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THE MODERN METHODOLOGY OF SHAPING PROFESSIONAL COMPETENCE AMONG UNIVERSITY STUDENTS

Marzhan Kenenbaeva[*], Baglan Zhaparova[*], Aliya Mombek[**], Aigul Iskakova[**], Kulbarshyn Meterbaeva[**], Akgul Zhubandykova[***] and Roza Nabuova[***]

Abstract: The present article discusses the modern methodology of shaping professional competence among university students. A whole span of universal and professional competence among university students has been selected and discussed. The key principles and mechanisms for shaping professional competence among university students in the context of computerization of education have been identified. An instructional model for shaping professional competence among university students in the context of computerization of education has been created and put into practice. Experiments have shown high efficiency of the elaborated instructional model for shaping professional competence among university students in the context of computerization of education. The instructional model for shaping professional competence among university students in the context of computerization of education is recommended for use in the university educational process.

Keywords: Modern methodology, shaping, professional competence, students, university, instructional model, computerization of education.

INTRODUCTION

Social and economic changes taking place in modern society that has different expectations from higher education, i.e. professional competence of a university graduate, prove the need for a competence-oriented approach in this education sector. Our analysis of a considerable number of research studies on the competence-based approach (Adieva, A. and S. Djamalova. (2013); Zhumasheva, A. et. al., (2016); Brown-Rice, K.A., Furr, S. (2013); Utegenov, Y. et. al., (2014); Dobrova, L.V. (2009); White, R.W. (1959); Berkimbaev, K.M. et. al., (2012); Zhumabaeva Z. et. al., (2016); Chown, A. (1994); Sundburg, L. (2001) has shown that traditional knowledge, skills and abilities need not to be contested in the new educational context. Emphasis is now put on knowledge, skills and abilities, the implementation of which contributes to the shaping of professional competence that most specialists perceive, today, as an individual's ability and readiness for a specific activity (Day, Ch. (1994); Zhaparova, B. et. al., (2016); Fernandez, N. et. al., (2012); Saliyeva, A.Z. et. al., (2016); Gifford, S. (1994); Sakenov, D.Zh. et. al., (2012); Henner, E.K. (2004); Rakhimbekova, G.O. et. al., (2015). The shaping of students' professional

[*] Pavlodar State Pedagogical Institute, Kazakhstan, 140000, Pavlodar, Mira Street, 60

[**] Kazakh National Pedagogical University named after Abai, Kazakhstan, 050000, Almaty, Dostyk Avenue, 13

[***] Kazakh State Women's Pedagogical University, Kazakhstan, 050000, Almaty, Gogol Street, 116

competence in the context of computerization affecting all sectors of modern society is impossible without improving the higher education system by the use of information technology that is now acquiring special humanistic significance, since it provides students with unique opportunities for self-fulfillment and positive thinking. Contradictions between ongoing updating of skills, the development of information technology, the appearance of innovative learning technologies and their slow implementation into university learning practices sets the present research firmly within the context of our wider purpose of developing an instructional model for shaping of professional competence among university students in the context of computerization of education.

The analysis shows a number of contradictions relative to methodological foundations for shaping professional competence among university students in the context of computerization of education:

- between the needs of society and the modern job market for a new kind of specialists having new professional training and the lack of methodological foundations to achieve this level;
- between the necessity to shape professional competence among university students in the context of computerization of education and the lack of methodologies to shape and develop it;

The need to handle the above-mentioned contradictions has determined the objective of the present study, which is to pinpoint and discuss the modern methodology of shaping professional competence among university students in the context of computerization of education.

