The Results Analysis of Innovative Educational Tools Use in Teacher Professional Activity

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Abstract

The article discusses one of the current problems of the education system modernization – the problem of teacher readiness to innovative educational tools use in professional activity. Practical, theoretical and methodological aspects of scientific research were analyzed in the framework of the use of innovative tools in professional activities. The author's attention is focused on the e-learning tools and information technologies toolkit in the information and educational environment and the entire education system modernization and digitalization. The analysis showed that the discussed topics are widely represented in the professional pedagogical community scientific research. At the same time, the innovative tools themselves, which include e-learning tools, have evolved from technical tools to pedagogical tools. The e-learning pedagogical tools development in the open education framework requires the traditional teaching and innovative means integration. However, regardless of innovative tools type, there is an increasing need of these pedagogical tools use competent implementation in educational organizations. This thesis is confirmed by a number of tasks: the need to determine the effective characteristics that ensure the successful teacher professional activities self-realization; the need for a scientifically based effective characteristic structure; the need to determine the methodological foundations of the effective characteristics formation; the need to resolve the contradiction between the innovative approaches implementation trend in the educational organization and the unwillingness of the teacher to solve these innovative problems. Also, in the course of the research results analysis in the vocational education field, we conclude that readiness, as an effective characteristic and in its essence seems to be a broader concept than competence. The author concludes that the readiness includes competence in its structure.

Keywords: e-learning, e-learning tool, open education, information educational environment of the university, university teacher readiness.

Анализ результатов применения инновационных образовательных инструментов в профессиональной деятельности преподавателя

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Аннотация

В статье рассматривается одна из актуальных в настоящее время проблем модернизация системы образования – проблема готовности преподавателя к применению инновационных образовательных инструментов в профессиональной деятельности. Проведен анализ практических, теоретико-методологических аспектов научных исследований в рамках применения инновационных средств при реализации профессиональной деятельности. Внимание автора сосредоточено на инструментарии электронных средств обучения и информационных технологий в условиях информационно-образовательной среды и модернизации и цифровизации всей системы образования. Анализ показал, что рассмотренная тематика широко представлена в научных исследованиях профессионального педагогического сообщества. При этом сами инновационные средства, в состав которых включаются электронные средства обучения, превратились из технического инструментария в педагогический. Развитие педагогического инструментария электронного обучения в рамках открытого образования требует интеграции традиционных средств обучения и инновационных. Вместе с тем, независимо от вида и типа инновационного инструментария возрастает потребность в грамотной реализации применения данных педагогических инструментов в образовательных организациях. Данный тезис подтверждается рядом задач: необходимость определения результативной характеристики, обеспечивающей успешную самореализацию преподавателя в профессиональной деятельности; необходимость наличия научно обоснованной структуры результативной характеристики; необходимость определения методологических основ формирования результативной характеристики; необходимость разрешения противоречия между тенденцией реализации инновационных подходов в образовательной организации и неготовностью преподавателя к решению данных инновационных задач. Также в ходе проведенного анализа результатов исследований в области профессионального образования приходим к выводу, что готовность, как результативная характеристика, – по своей сути представляется более широким понятием, чем компетентность. Автор приходит к выводу, что готовность включает компетентность в свою структуру.

Ключевые слова: электронное обучение, инновационные образовательные инструменты, открытое образование, информационная образовательная среда вуза, готовность преподавателя вуза.

Introduction

The education system reforming tasks of post-industrial society required changes in the means and methods of university educational process teaching and organizing that are adequate to globalization, integration, and digitalization processes [1]. This changes, based on the principles of state policy in the education digitalization field [2, 3], has led to the education new type emergence – open, which is founded on free unlimited access to educational resources. Open education can be implemented in a new information and educational environment that integrates electronic information resources, information and communication technologies. E-learning as a new form of education is fixed in the fundamental regulatory act - the Federal Law "On Education in the Russian Federation" No. 273 dated December 29, 2012. The e-learning contributes potential development to increase in the students professional training quality [4, 5], to increase the educational institution competitive advantages by attracting new pedagogical and human resources to implement educational programs [6]; brand recognition of an educational organization in the information space [7]. The starting condition for successful open education is the university teacher readiness to innovative tools use in professional activities. One of innovative example tools is e-learning tools. The innovative tools main user in the open education implementation is the teacher, who assumes the function of students managing process adaptation to the electronic information and educational environment.

