



---

# INFORMATION TECHNOLOGIES IN PROFESSIONAL PEDAGOGICAL EDUCATION

**I. V. Kudinov, G.F. Kudinova, V.F. Aitov and S.V. Kadi**

Bashkir State Pedagogical University named after M. Akmulla (M. Akmulla BSPU)  
Ufa, Russian Federation

**L.V. Bannikova**

Moscow City Pedagogical University, Moscow, Russia

**O. Y. Voronkova**

Altai State University, Barnaul, Russia

## ABSTRACT

*The aim of the article is to summarize the experience of M. Akmulla Bashkir State Pedagogical University (BSPU) on the development of e-learning methodology of the profile university. It reveals the main vectors for the development of university activities: the implementation of subject-oriented educational technology, the organization of training with the use of mass open online courses, the transition to active and project forms of work, the development and implementation of networked educational programs, the development of methods of simulation (simulation) training, integration training with production, implementation of dual training programs. The system of electronic educational resources created in M. Akmulla BSPU includes three innovative laboratories that study information technologies in education: "Methodology of subject-oriented learning in higher education", "Didactic design" and "Bimodal University as an innovative and advanced strategy I high school". The depth of innovation is ensured by the integration of electronic tools into the main processes and projects of the university. Version 2.0 of the electronic university - bimodal university - involves the integration of resources with portal solutions in the education system of the Republic of Bashkortostan (the e-education platform of the Republic of Bashkortostan) and the Russian Federation (the national platform for open education), and providing information and analytical support for the implementation of priority university projects. The most important directions of the development of the university in the field of information technologies are the introduction of the principles of open education in the educational process, active networking with the leading universities of the country and the world, providing the educational process with forms of quasi-professional activity, dual education and simulation training, contacts with knowledge-intensive enterprises, production, schools, electronic support of innovative projects and distributive implementation e-IT*

*solutions, electronic monitoring of the region's education system, improving the quality of e-education and IT competencies of participants, training personnel in the field of innovative information management.*

**Keywords:** information technologies, mass open online courses, dual training, simulation training, professional pedagogical education.

**Cite this Article:** I. V. Kudinov, G.F. Kudinova, V.F. Aitov, S.V. Kadi, L.V. Bannikova and O. Y. Voronkova, Information Technologies in Professional Pedagogical Education, International Journal of Mechanical Engineering and Technology, 9(9), 2018, pp. 1284–1292.

<http://www.iaeme.com/IJMET/issues.asp?JType=IJMET&VType=9&IType=9>

---

## 1. INTRODUCTION

Breakthrough of IT solutions in various fields of human activity, the acceleration of the pace of society has led to the rapid increasing demand in high-quality distance learning on open educational platforms.

E-education of leading universities challenges traditional educational forms and methods. Global trends in the content of education have changed towards the needs of obtaining specific information by the user "here and now".

This process is supported by the active state policy aimed at introduction of innovative approaches to organization of educational process in an open competitive Intercollegiate environment. The establishment of a national platform of open education, changes in Federal legislation in the field of application of remote educational technologies require universities revision the classical forms of students training, as well as active introduction of other forms of contact and non-contact work with students.

In this context, the main vectors of development activities of the University and requirements for the specialists training are the following: implementation of subject-oriented educational technologies, organization of teaching with the use of mass open online courses, the transition to active and project forms of work, individualization of training, tutoring, design and implementation of the network educational programs [21; 22], the development of methods of imitation (simulation) training, integration of education with production, the implementation of dual training programs [23; 24].

Informatization and innovation in the specialized pedagogical University in the first place relate to the activities of the departments for the production of a fundamentally new educational content and implementation of new forms of its development, other types of interaction between teacher and student with the use of streaming broadcasts, staged lectures and massive open online courses. This requires a systematic work on the development of University e-learning methodology and private methods of online and offline learning formats, educational containers of SCORM standards, conducting research in the field of quality of production and results of the development of massive open online courses and the effectiveness of their application.

