produced and consumed, so it is dominated by the pattern of using these three factors as the main educational product for the labor market. It is quite not coincidentally, that in transforming socio - economic conditions of socio-cultural world order the human dominant values are not so much skills, how much the competences, which are acquired independently, when knowledge on any media, the critical thinking development, independent and creative competencies of responsible decision-making become valuable. The project, the scientific and research work which require an update of educational technologies, acquiring a different form, structure and didactic content acquire the increasingly important significance in the educational process of higher school.

### *1.2 Theoretical and Methodological Novelty of the Study*

Theoretical and methodological novelty of the study is determined by:

- conceptual ideas of modular and competence-based approach to the design and implementation of pedagogical technologies didactic content in the development of higher school students' intellectual potential;
- organizational - structural and substantive components of the didactic modules which define a technologies' typology of students' intellectual potential development.

### *1.3 The Practical Significance of the Problem*

Practical significance of the research is in updating of educational technology by educational courseware materials within the boundaries of the didactic module.

### *1.4 Literature Review*

The state of research problems study in the theory and practice of pedagogy.

Theoretical and methodological basis of research is:

- modern concepts of modular and competence-based approach (Baidenko, 2006; Zeer, 2002; Masalimova, 2007; Raven, 2002; Khutorskoy, 2003);
- concept of design - technological didactic approach to teacher's training (Ibragimov, 2012; Polivanova, 2008; Sobkin, 2010; Choshanov, 2011);
- concept of a synergic approach to higher education students' intellectual potential development (Budanov, 2010; Valeeva, 2001; Vyugina, 2010; Goncharuk, 2003; Pevtsova, 2015a; Shadrikov, 2004);
- concept of project-based learning (Zimnaya, 2003; Novikov, 2002; Polat & Bukharkina, 2003; Pevtsova, 2015b);
- concept of design - oriented approach to University students' teaching technologies (Novikov, 2002; Selevko, 1998; Slastenin, 1997; Chernilevsky, 1996);
- concept of by problem developing - based learning (Makhmutov, Ibragimov & Choshanov, 1993).

## 2. Methodological Framework

### 2.1 Key Notions

- intellectual potential - a combination of sustained, unrevealed outstanding mental abilities of the student individuality of retrospective (yesterday abilities), to - date (today abilities ), prognostic (possibilities for the future), reflexive (possibilities, which are recognized by society) character to adopt, modify, use, reproduce and self - reproduce information, organically connected with mental processes, emotional and volitional characteristics and qualities of the individual in solving problems solving of a changing environment;
- didactic module - an independent part of the discipline with logically completed organizational, methodological, semantic structure, goals, technology, reflecting the movement from idea to reflection, control system and results' criteria;
- technologies' typology - classification of technologies based on the characteristic features of the higher school students' intellectual potential development;
- labor market - the prevailing current and future needs of a particular region in staff;
- competition - the rivalry between individual entities in achieving the same goal each for himself;
- competence - the ability of a person to use knowledge, skills and experience in standard situations;
- general cultural competence - the willingness of the individual to live in the cultural transformation of the society, to build a personal picture of the world - individual beliefs, to live, work, communicate and conduct, educate, train, assimilate new values based on the prevailing socio-cultural experience;
- professional competence - competence which is necessary to implement productive professional activity of a specialist;
- intellectual competencies - the ability of the individual to increase knowledge in various fields, to improve erudition.

### 2.2 Principles

- personal goal setting - orientation of educational process on the individual student 's intellectual potential development - the future professional that complies with the labor market requirements;
- integration - harmonizing objectives of the individual student's intellectual potential development with the objectives of the training;
- intellectual potential development requirements' relationship with production requirements to the personality of the future specialist;
- didactic units compliance in the intellectual potential development with the general cultural and professional competencies' content presented in a predictive model of a University graduate (profession gram, psycho gram, techno gram);
- project activities - focus on the development of professional, cultural, intellectual competencies in the process of research, design, problem - based, creative, learning and cognitive activity of students;
- the self - determination is individual trajectories designing of self-determination, self-education, self-actualization and self-transformation in educational and professional types of labor, intellectual potential development level ensuring in accordance with the personal goals;
- correction involves the correction of the imbalances in the production requirements to the graduates.

### 2.3 Functions

- diagnostic (the socio - professional orientation determining - motives, interests, attitudes, intellectual competence development level identifying, establishing of professionally significant qualities and abilities' severity);
- personal development (motivation, mediation, conflict, criticism, reflection, orientation, and self-determination, etc.);
- activity (the individual needs' gratification in intellectual potential development needed for a particular activity);
- adaptation - professional mobility development, ability to self-education, self-management (the design of alternative scenarios of professional career), the definition of professional activity individual style;

- cognitive (the development of the individual's knowledge about the world, the common culture, new knowledge cognition, self-education);
- prognostic (personality's creative potential revealing, setting formation on professional growth, career, readiness for innovations);
- correction (changes setting in professional activities development, overcoming professional crisis, deformations and stagnation overcoming);
- communication (development of self-management skills to establish contacts with others, establish civilized relations with others, knowledge of verbal and nonverbal communication skills to lead the team);
- reflective (abilities improvement to take decisions in various professional situations, critically use the knowledge to correct the errors and miscalculations).

