DOI 10.31489/2022Ped2/191-197

IRSTI 14.35.07

UDC37.01:004

R.S. Bobesh[1], G.B. Sarzhanova[2]*, S.B. Jangeldinova[3]

*Karaganda University of the name of academician E.A. Buketov, Karaganda, Kazakhstan*
*[2]Scopus Author ID: 57189506923 ORCID: https://orcid.org/0000-0002-3461-8963*
*(Corresponding author: galiya008@mail.ru*)*

# Smart technologies in the personal digital educational environment of a teacher

The article is devoted to topical issues related to the digitalization of the system of higher professional education. The authors consider and clarify the concepts of "Smart technologies", "digital educational environment", and "personal digital educational environment of a teacher". Based on the analysis of theoretical literature, the essence of the key concepts under consideration and their role in the organization and implementation of distance learning in higher education as a mechanism for ensuring the quality of education in digital format are determined. As a result of the intensive development of information technologies, smart education is gradually replacing "classical" e-learning, with which a number of concepts are associated, many of which do not have an unambiguous interpretation. Such concepts rightfully include "digitalization of education", "smart technologies", "digital educational environment", and "personal digital educational environment of a teacher". In the conditions of digitalization of education, the digital competencies of a modern teacher, which characterize his ability to use specific knowledge and modern ICT in the professional sphere, communication and software products in practice, become important for his further development as a specialist. This research is funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan (Grant No. AP13068185).

*Keywords*: digitalization of education, smart education, smart technologies, educational environment, digital educational environment, personal digital educational environment of a teacher.

## *Introduction*

The relevance of this study is dictated by the digitalization of domestic education, which implies the widespread use of modern multimedia and telecommunications technologies and the creation of subject-oriented and effective tools for the subjects of the educational environment: teachers, students, their parents.

The current state of the education system's progress is characterized by the information technology increasing the role of specialists' professional training. The student's academic performance assimilation with the help of information and communication technologies is much faster than compared with traditional technologies. These technologies raise the possibility to argue for the upgrowth, acquisition, and dissemination of academic performance, intensifying and expanding the studied topic content, modifying it faster, applying more productive teaching methods, and also significantly expanding access to the education procedure.

Much greater accessibility of the education system can be achieved through the use of self-education opportunities and the use of advanced telecommunications technologies, distance learning technologies used to present learning materials, self-study, organization of interactive exchanges between the teacher and the student when the learning process does not depend on time and space.

Higher education, the use of new information and communication technologies in the spirit of openness and international cooperation should ensure high-quality education, wide knowledge dissemination and accessibility, facilitate lifelong learning by developing learning materials integrated into local and global networks and the use of information and communication technologies in teaching, creating new forms of learning environments and opportunities for students.

As a result of the intensive development of information technologies, smart education is gradually replacing "classical" e-learning, with which a number of concepts are associated, many of which do not have an unambiguous interpretation [1]. Such concepts rightfully include "digitalization of the education system", "smart technologies", "digital educational environment of the university", and "personal digital educational environment of the teacher".

High-quality professional training in the digital educational environment of the university is achieved, first of all, through the widespread use of modern pedagogical technologies. This aspect determines the im-

portance of methodological support for the systemic integration of information and communication technologies in the educational process, which emphasizes the instrumental significance and didactic potential of information and communication technologies as a resource base for innovative pedagogical technologies. Currently, more and more attention is paid to the need for new approaches to the organization of educational activities, the creation of a personal development environment based on information and communication technologies supporting students' educational needs and creating conditions for their self-realization and self-development.

The purpose of this study is to summarize the results of a review and analysis of theoretical literature on the education system digitalization problems in general and teaching staff training in particular.