Results

In pedagogical science the study electronic teaching aids considerable experience has been accumulated and the information technologies for educational purposes use. The study subject were: the professional readiness formation features (M.V. Dikalova, N.Yu. Kulikova, V.A. Merkulov, O.V. Popova, Yu.N. Shvetsov, S.A. Belov, Yu.N. Sergeev, etc.); students readiness for information technologies use (D.A. Abdullaev, S.A. Deeva, A.V. Leshina, I.V. Pavlov, A.I. Shlykova, etc.); the e-learning basics and the prospects for its development (M.M. Zabbarova, S.P. Eremeeva, G.V. Mozhaeva and others); the of the information educational environment formation (I.I. Murtayeva and others).

Researchers (M.V. Lapenok), studying the scientific and pedagogical conditions for the electronic educational resources use of the educational information environment, note that the new information and communication technologies use in various fields of activity affects the educational activities effectiveness. The educational process studies in schools indicate a global education digitalization trend. Teachers develop methodological, organizational and instructive support for the educational process in the context of varied forms and teaching methods implementation with the systematic use of electronic educational resources and educational process management digitalization based on various services. These processes require special teachers training for innovative information activities. Based on the structure of pedagogical activity, the researchers identified the components (gnostic, design, constructive, organizational, communicative) of the teacher's information activities in school. The university teacher readiness to apply information technology use in a continuing education system (V.A. Merkulov) is considered.

The study subject was the future computer science teachers readiness to use interactive teaching aids (N.Yu. Kulikova) with an em-

phasis on the methodological foundations of its formation. It is noted that the starting point is the motivational stage in the formation of a stable cognitive interest in the interactive multimedia educational resources development. Scientists (A.I. Adaev) turn to the professional competencies formation for future chemistry teachers using information technology, since the university graduates preparation level for professional activity does not always meet the modern society requirements and the pedagogical science latest achievements [8]. The formation levels of future chemistry teachers professional competencies are determined on the basis of the criteria-indicative base: personality criterion, cognitive criterion, activity criterion.

Researchers (I.E. Krasilova) use educational online-communities for future foreign language teachers foreign-language communicative competence developing in order to increase their creative abilities and the ability to independently acquire new knowledge in a rapidly changing information space [9]. In such a situation, the role of additional educational tools that can help in self-education and independent work is growing. These tools are educational online communities, which is consistent with the federal state educational standards. A comprehensive model for the foreign-language communicative competence development of future foreign language teachers by means of educational Internet communities is based on the principles of goal-setting, continuity, continuity, systematicity.

Researchers (L.A. Desyatirikova) turn to the formation of the future teacher education bachelors readiness using computer tools. The study foundation was the competency-based and systemic approaches ideas: a model of the system for preparing future pedagogical education bachelors for the use of computer tools in professional activity is a combination of interconnected and interdependent components (the purpose of training, the substantive aspect of training, the technological aspect of training, organizational and pedagogical conditions for increasing their effectiveness training). Study results analysis (N.V. Khodakova) shows that e-learning tools and information technologies are widely used in the preschool education system.