#### *2.4 Organizational - Structural and Content Components of the Students' Intellectual Potential Technology Development within the Didactic Module Boundaries*

##### 1. Theoretical justifying:

- formation of educational - scientific knowledge informational base (Pevtsova, 2004);
- definition of goals and objectives of students' training content;
- construction of conceptual schemes, models of training program documentation, the education content elements' interrelation justifying;
- concepts and categories clarification of structure and content of the individual student's intellectual potential development technologies within the didactic module boundaries;
- didactic and methodological forms and methods of technologies' designing selection.

##### 2. Structural - semantic content project of higher school students' intellectual potential development technologies within the boundaries of the didactic module boundaries:

- scientific substantiation of principles of content selection and educational material structuring;
- theoretical knowledge system definition, providing training and practical knowledge profoundness which form the basis of professional skills;
- interdisciplinary links establishment in linked fields of professional activity;
- professional knowledge integrative relations' identification with other Sciences and professional knowledge system definition as a unified entirety of intellectual potential;
- the selection in the training content of : 1) the invariant part, which describes new and promising technologies for modern production, technical facilities etc.; 2) the professional part, which combines a professionally oriented knowledge, selected in accordance with the groups of occupations; 3) the specialized parts, including concepts and theory, selected in accordance with the specialization of students; 4) the ideological part, combining socio - humanitarian, ecological knowledge, providing cultural direction of knowledge.

### **3. Results**

#### *3.1 Pedagogical Nature of Higher Education Students' Intellectual Potential*

It is determined by the current tradition in psychological science, a tradition of understanding the essential characteristics of intelligence as relatively stable patterns of mental abilities, organically connected with mental processes, emotional and volitional characteristics and other personal qualities (Shadrnikov, 2004). The structure of intelligence by inertia today includes three groups of factors:

- intellectual abilities (cognition, memory, thinking, evaluation, etc.);
- specific material, which is perceived through the senses;
- thinking end-results (elements, class, relationship, system, foresight, etc.

But due to the discoveries in science and technology, electronic machine tools' making, able to solve complex problems, development of new scientific trends, discoveries, the phenomenon of artificial intelligence appeared. These innovative trends make adjustments in the structure and content of the classical psychological definition of "intelligence". Under the intelligence they began to understand the cognitive activity of man and all other complex systems, capable to learning, creative information processing and self-transformation (Vyugina, 2010; Goncharuk, 2003). Cognitive human activity, therefore, is just one of the forms of intelligence manifestation.

The automation introduction into intellectual processes and systems' creation with a high degree of artificial intelligence allow create intelligent systems, through which people are able to carry out cognitive processes in symbiotic functional unity of natural information media and electronic devices.

Innovative conditions which are specified by the discovery of nanotechnology, determine the use of hybrid intelligent systems, liberating man from routine activities for imaginative creation. Redistribution of functions between natural and artificial information agencies greatly enhances the development of the human intellect possibilities, intellectual transition opportunities into reality. Opportunities transition into reality is a process of intellectual potential actualization, becoming possible when there are conditions which make entities' self-realization so as his very existence real (Vyugina, 2010). The potentiality transition into reality, i.e. the maintenance of its existence, is carried out by various social institutions, including educational activities, designed to update the internal properties of the person. This category actualization emphasizes the dual nature of behind it- phenomenon: on the one hand, the efforts of the pedagogical activity's entity on creation of certain conditions, on the other hand - the personality activity.

Consequently, forms of intellectual potential are always dialogical, together doing, together creating. In this regard, it is important to prioritize personal development as potentially the content of person's "ideas" (his plan) is boundless, and he himself, in the practical plane of existence is opened to all embodiments, including also opposite ones in social and cultural sign. Because in modern society intelligence, knowledge and competence are produced and consumed, it is dominated by the pattern of using these three factors as the main educational product for the labor market. All this radically alters the methodological component of pedagogical technologies' didactic content, increase the intellectual potential of students as the leading component, as the strategic goals of education focused on the needs of the individual, the demands of society and the labor market.

### *3.2 Technologies' Classification in Higher Education Students' Intellectual Potential Development*

Conceptual ideas of modular and competence-based approach orient the higher education educational process on problems solution of intellectual, developed competent specialist's formation which is required in the modern labor market.