METHODS

Our research is based on educational philosophy, theory and research studies; the development of educational technologies; the theory and application of computerization of education; the education quality theory. Our study is focused on using the following theoretical methods: higher education theory; professional and teaching education theory; professional competence theory; methodological system setup theory; learning process design theory; teaching content creation theory; theory of activities and their role on personality development; theory of creative activity in the learning process; computerization of learning theory; testology theory; theoretical foundations of setting up monitoring and evaluation frameworks in education; rules and regulations concerning organization and monitoring of learning activities. Our research methods include theoretical analysis and conceptual synthesis of scholarly sources on psychological, educational, social and economical issues related to professional higher education processes and outcomes; analysis of psychological, educational, research and course materials, research-to-practice conference proceedings and Internet resources on the given topic; analysis of

education guidelines (State educational standards, professional training curricula, agendas, regulatory documents) that determine the direction and technologies aimed at implementing educations programs in the context of computerization of education; study, synthesis and systematization of teaching experiences related to computerization of education, elaboration and implementation of innovative educational technologies; modeling; private empirical methods (surveys, discussions, interviews, observations, testing), teaching experiments; qualitative and quantitative analysis of research results; statistical data processing.

RESULTS

The key notions in our research study are the following:

- Competence, abilities and knowledge that enable a person to act efficiently in a situation. The specialists' competence is an integrative quality enabling them to acquire and apply interdisciplinary knowledge and skills in a professional activity.
- Universal (common) competence refers to particular features of the specialist and fall into the following categories: social, personal, scholarly and instrumental.
- Professional competence mirror professional features of the specialist and fall into various categories corresponding to the key professional activities of the specialist (educational, methodological, formative).
- Professional competence is the result the training of students majoring in specific fields, which is reflected in how well university graduates have acquired universal and professional competence and in their overall personal characteristics.

We have analyzed the issues about the shaping of professional competence among university students and the reasons and factors behind the development of competence-based approach in professional education (Hoffmann, T. (1999); Onalbek, Zh.K. et. al., (2013); Hutchinson, D. (1994); Omarov Y.B. et. al., (2016); Karimova, A.E. et. al., (2016); Murzatayeva A.K.(2014); Kramsch, C. (2006); Mirza N.V.(2013); McClelland, D.C. (1973); Makhashova, P. et. al., (2016). Under modern conditions, education development gives priority to the training of specialists who possess the attitudes for professional and socio-psychological adaptation in a rapidly changing world. Education is not only a means for responding to demands of new society and market economy, but also a way of achieving and shaping creative and spiritual needs of individuals. The change of the education paradigm is accompanied by the process of refocusing educational outcomes from notions, such as "preparedness", "accomplishment", "general culture", etc. to the notions of "competence", "professional quality". Our study has focused on the notions of "competence" and "professional competence", which put emphasis on atomicity of

competency in relation to professional competence interpreted as a complex system of interrelated competences.

It is assumed that the list of competences is easy to compile, but difficult to explain methodologically. As of today, there are a number of classifications of competences as far as professional education is concerned. Two distinct groups are usually distinguished: universal and professional ones. A separate issue concerns the structuring of competences inside these groups. Our research has elaborated a methodological model of shaping professional competence of university students in the context of computerization of education, whose target function is to organize student training in line with a specific major. It is a system of universal and professional competences to be acquired in order to achieve professional competency. Figure 1 shows a set of competences classified according to the methodological model of shaping professional competence of university students in the context of computerization of education.

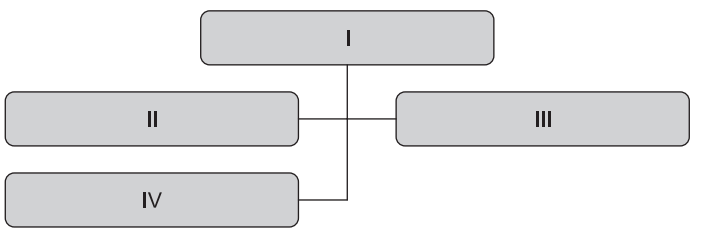

Figure 1: A set of competences classified according to the methodological model of shaping professional competence of university students in the context of computerization of education

Note to Figure 1. A set of competences classified according to the methodological model of shaping professional competence of university students in the context of computerization of education:

I. Set of competences
II. Universal (common) competences refer to particular features of the specialist and fall into the following categories: social, personal, scholarly and instrumental
III. Professional competence mirror professional features of the specialist and fall into various categories corresponding to the key professional activities of the specialist (educational, methodological, formative).
IV. Professional competence is the result the training of students majoring in specific fields, which is reflected in how well university graduates have acquired universal and professional competence and in their overall personal characteristics.