*Experimental*

The methodology of this research is based on the following research methods: the method of generalization, the method of abstraction, the method of analogy, the method of ascent from the abstract to the concrete, the system method. The methodological basis of the study was the work of foreign and domestic scientists: M.M. Kutepov, E.A. Chelnokova, K. Maksimova [2], I. Lyapina, E. Sotnikova [3], I.S. Mukhametzhanov [4], A.V. Solovov [5], M.S. Chvanova [6], J.O. Connelly, P. Miller [7], L.V. Baeva [8], Ş. Çălu [9], etc.

The research is also based on ideas in the field of e-learning in Kazakhstan, the development of digital educational content, the development of digital competencies of teachers in the aspect of designing their own digital resources, reflected in the works of such domestic scientists as G.K. Nurgalieva, E.V. Artykbaeva [10], G.B. Sarzhanova [11], G.Zh. Smagulova [12], and others.

*Results and Discussion*

Generational change creates new needs and opportunities for the development of the education system and educational technologies that will take advantage of the global information society to provide educational services of fundamentally new quality (see Table 1) [1].

Table 1

**Transformation of educational thinking of X-Y-Z generations**

| | X-generation (1963-1981) | Y-generation (Digital immigrants) (1982-1991) | Z-generation (Digital Native) (1992-2001) |
|---|---|---|---|
| Distinctive characteristics from the previous generation type | Fundamental education, technical literacy, individualism, self-sufficiency, pragmatism, striving for career growth, informality of views, nonconformism | Education is not fundamental enough, but in several areas, rapid development of new technologies, orientation to self-realization rather than career growth, hedonism, liberal views, communication, awareness, cosmopolitanism, conformity, self-confidence | "natural" attitude to technology, idealism, uncriticism, virtualization |
| Key factors | Access to education, creation of highly qualified jobs, development of globalization, urbanization | The development of technology, especially the Internet, globalization, the crisis of political regimes | ICT as a natural part of the environment, a natural means of communication |

Thus, we understand that the "smart" property is necessary for educational development that requires expectations and needs of a person and society, taking into account economy, production technologies and science changes.

A favourable condition for the effective use of "smart" information and communication technologies in the learning process is high-quality content and clear organization of this process. In this regard, the role of a teacher increases who is to own new information technologies. One of the ways to approach this problem is the introduction of a digital transformational educational environment. In a university digital environment, each teacher builds his own personal digital environment, having a possibility to choose necessary digital tools for solving problems related to the educational organization and sometimes educational process, interaction with students and colleagues, with his own professional development. In designing his own personal

digital environment, the teacher should focus on requirements of a teacher's professional standard. Students choose components of a personal digital environment to perform the appropriate functions. At the same time, they understand that the formation of a digital environment is possible only with an appropriate level of informative and communicative competence [12].

Over the past few years, a lot of research has appeared in the scientific literature on digital educational technologies and their role in teachers' digital competencies development. The integration of ICT (information and communication technologies) into education and curriculum can facilitate and improve the learning process; however, teachers still need support when introducing digital technologies into their professional practice [13]. March D. and others emphasize the advantages of introducing ICT into the educational process on the part of both the teacher and the student, mainly as a result of changes and achievements in learning theories [14].

In the education digitalization conditions, a modern teacher's digital competencies become important for his further development as a specialist as they characterize his ability to use specific knowledge and modern ICT in the professional sphere, communication, and software products in practice [12].

An important role is assigned to the mandatory completion of training and advanced training courses by teachers in the field of digital literacy to more successfully adapt professionally in a rapidly changing and dynamically developing digital educational space [15].

The study of special literature allowed us to define the essence of the concept of smart education, defined as "an interactive learning environment based on the use of mobile devices with the help of content from around the world, which is freely available regardless of time and space. This is to support the needs of students and teachers" [16]. Some scientists consider the component "smart" as an acronym:

S — self-directed;

M — motivated;

A — adaptive;

R — resource;

T — technology embedded [17].

