Meteshkin Kostiantyn, Sokolov Oleksandr, Morozova Olga, Teplova Nataliya. Integration of higher and secondary education: problems and ways of their solution on the basis of information technologies. Journal of Education, Health and Sport. 2016;6(7):375-390. eISSN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.58067
http://ojs.ukw.edu.pl/index.php/johs/article/view/3703

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 755 (23.12.2015).
755 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 15.06.2016. Revised 09.07.2016. Accepted: 15.07.2016.

INTEGRATION OF HIGHER AND SECONDARY EDUCATION: PROBLEMS AND WAYS OF THEIR SOLUTION ON THE BASIS OF INFORMATION TECHNOLOGIES

Kostiantyn Meteshkin[1], Oleksandr Sokolov[2], Olga Morozova[3], Nataliya Teplova[4]

[1]Department of Geoinformation Systems, Estimation of Land and Real Estate, National University of Urban Economy, Marshal Bazhanov Street 17, 61002, Kharkiv, Ukraine
E-mail: kometeshkin@yandex.ru

[2]Department of Informatics, Faculty of Physics, Astronomy and Informatics, Nicolaus Copernicus University, Grudzianska 5, 87-100, Torun, Poland
E-mail: osokolov@islumk.pl

[3]Department of Theoretical Mechanics, Mechanical Engineering and Robotic Systems, National Aerospace University, Chkalov Street 17, 61070, Kharkiv, Ukraine
E-mail: oligmorozova@gmail.com

[4]№ 105 Kharkiv comprehensive school of I-III level of Kharkiv City Council of Kharkiv region, Danilevsky Street 36, 61058, Kharkiv, Ukraine
E-mail: natateplova7@gmail.com

Abstract: Many of today's problems are related to state and efficiency of education system in the country. This article deals with the integration problem of higher and secondary education through creating information relationship between schools and higher educational institutions. The system analysis approach forms the basis of researches. These methods examine the crisis arising between higher and secondary school systems. Besides, systemic and synergistic approach is used. Its techniques help to identify signs of the change of methodological pedagogy paradigm to methodological educology paradigm. Entrants have complications while entering and choosing a higher educational institution and faculty. Cross-contradictions between two educational systems – higher educational institutions and secondary schools are studied.

Keywords: methodology; paradigm; school; higher educational institution; information technologies.

1. Introduction

Education of people is one of system-forming bases of state system. It is known that the education system is closely connected with other systems that determine the effectiveness of state structures – political, economic, legal, etc. Improving the efficiency and quality of education depends on many factors, in particular on the absence of the code of education in Ukraine – laws tied together on education (higher education, secondary education, pre-school education, etc.). Advantages and disadvantages of law and legislative field in Ukraine are given in detail in works (Meteshkin, 2012).

From the system theory standpoint, the mentioned laws provide the organization of connections between elements and subsystems in the global state education system, in higher educational system, complete secondary education and others. Analysis of the structures and relationships between and within these systems shows that there are many problems, both at the methodological level of development and operating of education systems as well as at the information level.

The problems of integration of higher and secondary education in Ukraine and the ways of their solution with the help of information technologies are considered in this article.

2. Analysis of recent researches and publications

Analysis of recent researches and publications shows that currently there are a large number of scientific literature, both domestic and foreign where the processes and phenomena associated with the introduction and usage of information technology in secondary schools and institutions of higher

education are examined (Voznyuk, 2009, Kalontarov, 2014). The practice of teaching in the university and educational work with first-year students shows that the former school graduates are experiencing some difficulties in the transition from the less complicated system of education – schools to a more complex system – higher education institution. One of the main reasons of difficulties arising in education among first-year students, in our opinion, is the transition from acquiring unrelated general knowledge (in physics, mathematics, chemistry, language, etc.) in school to the formation of professional knowledge in the specialty. The difficulties obviously are in the career guidance for pupils. Today a large number of events such as university open days, etc and preparatory courses are organized in order to guide pupils in choosing their future profession.

Modern information technologies make it possible to organize the communication among university teachers and pupils, their school teachers and administrators in the virtual space on a permanent basis.

The aim of the article is to detect the contractions between the functioning processes of the systems of higher and secondary education and also to show the ways of solving the integration problem of these systems on basis of information technologies for career guidance for senior pupils who have learned the basics of computer science.