## 2. MATERIALS AND METHODS

In response to the global challenges in M. AkmuLLa Bashkir state pedagogical University three innovation platforms (labs), exploring information technology in education were formed: a)"The Subject-Based Learning Methodology in High School" (deals with the development of subject-oriented professional education theoretical and methodological foundations considered with the competent specialist training requirements), b)"Didactic design" (develops a visual didactic resources for the education system), c)"Bimodal University as an

Innovation and Advanced University Development Strategy" (deals with the theoretical justification and introduction the technologies and teaching tools of imitation (simulation) training into the educational process).

The innovation platforms scientific research are directly related to the pedagogical University development strategic directions: integration of education, science and production into a specially organized educational process, where the key role is played by information technologies.

Moreover, the structure of the University is considered as the formation of the bimodal open scientific-educational and social center, combining the resources and projects for sustainable social development of the region, the harmonious preservation of national traditions and implementation of innovative pedagogical technologies, implementation methodology of e-learning and interactive education.

We understand "open bimodality" as the interconnected equilibrium of the University's development in an objective reality and a virtual environment free of charge with absence of any restrictions on the use of educational resources.

Consequently, a bimodal University serves as a platform for the formation of social and cultural portal of the region (figure 1). In particular, information and educational resources of the bimodal University will help to build an individual trajectory of training to career guidance, to exchange experience in the development and use of media content for leisure activities, self-education, refresher courses and retraining.



**Figure 1** Bimodal University-vector of development of innovative pedagogical University

Employers are involved in the process of developing media content and that will increase the quality of vocational training graduates/students.

The development of the concept of bimodality in the projection of the Open University entails the implementation of mechanisms of academic mobility of students with the normative possibility of credit transfer of individual disciplines and modules for learning outcomes as in their own online courses and the world leading MOOC platforms.

The depth of the innovation is provided by the integration of electronic tools in the basic processes and projects of the University. Version 2.0 of the electronic University – the University of bimodality – involves the integration of resources with portal solutions in the education system of the Republic of Bashkortostan (platform electronic education of the Republic of Bashkortostan) and the Russian Federation (national platform for open education), as well as providing information and analytical support of implementation of the priority projects of the University (figure 2).



**Figure 2** M. Akhulla BSPU – the integration traditional and e-learning

Inside the University a united information-educational environment is created which integrates all the main activity processes of the University on the principle of "virtual counterpart" of a real University.

In managing the massive adoption of cloud technologies, including application outsourcing and SaaS (Software as a Service) models server solutions implementation and specialized tested software applications technologies for persons with disabilities are expected.

Currently, M.Akhulla BSPU developed the model of professional activity and technology imitation (simulation) of learning. In the University educational process the forming competences centres, equipped with specialized exercise devices, simulators and competences formation controls are instrumentally and technologically integrated.

The use of simulation devices in the educational process allows each student (future teacher) to imitate professional activity or any element in accordance with the requirements of professional standards and educational services provision regulations (rules). To realize the possibilities of providing students with counseling and methodological support the individual course in the form of mixed learning can be included in the educational process.

Students activity in the conditions of simulated education in the center ensures the creation opportunities to develop and maintain pedagogical skills in standard and non-standard educational situations required for each teacher, contributes to the achievement of competence in the conditions close to real educational process, reduces the number and consequences of pedagogical errors that can be identified, discussed and corrected, which increases the effectiveness of training in reality.

To improve the quality and quantity e-assessment tools fund is possible only in the development of network forms of pedagogical University cooperation.

Such electronic assessment tools fund is formed by the representatives of educational institutions of Ufa, Chelyabinsk and Perm. Comprehensive electronic system of control and training case studies is aimed at creating a managed system of independent work of students, contributing to the specific competences formation.

