



# Quality of Education in the Application of E-Learning in Vocational Education

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## Abstract

The article analyzes the advantages and disadvantages of learning technologies that the complex nature of their application allows you to achieve a synergetic effect, which ensures high-quality education. The material describes the didactic component of the e-learning model offered by the authors - the D. Kolb cycle, based on which it is expedient to build the content of the educational process. Also, the authors pay much attention to the issue of changing the professional position of a teacher from traditional to tutor and consultant in the course of e-learning. The article concludes that the factors increasing the quality of professional education with the use of e-learning are the complex use of a case study, telecommunication, and network technologies in combination with the construction of the educational process on the basis of the didactic cycle D. Kolb and the change of teachers' professional position.

**Disciplinary:** Vocational Education (Elearning).

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## 1 Introduction

The transition to a post-industrial society, one of the leading features of which is the active implementation of digitalization, has generated significant changes in the system of professional

education. Such changes are associated with the introduction into the educational process of content components and methods of educational activity adequate to the current and future state of science and technology, which are caused by the mass application of digital technologies in all spheres of human life and society, peculiarities of personality socialization in the conditions of post-industrial civilization (Ivanova et al., 2019).

At the same time, it is necessary to keep in mind that the insufficiency of resources, which the education system as a whole, and vocational education, in particular, can have, is the strategic factor, which both in the past and in the present and in the foreseeable future will have a significant impact on the development of educational activity (Bakuradze, 2013). This is a serious obstacle to achieving quality education, which ensures the development and implementation of breakthrough technologies, high living standards for the population, and worthy responses to a variety of social, environmental, and political challenges.

The insufficient resources to ensure high-quality professional education include both the material and technical base of educational institutions, as well as the amount of their funding, but also the number of highly qualified teaching staff, which is not enough to implement the educational process that provides a modern quality of education. Moreover, this highly qualified personnel tend to work in large university centers. We should also note the lack of time resources available to teachers and students for the educational process: the increased workload of the former and the need to work for the latter is a significant obstacle to ensuring the quality of the educational process. The situation with the lack of resources in the vocational education system has been aggravated in recent years by the significant acceleration of knowledge obsolescence, which is especially characteristic of the technical sphere. This requires the vocational education system to regularly review the content of vocational education and the methods of educational activity.

The above circumstances determine the need to use in mass educational practice solutions, which would be characterized by low resource costs. Among these solutions should be the use of e-learning, and, above all, its leading variety - distance learning technologies.

## **2 Materials and Methods**

In determining the purpose of the study, we were guided by the methodology of a systematic approach to educational activities. This methodology implies identifying numerous internal and external relations between the elements of professional education and ordering these relations, which implies their hierarchical order.

The use of the general logical method of analysis in combination with the system approach makes it possible to distinguish the positive and negative effects of some or other e-learning tools, as well as to assess their strength and, in case of negative impact, to determine the ways of compensation.

The synergetic approach to the educational process and the method of synthesis allow us to determine the complex influence of e-learning tools on the quality of the educational process. This

influence is carried out due to the self-organization of participants in educational relations, assuming the spontaneity of transition from less complex to more complex and ordered forms of educational process organization within the implementation of e-learning.

The combination of the above-mentioned scientific approaches and methods of cognition allowed us to model the educational process, the main components of which were case study, telecommunication, and network distance learning technologies. The organizational basis of the developed model was the didactic cycle of D. Kolb which assumed such stages of work with students as referring to their experience, a reflection of this experience, mastering the theory of the issues in question, and experimenting based on the reflection made and the knowledge received.

Empirical methods, such as observation and experimentation, were actively used during this study. During the pedagogical observation the results and effects of using traditional approaches to the organization of the educational process, which was characterized by fragmented use of modern digital technology, were recorded. The experiment included the integrated use of case study, telecommunication and network distance learning technologies, construction of the content of the educational process on the basis of the D. Kolb cycle, as well as work on changing the professional position of the teacher. We developed the program of the experiment, monitored the progress and results of each of its stages, and at the end of the experiment - its final results and effects. To experiment, we took five study groups of students and three study groups of trainees of professional development courses at two universities: classical university - Federal State Budgetary Educational Institution of Higher Professional Education "K.G. Razumovsky Moscow State University of Technologies and Management (First Cossack University)" (hereinafter – MGUTU) and technical university - Federal State Educational Institution of Higher Professional Education "Russian Transport University (MIIT)" (hereinafter - RUT (MIIT)). In total, 210 students (105 from each university) and 120 trainees of professional development courses (60 from each university) took part in the experiment. Some elements of the model were tested at the Institute of Management of the University of Social Sciences and Management of the Republic of Mali.