During research common scientific methods – analysis and synthesis, aggregation and decomposition and analogy method are also used. In particular the set of higher education institutions is presented as complex system – higher education, and the set of comprehensive schools by analogy also presented as complex system – secondary education. In researches the system approach is used, particularly the methods of setting the problems of integration of higher and secondary education, where the relationship of contradiction between the positive and negative sides of the test of the integration process between two complex educational systems are emphasized.

Besides, during the process of research the separate methods of systemic and synergistic approach were used to establish features of evolutional development of methodological bases of pedagogy. Experimental methods are very important in there researches. They made possible to establish strong and weak sides of using the information systems in higher educational institutions and secondary schools.

3. Features of new methodological paradigm of development of pedagogy

Many scientists in Ukraine (Kuzmenko, 2014, Ohnevyuk, 2009) studying the processes and phenomena of training and education conclude that present development of methodology of pedagogical sciences undergo revolutionary changes, i.e. at this historical stage the transformation of traditional methodological model of pedagogy as science about training and education into the new methodological paradigm, so called methodology of educology.

The bases for arising methodological paradigm are not only humanitarian (Kremen, 2008) but technical sciences as well – theory of systems (Karl Ludwig von Bertalanffy, 2013), theory of automatic control (Yarushek, 1993), cybernetic pedagogy (Meteshkin, 2004) and so on. Analysing evolutional development of methodology one can distinguish some historical facts which have led to a "break" of methodological bases of education. First of all, this is the first higher educational institution (academy) created by Platon where students got fundamental knowledge on a basis of mathematics. It is generally recognized that according to Platon’s requirements one cannot study at the academy without knowing mathematics. In principle, this historical fact testifies that there was the division of existing at that time system of education into two systems – school and higher education. It should be mentioned the historical fact of creating the Great didactics by J.A. Komensky at the end of the Middle Ages in which the main principles of education are fixed. Namely didactics is

considered the basis of methodology of pedagogy, because its principles unite the system of higher and school education.

Direction of developing any methodology of science depends on chosen object of research; in particular, at the beginning of the past century the famous teacher A.S. Makarenko formulated the object of research of pedagogy as system of pedagogical phenomena that in our opinion is fuzzy and unspecified concept. Besides, many present authors of textbooks and training appliances in pedagogy and pedagogy of higher school adhere to anthropocentric approach while formulating the definition, that is the object if pedagogical research (Podolyak, 2006, Fitsula, 2007).

Let's note one more historical fact which essentially influenced the formulation of new methodological paradigm in pedagogy. It is the "start-up" of process of integration in higher schools in states of European Union, so called "Bologna process". The idea of creating transnational system of higher education gave impetus to create collective intellect on the basis of modern technologies (Wachter, 2004). Among with this, the problems are complicated. It is connected with preparing the school pupils for training in higher educational institutions which are integrated into transnational system of higher education.

Thus, for a past century the great by scale structural transformation took place both in society and in methodology of science and, in particular, in pedagogical one. Modern society develops by the way of integration, informatization and also strengthening communications between system-forming state structures.

Relations between educational systems, in particular, European states, are strengthened and become more various. Methodology of pedagogy in its development for last one hundred years is characterized by the change of some methodological paradigms connected with achievements of scientific-technical revolution. Its structure from simple consisting of three scientific directions and

theories (didactics, school-conduct and theory of education) was reformed into complex structure consisting of a great many theories and scientific directions. Besides, new and original results in the field of education and training a man are obtained in the frameworks of other sciences such as psychology, sociology, economics, cybernetics and so on.

4. Practice and crisis-ridden phenomena in relations of two systems – higher and secondary schools

What does the practice of interaction of higher educational institutions with comprehensive schools show?

Answering this question one can use the methods of system analysis and presume that higher education is the set of higher education institutions and the set of comprehensive schools of I-III level, colleges, schools and technical schools with corresponding organs of control – secondary education. The interaction of two educational systems in generalized view will be shown schematically in Figure 1.