The use of Smart technologies is not limited only to instrumental support of the educational process (Smart-board, multimedia projector, etc.), but is implemented in the implementation of existing online educational Smart tools and services for building digital personal educational environments of the teacher and students with the construction of possible individual trajectories of the latter's educational activities. In addition, it should be noted that modern educational programs of higher professional education involve an increase in the time allocated for extracurricular work, which means that the potential of Smart tools and Smart services increases, which makes it possible to organize and provide a system of remote support, support of students' activities at the university, delivery and broadcasting of digital educational content, creating conditions for formation of competencies of a specialist of the XXI century.

The solution to these tasks seems possible due to the implementation of Smart technologies in the design of a teacher's personal digital educational environment, the function of which, on the one hand, is to organize the educational and cognitive activities of students in an information-rich educational environment and manage the educational and extracurricular interaction of participants in the educational process, and on the other — to adapt the teacher to the changes taking place digital reality, facilitation of the development of its digital and design competencies [18]. At the same time, the personal digital educational environment of a teacher evolves and changes with the advent of new technologies and the growth of his professional and personal qualities.

In the education system, smart technologies can be divided into two groups: 1) technologies for the implementation of the educational process and 2) technologies for monitoring and evaluating the educational achievements of students. The main tasks of implementing smart technologies in the educational process are:

- mastering students' reproductive skills;
- deepening of intersubject relations;
- improvement of the mechanism for monitoring and evaluating the formation of educational competencies of students;
- formation of the ability to predict the results of educational activities;
- formation of creative abilities of students, etc.

The implementation of smart technologies in a teacher's personal digital educational environment allows for performing a number of didactic functions, which are a manifestation of the properties of teaching methods and tools in the educational process to solve various tasks:

- ensuring the principle of visual learning — implemented through the presentation of information in an interactive form, in the form of diagrams, presentations, videos, infographics, etc.;

- delegation of a number of functions from the teacher to the computer — modern portable computers are a full-fledged didactic material that ensures the work of students in an interactive environment;

- individualization of the learning process;

- the use of computer-based design systems in the learning process — design systems in the field of education allow for the procedures of final control, as well as self-control by computer evaluation of completed tasks [19];

- the principle of multilevel learning — this principle allows one to study educational material in the learning process both at a superficial level, just getting acquainted with the information, and to study it in detail, conducting various laboratory work, carrying out educational projects, etc.;

- variety of work — this principle is the possibility of both theoretical study of educational material and practical work with him;

- search for information using the Internet — this function of information technology allows one to get the most up-to-date information in the shortest possible time, develop students' communicative abilities, organize students' collective work, etc.;

- modeling — allows to visualize various processes and phenomena using computer technology, 3D graphics functions and modeling technologies [20].

The use of smart technologies in a personal digital educational environment opens up new opportunities for teachers: experiences and ideas sharing, developing theory and science deeper, saving time by existing content refining, rather than creating it from scratch. They can develop an individual approach for each student in accordance with the competencies they develop. Smart training could allow the teacher not to waste extra time developing new content otherwise he can use existing content, combine it, and also refine it. The teacher should not only familiarize students with the latest technologies and teaching tools, but also learn how to work with them and build the educational process in a different way.

The digital educational environment will require the development of online communities in which teachers will be able to share content, as well as share ideas and experiences.

By now, the necessary prerequisites have developed in the world for the successful implementation of the smart learning system:

- Web2.0 information and software tools have been created that are well-focused on solving smart education problems;

- Cloud technologies have become widespread;

- Educational Resource Creation management systems (LMS) have been developed.

The introduction of smart technologies and digital devices and technology development, i.e., a technological environment change, has led to learning environment changes through innovative teaching methods, to the creation of an intellectual environment for the continuous development of the competencies of participants in the educational process, including formal and informal learning process.

Technical basis for the implementation of such education is the entire available set of devices both belonging to students and educational institutions: computers, laptops, tablets, smartphones, etc. devices.

