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Key vectors of training a new generation of education professionals

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Abstract

The article analyzes the experience of implementing higher education programs using distance technologies at I.N. Ulyanov State Pedagogical University in Ulyanovsk. It identifies the prospects for digitalization, as well as the design of the educational process of the university as a platform for coming up with individual educational trajectories of students using digital technologies. When carrying out the research, theoretical and empirical methods were used, the latter in the format of a questionnaire survey of 1st through 5th- year students and scientific and pedagogical workers of the university with subsequent content analysis. The main problems of digitalization of education are identified: the increased volume of teachers' workload, technical problems, methodological problems, motivation and involvement of students, digital competence of all the parties involved in the educational process. The prospects for the development of digitalization at the university are outlined. They include: the creation of new educational content, the development of infrastructure and information environment, the introduction of distance technologies, online learning. All this inevitably leads to a change in traditional forms and methods of teaching, requirements for teachers and students, the expansion of project activities of students and remote additional education for children, the awareness of digital culture, psychological preparation for distance learning. The accumulation of educational content contributes to the individualization of education. The individual educational trajectories will be implemented in the elective content of curricula and the content of disciplines and practices. This can lead to pedagogical activity with the use of special pedagogical technologies, modernization of the organizational structure of the university. The research results can be used in the organization of the educational process at universities, the development of basic professional educational programs, curricula to meet the requirements of higher professional education.

Keywords: educational process, educational environment, digitalization of education, distance educational technologies, individual educational trajectory.

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Introduction

In the context of the national doctrine of education in the Russian Federation until 2025, the national project "Education", new trends for the development of higher professional education are outlined, which highlight digitalization and individualization of education, as factors in the development of professional, supra-subject competencies and the advanced development of professional training (Herzen, Sukhareva, & Skorokhodova, 2019; Khokhlova & Starikova, 2018; Ministry of Education of the Russian Federation, 2018). Digitalization is one of the approaches to the use of digital resources in the transformation of education (Petrova & Bondareva, 2019; Stokov, 2020). IT technologies, messengers, social networks have changed social values and contributed to the emergence of a new type of students. These students plan their educational trajectory proactively and they are motivated for personal development and identity formation. In order for higher education to meet the requirements of our time, it is necessary to determine the ways for further digitalization and individualization of education.

Purpose and objectives of the study

The purpose of this study is to analyze the experience of implementing higher education programmes using distance technologies and determine the prospects for digitalization, as well as to determine the design of the educational process (activity) of the university as a platform for designing individual educational trajectories of students using digital technologies.

Literature review

Global trends in education are the subject of numerous scientific publications. The main trends of digitalization and individualization of education that we have outlined have been in the focus of scientific research (including at the dissertation level) for more than a decade.

Psychological and pedagogical aspects of the use of digital educational resources were considered in the works of Kuanysheva, Asainova, Ragulina, & Lapchik (2019), Asmolov, & Asmolov (2009). It is worth mentioning Shteimark's research (2011) "Improving the quality of knowledge of students of a pedagogical university by means of digital educational resources", carried out at the Moscow City Pedagogical University. The author, in particular, notes that digital educational resources are modern cognitive tools that offer real prospects for improving students' knowledge.

A lot of papers are devoted to the use of digital technologies in specific types of pedagogical activity: in chemistry lessons (Zimina, 2012), in elementary school (Baklanova, 2013).

The problems of distance learning are closely related to digitalization. The latter is also actively studied by representatives of pedagogical science. In particular, the trends in the development of distance learning using the example of universities were studied by Korneeva (2007). Historical and pedagogical aspect of the development of distance education in the Ulyanovsk Region was researched by Belukhina (2011).

Ideas of individualization of education have been present for many centuries in philosophical (Aristotle, Plato, Socrates, etc.) and in purely pedagogical literature (for example, the ideas of Pestalozzi (cited in Heafford, 2016). At the present stage, both general issues of individualization of university education (Zhukova, 2006) and specific issues, for example, individualization of teaching mathematics (Matveeva, 2009), individualization of teaching in junior courses (Yakovenko, 2000) are being studied.

Burlakova's doctoral dissertation (2012) "Individualization of professional training of students in a modern pedagogical university" is worth mentioning. She defines the individualization of the preparation of a future university teacher as a process that contributes to the professional education of a student and a positive change in his/her inner world with the aim of self-realization in pedagogical activity and in everyday life.

Despite the abundance of scientific literature, many issues require further research. The reason for this is primarily the variability of the subject. Distance learning in 2020 has raised many new questions about the acceptable limits of digitalization and distance learning and their effectiveness.