Our research has proved that the totality of universal and professional competences results from training that should provide the basis for building up

educational content and correspond to educational curricula. At the same time, the following challenges are to be responded to: determining the totality and order of shaping universal and professional competences; specifying the stages of studying academic disciplines; establishing relations between competences and content of academic disciplines that ensures shaping of a specific competence.

Communication technologies as a means of acquiring interdisciplinary knowledge and skills and of shaping professional competence is a major part of the process of shaping students' universal and professional competences. Overall, various competences, educational content and information and communication technologies provide the necessary educational setting for the implementation of educational objectives.

The following key directions ensuring the development of computerization of education in professional higher education have been identified on the basis of the conducted study: enhancement of information culture among teachers and students; elaboration of educational content in line with universal and professional competences; facilities and resources development; professional education setting modeling; use of Internet and multimedia means for attaining professional education objectives by means of an education quality management system.

Assessment of learning outcomes based on traditional means of control leads to subjectivism, to incompatibility of grades and, as a result, to their devaluation. The elaboration of the needed assessment system is possible only if it is based on the transition from subjective assessment to objective evaluation of students' knowledge, which requires the use of mathematical evaluation methods as well as the evaluation of the accuracy and reliability of the obtained results. The implementation of this approach depends on the answers to the following questions: what is to be measured, how and by what means, with what tools, how to assess the accuracy of a measurement, etc. Given that a quality assessment of learning outcomes requires the processing of large amount of information, demand for information and communication technologies, which will automate this process and make its forecasting possible, is becoming more and more relevant.

The current stage of computerization of education is related to overcoming the widening gap between educational content, education infrastructure and needs of new economy and society, on the whole.

Today, a key factor in ensuring computerization of education is teachers' information culture, their readiness to apply information and communication technologies that make it possible to shape students' research, creative and cognitive activity methods.

Research Significance

The methodological model of shaping professional competence of university students in the context of computerization of education contains structural elements,

hierarchical links among them, learning stages and types between the protagonists of the learning process: the student and the teacher.

The creation of the methodological model of shaping professional competence of university students in the context of computerization of education exploiting opportunities offered by information and communication technologies implies setting common requirements for the educational environment, which includes computers and other technological facilities, communication media, up-to-date computer software, electronic digital resources classified by subject and topic into different modules. Figure 2 shows the methodological model of shaping professional competence of university students in the context of computerization of education.

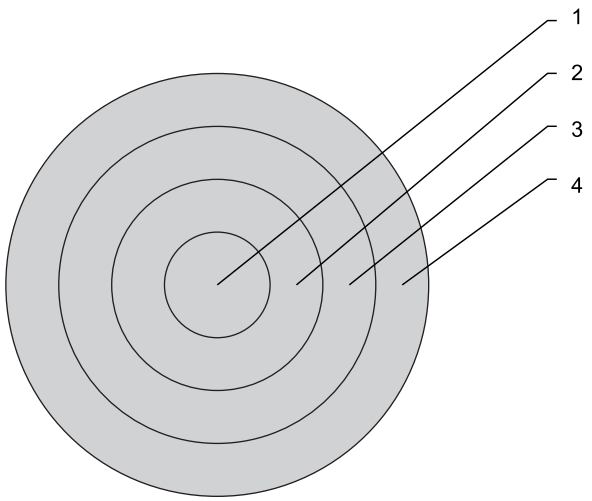

Figure 2: The methodological model of shaping professional competence of university students in the context of computerization of education

Note to Figure 2. The methodological model of shaping professional competence of university students in the context of computerization of education:

The methodological model of shaping professional competence of university students in the context of computerization of education is presented as a set of modules ensuring, on the whole, the creation and functioning of the university educational environment.

1. Module 1 is designed for multifunctional digital learning content and technological and communication facilities helping elaborate and apply efficient learning technologies in teaching all curriculum disciplines with a view to shape students' professional competence.

   In Module 1, content is represented by proprietary teaching materials for computer-assisted academic subjects, which take into consideration

psychological and educational requirements for information and communication technologies in use and adopt a modular structure reflecting that of learning objectives.