In addition, it is necessary to have:

- broadband Internet access (speeds from 4 to 10 Megabits per second);

- modern local area network and network equipment for combining workplaces in classrooms and workrooms within the organization;

- an Internet site for providing access to educational organization information resources;

- e-learning system educational services internet portal;

- a corporate network providing an opportunity for electronic information exchange between teachers, as well as for access to the Internet.

They perceive new knowledge with great interest if their teaching takes place using the latest information, communication and audiovisual technologies. The introduction of smart technologies has a positive impact on the learning process, helps teachers expand learning opportunities, work with individual students, in small groups, or with the whole class with any teaching method, and also provides access to various reference systems, electronic libraries, and other information resources available to teachers and students anywhere in the world. The use of smart technologies makes the lesson more dynamic, increases the motivation of students to learn, and also allows the teacher to improve the quality of education in accordance with the demands of society. Conducting lessons using interactive technologies involves the presence of an interac-

tive whiteboard, a projector, a computer, and software. The use of such a complex allows to replace traditional visual aids with multimedia in the classroom.

## *Conclusions*

The introduction of information technologies into the system of professional pedagogical education is a prerequisite for the global digitalization of education, which has demonstrated ample opportunities for the training of modern highly-qualified specialists. Active and widespread use of smart technologies in the digital educational environment of the university undoubtedly contributes to the development of the personal digital educational environment of the teacher, develops digital and professional competencies, provides variability of forms, methods and means in the training of students, develops their cognitive competence.

The results of this study are updated by the initiative noted in the President's address of continuing support for the educational project "Digital Teacher", aimed at improving digital literacy and supporting Kazakhstani teachers, and creating conditions for the development of digital competence and professional development of teachers, taking into account modern requirements of digital reality.

## *Acknowledgements*

This research was funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan (Grant No. AP13068185).

The authors of the article express gratitude to the editorial board of the "Pedagogy and Psychology" scientific journal for their support in publishing the results of the study, as well as to the reviewers whose comments helped to improve the structure and content of the material presented in the article.

## References

1 Dneprovskaya, N.V., Yankovskaya, E.A., & Shevczova, I.V. (2015). Poniatiinye osnovy kontseptsii smart-obrazovaniia [Conceptual foundations of the concept of smart education]. *Otkrytoe obrazovanie — Open education, 6*, 43–51 [in Russian].

2 Kutepov, M.M., Chelnokova, E.A., & Maksimova, K.A. (2020). Smart technologies in education. *Baltic Humanitarian Journal, 9, 3(32).* https://doi.org/10.4018/ijcssa.2018010101.

3 Lyapina, I., Sotnikova, E., Lebedeva, O., Makarova, T., & Skvortsova, N. (2019). Smart technologies: perspectives of usage in higher education. *International Journal of Educational Management, 33(3).* https://doi.org/10.1108/IJEM-08-2018-0257.

4 Mukhametzyanov, I.S. (2019). Digital educational environment, health protecting aspects. Journal of Siberian Federal University. *Humanities and Social Sciences, 12(9).* https://doi.org/10.17516/1997–1370–0484.

5 Solovov, A.V., & Menshikova, A.A. (2021). Modeli proektirovaniia i funktsionirovaniia tsifrovykh obrazovatelnykh sred [Models of design and functioning of digital educational environments]. *Vysshee obrazovanie v Rossii — Higher education in Russia, 30(1)*, 144–155 [in Russian].

