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# A Method of Developing Technological Readiness for Using Virtual Educational Environment in The Professional Activity of a College Teacher

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**ABSTRACT**

Present article provides the definition of the concept of "teacher's readiness for using virtual educational environment in credit educational technology". We defined the criterions and development levels of college teacher's readiness for using virtual educational environment, which are represented by three components - motivational, cognitive and operational; we reveal the content of these components. We describe the developmental stage of the experiment through four consequent stages (basic, applied, Web and interactive), the main position in which is taken by special courses that were conducted during advanced training for teachers with different levels of the studied readiness. We describe the obtained results of the study and practical recommendations for developing college teachers' technological readiness for using virtual educational environment during the professional activity in credit educational technology.

**KEYWORDS**

Technological readiness of a college teacher, credit educational technology, virtual educational environment, advanced training of teachers

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## Introduction

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Integration of Kazakhstan in the global educational space, ratification of Bologna agreements, introduction of informational-communicational (ICT) and credit educational technologies (CET) set high demands for technological readiness (TR) of a college teacher. It is specifically highlighted in the Governmental program of educational system development in Republic of Kazakhstan [8]. One of perspective directions is modelling teacher's preparation for perceiving constant technological and content changes, for scientific pedagogical understanding of the processes in the Web and anticipating development of technologies, which integrate modern ICT capabilities with the content of professional activity. The significance of the problem is amplified by the fact that within the CET each college teacher has to be prepared for working in virtual educational environment (VEE) of the college, contrast to the traditional educational models, where the developed ICT component in the professional activity structure is a complementary and not defining tool for performing educational process.

It is necessary to note an increased research interest towards the analysis of the efficiency of using informational-communicative technologies in the educational process on all educational stages during the past decades. Studies of Chzhan E.E., Baygozhanova D.S., Oshanova N.T., Akhmetov B.S., Tusubaeva Zh.M., Aykumatova A.G., Baygusheva K.M., Ertysbaeva G.N., Erakhtina I.I., Abisheva L.P., Usenov S.S., Balabekova M.Zh., Maydisarova D.S., Doszhanov B.A., Belyaev M.I., Grigoryev S.G., Grinshkun V.V., Demkin V.P. and Kapbasova G.B. define the main directions in using ICT in education; propose the principles of creating digital educational resources; and develop didactical and technological approaches towards developing and functioning of distance education systems and electronic learning. Works of Andreev A.A., Chernobay E.V., Khutorskiy A.V., Bang J. and others address the problems and ways of creating virtual educational environment in college. Problems of integrating credit educational technology were described in the studies of Artamonova E.I., Kargina S.T., Dautbaeva D.K., Kosherov T.S., Kusainov A.K., Nauryzbay Zh.Zh., Mirzandaeva R.Zh., Omirbaev S.M., Mukhametkaliev T.M., Shagulari V.V. and others. They point out that the transition to credit educational technology changes the content, methods and organizational forms of educational process, which sets specific requirements towards a college teacher, including his use of virtual educational environment. Analysis of the studies and practical work of colleges allowed revealing a controversy between the need in integrating virtual educational environments in colleges upon the transition to credit educational technology and insufficient technical readiness of the teachers for using this environment in the professional activity. The necessity of resolving the described controversy calls for the creation of a method for developing college teacher's technological readiness for using virtual educational environment in the professional activity.

## Essence of The Used Concepts

Based on the analysis of approaches of Bateshev E.A. [3], Dzhusubalieva D.M. [6], Erakhtina I.I. [7], Kolesnikov Yu.Yu. [9], Lobanova E. [11], Nurgalieva G.K. [13], Plekhanov S.P. [15], Shalaev I.K. [16] and Shevelev N.A. [17], we define virtual educational environment as informational Internet/Intranet environment, which integrates electronic educational content, user-oriented educational services, applied software and infrastructure of Web interaction

between educational process subjects, which is actualized on the basis of telecommunication systems. In our opinion, virtual educational environment has to contain the following components: informational-content, software-service and hardware-telecommunication components.

Researchers of credit educational technology, such as Artamonova M.V. [2], Baydenko, V.I. [4, 5], Zavalko N.A. [20], Traynev V.A. [19] and others, define the following advantages of this technology: high level of academic freedom; systematic step-by-step control of learning activity; possibility of international transcript translation; independent mode of students' learning activity, etc. As far as the disadvantages of implying credit educational technology in Kazakhstan are concerned, Akhmetova G.K. [1], Kusainov A.A. [10], Mukhametkaliev T.M. [12] and Tazhigulova G.O. [18] think that they constist primarily of insufficient supply of students' educational materials, lack of textbooks and limited access to the present ones, which has a negative effect on organizing students' independent work. High significance in planning and organizing educational process with credit educational technology goes to the optional parameters of the Bologna Process; we list distance learning, electronic resources and module system among them. Actualizing the abovementioned parameters is optimized by the use of IT.