### 3. RESULTS

Being the scientific and methodical center in the region, M.Akhulla BSPU pays special attention to introduction of scientific-pedagogical concept of electronic educational resources creation. The University has created a number of electronic educational resources: at the level of the Ural-Volga region (interregional network pedagogical University), at the level of the region (informational-educational portal of the Republic of Bashkortostan, remote Olympiads and competitions, open school, the best teachers of the Republic of Bashkortostan) at the level

of Ufa (of educational institutions of Ufa activities monitoring), at the University level (distance learning system (DLS) on the basis of LMS Moodle 2.7).

Let's focus on the key projects of the MArmulla Bashkir State Pedagogical University. One of the most important implemented projects is a resource "Informational-Educational portal of the Republic of Bashkortostan" (<http://oprbr.ru>).

It is a tool of system of information and digital resources formation for educational and methodological purposes.

The resource allows accumulating the advanced pedagogical experience and statistical information of all the participants of educational process (teachers, students, parents, and education authorities) in a single information area.

At the moment a large archive of methodical materials which are constantly being used in the learning process has been accumulated.

For work with gifted children the centre of giftedness development with own support website of Olympiads movement was created. Remote Olympiads and contests ([olimp.bspu.ru](http://olimp.bspu.ru), [distolimp.bspu.ru](http://distolimp.bspu.ru), [olimp-alfa.bspu.ru](http://olimp-alfa.bspu.ru)) – specially created for the organization and conduct of remote contests and competitions – have made it possible to unite the participants, organizers and experts from anywhere in the world, as well as allow all participants to self-actualize creatively in any scientific field.

Interregional Olympiad "Alpha" is held annually in our University and at the pedagogical University in Orenburg, Perm and Chelyabinsk.

The project "Open school" is designed to implement mixed models of e-learning, as well as for the development of IT-competencies of teachers, the organization of network interaction of educational institutions using e-learning and distance educational technologies, and most importantly – the provision of equal conditions for education for children in rural and urban areas.

Electronic educational resource "Open school" is able to provide teachers and students of secondary educational institutions of the Republic of Bashkortostan and other subjects of the Russian Federation non-interrupted learning and additional online content for all school subjects of the syllabus.

The project involves the development and implementation of new training modules, organization of additional classes and consultations for pupils, support children who are temporarily or permanently home schooled, and children with disabilities, support the process of teaching children of small and rural schools.

Within the project organized technical providing of video lessons of the best teachers of the Republic of Bashkortostan, and their subsequent placement in the current system of distance education in Russian language.

In M.Akmulla BSPU the information resource "The Best Teachers and Schools of the Republic of Bashkortostan" ([best.bspu.ru](http://best.bspu.ru)) designed to cover the activities of the schools and the names of teachers who have made and are still making a worthy contribution to the development of the educational sector in the region and the country was created. The website is aimed at forming a positive image of the educational community, at promotion its history, achievements, personalities, improving awareness among education community about the best representatives of modern teachers and schools of the Republic of Bashkortostan, creating conditions for interaction and exchange of pedagogical experience, as well as stimulation of creative activity of teachers and teaching staff.

Popularization of the Russian language is another step towards strengthening our country's position in the world, as well as improving its status, the formation of an attractive image.

In the University there is a resource which provides foreign citizens the necessary language base for adaptation in the modern Russian socio-cultural environment and communicates with native Russian speakers.

The E-project implemented in Russian and English languages (rki.bspu.ru). Starting in 2014, M.Akmulla BSPU conducts Humanities research and scientific-methodical development of the project of Islamic education in the funding framework of the Ministry of Education and science of the Russian Federation. The main objective of the University is in providing instruction in secular subjects in religious educational institutions.

On the specialized Internet resource online courses providing additional professional training for employees of spiritual educational institutions is hosted, for example, the course "Fundamentals of effective professional communication in the Russian language" and several others.