Our study reveals the didactic potential of a number of modules that are part of teaching materials as well as particularities of their creation resulting from the need to harmonize requirements for a competence-based approach towards content and presentation of teaching materials and opportunities offered by information and communication technological tools.

High quality lectures in specialized multimedia lecture halls are accomplished through clear presentation structures, interactivity, additional ways of presenting information using audio and video, universal accessibility to facts drawn from history of science, demonstration of the real process (original) related to this or that task, a possible model (image) of the process under investigation, model formalization, estimation, estimation results and comparison with the original.

Every student analyses the information provided in his or her own way. The lecture as presentation allows for delivering the material as part of an ongoing dialogue with the audience, whose involvement is determined by the content of the learning materials and ways of their implementation resulting in the achievement of educational objectives. Workshops on various disciplines are elaborated on the basis of specialized tooling systems designed for addressing tasks from a particular subject and professional field. Timely incorporation of such systems into teachers' didactic toolkit will enrich the content of academic courses with tasks that are as close as possible to modern professional tasks requiring integration and application of knowledge derived from several subject areas and developing students' algorithmic, heuristic and creative thinking. In other words, such tasks contribute to the coherent and systematic shaping of general academic and professional competences.

2. Module 2 is based on traditional and innovative educational technologies optimizing cognitive process, such as distance learning technologies, project method, individual learning planning and external studies.

   Widespread information and communication technologies open up new opportunities for students' efficient individual work organization. Setting up students' e-portfolios is necessary to shape all groups of competences. The higher the level of students' understanding of their competitiveness on the job market, the better their e-portfolios will be structured and filled.

   Individual work organization is aimed at continuously filling students' e-portfolios, which are the pilot versions of future specialists' e-portfolios,

reflects their preparedness for professional life and ensures learners' self-organization and responsibility for their learning outcomes.

3. Module 3 is based on computer-aided testing combined with a deep and multifaceted result monitoring in differential and integral forms. It also provides an opportunity for creating rating portraits of a student or a group of students.

   The functional purpose of this module is to achieve a high level of students' training by enhancing their motivation for in-depth, systematic and productive study supported by special content of test assignments establishing intra- and interdisciplinary connections in order to obtain a holistic view of the studied discipline and to ensure ongoing control of the current level of learners' achievements for prompt feedback and correction of teaching methodology.

4. Module 4 presents the generally adopted approach to determining the criteria for quality of education; in other words, it provides an idea about the quality as a planned target and outcome ratio. Module 4 is designed for establishing a correlation between the objective and the outcome in terms of education and for identifying the criteria and mechanisms for assessing the level of professional competence, in general, and of various competences, in particular.

   Our study has elaborated a system of criteria for monitoring and test materials and of mechanisms for assessing the level of shaped competences. The differential criterion is based on competence formalization by measuring a specific student's academic achievements, that is, by realizing his rating portrait. The level of separate competences and that of professional competence is determined on the basis of performance measurements and methods of mathematical statistics.

The integral criterion allows for controlling the level of competences and professional competence development for the entire study period.

Assessment of the level of competence development is carried out by applying testing procedures by means of information and communication technologies. Measuring competences requires the development of monitoring materials featuring questions and assignments aimed at determining the following indicators of the level of competence development: knowledge, skills, first-level working knowledge of a subject (understanding and applying intra-disciplinary connections, i.e. first-level integrating skill) and second-level working knowledge of a subject (understanding and applying interdisciplinary connections, i.e. second-level integrating skill).

It should be noted that all modules of the Methodological model of shaping professional competence among university students in the context of computerization of education using information and communication technologies are related to one

another. The modules work together with common resources, their work results influence one another and the general objective is achieved only by coordinated movement along the learning trajectory by means of minimizing risks and financial and physical efforts of all participants in the learning process.

The elaborated Methodological model of shaping professional competence among university students in the context of computerization of education allows for organizing the learning process based on individualization, variability and individual-oriented principles by using challenging research and project methods.

Special attention is given to the implementation of educational and work internships and pre-graduation practical training ensuring targeted shaping of certain groups of competences.