Methodology

The object of the research was the digital culture of students and teachers of higher education and its influence on the modernization of the educational process at the university. The work examines the experience of the Ulyanovsk State Pedagogical University (UIGPU). To achieve this goal, the following methods were used: theoretical methods - analysis of literary sources, world trends, strategies for the development of education in the Russian Federation, comparison and systematization, generalization of facts, modeling the educational process of the university as a platform for designing individual educational trajectories of students using digital technologies; empirical methods - observation, analysis of the products of educational activities of students, questionnaires of trainers and teachers. Monitoring of the subjective ideas and expectations of students and scientific and pedagogical workers from the use of distance technologies was carried out one and seven months after the active introduction of these technologies into the educational process of the university. 3,062 students of 1st-5th year students and 326 scientific and pedagogical workers of UIGPU took part in the survey on a voluntary basis, followed by content analysis. The data entrusted in the course of the survey and analysis was subject to statistical processing.

Results

The goal of the digital transformation of education at the university is to train personnel to work in the digital economy. Success in this direction requires the simultaneous solution of three tasks: digitalization of university education, assistance in the digital transformation of the social sphere of the region, digital transformation of the university itself as an organization, its business processes and services.

The digitalization of higher education implies a complex of organizational, educational and methodological measures. In particular, the Center for Digital Transformation of Education has been created at the Ulyanovsk State Pedagogical University. A modern studio for recording online courses is being assembled. Advanced training of university teachers in the field of digital skills is being carried out. More than 80 percent of university professors were trained in 2020.

Scientific research is a prerequisite for successful digital transformation. For example, currently we are working at the research project "Development and integration of educational online courses into the digital environment of the university", funded by I.N. Ulyanov State Pedagogical University.

All educational programs of higher education include a module on information and communication technologies and media literacy.

At the beginning of this year, 80 students studied under the Big Data program developed by Moscow State University. Also, our students took part in the intensive "Be in the digital!", Organized with the participation of the University 20.35.

Promising areas of modernization of the educational process are:

- partial transitioning from in-class to on-line lecture courses;
- introducing on-line classes in educational process;
- upgrading training profiles, training of educational data engineers and pedagogical designers;
- creating educational trajectories in the information environment, including through the analysis of the digital portfolio;
- using virtual and augmented reality tools in education. The project "Pedagogical Simulator" developed by the university took a high position in the accelerator of the Agency for Strategic Initiatives for educational projects.

In case of successful implementation of the project, the simulator will help pedagogical universities and training centers to solve the problem of passing pedagogical practices using a VR simulator that simulates non-standard situations.

The second task is to facilitate the digital transformation of the social sphere of the region.

The university is helping to eliminate digital skills gaps through CVE programs. The courses are being implemented to improve the qualifications of teachers "Remote interaction of teachers and students: technical and psychological and pedagogical aspects", "Basic techniques for working with interactive equipment", etc.

The university runs an advisory center that provides services of a psychologist and pedagogical support to the students' parents.

In September 2021, the university will create a Center for Continuous Professional Development of Teachers. One of its tasks will be assessing digital competencies and producing recommendations on individual trajectories for their development.

Finally, the third task is the digital transformation of the university itself as an organization, its business processes and services.

This implies:

- creating a modern digital campus, including an access control system, video surveillance, electronic document management;
- organizing management of the educational process through the electronic dean's office;
- digitalizing online services for applicants, their parents, students, employees and external contractors.

Ten months of organizing the educational process exclusively using e-learning and distance learning technologies allowed us to collect solid material.

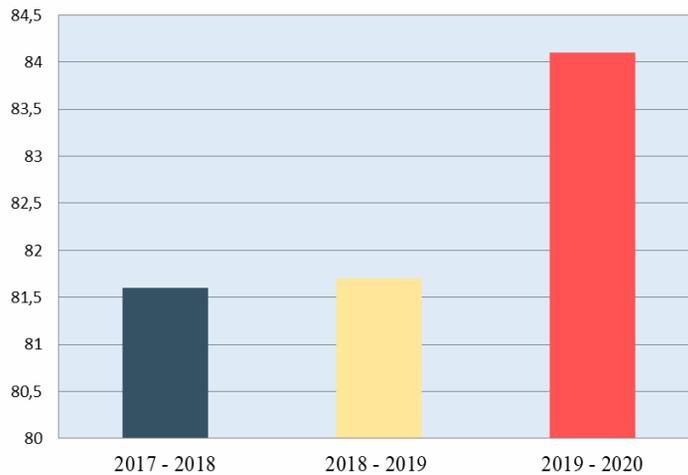


Figure 1. Overall Students' performance at the end of the summer semesters (2017-2018, 2018-2019, 2019-2020 academic years.) (Percentage of students without academic debt)