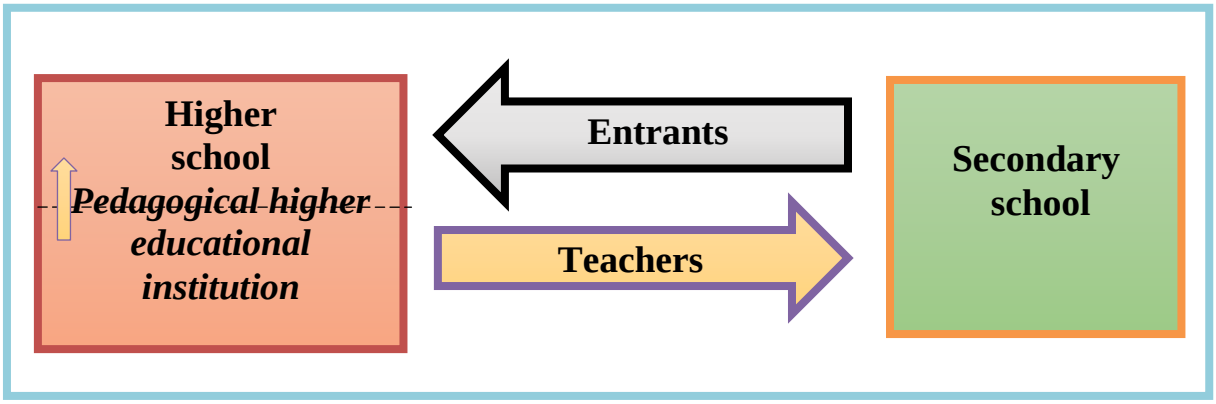

Figure 1. Generalized scheme for interaction of higher and secondary schools

The scheme on Figure 1 presents main connections between considered systems. Secondary school organizes admission of student into higher educational institutions with help of procedures of independent testing.

Unfortunately, the procedure of independent testing has both positive and negative sides. More details about procedure and special aspects of External independent testing can be found on the official website (The Ukrainian Center for Educational Quality Assessment) [17]. Let us centre upon the analysis of one of negative sides – the rules for entrants when entering the higher educational institutions. During several years' observation of organization and holding the entrance campaigns in National University of Urban Economy an interesting fact was discovered. Entrants come with whole family to hand in the documents for entering the higher educational institution. Their mothers, fathers, grandfathers and grandmothers help them to choose profession. What is the reason that modern entrant cannot choose their profession themselves? In our opinion the reason is the practical solution of multi-criteria problem with the corresponding requirements. A secondary school graduate is proposed to solve a task from the field of mathematical, programming (linear, dynamic, and bulging). Is a school leaver practically ready to solve tasks of optimization, if from mathematical disciplines he was taught only to arithmetic, general algebra, geometry and trigonometry?

That is why the joint “collective intelligence” of a family imitating the work of commission of experts calculates and estimates: family budget, certificate marks and abilities of an entrant, remoteness of higher educational institution from native home, absence or presence of a hostel, possibilities of labour arrangement of future specialist (master) and so on. Finally the family “commission of experts” has to arrange priorities of higher educational institutions and specialities of possible education of future student.

Pupils of upper secondary school and their parents begin to work at this task beforehand choosing higher educational institution where they enter the preparatory courses to get additional marks stipulating for hope to get desirable budgetary place in a concrete higher educational institution.

Preparatory courses organized by educational institutions are one of the ways to establish connections between secondary educational and higher schools. Unfortunately, such connection is episodic for limited number of pupils (only for pupils from graduation forms) and monotonous according to contents. Preparatory courses are mainly intended for “coaching” the school pupils in solving test tasks of the same type. The similar courses do not foresee any career guidance. However, there are comprehensive schools and colleges which have professional direction that from time immemorial orients leavers of these schools to narrow searching higher educational institutions and specialities for further education.

Figure 1 shows connections of higher educational school with secondary school. Connections are formed due to preparation of pedagogical cadres for all system of state education. However, practice shows that novice teachers admitted to conduct lessons with students have poor knowledge in the field of didactics, in particular, main didactic principles of J.A. Komensky and modern interactive methods of reaching at higher educational institutions.

Comparing educational processes occurring in secondary and higher schools one can find significant difference in their structures. Besides, when investigating their types of support: material, technical, linguistic, methodical, information and others one can discover preferences of systems of higher school over secondary schools. Together with that, the analysis of higher educational ones shows that training appliances (textbooks) for schools are manufactured more qualitative than at higher educational institutions. School textbooks have colourful illustrations, are written in plain language, have analogies in electronic textbooks that cannot be said about most of educational literature published for higher educational institutions. Often higher educational institutions in order to save costs produce educational literature of poor quality which is written without considering the known principles of didactics.

At our sight, from the above it might be assumed that two systems – higher and secondary education function as such, but interact with each other during conducting independent testing. Certainly, it is subjective opinion of authors who generalized the practice of functioning schools and higher educational institutions. Along with it, there are schools which support close connection with higher educational institutions. Some private higher educational institutions have comprehensive schools in the structure. Creative and innovation teams like BerkoShko (the space of home education) [3] are organized. Authors stress that this article deals with general tendencies of integration of higher and secondary educational schools.