In the process of the conducted research, we determined the classification of innovative technologies, which are identical to aims, objectives, content of students' training - future specialists. Among these technologies a special mission in the development of intellectual potential belongs to:

- design technology that acts as a practical concept, which is implemented by the students. In the process of design activity, students independently formulate the problem, purpose, hypothesis, objectives, develop long-term plans of work, practically implement them, evaluate and control the quality of the final product. As a product recommendations for educational institutions and production, reports, abstracts of materials on a given topic, abstracts, research projects, theses, articles, computer programs, etc. can be presented;
- techniques of constructive learning. They are similar with design technologies;
- simulation planning technology. Is a kind of role play in the learning process. These technologies stimulate individual activity of students and develop the corporate culture. Thus students develop an understanding of the dependence of technology on the content of the studied material;
- technology of situational method. It stimulates analytical thinking and develops the ability to transfer and apply theoretical knowledge in practical activities, forms competence of teamwork;
- interactive technology. These technologies include simulation, role-playing and business games. These technologies allow to significantly improve the intellectual activity of students: the ability to formulate the problem, be initiative, independence, be able to work in a team etc.;
- trainings of the team spirit. They enhance socio - professional status, professional self-preservation, social and professional adaptability;
- developmental diagnosis technology. These technologies are focused on motivation enhancing for professional growth, formation of adequate self-esteem, personal and professional status;
- technology "the case study method". The essence of this technology is that it offers students a real understanding of a social problem or situation. The initial material for the work is the package (case), which contains information about the problem, which is in the content of the studied topic. Students, comprehensively discussing the problem situation, justify its decision, which is further given to experts' evaluation. In the process of problem analyzing and the optimal solution finding such important competences as goals' achievement motivation, flexible thinking, teamwork and responsibility are formed;

- technology of professional and personal development portfolio. It is used in teaching practice also as a monitoring and evaluation mechanism of students' intellectual development, so a condition of students individual training trajectories' building, the systematic collection of evidence, which serve as a method of systematic reflection on their own activities and results' view in one or more areas for ongoing assessment of the educational activity. In the aspect of the studied problems, the portfolio is not only a report on the educational process of personal activity, but a continuous formation of the intellectual mechanisms of self-organization and self-realization, self-assessment in purposes' achieving, peculiarities of the course and quality of the results of educational work, the analysis of work features with different sources of information, sensations, thoughts, impressions.

### *3.3 Didactic Module*

In the research process, the peculiarities of training modules designing are established, enriching the pedagogical technology didactic content of higher school students' intellectual potential development. The first procedure in this process is each component processing in the didactic content and its visual representation in a modular program and in the module, the division of the discipline content into intrasubject logical components of training material (topic, several topics or sections) which involve obligatory control. Depending on the amount of content the number of hours allocated differs from 3 - 5 till 8 - 12 modules. The second procedure aims at identifying of specific learning objectives for each module.

In accordance with the requirements of the HPE FSES, the model of the specialist, the technology, the material content, the list of knowledge to be learned and competences to be mastered by students is accepted, a system of ultimate goals' achievement monitoring is established. A third procedure is aimed at defining of the relationship between students' knowledge and skill levels. So, the lower the reproductive level of training requires students' elementary reproduction of knowledge and skills. And higher, productive level lifts students on a creative level. Students have the right of choice, so in the process of studying the module, they can move from reproductive to productive or creative levels. To achieve these goals the developing technologies are worked out. This is the strategic goal of didactic technologies designing of higher school students' intellectual potential development within the boundaries of the training module. The fourth procedure is the development of tasks system for each student individually. For each module of the subject teacher plans various activities for the students. These are project development, problem solving, laboratory work, practical tasks doing, preparation of reference notes, etc. Analysis of established procedures shows that the purpose of didactic technologies content within the boundaries of the training module is relevant to the modern higher school directions of intellectual potential development by providing flexible training content, its rethinking and adaptation to individual opportunities, expectations and level of intellectual potential development.

## **4. Discussion**

The results of the study confirm the assumption about the theoretical and practical feasibility of the didactic technologies' design and implementation of students' intellectual potential development within the boundaries of the training module.

The effectiveness of pedagogical conditions' complex developed in the process of the conducted research (organizational, methodological, content, technology, criteria) is confirmed by experimental work results. To determine the basic parameters of students intellectual competence development a set of criteria was used: the cognitive component (logical expression skills' presence - 53%); emotional component (self-critical in relation to their own activities - 54,7%); behavioral component (active in the continuous improvement of their educational and cultural level - 67.3 per cent); professional component (capable to apply adequately the formed competences - 56,8%). Assessment of intellectual potential development was made on the basis of indicators' set which determine the level of students' knowledge about its characteristics: a retrospective potential (45%); actual capacity(65%); predictive potential(45%); reflective capacity(45%). The formed intellectual competencies criteria implementation were determined by the activity results: motivation for the competences' development (47,9%); competencies' operating (61.3 per cent); activity goals' design (57,8%); alternative competencies' choice (67%); self-determination in activities (57%); willingness to changes (45%).

## **5. Conclusion**

Turning to the problems' study of the higher school students' intellectual potential development is predefined by society demands, the labor market in highly competent professionals with a high level of intellectual potential. This trend is becoming a priority of state policy, because in modern conditions the state and society need a new generation of young professionals - intellectuals. In connection with these trends, the pedagogical technology development of higher school students' intellectual potential development on the basis of the training module's

didactic content is consistent with the purposes.

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