Finally, the method of comparison allowed us to record the differences between the traditional use of e-learning and its proposed model.

### **3 Results and Discussion**

In the course of this study, we have revealed that the resource intensity of basic and additional professional education is a marker that separates elitist professional education, which is available to a small part of the student contingent and is mainly conducted in the mode of full-time education, from mass education. The distinctive feature of such elite education is the direct interaction in the system of "teacher-student". The organization of mass professional education will increasingly use indirect forms of interaction between students and instructors. This means that the process of ensuring accessibility of vocational education, especially in its mass segment, will largely be realized through e-learning and, above all, distance learning technologies, which presuppose mediated interaction between students, teaching staff, and the specialists who organize

the educational process. At the same time, there will be an obvious decrease in the quality of education, which will be a consequence of ensuring its accessibility.

This conclusion actualizes the task of introducing e-learning into the educational process of basic and additional professional education in such a way that it would enable us to achieve the results of the educational process of acceptable quality in conditions of, first of all, mass education.

In the course of our analysis, it was determined that e-learning is a way of implementing educational programs in part or in full, using various information systems and information and telecommunication networks. It implies the use of distance learning technologies by making various electronic resources and services available to participants in educational relations, as well as the remote exchange of knowledge and skills, as well as to organize collaborative learning activities. Then, distance learning technologies are understood as educational technologies, which are implemented mainly through the use of information and telecommunication systems in terms of mediated interaction between students, teachers, and organizers of educational activities (Bakuradze et al., 2018). Thus, distance learning technologies are the main means of e-learning.

As a result of the study three groups of distance learning technologies were studied: case, telecommunication, and network. Case technologies stipulate that students are provided with a variety of information educational resources in the format of cases - educational-methodical complexes, as a rule, on electronic media, which are designed for independent study. The use of case technologies makes it possible to ensure the completeness of the content of education, which is very important for the system of secondary and higher education but is not a mandatory requirement for the content of modern additional educational programs. But case technologies do not provide quality means of interaction between students and teachers. In addition, the provision of cases ready to be mastered by students has both positive and negative effects. Their positive effects include saving time on searching for educational information, which undoubtedly contributes to the acceleration of the educational process, and makes it possible to promptly refer to it at the right time for the student, turning the case into a kind of means of quick professional support. The negative effects include the fact that by consuming the information practically in a "ready-made" form, the student makes no effort to search for it and analyze it. This leads to superficiality in mastering knowledge and skills, and insufficient development of learning and research competencies, the importance of which increases from year to year.

The negative effects of case-based technologies related to the organization of interaction between students and teachers can be compensated by telecommunication technologies, which involve the use of telecommunication networks for the interaction of participants in educational relations in an interactive mode and also allow them to obtain a variety of educational and methodological materials. However, telecommunication technologies, primarily due to the psychological features of distance communication (Robert, 2010), cannot sufficiently provide the effects of face-to-face interaction, which are possible in the classroom work of a student and a teacher. Also, the use of these technologies requires that educational institutions and students

have such technical devices, which would meet the required technical characteristics for their provision. The latter may involve significant investments for the purchase of new technical devices or modernization of existing ones; certain costs for their operation. Thus, the positive effects of the use of telecommunications technology can be offset.

Network technologies used in e-learning are based on the use of global and local information networks. These technologies are designed to give students and teachers access to information and educational resources that are beyond their reach, outside the educational institution. As the above resources can be quite unique professional educational programs, and high-quality teaching materials, as well as organizational, such as opportunities to participate in interesting for the student scientific research, scientific-practical conferences and seminars, virtual practical lessons, master classes of important personalities, virtual excursions, and other events. All this contributes to the development of students' creativity, which is currently one of the most important goals of professional education (Karavanova et al., 2020). Network technologies contribute to the formation of virtual educational networks, which allows to significantly expand the knowledge component of the educational process. They enable the student to become a participant in educational events, which are inaccessible to him outside the network interaction (Builova & Bakuradze, 2016). These circumstances have allowed us to conclude that network educational technologies are an essential factor of motivation of educational activity for those students who attach importance to the digitalization of their life activity. An important positive role these technologies have on the organizational side of the educational activity. But network technologies do not solve the main problem of education, which is to build effective interaction between the participants of educational relations.