In order to interact efficiently in virtual educational environment it is necessary for the teacher to be technologically ready. We define this readiness as a teacher's ability to solve professional tasks with the use of tools and methods of ICT, namely:

- to perform informational activity for collecting, analyzing and storing the informational resource in order to automatize the processes of informational-methodic support;
- to create, evaluate and actualize the capacities of electronic educational resources and educationally-oriented informational content in the Internet;
- to organize Web interaction (communication) between educational process subjects and interactive services, which function on the basis of ICT tools;

to manage to process of students' independent work in virtual educational environment.

## Modelling The Process of Developing College Teacher's Readiness for Using Virtual Educational Environment Within Credit Educational Technology

Based on the goal, tasks and object of the study, we constructed a model of developing college teacher's readiness. It includes the following stages: basic (developing the optimal invariant of knowledge and abilities related to the use of a personal computer in educational process on a user level); applied (it corresponds with conscious methodically correct use of ICT in teaching one's own subject; teacher's mastering of knowledge, abilities and skills for working with the software necessary for creating electronic educational resources); Web (a teacher initiates Web interaction between all educational process subjects); and interactive (interaction between educational process subjects through distance education courses) (see table 1).

We defined the criterions and levels of college teacher's technological readiness development, which are represented by three components

(motivational, cognitive and operational). Each of these components is evaluated by three levels – high, average and low.

**Table 1.** Structural-content characteristic of the components of college teacher's technological readiness by three stages

| Components of technological readiness | I stage (basic) | II stage (applied) | III stage (Web) | IV stage (interactive) |
|---|---|---|---|---|
| Motivational component (represents professional-personal self-definition of a college teacher) | Developing the need in using a PC for organizing the educational process. Personal interest in learning to work with a PC for organizing the educational process within CET | Developing the need in using applied software for organizing the educational process within CET. Interest towards using EER in the educational process | Developing the need in using Web technologies for organizing the educational process within CET. Robust interest towards using ICT in the educational process; tendency to search pedagogic technologies, which are appropriate for modern ICT. | Developing the need in interactive communication in order to organize the educational process within CET. Firm belief in ICT viability in the modern educational process; urge to be an active participant of the Web educational communities. |
| Cognitive component (represent the level of knowledge about scientific methodic bases of using ICT in the educational process) | Obtaining basic knowledge about the PC. Presence of ideas about PC functioning and its didactical capabilities; knowledge about the principles of Microsoft Word text editor functioning; knowledge of the principles of Windows OS functioning. | Obtaining the knowledge about the software, EER, their development and implication. Knowledge of the ways of creating, validating, correcting and analyzing electronic educational resources within CET. | Obtaining knowledge about the techniques of Web interaction during educational process within CET. Knowledge of the basic methods of integrating electronic educational resources in the educational process; generalization and distribution of positive experience in ICT use in learning a subject; knowledge of techniques for Web interaction in VEE. | Obtaining the knowledge about interactive learning techniques during the educational process within CET; development of DC in teaching. Knowledge about informational and scientific methodical support of all stages of educational process in college; knowledge of various methodic techniques of ICT use in the educational process; knowledge of techniques for organizing Web interaction, which facilitate the development of Web educational communities. |
| Operational component (represents the level of mastering the scientific methodic bases of using ICT in the educational process) | Mastering the basic abilities of collecting, storing and processing the information on a PC. Practical ability to use technological and methodical bases of preparing illustrative and didactic materials by the tools of Microsoft Word; abilities to work with Windows OS objects. | Mastering the abilities of creating and using EER during the educational process within CET. Practical ability to use the techniques of creating, validating, correcting and analyzing electronic educational resources. | Mastering the abilities of using Web technologies during the educational process within CET. Practical ability to use the method of integrating EER in the educational process; generalization and distribution of the positive experience in using ICT in learning a subject; knowledge of techniques for Web interaction in VEE. | Mastering the abilities of using the capacities of interactive communication and developing DC for organizing the educational process within CET. Informational and scientific methodical support of all stages of college educational process digitalizing; ability to independently master the necessary software resources; mastering the various methodical techniques of using ICT in the educational process; mastering the techniques of organizing Web interaction, which facilitate the development of Web educational communities. |