In the context of education modernization, the teachers professional competence development in the field of Internet technologies, whose activities are associated with professional multifunctionality, multi-subjectivity, and the branching out of the emotional-communicative sphere of interaction with students, gets particular importance [10]. An important role should be played by the system of postgraduate teacher education, which creates the conditions for the continuous development teachers professional competence, which is facilitated by Internet technologies (V.V. Krasin). Based on the results analysis of the specialized course practical application, the researchers conclude that the introduction of a block-modular structure in the teachers training to use Internet technologies should be accompanied by design methods widespread use. The technology of express teachers learning is created (S.S. Grushevsky) to develop teaching materials based on models and software resources of innovative computer didactics [11].

Summarizing the results of the research, scientists (S. A. Belov) argue that an important component of modern pedagogical activity is information and communication competence, the which formation can occur with the help of a training blog – a website in the journal form from records arranged in reverse chronological order used the educational process subjects for storing and presenting the available educational information in various forms (graphs, maps, drawings, charts, videos), creating open and indoor community to dis-

cuss the problem tasks and situations in the online and offline modes, realization of group projects and control over the educational information assimilation. The creation of an information and educational environment is ensured by the necessary knowledge of the teacher himself and the the educational blog inclusion as an information and educational environment in the process of forming a component of IT competency [12].

Scientists (N.A. Davydova) turn to the formation of the university teacher competence in the field of automated testing of knowledge. The modern system of higher education is characterized by a significant number of requirements for controlling the knowledge quality. To meet these requirements, it is necessary to change the approach to the pedagogical control process organization, including by the means of the modern automated knowledge control technologies introduction. The university teacher competency in the field of knowledge automated testing is understood as a person integrative property, reflecting the teacher ability and readiness to carry out pedagogical control of knowledge using computer tests.

Considerable pedagogical experience has been accumulated in the field of the information and communication technologies use in the secondary and secondary vocational schools educational process, and most often, e-learning means the software and hardware resources used in distance learning. So, some researchers (S.A. Deeva) believe that the willingness of teachers (including future teachers of a vocational pedagogical university to work in the distance learning system) to carry out professional activities should be divided into personal, theoretical and technological components [13]. In connection with the educational technologies widespread use, the performed actions algorithms compilation becomes an essential component of the future teacher's activities, an integral part of their professional and pedagogical culture (S.I. Ostapenko). It is argued that the process of formation of the algorithmic future teachers culture during distance learning should be based on a combination of culturological, algorithmic and technological approaches [14].

The problem relevance of readiness for the innovative information technologies use is substantiated by researchers (N.B. Strekalova), who argue that the widespread use of such tools in all areas of activity will demand specialists who competently master it at two levels: the level of general professional needs inherent in any specialty (electronic document exchange , searching for information on the network, communication interaction, etc.); the level of narrowly professional needs lying in the plane of a specific specialization (for an accountant - maintaining automated accounting, for an architect - developing a project, etc.) [15, 16, 17]. It is proved that the formation of information and communication competence of students of humanitarian specialties should take place in the educational system, which is a combination of educational results environmental diagnostics, environmental design and environmental production. The dominant approach is environmental. The effectiveness of the information and communication competence development system developed by the author is due to the quantitative increase in the indicators of components in the structure of information and communication competence.

In order for college students, school students, university students to have an acceptable level of information and communication competence, it is necessary that teachers have such a level. Scientists (Yu.N. Sergeev) consider that it is important to develop the primary school teachers information and communication competence in a continuing education system, having previously ascertained what are the organizational and pedagogical conditions for the this com-

petency development [18]. The need for various forms of advanced training in accordance with changes in the IT-rich environment of primary schools is shown.

In modern conditions, an important task is to effectively support implementing innovative processes possibility that are capable of ensuring the education digitalization. Scientists (A.V. Miller) study the process teachers IT competence formation by means of electronic educational resources in the conditions of additional professional education, develop an assessment map of teachers IT competence level of on the basis of a number of criteria: use of existing electronic educational resources in work; the ability to use the adaptability of electronic educational resources; using the capabilities of the Internet, network interaction; experience dissemination in the creation and electronic educational resources use [19].