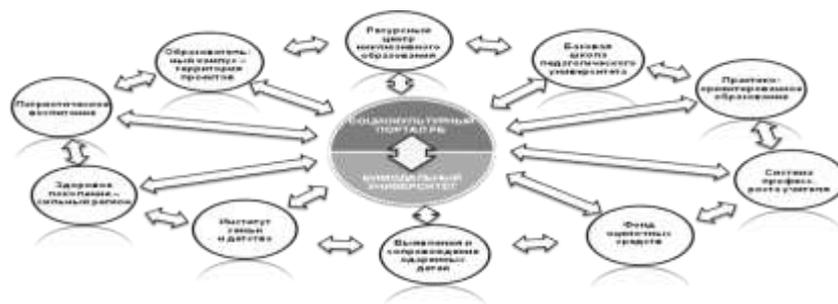
The work carried out in monitoring the development of the it infrastructure and the status of electronic education in the Republic of Bashkortostan allowed us to obtain a huge database for research, and to assess the current state of the education system of the region and of the city of Ufa in the field of e-learning and to adjust the vectors activities of the University. Information obtained from monitoring has strengthened the collaboration between the pedagogical University and the schools of the Republic.

The conducted research is a part of a complex of measures to evaluate and improve the effectiveness of educational organizations. Now M. Akmulla BSPU implements services related to the effectiveness of educational organizations, taking into account external opinions of parents and students.

Developing socially oriented and regional Internet projects of the University contribute to the accessibility of education for all citizens and improving the quality of e-learning, they must be integrated into a common information-educational environment of the region.

This is facilitated by the availability of information standards for the integration of information systems of educational organizations, the requirements for use of single tools of students' identification and authentication.

The adjustment of the educational activities by means of e-learning and distance educational technologies, the realization of the socially oriented educational projects on equal opportunities in education for all citizens of the region allow (figure 3):



**Figure 3** Electronic information educational environment of the University and information support of strategic projects

- to reduce the risks of creation of e-learning content for all levels of education in accordance with the requirements of the Federal State Educational Standard (FSES);
- to involve a wide range of participants in creating e-learning courses, educational and other organizations, including private investors;

- to attract authors and stakeholders to the creation, support and maintenance of educational portal for the development of the content of education at all levels of education,
- to increase the number of available media content;
- to increase the effectiveness of e-learning;
- to provide credible assessment of learning outcomes (including monitoring completion of the assessment of learning outcomes), reliable transfer of learning outcomes in electronic information-educational environment of educational institutions, various types of communication between students;
- to apply simulations, simulators, teaching-controlling computer programs, virtual laboratories, project activities, etc.;
- To expand opportunities for the development of academic subjects/disciplines in the conditions of remote educational technologies and to increase the number of students.

The introduction of a system of assessing the quality of media content will ensure continuous improvement of the quality of media content, which will increase competition in the education market and to expand the circle of participants.

A system for assessing the quality and potential payback of the investment will attract businesses and employers that will enable citizens to gain access to new training courses aimed at the mastery of in-demand competencies and will contribute to successful employment, organization of leisure of children, people with disabilities and citizens of the 3rd age, etc.

#### **4. DISCUSSION**

The use of information technologies in the education system were considered in the studies of S.V. Agapova [1] A.A.Andreev [3], V.P.Bespalko [5], M.P.Lapchik [10], E.S.Polat [12, 13, 14], A.Yu.Uvarov [4] I.V.Robert [15, 16], etc., problems and prospects of creation and functioning of informational educational environment were discussed in the writings of S.G.Grigoriev [7], A.Kuznetsov [9], T.B.Zakharova [20], issues of informatization of education were the objects of investigation in the works of A.L.Semenov, S.Gutman [8], I.V.Robert and others [15; 16].