## Content of The Experimental Work

During the stating stage of the experiment we revealed that the process of advanced training of teachers in the field of ICT has a fragmented nature. Among the course graduates only 3% of the teachers constantly used ICT in their lessons. Based on the interviews with the teachers, we revealed that they need special training in the extended use of informational technologies in college. Analysis of the survey showed that the majority of the teachers do not see the opportunities for stimulating students' cognitive and professional interests during the process of learning subject material through using ICT (85%). Moreover, the majority of the teachers think that using ICT makes the educational process more illustrative (93%). Only 25% of the teachers think that using ICT makes the educational process more intensive, while 60% disagree with this statement. The majority of the teachers' state that using ICT is related to bigger difficulties related to organizing and supplying the work places.

The next step was the stage of revealing the real level of college teachers' real technical readiness. It included the diagnostics of training level, level of development of personal and professional interests and motives for the professional activity, division into the groups, according to the defined levels and definition of individual educational trajectories.

Organizational pedagogical conditions, which support the efficient development of a college teacher's technological readiness, are: orientation for the subjectivity of a personality, which is capable of self-identification; creation of a creative environment; stimulation towards reflective activity; dialogue-orientation of the educational process; consideration of requisite sequence and fulfillment of the education duration periods on each stage.

Success in mastering new educational material is majorly dependent on the presence of knowledge, abilities and skills, which were acquired on the previous stage of education; because of this, a necessary condition in the experimental work during the transition to the next stage of technological readiness development was the actualization of the prerequisites. Duration of learning on each stage was not less than a trimester (10 weeks). Due to the fact that teachers have a weekly load, which is stated in the schedule, and it was impossible to have course training classes 2-3 times a week, the classes schedule was created with regards to that conditions; the lessons were conducted once a week for two hours of classwork, two hours of independent work with a teacher's supervision (IWWT) and two hours of independent work as a listener (IWL). With such schedule a teacher selected the time, which was convenient for him, and attended the lessons of course training during a semester without harm for his professional activity. Successfulness of course training demonstrated that such organization is the most optimal for developing technological readiness in a college teacher. Pedagogical conditions are directed at developing individual

style of a teacher as an active subject of activity with ICT use, who is able to construct his own conceptual foundation of pedagogical activity in the conditions of VEE and mastering the techniques of making professionally valuable decisions during CET conductance.

Developmental stage of the experiment on actualizing the developed model was conducted on the basis of the method of developing a college teacher's readiness for using VEE within CET through four consequent stages, where the leading place was given to the courses developed by Orazalina Z.Z. [14]. The method was created by the authors of present study. In order to define the efficiency of the developed model and method of its realization, we started two programs of course training for teachers with equal amount of educational hours. One program was conducted in line with the traditional technologies, which have been used for many years, while the other was in line with the model and method, developed by the authors.

In accordance with the structure of technological readiness, during the first stage we conducted a "PC user" course, which developed basic technological readiness, i.e. optimal invariant of knowledge and skills related to using a personal computer in the education process and introduction to the bases of modern informational technologies and the core concepts of informatics.

On the second stage we used an "Informational-communicative technologies in the educational processes" course, part I – "Creation of electronic educational resources (EER)". Its aims were: to learn the technology of hypertext, hypermedia, the requirements towards creating electronic educational resources; to be able to construct and create electronic educational resources on the basis of Web-applications; to use the technologies of teleconferences in the educational process; to use the necessary software resources. These technologies have to be a "background" for a teacher, similar to how he uses a pencil, a pen, reads a text or uses elementary mathematical calculations.

The third stage ("Informational-communicative technologies in the educational processes" special course, part II – "Web services in the educational process") is supposed to educate a teacher to see and solve problems related to integrating ICT in college educational process, to a researcher and initiator of Web interaction between the educational process subjects. In order to successfully develop Web technological readiness, it is necessary: to learn the main concepts and structure of local networks; the main Intranet and Internet services and to be able to use them; to be able to use the services of local computer networks and global computer web Internet to search, receive and send information; to fill the "Teacher's page" with educational information on the basis of using the hypertext technology; to use local educational portal and catalogue of electronic educational editions in the educational process.