The introduction of a tiered education system in the Russian Federation within the integration framework into the Bologna system has given new research directions. Some researchers (D.A. Abdulaev) consider readiness from the point of view of the person integrative education who has a systematic organization, a complex, multi-level structure and acts as a combination, interaction and interpenetration of motivational, cognitive, operational, emotional-volitional and communicative components, the degree of formation of which allows us to use the Internet resources and services in solving professional problems, to present the results of your professional d activities.

Scientists (A.I. Shlykova) to assess the level of IT competency proficiency suggest using a matrix approach. On the basis of its results and the use of competency indicators, it is concluded that there is competence and its certain level [20, 21]. Researchers (B.L. Batakov) turn to students general professional training using a computer-based information learning system. Currently, universities pay more attention to the theoretical knowledge of students in general professional disciplines obtained in lectures and from the Internet than the formation of practical skills, which are necessary for a modern university graduate [22, 23]. The ideas of a system-structural, contextual, information-technological, model approaches become the foundation for the educational structurally-meaningful models development of students general professional training. Researchers (E.R. Guzueva) are considering the formation of professional competence of future bachelors using educational Internet portals. Fierce competition in the labor market among specialists with traditional socio-cultural training requires professional competence, which is formed by Internet portals using [24].

Means of distance technologies (S.P. Yeremeyev) improve the quality of the educational process in accordance with the individual current and future needs, society and the state. The design of the educational process by means of distance technologies is able to ensure in practice the university graduate readiness to use existing skills and experience in professional activity that activate their professional self-realization [25, 26]. A competency-based approach helps to create the educational process projection as an open, technological, focused on the formation of students' competence. From a modern specialist, new professional and personal qualities are required. Researchers (E.L. Markova), using systemic, competency-based, communicative-active, personality-oriented, collaborative approaches, create a model for the formation of corporate communication competence, including the goal, criteria for the formation of corporate communication competence, forms, methods and means of information and communication technologies , principles of information culture.

Researchers (I.I. Murtayeva) form the specialists information culture in the field of social work and create didactic systems [27]. Scientists (O.A. Nikitenko) create integrative fundamentals of teaching a foreign language for a non-linguistic post-graduates through information and communication technologies, believing that the integrative basis of teaching a foreign language is a combination of interdisciplinary synthesis didactic and methodological components. When creating a model for the integrative basis formation, a construct is developed based on the competency-based approach integration, a computer-based learning environment, and personality-oriented and communicative approaches [28].

Based on the activity-based and competency-based approach principles application, to the various fields specialists training (T.V. Sedova), the individual information culture is formed by telecommunication technologies using in training and educational process management [29]. Researchers determine the teachers readiness to develop and use electronic teaching aids in professional activities as an integrated personality state based on sustainable positive motivation of the formed components (motivational, cognitive, informational and communicative) that ensure the teacher's ability to constantly improve professionally [29].

The attention of not only researchers, but also practitioners is drawn to the formation of students professional competence using innovative information and communication technologies and e-learning tools: we study (R.A. Agakhanova) the means of the professional competence automobile-road university students forming – e-learning tools, which allows introduce a fundamentally new form of continuing education based on detailed self-esteem supported by technological means and motivated by the results of the individual self-educational activity self-assessment [30, 31]. On the basis of the basic competency approach that influences the educational system level improvement, the structure, content of IT competencies (organizational, methodological, educational, technical, software, informational, educational, methodological components), as well as a formation model of undergraduate students IT competencies (A.B. Shikhmurzaeva) in an information-pedagogical environment are being developed [32, 33].

The information and technology development determines the creation of a new education model, where goals and objectives change. Based on the synthesis of systemic, substantive, and essential approaches, scientists (K.A. Shakhbanova) construct a model for the educational process organization for preparing a future specialist technician for the information technologies use in professional activities [34]. The problem of (O.N. Zaitsev) distance learning in the organizing process of students independent work, in particular, medical specialties, is widely discussed. There is a need to attract such technologies that would meet the requirements of the Federal State Educational Standard of Higher Professional Education and be able to meet the needs of related disciplines, and could also be focused on the use of modern information and communication technologies. Using the studying mathematical disciplines example, a distance learning system for future medical workers was designed [35].