The efficiency, organization and maintenance of e-learning, and also questions of the organization of this type of training is presented in the writings of M.Allen [2], E.Z.Vlasova [19], I.N.Meshcheriakova [11], A.V.Solovov [18], S.A.Schennikov [17]. They were however fragmented in nature, scientists analyzed the individual components of the University informatization, not related to the general conceptual provisions of the holistic organization of educational process in higher education and the role of pedagogical University as a scientific-educational and social center of the region.

#### **5. CONCLUSION**

As a result of modern informatization of the University teaching process is close interaction of the teaching community with the people of the region by means of automated electronic self-developing projects.

Electronic systems allow providing teachers' professional development support, to build a chain of interaction from student to Professor of the University, to implement the methodological, organizational and substantive support of small, rural schools to implement massive open online education courses for parents, students and teachers.

Thus, the most important directions of development of the University in the field of information technology are:

- the introduction of the principles of open education in the educational process;
- active network cooperation with leading universities of the country and the world,
- information support of educational process by means of quasi-professional activity, dual education and simulation training,
- establishing IT contacts with science-intensive enterprises, manufacturing, schools, electronic support of innovative projects and distribution implementation of IT solutions,
- electronic monitoring of the region education system,
- improving the e-learning and IT-competencies quality of the participants,
- training in the field of innovative information management.

M. Akmulla BSPU is the only Pedagogical University in the Republic of Bashkortostan, which is focused on meeting the region's needs for highly qualified teachers. The University carries out systematic work to improve the quality of personnel training and run the Republican social programs/ It is implementing a number of applied, scientific-educational and innovative projects for the development of General and professional education. M.Akmulla BSPU makes a significant contribution to the improvement of the entire regional education system, conducts research in the framework of laboratories of the centre, carries out constant monitoring of the education sector and current research and development in the electronic projects of the University, identifies key trends and issues.

The article can be useful in practical terms for the specialists and heads of higher educational institutions of pedagogical profile, for PhD students, secondary education teachers and other educators, for centers of advanced training and retraining of the pedagogical universities.

## ACKNOWLEDGMENTS

Work is executed at financial support of the Russian Federation represented by the Ministry of education and science of the Russian Federation (project "Promotion of resources related to the study of Russian language and Russian language education in mass media and Internet resources" in the direction of 3 "Development of Open Education in Russian Language and Russian Language Learning" of federal target program "Russian language" within 2016-2020 years).

## REFERENCES

- [1] Agaponov C.B. (2003) Sredstva distancionnogo obucheniya. Metodika, tekhnologiya, instrumentarij [Distance learning tools. Methodology, technology, tools]. 336 p.
- [2] Allen, M. (2016) E-Learning: How to make e-learning understandable, high quality and affordable [Text]. Michael Allen. – M.: Al'pina Pablisher, – 200 p.
- [3] Andreev A. A. (2014) Russian open educational resources and massive open online courses. Higher education in Russia. №6, -2014. – pp. 150-155.
- [4] Asmolov A. G., Semenov A. L., Uvarov A. Y. (2010) Russian school and new information technologies: a look into the next decade. M.: Nekspriint– 95 p.
- [5] Bepalko V. P. (2002). Education and training with computers (pedagogy of the third Millennium). M.: Publishing house of Moscow psychological-social Institute; Voronezh: MODEK, 2002. – 352c.
- [6] Bulin-Sokolova E. I., Semenov A. L., Uvarov A. Yu (2009) School of information: the path to renewal of education. Informatics and education. No. 11, p. 3-12.

