

Approaches to assessing the quality of distance learning in higher education through the development of tools for monitoring learning outcomes

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Abstract — The paper focuses on the analysis of developments in the system of professional education associated with the intense application of distance learning technologies. The study of distance learning as a historically and dynamically progressing phenomenon made it possible to identify the set of factors that determine its quality. Emphasis was placed on mechanisms for ensuring the distance learning quality, were suggested approaches to designing of learning outcomes monitoring tools that allow the assessment of shaping competences most demanded by the job market.

Keywords — digitalisation, professional education, distance learning, competencies, monitoring and control tools.

I. INTRODUCTION

May 30, 1997, when the Order No. 1050 of the Ministry of Education of the Russian Federation, activated the experiment of distance learning in education, was issued, can be considered the official start date of distance learning development in Russia. On October 25, 2016, the priority national project "Modern digital educational environment" was approved. The pillar of the Russian system of distance education has become the Internet portal, where a wide range of online courses is collected. The portal is integrated with the Unified identification and authentication system, which allowed authorizing both students and teachers on it. A system of gained knowledge on the online courses assessment based on open source software was designed alongside with the portal.

As reported by the Atol Company, the total market volume of online education in Russia in 2018 was 21 billion rubles. In October 2019 the Yandex.Dengi Company announced that the average check of Russians for courses, trainings and master classes on the Internet year to year increased by more than 20%, and the turnover of the online education market-more than 60% (Tadviser.ru).

Russian educational system is vigorously internalizing information technology, Internet, methods of distance learning and tele-education, develop new forms and methods of organization of educational process, university governance, accompanied by a transformation of the principles of organization, control, and management of educational processes, the expansion of the boundaries and possibilities of the teachers' and students' access to global scientific knowledge databases, qualitative changes in the learning and content of learning nature [4]. To date, Russia has formed a national infrastructure of computer telecommunications for science and higher education on the basis of RBNet, continues to boost growth in the Russian segment of the global Internet.

The research issue of the paper is at the interface of various sciences - sociology, pedagogy, psychology, economics, and informatics. Each of them employs its own approaches to consideration and justification of the issue. A large number of scientific publications reflect matters of the Internet technologies application in education. However, the analysis of the distance learning technologies is essential for furthering of this form of training.

The following discrepancies are revealed in the system of higher professional education: between the high potential of distance education and its low demand; between opportunities to improve the quality of education through information technology and the present skills level not generally meeting the requirements for embracing innovation in society; between opportunities for distance education to respond quickly to the job market requests and the inertia of the integration of this service in universities.

Insufficient level of demand for quality professional education in society, due to the unsatisfactory pace of economic development, negatively affects the interests of enrollees,

students, their parents, employers, universities themselves in educational services, notably, even striving of some students to obtain a diploma at minimal intellectual and financial costs.

The goal of the paper is to study the mechanisms of quality assurance of distance education in universities. The authors used systematic, comparative-historical and complex approaches that contribute to the analysis of distance learning as a historically and dynamically advancing phenomenon and at the same time a process. These approaches allowed grasping the set of factors that determine the quality of distance education.

The empirical basis of the study is the results of the analysis of normative and legal documents on distance education and distance learning, information posted on the Internet about the educational activities of Russian universities using distance education technologies in the educational process, data on distance education of Russian and foreign studies, materials of recruitment agencies.

II. LITERATURE REVIEW

At the core of distance learning is a social presence theory, used to study the interaction of students in the information environment [9]. The theory is grounded on attempts to describe digital learning through interaction, immediacy, intimacy, connectedness and social presence, which, according to the author, positively affects the results of the educational process.

Research suggests [13] that digital competence and information literacy – the ability to receive, understand, evaluate, and use information in a variety of digital contexts – is a crucial skill considered essential to success in higher education. The authors' overview approaches to assessing the information literacy of students in the framework of professional education.

Continuing the competence-based approach in modern education, Italian researchers focus on shaping of the creative capacity of students [1]. Methodically, creativity is associated with teamwork experience and innovative practices, including the introduction of collaborative technologies based on the widespread adoption of computer and web applications, which, according to the authors, will substantially transform educational institutions.

Australian scientists [3] categorize varied digital presentation tools distance learning as methods focused on digital technologies (Digital storytelling). The authors consider the digital presentation tools as a supplement rather than a replacement for traditional methods of training and evaluation.

M. Wray, P. R. Lowenthal, B. Bates [14] note that comparative studies have largely concentrated on the similarities and differences between online and face-to-face learning. However, differences in teachers' approaches to the structure and methods of online teaching are meaningful.

Pointing out that modern universities incorporate online learning to expand their markets, limit the costs, or adopt more flexible and blended learning achievements, Y. Ryan and C. Latchem [11] put greater emphasis on small impact that distance education departments have on planning and valuation of educational programs.