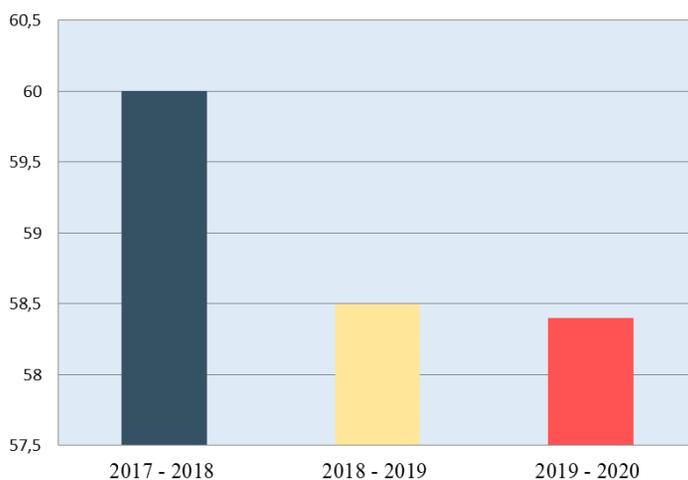


Figure 2. The quality of students' knowledge based on the results of summer exams 2017-18, 2018-19, 2019-20 academic year (undergraduates earning B's and A's)

The comparison demonstrated that the university saw a sharp rise in academic performance and a slight drop in the quality of knowledge. It can be assumed that the remote format allows students who combine study with work or other activities not to lose contact with the university, complete assignments asynchronously and continue their studies. As a result, the absolute academic achievement rate is growing.

The next tool is the comparison of Federal Internet exam in the field of professional education (FEPO) results.

This tool is not perfect either. In general, the university shows a drop in results, although insignificant, and the results in individual disciplines are generally about the same as last year.

Table 1. Quantitative indicators of participation in FEPO

| Period of the event | Stage | Number of training areas | Number of test sessions |
|-----------------------------|---------|--------------------------|-------------------------|
| March –July 2018 | FEPO-27 | 13 | 3377 |
| October 2018 –February 2019 | FEPO-28 | 12 | 4083 |
| March –July 2019 | FEPO-29 | 12 | 2573 |
| October 2019 –February 2020 | FEPO-30 | 11 | 4593 |
| March –September 2020 | FEPO-31 | 9 | 642 |

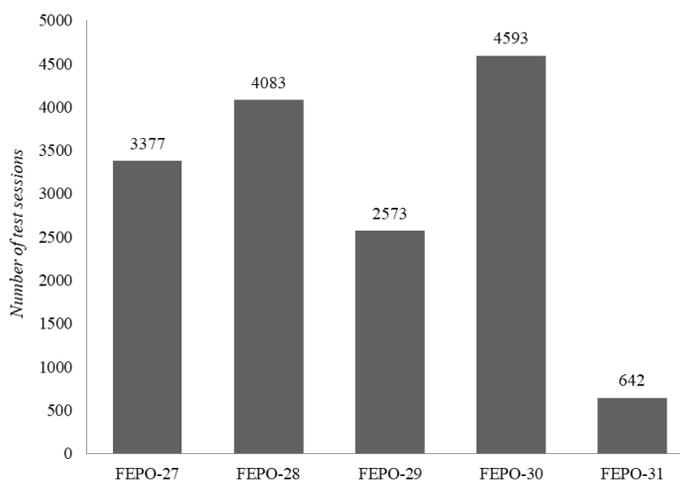


Figure 4. Dynamics of the number of testing sessions

Let us move on to school education. Here we have a comparison of the results of the USE, VLOOKUP, VOS and the quality of knowledge.

Comparison of the VLOOKUP results in our case does not make it possible to draw conclusions. The fact is that the students took one history test in April 2020, that is, at the beginning of the pandemic. After that, the work was carried out only in September by newly- enrolled students, therefore, the VPR in this case does not provide an opportunity to assess the quality of training in our lyceum classes.

Comparison of the USE results hardly gives the desired picture, since the pandemic captured only a few months at the end of the school year. Nevertheless, the statistics are in front of you, the results are somewhere worse, somewhere better, but in general on the same level.