- [7] Grigoriev, S. G., Grinshkun V. V. (2008) Informatization of education. The fundamental basis. Tomsk: Izd-vo "TML-Press". – 286 p. – Mode of access: <http://mgpu.info/izdaniya/knigi-dlya-vuzov/> – [date accessed: 27.04.2018].
- [8] Gutman, S. (2004) Education in the information society / S. Gutman. – SPb.: The Russian national library. – S. 6.
- [9] Kuznetsov, A. A., Grigoriev S. G., Grinshkun V. V. (2009) Educational electronic publications and resources. M. -156 pp.
- [10] Lapchik, M. P. (2011). E-learning technologies in the pedagogical system of innovative education. Innovations in continuing education. № 2(2). – S. 5-10.
- [11] Meshcheryakova, I. N. (2014) The possibilities of e-learning in the development of cognitive activity of students. M.: Flinta, 60 p.
- [12] Polat E. S., Moiseev M. V., Petrov A. E. et al. (2006) Pedagogical technologies of distance learning: textbook for stud. ouch. proc. Institutions. M.: Academy, – 400 p.
- [13] Polat, E. S., Bukharkin M. Y, Moiseev M. V., Petrov A. E. (2002) New pedagogical and information technologies in the education system. Under the editorship of E. S. Polat. Moscow: Academy, — 272 p.
- [14] Polat, E. S. (2001) The Internet in Humanities education. Textbook. a manual for students. ouch. proc. institutions. – M.: VLADOS, – 272 p.
- [15] Robert I. V. (2012) Informatization of education as a new field of pedagogical knowledge. Man and education. №1 (30). – P. 14-18.
- [16] Robert I. V. (2007). Theoretical bases of development of Informatization of education in modern conditions of information society of mass global communication. Proceedings of the IRE RAO. – No. 23. – P. 3-14.
- [17] Shchennikov, S. A. (2010). Didactics of e-learning. Higher education in Russia. No. 12. – Pp. 83-90. – Mode of access: <http://vovr.ru/upload/12-10.pdf> – [date accessed: 15.02.2018].
- [18] Solovov, A. V., Menshikov, A. (2015) E-learning: the vector of development. Higher education in Russia. No. 11. – Pp. 66-75. – Mode of access: <https://cyberleninka.ru/article/v/elektronnoe-obuchenie-vektor-razvitiya> – [date accessed: 27.02.2018].
- [19] Vlasova, E. Z. (2014) E-learning in the modern University: problems, prospects and experience. UNIVERSUM: Vestnik of the Herzen University in 2014. – No. 1. – P. 43-49. – Mode of access: [https://lib.herzen.spb.ru/media/magazines/contents/2/2014\\_1/vlasova\\_1\\_14\\_43\\_49.pdf](https://lib.herzen.spb.ru/media/magazines/contents/2/2014_1/vlasova_1_14_43_49.pdf) – [date accessed: 01.03.2018].
- [20] Zakharova, T. B., Zakharov A. S., Samylkina N. N. (2016) The Organization of modern informational educational environment: methodical manual and others. M.: Prometey, 278 p.
- [21] Korableva, O. N., Kalimullina, O. V., & Mityakova, V. N. (2018). Innovation activity data processing and aggregation based on ontological modelling. Paper presented at the 2018 4th International Conference on Information Management, ICIM 2018, 1-4. doi:10.1109/INFOMAN.2018.8392659
- [22] Kurbanova E., Korableva O., Kalimullina O. (2018). Enhancing the Effectiveness of Asset Management through Development of License Management System on the Basis of SCCM 2012 Program by Microsoft Company. Paper presented at the ICEIS 2018 - Proceedings of the 20th International Conference on Enterprise Information Systems, 2: 171-178
- [23] Sapozhkov S. B., Burakova E. M., Tesleva E. P. (2016) Three-Stage Character of Molten Metal Drop and A Hard Substrate Contact Interaction. IOP Conference Series: Materials Science and Engineering. Vol. 142 - №. 1, Article number 012019. - p. 1-7
- [24] Shestopalova I.A., Kolodyaznaya V.S., Kiprushkina E.I., Kuprina E.E., Petrova V.A., Rogozina E.A., Danko V.O. (2018) Functional-Technological Properties of Meat-And-Vegetable Emulsions with The Addition of Chitosan Derivatives. Progress on Chemistry and Application of Chitin and Its Derivatives, IET, pp. 170-178.