DISCUSSION

One of the decisive moments in the shaping of professional competence among students is the use of the didactic potential of information and communication technologies aimed at shaping future specialists' competences. First of all, we have proved the need to implement computer workshops into the learning process, where the student and the teacher hold an ongoing dialogue: the student is working in an environment open for prompt changes and additions, while the teacher has an opportunity to pose to the audience fresh challenges that are difficult or impossible to meet without a computer.

We have identified methodological approaches to shaping future specialists' professional competence as being the creation of an open learning environment; implementation of new forms of educational process organization (computer workshops, multimedia lectures, etc.); elaboration of software and methodological support (e-textbook, special computer software, practical applications bank, object modeling tasks, etc.)

We have created multimedia courseware and methods of delivering multimedia lectures. We have also refined the methods of running computer workshops, shaped and specified requirements for didactic electronic resources for every application. As a result, priority has been given to multifunctional materials that are open to prompt changes and additions and allowing for individualizing the student training process and implementing humanization, computerization, individualization and personality-oriented learning principles. We have elaborated a system of ongoing automated monitoring of students' learning achievements aimed at improving the quality of student training in the major academic disciplines of the curriculum. At this stage, the key principles underlying the shaping of specialists' professional competence by using information and communication technologies have been established as follows: the information causality principle; the information consistency and continuity principle; the content saturation principle; the educational impact optimization principle.

CONCLUSIONS AND RECOMMENDATIONS

The elaborated Methodological model of shaping professional competence among university students in the context of computerization of education ensures students' professional training as specialists having sufficient competitiveness and a high level of professional competence and being capable of working in the constantly changing educational environment. There have been positives changes among teachers and students regarding information resources: 91% of teachers began to use information technologies on a regular basis with a view to shape professional knowledge, skills as well as abilities to address complex applied tasks both on the intra- and interdisciplinary levels; 93% of teachers realized the significance of information technologies and are now creating their own learning models based on information technologies. The implementation of the Methodological model of shaping professional competence among university students in the context of computerization of education has allowed for broadening future specialists' professional interests and opportunities. New mechanisms for professional education quality management and information and methodological support for conducting research on the quality of the shaping of professional competences and competency have been elaborated. We have identified and given scientific justification of various components of the educational environment providing the future specialists' professional competence shaping process with information resources and various didactic materials. A transition curriculum for all academic disciplines has been designed. Every discipline and competences shaped within the framework of this specific discipline have been determined.

Unlike the research studies carried out by Hoffmann, T. (1999); Onalbek, Zh.K. et. al., (2013); Hutchinson, D. (1994); Omarov Y.B. et. al., (2016); Karimova, A.E. et. al., (2016); Murzatayeva A.K.(2014); Kramsch, C. (2006); Mirza N.V.(2013); McClelland, D.C. (1973); Makhashova, P. et. al., (2016); Adieva, A. and S. Djamalova. (2013); Zhumasheva, A. et. al., (2016); Brown-Rice, K.A., Furr, S. (2013); Utegenov, Y. et. al., (2014); Dobrova, L.V. (2009); White, R.W. (1959); Berkimbaev, K.M. et. al., (2012); Zhumabaeva Z. et. al., (2016); Chown, A. (1994); Sundburg, L. (2001), among others, the originality of our study lies in the fact that we have proved the workability of the elaborated Methodological model of shaping professional competence among university students in the context of computerization of education which is supported by the sustainability of results, independence from judgmental factors and usability in any higher and secondary vocational education institutions. The Methodological model of shaping professional competence among university students in the context of computerization of education can be structured, if needed, out of several modules, each of which being designed for specific didactic tasks and functioning independently while maintaining connections with other modules. The Methodological model of shaping professional competence among university students in the context of computerization of education is recommended

for use in universities when developing standards in education curricula. Practical applications of the Methodological model of shaping professional competence among university students in the context of computerization of education has revealed that it provides conditions for self-determination and self-development through learners' intense creative activity and dialogical subject/subject relations with teachers, whose creativity is motivated and maintained by the methodology allowing them not only to better respond to traditional didactic challenges, but also to expand the array of means of meeting these challenges and to have an opportunity to conceive, set up and creatively carry out new ideas, concepts and projects. The model under discussion meets educational needs of all participants in the university learning process by maintaining partnership relations between the learner and the teacher.

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