Massive open online courses (MOOCs), designed as digital displays offering multimedia courses for those interested in learning are the most mainstream digital learning technologies as described by researchers. The study of tools used for the professional skills development has recently gained considerable prominence in the research of digital education technologies [12].

III. PROFESSIONAL EDUCATION SYSTEM DEVELOPMENTS

Rapid introduction of digital technologies and a spread of distance learning are vital drivers of significant developments in the professional education system.

1. Reducing spatial constraints and temporal limitations in education. Traditionally, educational institutions are bound to a specific geographical location, and students, in order to obtain the necessary professional skills, are compelled to concentrate near the educational institution. Additionally, traditional education has time constraints. Classes (lectures) are held at certain times, and students must attend them according to the schedule. Digitalisation removes these limitations. Using distance learning technologies, students can receive educational materials in any geographical location at any time having Internet access and a stable communication channel.

2. The role of informal learning is expanding. With certain skills and commitment, students can acquire professional knowledge without obtaining a formal diploma. New learning models are emerging inter alia the "learning from each other" model, when included in the process of working together students share their knowledge and skills. Teachers also get an additional opportunity to work with students within the framework of the "one for many – lecture" model (the lecture of a specialist becomes available to a very broad audience), "one for none" model (the teacher individually advises the student online or offline). The "many for many" model empowers both teachers and students to familiarize with different approaches to problems, including conflicting ones. In this case, both will have to choose. Unfortunately, the students' choice is especially difficult due to the lack of sufficient specialized knowledge and will not always be justified.

3. The emergence of new problems related to the government regulation of educational programs. Given that the state accreditation models of distance professional educational programs are in progress, employers meet considerable difficulties in assessing the professional competencies of their candidates for vacancies. Albeit the informal training programs can be remarkably effective there has been a strong distrust of them in the Russian Federation.

4. The role of the teacher, who becomes a designer of educational materials for placement on educational platforms,

is changing. A notable number of teachers do not possess so far the necessary skills to create high-quality distance learning materials. There is no extensive training yet. Apparently, the system of professional training in the Russian Federation is in a wait-and-see position in the expectation of a natural shift of generations.

The digitalisation of professional education and the spread of distance learning have their advantages and negative aftereffects (Table 1.)

TABLE I. POSITIVE AND NEGATIVE AFTEREFFECTS OF DIGITALISATION OF PROFESSIONAL EDUCATION

Positive aftereffects	Negative aftereffects
Cheaper education (no need to invest in buildings, facilities, hostels, infrastructure; fewer teachers will be needed, students will not need to travel to study, etc.)	The complexity of choosing a training program.
Wide geographical outreach	Not consistently high quality training materials.
Availability of training kit at any convenient for the student time	Problems of students' motivation to complete a full cycle of training
Availability of education for people with limited mobility, disabilities and special needs	Students' lack of "face to face" communication practice and therefore, incomplete social communication skills
The possibility of a high degree of individualization of the training trajectory and content	Employers' lack of clear understanding of the presence and level of completeness of competences of potential candidates for vacancies after distance learning

IV. REQUIREMENTS FOR LEARNING OUTCOMES

The purpose of the professional education system is to provide numerous enterprises and organizations with specialists. According to the online survey of the HeadHunter research service conducted among HR-specialists the most relevant expertise in the job market of the Russian Federation appear to be skills, which are listed in the Table 2.

TABLE II. THE MOST RELEVANT SKILLS AND ATTRIBUTES IN THE MODERN JOB MARKET

Skills and Attributes	Ability to work with people, non-conflict behaviour	Entrepreneurship, ability to look for and find unexpected solutions, creativity	Leadership	Emotional stability, stress resistance	Advanced sense of responsibility, motivation:	Ability to work independently, without the help of management and colleagues	C. Specialized professional and technical competences	Diligence, integrity and discipline:	Digital knowledge and skills (knowledge of IT systems, programming skills	Skills in working with quantitative information and calculations	Intelligence and erudition	Commitment and loyalty to the employer	Computer skills with ordinary, non-specialized programs
Vacancy													
The Head of the organization (General Director, Managing Director, Branch Director, President of the Company) or her/his Deputy	+	+	+	+									
Head of Division		+	+		+	+							
Line Manager (mid-level manager)	+	+	+		+								
Qualified specialist with higher technical education					+		+	+	+				
Qualified specialist with higher non-technical education	+				+			+		+			
A qualified specialist in the field of sales		+		+	+	+							
Administrative staff				+				+			+		+
Technical and service personnel	+				+			+				+	
Skilled worker					+	+	+	+					
Number of references	4	4	3	3	7	3	2	5	1	1	1	1	1

(Calculation on data: What job seekers' skills are the most scarce 19 August 2019) <https://spb.hh.ru/article/25225>

Among the most in-demand attributes specialists highlight the following: advanced sense of responsibility; motivation; diligence, integrity and discipline; ability to work with people; non-conflict personality; entrepreneurship; ability to look for and find unexpected solutions, creativity.