6 Chvanova, M.S., Kiseleva, I.A., & Samokhvalov, A.V. (2020). The essence and structure of smart technology in mobile education. *Proceedings of the 2020 IEEE International Conference "Quality Management, Transport and Information Security, Information Technologies". IT and QM and IS.* https://doi.org/10.1109/ITQMIS51053.2020.9322949

7 Connelly, J. O., & Miller, P. (2018). Improving Learning Outcomes for Higher Education Through Smart Technology. *International Journal of Conceptual Structures and Smart Applications, 6(1).* https://doi.org/10.4018/ijcssa.2018010101

8 Baeva, L.V., Khrapov, S.A., & Azhmukhamedov, I.M. (2021). "Smart Technologies" in Education: Development Opportunities and Threats. In: Popkova, E.G., Sergi, B.S. (eds). "Smart Technologies" for Society, State and Economy. ISC 2020. *Lecture Notes in Networks and Systems, 155. Springer, Cham.* https://doi.org/10.1007/978-3-030-59126-7_79

9 Țălu, Ș. (2020). *New Perspectives in the Implementation of Smart-Technologies in Higher Education.* https://doi.org/10.2991/aebmr.k.200502.042

10 Nurgalieva, G.K., & Artykbaeva, E.V. (2010). *Metodologiia i tekhnologiia elektronnogo obucheniia [Methodology and technology of e-learning].* Almaty [in Russian].

11 Toleubekova, R.K., & Sarzhanova, G.B. (2018). Application of information technology in improvement of teachers' competence. Springer Proceedings in Complexity. https://www.researchgate.net.

12 Smagulova, G.Z., Sarzhanova, G.B., Tleuzhanova, G.K., & Stanciu, N. (2021). The development of future foreign language teachers' digital competences in creating multimedia tutorials. *The Education and Science Journal, 23(6),* 216–245. https://doi.org/10.17853/1994-5639-2021-6-216-245.

13 Pachler, N. (2001). Connecting schools and pupils: To what end? Issues related to the use of ICT in school-based learning. *Issues in teaching using ICT. London: Routledge Falmer,* 15–30. https://doi. org/10.4324/9780203185117-2.

14 Marsh, D. (2002). CLIL/EMILE: The European dimension — Actions, trends and foresight potential. http://europa.eu.int/comm/ education/policies/lang/languages/download/david_marshreport.pdf.

15 Raven, D., Yarygin, O.N., & Korostelev, A.A. (2017). Kompetentologiia: ot prakseologii do sotsiokibernetiki [Competentology: from praxeology to sociocybernetics]. *Azimut nauchnykh issledovanii: pedagogika i psikhologiia — Azimut of scientific research: pedagogy and psychology, 6, 1(18),* 167–175 [in Russian].

16 Bekturova, Z.K., & Vagapova, N.N. (2015). SMART-tekhnologii v obrazovanii [SMART technologies in education]. *Vestnik «Orleu»-kst. — Bulletin of "Orleu"-kst, 3(9),* 17–21 [in Russian].

17 Smart learning programme for Specialists of the Republic of Kazakhstan Professional development for teachers based on Smart Learning (2014). *Korea Soongsil Cyber University,* 145.

18 Starodubcev, V.A. (Eds.). (2013). Sozdanie personalnoi obrazovatelnoi sredy prepodavatelia vuza [Creating a personal educational environment for a university teacher]. https://search.rsl.ru/ru/record/01007844861? ysclid=l9h9es5xd8118614983 [in Russian].

19 Yarygin, O.N. (2013). Ot 'competence' do «kompetentnosti»: prodolzhenie evoliutsii poniatii [From 'competence' to 'competence': continuation of the evolution of concepts]. *Vektor nauki Toliattinskogo gosudarstvennogo universiteta. Seriia: Pedagogika, psikhologiia — Vector of science of Togliatti State University. Pedagogy, Psychology Series, 2 (13),* 333–336. Retrieved from http://elar.rsvpu.ru/handle/123456789/40490 [in Russian].

20 Smirnova, Zh.V., & Krasikova, O.G. (2018). Sovremennye sredstva i tekhnologii otsenivaniia rezultatov obucheniia [Modern means and technologies for evaluating learning outcomes]. *Vestnik Mininskogo universiteta — Bulletin of Mininsky University, 6* (3). 9–16 [in Russian].