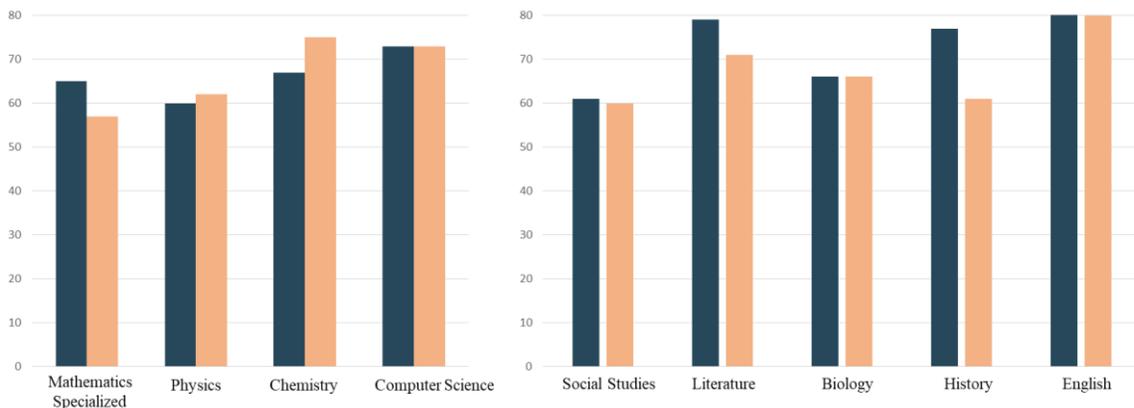


Figure 5. Comparison of the results of the exam of lyceum students

Comparing the results of the municipal stage of the Higher School of Economics, one can see a significant increase in the number of lyceum students who reached the regional stage.

Finally, comparing the quality of knowledge based on the results of the first and second semesters of 2019/2020 academic year does not give grounds to conclude that the quality of education has dropped.

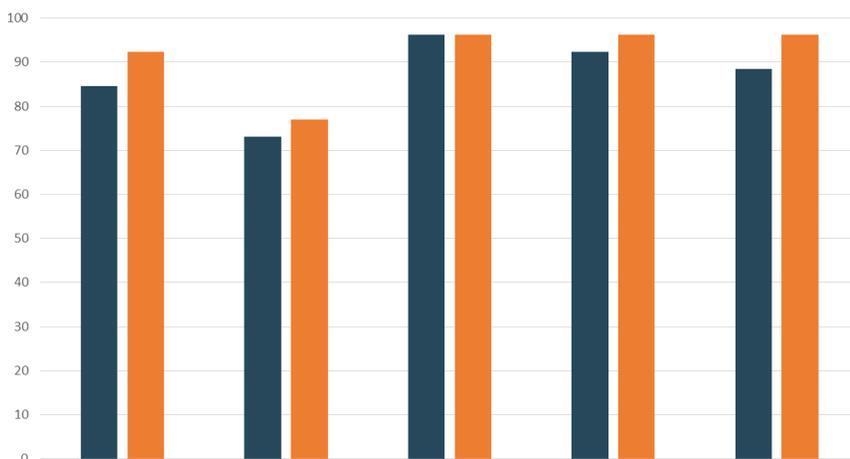


Figure 6. Analysis of the quality of knowledge of lyceum students based on the results of first and second semesters of the 2019-2020 academic year.

Thus, the analysis of the assessment results shows the stability of the academic progress.

But let us turn to another criterion - the subjective impression of teachers.

In October-November of 2020, the Department of Methods of Mathematical and Information Technology Education held the All-Russian Conference "Quality Management in Education: Problems and Prospects." Prior to the conference, two hundred and two teachers were polled to find out their stand on distance learning. 60% of respondents claim that the effectiveness of distance learning has dropped, 17% deem it has not changed, and 14% said that it has risen. It should be noted that this is not a first impression, but an already established opinion, since the survey was conducted almost eight months after the introduction of a lockdown.

Thus, the reported data do not give grounds to speak of a decline in the quality of education. However, the impressions of the teachers cannot but cause concern.

The teacher, in direct interaction with the student, reacts earlier to any changes in the educational process. It can be assumed that with long-term distance learning, the reported figures will also show negative dynamics.

We share our country's leaders' opinion that nothing can replace live communication between the teacher and students.

Let us move on to assessing the contentedness of educational process participants. We rely on the results of five surveys:

- 1) 1,807 students' survey, in April 2020;
- 2) 326 teachers' survey, March 27 to April 7, 2020;
- 3) a survey run by the Department of Psychology among teachers in May 2020. 55 teachers were interviewed;
- 4) a survey organized by the Department of Methods of Mathematical and Information Technology Education in November 2020, in which 202 university teachers took part;
- 5) a survey of students, held in November 2020. 3,062 undergraduates participating.