Moreover, employers expect candidates for vacancies to have competencies that meet professional standards. At this point, distance education standards are practically not subject to state accreditation, so employers do not have confidence in their applicants' capabilities. Employers don't view informal education as a basis for hiring at all. In this regard, the establishment of knowledge/skills control and competency assessment systems is of particular relevance for distance professional education.

V. EDUCATION PERFORMANCE CONTROL TOOLS

For control purposes, it is advisable to use the following tools.

1. Interactive elements in the lecture. The main type of presentation of educational materials in professional education is a lecture. Regarding distance learning, it is much more challenging for the teacher to hold the students' attention than in the classroom. To test the perception of the material during the lecture, it is worthwhile from time to time to ask clarifying questions that require an immediate answer, regardless of online or offline student listening to the lecture. The timely response of the student will indicate his involvement in the learning process. The absence of the necessary answers will mean the absence of the student and he will need to refer to the training material again to obtain a positive mark and the possibility of moving on to the next training materials [7].

2. The use of materials created on the basis of the tests theory to test knowledge. Universities in the Russian Federation are actively designing distance courses. The template of any distance course includes a set of test (control and measurement) materials, typically in a test form with a single answer. A large number of tests of different quality are presented on various educational platforms. It is problematic that teachers develop them virtually spontaneously, largely following their understanding.

Meanwhile, there is a test theory that describes the qualities required by such materials. Most of the creators of control and measurement materials have not been trained and have a poor understanding of the reliability and validity of control and measurement materials. The prepared tests are used without approbation and their quality is not subject to analysis within the framework of the implemented educational programs. In this regard, it is impossible to speak with confidence about the degree of formation of the necessary competencies and the effectiveness of distance learning.

Apart from just technical specialists, structures involved in the distance courses production should comprise methodologists who are able to analyze the quality of control materials on the basis of statistics and help teachers to ensure adequate verification of knowledge. The complexity of questions, distribution of estimates, reliability and validity (together with the developer) of control materials are mandatory for analysis. In addition, it is advisable to assess the compliance of materials with learning objectives based on the place of the test in the education. A stable classification of tests was built up throughout using test materials, see presented in the table 3.

While narrow distribution of estimates makes it possible to answer the question "they know/they do not know" or "learned-not learned", wide distribution appears to be a way to differentiate estimates. The number of questions should be less in case of low students' motivation (the beginning of training) and higher in case of high motivation (the final test). Experts believe 25 to be the optimal number of questions. The complexity of the questions is determined by the number of

correct students' answers, though since groups may have different levels of preparedness, more extensive statistics are required than testing one group of students.

TABLE III. FEATURES OF TESTS FOR DIFFERENT PURPOSES

The place of the test in the educational process (goals)	Distribution of estimates	
	Narrow	Wide
Test before training (diagnostics)	Many questions Many topics Low complexity Hints and explanations are not recommended	
Test during training (monitoring, test as training)	Many questions Many topics Medium complexity Hints and explanations are recommended	Little question One topic Medium complexity Hints and explanations are recommended
Test at the end of training(control)		Many questions Moreover Medium and high complexity Hints and explanations are not recommended

Tasks of low complexity assume from 90 to 80 percent of correct answers, middle complexity - from 80 to 20 percent, high complexity - from 20 to 5. It is ought to exclude from tests super simple tasks, when all students answer correctly, and unworkable when the correct answers are absent at all. These two extreme complexity groups commonly contain tasks with an infelicitous wording or technical error, so they require careful attention

3. Project Implementation. The project-based learning method was elaborated by foreign authors J. Dewey, W. Kilpatrick. The project-based learning phenomenon is the full-fledged scientifically grounded training technology. Knowledge and skills are mastered by students on their own, they are used for self-education or training. As demonstrated in the studies of the National Research University "Higher School of Economics", researchers have always seen critical thinking, emotional intelligence, team skills, client orientation, project management, etc. as the most conceptual supra-professional competencies, or soft skills [5, 2].

The concept of supra-professional qualities, or soft skills, partially correlates with the concept of professionally meaningful qualities; the complex of these qualities correlates, along with hard skills, with part of the professional competence of the future specialist. In this context, project activity in the education system is a way to control of the listed qualities.

Several models of project management are implemented in higher education. The most radical model is one in which the entire infrastructure and endeavor of an educational organization are reorganized in line with the requirements of a project-oriented approach.