Р.С. Бөбеш, Ғ.Б. Саржанова, С.Б. Джангельдинова

## Педагогтің жеке цифрлық білім беру ортасындағы smart-технологиялары

Мақала жоғары кәсіптік білім беру жүйесін цифрландыруға байланысты өзекті мәселелерге арналған. Авторлар «Smart-технологиялар», «Цифрлық білім беру ортасы», «Педагогтің жеке цифрлық білім беру ортасы» ұғымдарын қарастырып, нақтылаған. Теориялық әдебиеттерді талдау негізінде қарастырылған негізгі ұғымдардың мәні және олардың сандық форматта білім беру сапасын қамтамасыз ету тетігі ретінде университетте қашықтықтан оқытуды ұйымдастырудағы және іске асырудағы рөлі анықталған. Ақпараттық технологиялардың қарқынды дамуы нәтижесінде ақылды білім біртіндеп «классикалық» электронды оқытуды алмастырады, онымен бірқатар ұғымдар байланысты, олардың көпшілігінде біржақты түсінік жоқ. Мұндай түсініктерге «білім беруді цифрландыру», «смарт-технологиялар», «цифрлық білім беру ортасы» және «педагогтің жеке цифрлық білім беру ортасы» жатады. Білім беруді цифрландыру жағдайында қазіргі заманғы мұғалімнің кәсіби салада нақты білімі мен қазіргі заманғы АКТ-ны, коммуникациялық және бағдарламалық өнімдерді практикада пайдалану қабілетін сипаттайтын цифрлық құзыреттілігі оның маман ретінде одан әрі дамуы үшін маңызды бола бастайды.

*Кілт сөздер*: білім беруді цифрландыру, смарт-білім беру, смарт-технологиялар, білім беру ортасы, цифрлық білім беру ортасы, педагогтің жеке цифрлық білім беру ортасы.

Р.С. Бөбеш, Г.Б. Саржанова, С.Б. Джангельдинова

## Smart-технологии в персональной цифровой образовательной среде педагога

Данная статья посвящена актуальным вопросам, связанным с цифровизацией системы высшего профессионального образования. Авторами рассматриваются и уточняются понятия «Smart-технологии», «цифровая образовательная среда», «персональная цифровая образовательная среда педагога». На основе проведенного анализа теоретической литературы определяется сущность рассматриваемых ключевых понятий и их роли в организации и реализации дистанционного обучения в вузе как механизма обеспечения качества образования в цифровом формате. В результате интенсивного развития информационных технологий на смену «классическому» электронному обучению постепенно приходит смарт-образование, с которой ассоциируется ряд понятий, многие из которых не имеют однозначной трактовки. К таким понятиям, по праву относятся «цифровизация образования», «смарт-технологии», «цифровая образовательная среда» и «персональная цифровая образовательная среда педагога». В условиях цифровизации образования цифровые компетенции современного учителя, которые характеризуют его способность использовать конкретные знания и современные ИКТ в профессиональной сфере, коммуникационные и программные продукты на практике, становятся важными для его дальнейшего развития как специалиста. Данное исследование финансируется Комитетом Науки Министерства Образования и Науки Республики Казахстан (грант № AP13068185).

*Ключевые слова*: цифровизация образования; смарт-образование; смарт-технологии; образовательная среда; цифровая образовательная среда; персональная цифровая образовательная среда педагога.

## References


1 Днепровская Н.В. Понятийные основы концепции смартобразования / Н.В. Днепровская, Е.А. Янковская, И.В. Шевцова // Открытое образование. — 2015. — № 6. — С. 43–51.

2 Kutepov M.M. Smart technologies in education / M.M. Kutepov, E.A. Chelnokova, K.A. Maksimova // Baltic Humanitarian Journal. — 2020. — Vol. 9, No. 3(32).

3 Lyapina I. Smart technologies: perspectives of usage in higher education / I. Lyapina, E. Sotnikova, O. Lebedeva, T. Makarova, N. Skvortsova // International Journal of Educational Management. — 2019. — 33 (3).