The importance of using innovative teaching aids is noted not only in the activities of teachers of educational institutions, but also in other professional fields. So, researchers (T.V. Kuzminykh) study the process of forming competence in the field of information and communication technologies with future state civil and municipal employees. Digitalization of state authorities and local governments is a priority for the competitive society development in the context of the Russian Federation state and municipal government reforming. There is a comprehensive implementation of information and communication technologies in all spheres of professional activity of state civil and municipal servants, which actualizes the task of training competent specialists in the field of information and communication technologies, performing their duties in the electronic state. It is necessary to determine the essence and content of the IT competence of state civil and municipal servants, given their place in the structure of state authorities and the actual state of digitalization [36].

In the modern paradigm of education, addressed to the student as a subject of the educational process, the cognitive interest developing importance is increasing. A model is developed for students cognitive interest development, taking into account the requirements of federal state educational standards and based on the use of information and communication technologies (E.B. Belyaeva). The main thing in constructing this model is a personality-oriented approach, since when learning with the help of information and communication technologies, opportunities are provided for realizing the student's personal aspirations, revealing individuality, and manifesting independence [37, 38].

The educational process globalization trend is also confirmed by the logic of modern research: e-learning tools and information technologies are used not only in the Russian Federation educational system. Scientists (Z.Z. Orazalina) are studying the formation of the university teachers technological readiness to use the virtual educational environment with credit training technology using the example of the Republic of Kazakhstan. The orientation to the innovative higher education development, the new information and communication technologies introduction, initiated by the inclusion in the process of integration of Kazakhstan with European countries in the field of education, is noted. Researchers note the importance of creating a virtual educational environment based on information and communication technologies as a central component of the learning process [39].

The integrative organization issues of the virtual educational environment in the process of athlete student training in computer science and physics are studied by scientists (R.R. Khadiullina) who prove the need to ensure education accessibility and quality to all athlete students, as well as create optimal conditions for individual educational paths determining and implementing. On the basis of the principles of competency and environmental approaches, the integrative organization didactic model of the of a physical education university virtual educational environment is built.

The virtualization tools use for the interaction between the teacher and the student allows new means to organize such a contact. Researchers (A.I. Goryachykh) apply a motivational program-targeted approach to the organization of teacher and students joint activities using information and communication technologies. It is noted that the construction of the educational environment using the information and communication technologies means can significantly expand its interactive capabilities, increase the visualization of educational material, provide operational control and correction of the results of educational activities, provide access to new sources of educational information, provide students with educational and practical solutions tasks that form research, design skills, the creative nature of their activities [40; 41].

Conclusion

According to the results of the scientific research analysis on the use of innovative tools in preparation for professional activities in the information and educational environment (table 1), we conclude that their subject matter is widely represented in pedagogical research. At the same time, it should be noted that, regardless of their type, the need for the innovative educational tools competent implementation in an educational organization confirms several problems solving relevance: firstly, it is necessary to determine the effective characteristics that ensure successful self-realization in the professional sphere, which is formed by a new type of education – open; secondly, it is necessary to scientifically substantiate the structure of this productive characteristic, having considered its es-

sence; thirdly, for the appropriate integration of traditional and innovative methods implemented in the new information and educational environment, it is necessary to determine the methodological basis for the effective characteristics formation; fourthly, it is necessary to resolve the contradiction between the legislatively confirmed trend of implementing innovative approaches in the educational organization and the teacher unwillingness to solve these innovative problems.