The study we have conducted makes it possible to conclude that the content basis of the proposed model of e-learning in professional education, it is advisable to make a case study, on telecommunication and network technologies, which in their totality contribute to improving the quality of the educational process. As the testing of the proposed model showed, the use of the above-mentioned technologies in aggregate increased students' satisfaction with the educational process in the experimental groups of RUT (MIIT) and K.G. Razumovsky Moscow State Technical University (PKU) by 43% against an average of 13.5% when each group of technologies were used separately. The efficiency of the educational process increased with the integrated use of the above-mentioned distance technologies by 15% on average.

However, substantive changes in e-learning should be supplemented by changes in the methodology of classes, as well as changes in the professional position of teachers and their training. Speaking about the methodological changes, it should be borne in mind that the distance learning mode can be effective only when its content is based on the existing professional experience of students in the field of studied professional activity. Such experience is necessary when learners actually study the courses offered through e-learning by correspondence. There is no problem with its availability when studying additional professional programs, but when studying

higher education programs for students who have only a theoretical idea of their future profession, it is necessary to immerse them in the professional sphere from the very first months of study.

Based on the above, it seems reasonable to build the content of e-learning in vocational education based on the didactic cycle of D. Kolb, who proposed a generalized model of learning, which is based on the use of students' experience and reflection of such experience.

This cycle can be represented in the form of four successive stages (Figure 1).



**Figure 1:** The didactic cycle by D. Kolb

The first stage (stage "personal experience") represents the actualization of the students' professional experience and identification of their stereotypical ideas about the object under study. Further, at the second stage (stage "comprehension of experience") there is a reflection of the professional experience of students, assuming its comprehension. Such comprehension makes it possible to discover problems in professional activity related to the studied object.

Abstract conceptualization, which implies a brief presentation of theoretical material that is included in the content of the educational program, represents the third stage (stage "acquaintance with theory") of the unfolding of D. Kolb's didactic cycle. This stage focuses on the development of students' leading concepts about the object under study, which can enable them to change some of their stereotypical ideas about such an object as a result of their own judgments and inferences.

Active experimentation on the basis of the knowledge and skills acquired at the third stage and their active application in the course of practical classroom work and in the course of practical training constitute the fourth and final stage of D. Kolb's (1984) didactic cycle (stage "application in practice"). The content of the received education is tested experimentally. It can be clarified in some aspects and even be subjected to reasoned refutation, which should be presented for discussion to the study group under the guidance of a teacher. Application of the received knowledge and skills in practice occurs in the process of specially organized independent work of the student, which provides his active experimentation with the mastered educational material (Bukhteeva et al., 2019).

Further, during the discussion of the results of practical works, there is a new reference to the personal experience of students, during which changes in it related to the development of new knowledge and skills are recorded.

Testing of the proposed model of e-learning showed an increase in interest of students in the use of didactic cycle D. Kolb, especially in relation to students of refresher courses - courses as interesting recognized 93% of students who were trained with the use of didactic cycle D. Kolb, as opposed to 56% of students who were trained by traditional methods. Students also rated the use of the didactic cycle by D. Kolb, as increasing interest in learning by 76% vs. 52% in traditional teaching. Learning outcomes when using this cycle also showed an upward trend - an average increase of 13% for students and 24% for the trainees of the professional development courses of both universities.

The digitalization of the educational process makes special demands on the selection of personnel (Panshin & Vlasov, 2019). The systematic application of e-learning requires the teaching staff not only to master digital competencies but also a change in the professional position of the teacher. This position should be shifted from teaching roles (lecturer, seminar and practice leader, etc.) to the roles of organizers of students' educational activity, tutor, expert, and consultant. It provides for teachers and organizers of the educational process to master the technologies of tutoring and consulting, the knowledge of the psychology of modern adult learners and andragogy. At the present time for the teaching staff participating in the experimental activities of universities the relevant refresher courses and training are held, and consulting activities are carried out, which have the aim to support the change of professional and pedagogical positions.

## 4 Conclusion

Thus, the factors for improving the quality of professional education when using e-learning are the integrated use of case study, telecommunication and network technologies in combination with the construction of the educational process based on the didactic cycle of D. Kolb. It also implies teachers' transition from the traditional professional-pedagogical position to tutoring and consulting positions.

The results of the research were discussed at the International Internet conference "Modern problems of railway transport" (April 2020, RUT (MIIT) and at the International scientific-practical conference "Formation of digital culture of continuous humanities education in the context of traditional values" (Moscow, K.G. Razumovsky Moscow State Technical University (PKU) 08-09 June 2021).

## 5 Availability of Data and Material

Data can be made available by contacting the corresponding author.

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