4 Mukhametzyanov I.S. Digital educational environment, health protecting aspects / I. S. Mukhametzyanov // Journal of Siberian Federal University. Humanities and Social Sciences. — 2019. — 12(9).

5 Соловов А.В. Модели проектирования и функционирования цифровых образовательных сред / А.В. Соловов, А.А. Меньшикова // Высшее образование в России. — Выпуск 1. — 2021. — С. 144–155.

6 Chvanova M.S. The essence and structure of smart technology in mobile education. / M.S. Chvanova, I.A. Kiseleva, A.V. Samokhvalov // Proceedings of the 2020 IEEE International Conference “Quality Management, Transport and Information Security, Information Technologies”, IT and QM and IS. — 2020.

7 Connelly J.O. Improving Learning Outcomes for Higher Education Through Smart Technology / J.O. Connelly, P. Miller // International Journal of Conceptual Structures and Smart Applications. — 2018. — 6 (1).

8 Baeva L.V. “Smart Technologies” in Education: Development Opportunities and Threats. / L.V. Baeva, S.A. Khrapov, I.M. Azhmukhamedov, E.G.Popkova, B.S. Sergi, (Eds.) // “Smart Technologies” for Society, State and Economy. ISC 2020. Lecture Notes in Networks and Systems. — Vol. 155. — Springer, 2021.

9 Ţălu Ş. New Perspectives in the Implementation of Smart-Technologies in Higher Education / Ş. Ţălu. — 2020.

10 Нургалиева Г.К. Методология и технология электронного обучения: монография / Г.К. Нургалиева, Е.В.Артыкбаева; под общ. ред. Г.К. Нургалиева: Алматы, 2010. — 200 с.

11 Toleubekova R.K. Application of information technology in improvement of teachers’ competence / R.K. Toleubekova // Springer Proceedings in Complexity. — 2018.

12 Smagulova G.Z. The development of future foreign language teachers’ digital competences in creating multimedia tutorials / G.Z. Smagulova, G.B. Sarzhanova, G.K. Tleuzhanova, N. Stanciu // The Education and science journal. — 2021. — 23(6). — 216-245.

13 Pachler N. Connecting schools and pupils: To what end? Issues related to the use of ICT in school-based learning / N. Pachler; Leask M. (Ed.). // Issues in teaching using ICT. London: Routledge Falmer. — 2001. — P. 15–30.

14 Marsh D. CLIL/EMILE: The European dimension – Actions, trends and foresight potential / D. Marsh. — 2002.

15 Равен Д. Компетентология: от праксеологии до социокибернетики / Д. Равен, О.Н. Ярыгин, А.А. Коростелев // Азимут научных исследований: педагогика и психология. — 2017. — Т.6. — № 1(18). — С. 167–175.

16 Бектурова З.К. SMART-технологии в образовании / З.К. Бектурова, Н.Н. Вагапова // Вестник «Өрлеу»-kst — 2015. — 3(9) — С. 17–21.

17 Smart learning programme for Specialists of the Republic of Kazakhstan Professional development for teachers based on Smart Learning – Korea Soongsil Cyber University. – 2014.

18 Создание персональной образовательной среды преподавателя вуза. / под ред. В.А. Стародубцева // Учебное пособие. Томский политехнический университет. – Томск, 2013 – 118 с.

19 Ярыгин О.Н. От ‘competence’ до «компетентности»: продолжение эволюции понятий / О.Н. Ярыгин // Вектор науки Тольяттинского государственного университета. Серия: Педагогика, психология. — 2013. — № 2 (13). — С. 333–336.

20 Смирнова Ж.В. Современные средства и технологии оценивания результатов обучения / Ж.В. Смирнова, О.Г. Красикова // Вестник Мининского университета. — 2018. — Т. 6, № 3. — С. 9.