In the analysis of research results in the field of vocational education, we conclude that readiness, as an effective characteristic, in its essence seems to be a broader concept than competence, which includes it in its structure [42]. The teacher, solving innovative problems, broadcasts this readiness, the structure of which is determined by the of pedagogical activity specifics.

Table 1

Studies definitions of the professional specialists readiness formation problem by information technology and e-learning tools

Research	Formed characteristic	Methodological approaches
Express training technology for teachers to create teaching materials based on the innovative computer didactics models and software resources	Readiness	System
Scientific and pedagogical grounds for the electronic educational resources creation and use of the distance learning information environment	Readiness	System, competency
Formation of the future bachelors pedagogical education readiness for the computer tools use in professional activities (for example, preparation for teaching mathematics)	Readiness	System, competency
Future computer science teachers readiness to use interactive teaching aids	Readiness	Active, competency
Formation of university teachers readiness for the electronic learning tools development and use in professional activities	Readiness	Active, competency
Formation of university teacher readiness to use information technology in a continuing education system	Readiness	Personally oriented, competency
Formation of future bachelors readiness to use Internet technologies in the educational process	Readiness	Personally oriented, competency
Formation of the university teachers technological readiness to use the virtual educational environment with credit training technology on the example of the Republic of Kazakhstan	Readiness	Personally oriented, system
Designing the university students educational process by means of distance technologies	Readiness	Competency, integrative development
Integrative organization of the virtual educational environment in the process of training athlete students in computer science and physics	Readiness	Competency, personally oriented, system
Formation of students readiness for distance learning in the college educational process	Readiness	Personally oriented, competency, technological
Distance learning technology in the process of university students independent work organizing of medical specialties	Readiness	Personally oriented, system, contextual
Preparing a future technician specialist for the information technology use in professional activities	Readiness	System, informative, essential
General professional training of undergraduate students using a computer-based information learning system	Readiness	System, structural, contextual, information technological, model
Professional training of preschool teachers for the information technology use in future practice	Readiness	Personally active, contextual, system, competency
Motivational program-targeted approach to the teacher and students joint activities organization using information and communication technologies	Readiness	Motivational, target, competency
Environmental approach as the information and communication competence formation of humanitarian specialties students	Competence	Environmental
The participation of educational Internet communities in the foreign language communicative competence development of future foreign language teachers	Competence	System
Formation of undergraduate students information and communication competence in the information and pedagogical environment conditions	Competence	Competency
Formation of teachers IT competence by means of electronic educational resources in the conditions of additional professional education	Competence	Competency, personally active

Research	Formed characteristic	Methodological approaches
Formation of future bachelors professional competence using educational Internet portals	Competence	Competency, personally active
Formation of future bachelors information and communication competence in the distance learning conditions	Competence	Competency, matrix
Formation of automobile-road university students professional competence on the e-learning basis	Competence	Competency, system
The formation of the IT competency communicative component in future vocational training teachers through the training blog	Competence	Competency, system, personally oriented
Formation of primary school teachers information and communication competence in a continuing education system	Competence	Competency, system, personally oriented
Building competence in the information and communication technologies field for future state civil and municipal employees	Competence	Competency, personally oriented, system
The formation of teachers professional competence in the distance learning conditions of the continuing education system	Competence	Competency, system, technological
Formation of an integrative basis for teaching a foreign language post-graduates of a non-linguistic university through information and communication technologies	Competence	Competency, personally oriented, communicative
The formation of the university teacher competence in the automated knowledge testing field	Competence	Holistic, system, personally active, competency
Formation of specialist corporate communication competence by means of information and communication technologies	Competence	System, competency, communicative active, collaborative
Formation of the future teachers algorithmic culture	Culture Competence	Cultural, algorithmic, technological
The formation of future chemistry teachers professional competencies using information technology	Competence	System, active, personally oriented
Formation of specialists information culture in the university	Culture	System, active, competency, acmeological, technological, contextual
The development of students cognitive interest based on information and communication technologies	Interest	Personally oriented, competency

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