5. The ways to solve the problems of integration of higher education institutions and secondary schools

Mankind has passed long way of development and has come to the society based on knowledge where information technologies or as they are called IT-technologies play a great significance.

Information technologies at present time are used in many spheres of human activity, including the system of education. Modern students and school pupils have a wide access to calculating technics and learnt to use information nets, in particular, Internet. Many higher educational schools have their corporative information nets, on the bases of which wide circle of necessary and important tasks are solved. Comprehensive schools keep up with IT-technologies, where along with classes of physics, mathematics, geography and soon there are classes of informatics which have access to Internet at present time each secondary school, college or technical school have possibility to organize and accompany their sites free of charge.

The information-communication infrastructure is created according to the law of Ukraine “About conception of National programme of informatization”

(1998) [7] in the education system. However, practice shows that built infrastructure is little efficient and is substantially used for advertisement of processes in training, education and informing the participants of training and educational processes about different events. At our sight, such situation is determined by some reasons.

Firstly, scientific bases of creating the information systems and their effective using on the basis of web-technologies are poorly developed. This remark in full measure belongs to both secondary schools and higher educational institutions. In the work (Meteshkin, 2014) the basic conceptual and principle concepts of creating information systems for higher educational institutions, in particular, for departments are cited. They can be used partly while developing sites for comprehensive schools.

Secondly, the new law of Ukraine “About higher education” [20] takes slightly into account the basic concepts of National informatization program [7], in the part concerning informatization of education and science, resulting in useless “paper creation” and considerable reduction of time for pedagogical and scientific-pedagogical workers for thinking, approbation and realization of interactive methods of teaching.

Thirdly, many entrants study at higher educational schools on those specialities which do not generate interest and as a result they seldom attend studies, get satisfactory and unsatisfactory marks, and some of them want to get just a piece of paper about graduation from the higher educational institution and even of European standard instead of knowledge.

Figure 2 shows fragment about organizing the collaboration of the department of Geoinformation Systems, Estimation of Land and Real Estate of Kharkiv National University of Urban Economy named after A.N. Beketov and № 105 Kharkiv comprehensive school of I-III level on career guidance work with entrants (Site of the department of Geoinformation Systems, Estimation of Land and Real Estate) [16].

As part of cooperation on career-oriented work a special page has been allocated on the site of the Department of geographic information systems, valuation of land and immovable property. The page was named “Geography classroom” (developed partially), where the information about object and subject of study of geographical sciences not provided by school plans and programs is published.

Figure 2. Fragment about organizing the collaboration on career guidance work

Thus, to strengthen connections between higher educational institutions (departments of career guidance) and schools it is necessary to organize the systems of supporting the educational processes in schools on the basis of web-technologies, giving them professional directionality.

6. Conclusion

Conclusions are made that today pedagogical training on teaching in higher education is organized poorly. In this work the information and methodical support for schools and higher educational institutions is analysed,

as a result of which the conclusion about poor organization of such a support in many higher educational institutions is drawn. It is noted that at present time comprehensive schools gained access to the Internet and they also launch websites that is a powerful tool both for teachers and for pupils and their parents when solving the problems of education and upbringing. However, it is noted that most of schools use information resources of the Internet ineffectively. It is shown how to solve the problem of career guidance for pupils using the example of information technologies, in particular, creating the system in support of educational processes in schools giving them professional directionality. Specific proposals are formulated to create special standards for information systems used in schools, educational materials of "new generation" motivating the trainees to self-education, the system of self-education of teachers in higher educational institutions and teachers in schools for creating and accompaniment of sites.

The preceding leads to conclusion that most of problems in education may be solved or at least soften through informatization of training, education and upbringing processes and system integration of higher and secondary educational schools as well. On this basis we propose:

– to introduce standards for informational systems used in higher educational institutions and schools side by side with existing ones;

– to develop and improve the methods of both teaching and control of educational processes through creating the systems of intellectual support of these processes on the basis of existing infrastructure of educational nets (Scott Freeman, 2014);

– to create educational material of "new generation", motivating learners for independent, profound study of discipline, as it is proposed in technology of education "Partnership", the description of which can be found at the link [11];

– to teach and self-educate pedagogical and scientific-pedagogical workers to methods of creating and accompaniment of dynamic sites, to gain experience of their structuring and using as instrument to control pedagogical collective and training process as a whole.

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