The most balanced model is the creation of a project office in the organization. However, in most domestic universities,

project management is currently implemented in the form of general or local project bodies (committees, councils) (as a rule, the project function is performed by some already established group, for example, the educational and methodological council of the Institute, faculty, etc.). In the latter case, it is not suggested the systematic implementation of a project-oriented approach in the management of an educational organization. At the same time, the latest model is of a special value as it exhibits the professional community's efforts.

The project management mechanism deployment serves as a determining factor in the success of educational work. This is related to the fact that the professionally meaningful qualities within the professional competence and readiness of the future bachelor might be shaped not only within a particular discipline or extra-curricular action, but in the context of the consolidation of the professor/teacher's corps, ensuring the implementation of the educational program. In this regard, the bottom-up initiative has the special capacity for effectiveness.

With regard to the methodological component of project activities, it is noteworthy that actions in the project require awareness, meaningfulness, and understanding of what field the problem belongs to. The design action is distinguished by its rationing and initial forethought. It cannot be completely arbitrary or spontaneous, because it lays within the framework of certain project procedures inherent in each of the project activities organization stages. The design action is goal-oriented, meaningfully determined by the general design methodology. Furthermore, the participants of the project activity inculcate within themselves a quality which can be characterized as conceptuality of behavior or compliancy to the theoretical rationales and norms enhanced at the pre-project stage, basing on shaping of the listed attributes.

This refers to the ability to consciously apply the goal-setting, sustainability of principles and standards for implementation of the project activities, the presence of logic of action related to the understanding of the design process, the ability to structure own endeavor, to bring it into the system respectively the stages of the project, the ability to creatively navigate in any project activity situation, using it to implement charted design, using reflection for assessment, correction and actualizing in the project. The student is given an independent choice of innovative methods, means and ways to problem solving, students apply previously mastered actions to solve atypical tasks, meanwhile they receive subjectively new information and undertake the project work, the results of which were not known to anyone in advance. Due to the technological nature of the procedures included in the structure of project activities, gathered together people, who do not individually have a special creative potential, acting according to the rules of the project, are able to get jointly socially fascinating and valuable outcome. Since the project is typically implemented by a team, its success is largely due to the level of communicative abilities of all participants.

Greater use of modern means of communication in distance education enables students, located in different regions of the

country, to smoothly participate in the project implementation, and, importantly, it likewise generates the enhancement of students' creative capacity and allows expanding the problem field of the research effort.

VI. BENEFITS OF DIGITALISATION OF EDUCATION

1. An open system of continuous education is progressing, providing each person with her/his own learning trajectory, possibility of obtaining several educations of different profiles regardless of age. Distance education, as one of the forms of continuous education system, is designed to apply human rights to education and information obtaining. In this way anyone who wishes may receive basic or additional education in parallel with his professional work. Distance education replaces extramural education.

2. The process of cognition changes: a shift from the knowledge accumulation to the action in a specially organized learning environment takes place.

As a result, the students' cognitive exercise effectiveness is growing; the motivation of achievements is increasing. High-quality distance courses strengthen the students' motivation through the binding of tasks to specific problems, "breaking the pattern", operational feedback. Interactivity leads to the evolvement of new types of thinking: alternative, heuristic, systemic. Skills of independent decision making are shaped.

3. Differentiation and individualization of learning becomes a reality. The student has maximum freedom in choosing the number of courses, time and place, the intensity of training in accordance with their abilities, opportunities and goals.

4. Students' access to various sources of information reduces the knowledge authoritarianism, enables criticality, independent thinking, creative approach to their education. A single educational information space emerges on the global scale.

5. Access to education is guaranteed regardless of social conditions of people.

VII. LIMITATIONS OF THE DIGITALISATION OF EDUCATION

1. Distance learning enables to get acquainted with different approaches to problems, comprising conflicting, of different quality. The consumer faces a difficult choice.

2. The absence of a state accreditation model of distance professional educational programs, results in a lack of common approaches to assessing their quality and effectiveness.

3. There is still considerable ambiguity in how to assess the competencies formed as a result of distance learning, and therefore uncertain understanding of distance learning possibilities by employers.

VIII. CONCLUSION

The paper presents approaches to assessing trends in the distance learning development. Some authors focus on the enhancing of student's creative capacity; others accentuate the technologies of digital presentation of material and significant differences in the approaches of teachers to the structure and methods of distance learning. In this regard, it should be underlined that unidirectional trends are demonstrated in Russia and abroad.

Taken together, these findings suggest approaches to the development of learning outcomes monitoring tools, allowing assessing the level of competencies of most demand by the job market.

The experience of the widespread introduction of open online courses (digital storefronts), offering high commercialization of the process and the lack of quality of training assessing systems, should, therefore, be interpreted with caution.

We assume that furthering distance learning technologies should move towards the technological component advancement of the educational process and formalization of approaches to assessing the quality of education and learning outcomes.

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