The fourth stage is related for training a tutor, a mentor of learning (pedagogue-tutor), who has to have interactive technological readiness, possessing which allows organizing the learning process on the interactive level of communication through creating distance education courses, based on the example of the Moodle system. In order to successfully develop technological readiness on the fourth stage it is necessary: to master the knowledge about systems of educational process management, which allow simple and efficient use of any types of electronic materials for educational goals; to know about various possibilities of creating, editing and saving the courses in a standardized

format; to know about various capacities of Moodle and reasonably choose certain modules with regard to the specific tasks, the specifics of the subjects, readiness of certain resources, etc.; to know the main system modules. A teacher also has to be able to perform the setup of the main course parameters, to create the content of courses, to define the informational content of the course (quality and content of the thematic parts, main sources of information, main topics for discussion on the forums and chats and the main forms of interaction); to develop an evaluation method for the whole course in general; to create tests, structure the questions according to the topic, types and difficulty; to use the built-in tools for statistical analysis of the tests results; to organize distance group lessons, which imply doing practical work in a team; to perform the work on a forum (which provides an opportunity to exchange information on a certain range of problems); to work with appeal requests as the elements of the educational course, etc.

While conducting the experiment, we paid special attention to the optional parameters of the Bologna process (organizing distance learning and students' independent work efficiency) and the goals of credit educational technology (amplifying the role and efficiency of students' independent work), which are highly significant during the planning and organizing of the educational process. Course training amplified student's independent work by providing complete educational and methodic material on the distance course of the college educational portal. Electronic courses of the students were used in the educational process, which, in turn, motivated the teachers for independent supply of high-quality content of open-access educational material. We also regarded for other conditions, which efficiently influence the process, such as: teachers' motivation for studying in the field of VEE use within CET; presence of well-prepared teachers (tutors), who provide learning the basic and advanced modules; presence of VEE rich in educational Web services and electronic educational resources; presence of computer base and software; presence of telecommunication structure of the college.

## Results of The Experimental Work

During each stage of the experimental work we conducted pedagogical monitoring of the process of developing teacher's technological readiness. We used the following methods: pedagogic observation, survey, interviews, testing, studying and generalizing of the frontier pedagogical experience. The results of the final diagnostics are presented in Table 2.

**Table 2.** Results of the final diagnostics in control and experimental groups

| Level of technical readiness development | Stages of education | Control groups (%) | Experimental groups (%) |
|---|---|---|---|
| 0% - 25 % | Basic | 30 | 0 |
| 25% - 50 % | Applied | 57 | 1 |
| 50% - 75 % | Web | 9 | 5 |
| 75 % - 100 % | Interactive | 4 | 94 |

The obtained results were checked for validity and adequacy with the use of mathematical statistics - dispersion analysis, the main component of which was

the Fisher criterion. The efficiency of integrating the developed model and method was confirmed during experimental validation and integration in practice in a number of colleges in Kazakhstan by obtaining statistically significant differences in the levels of teacher's technological readiness to use VEE within credit educational technology between control and experimental groups for all three components (motivational, cognitive and operational)..

## Discussion

The main points of the study and its results were discussed on international conferences (Ust-Kamenogorsk, Almaty, Astana, Karagandy), seminars of the Republic (Ust-Kamenogorsk, Shymkent), a seminar during university lyceum; they were partially published in a number of research articles in the journals "Regional bulletin of the East, Computational technologies", "Bulletin of the National Engineering Academy of Republic of Kazakhstan", "Ізденіс (Search)", "Ұлт тағылымы (National domain)", "Қазақстан жоғары мектебі (Higher school of Kazakhstan)", "Bulletion of Eurasian Humanitarian Institute", "Questions of philology and journalism", "Bulletin of Kazakh-American Free University"; they are represented in the reports on the research project of MES of RK "Modern informational technologies in university education" and integrated in practical work of a number of colleges in the Republic.

## Conclusion

The conclusions, which were based on the results of the study, allowed proposing the following practical recommendations:

1) It is necessary to have a college policy, which is aimed at creating an organizational infrastructure of VEE with the following specifics: providing program-methodical textbooks; educating the teachers with the developed special courses; creating a portal of electronic educational resources and distance learning.
2) The process of developing technical readiness in college teachers has to be goal-oriented and systematic.
3) The created model of developing college teacher's technical readiness can be used in the system of advanced training of college teachers and pedagogical staff of secondary and professional secondary educational institutions and in the process of teaching the prospective specialists.
4) In order to evoke teachers' interest in developing technological readiness and integrating ICT in the professional activity, it is necessary to conduct contests, reward the work of innovators, certify the developed EER and distance learning courses.

The present study does not claim to have completely analyzed all aspects of the complicated and multi-factorial problem of development technological readiness in a college teacher. The questions of coordinating the activity of all social institutes, which are intended to participate in developing teacher's technological readiness, require further study, as well as the questions of creating an inventory for psychological-pedagogic diagnostics of the process of developing their technological readiness.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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