University teachers are not satisfied with distance learning. According to the survey, most of them do not find it appropriate. Along with the interest in learning new things, this learning format results in fatigue, irritation and discontent.

Teachers note a lack of feedback, excessive fatigue. At the same time, self-development is noted, the emergence of new forms of teaching classes.

The number of students satisfied with their distance learning experiences rose by 7% during the year.

The convenience of this format was noted in November by 4% more students.

Among the difficulties associated with learning, students name:

- unstable Internet connection;
- multitasking;
- greater fatigue brought on by working for a long time;
- methodological problems (changes in the schedule).

Students see distance learning as promising. In April 2020, half of the respondents believed that certain disciplines can be taken remotely on an ongoing basis. In November, there were already 66.5% of such students.

Students are concerned about:

- prolonged period of distance learning;
- exam format;
- practice format;
- setting too much homework;
- straining eye-sight

The organization of distance learning and, in general, the course of digitalization of education does have problems.

Analysis shows that teachers and students face challenges on a daily basis. At the same time, a comparative analysis of surveys in the spring and autumn shows that over the past months, technical difficulties have disappeared. The teachers say that the main difficulties are students' motivation and organization.

In general, the problems of distance learning to be solved are:

- increased volume of teachers and specialists' workload;
- technical difficulties (lack of technology and a stable connection to the Internet);
- methodological challenges (unaddressed forms and methods of knowledge monitoring, difficulties in organizing group work);
- lack of motivation and involvement of students;
- low information technology competence of those participating in the educational process;
- low level of digital culture.

In this context, the main prospects of distance education at the university are obvious.

1. Creation of new educational content - online courses. It seems that the work on the creation and implementation of online courses, as well as online support for the taught disciplines, should be taken into account in an effective teacher contract.
2. Development of infrastructure and information environment. It is necessary to create a convenient personal account of the student, which reflects the academic progress, selects disciplines, and updates the schedule.
3. Optimization of the teacher's work. The need is ripe for phasing out some documents, including paper registers and students' grade books. The complexity of teaching is largely due to the lack of effective methods for diagnosing educational results in the context of digitalization of education.
4. Stepping up students' project activities. Thus, experience has shown that the main way to solve the problems of training specialists in creative professions in lockdowns is the organization and implementation of project activities. We are talking about both student projects and enlisting students in professional projects.

5. It is necessary to continue the work on upgrading IT-competencies of the university staff, including the creation of a single updated resource with materials for the development of IT-competencies by the university staff.

6. The weakening of the territorial barrier makes it possible to develop the implementation of distance supplementary education for children and expand its geography.

7. The upbringing of digital culture of students has gained relevance. Black screens, obscure names and unofficial appearance in the conference should not be tolerated. Rules of digital etiquette should be formulated and no breach of it allowed.

The accumulation of educational content through further digitalization will contribute to the individualization of education. The implementation of individual educational trajectories is proposed to be carried out using the elective content of curricula, the content of disciplines and practices.

Discussion

The main and inevitable prospect of modern education is the inclusion of digital technologies in it. Views on this perspective vary from total approval to absolute denial.

In 2020, employees of the Higher School of Economics conducted a study of the effectiveness of distance learning. The work was carried out jointly with American colleagues. 325 students of three regional universities, studying in the areas of "mechanical engineering" and "construction" were divided into three groups. The first one attended classes in person. The second looked at the notes of lectures and came to practical classes at the university. Students from the third group had online classes. As a result, the disciplines were mastered equally well. Although satisfaction with classes in the third group was significantly lower, the researchers explain this by lack of experience. The cost savings for training one student when scaling this model can be up to 19% (Chirikov, Semenova, Maloshonok, Bettinger, & Kizilcec, 2020).

However, the results of our studies, which are described above, indicate that the quality of education in the long term faces serious difficulties.

Thus, the most appropriate approach in the future will be a combination of face-to-face and distance learning.

We should clarify that distance technologies are rarely able to improve the process of imparting knowledge to a student. This thesis can be explained using a lecture example. It is commonly believed that a lecture may be recorded in advance and then viewed by students. This, of course, saves resources and is convenient to both parties. However, such an approach can, over time, devalue the lecture as a type of activity, make it meaningless.

Here is what the director of the Center for Economics of Continuing Education, Institute for Applied Economic Research, RANEP, Klyachko (2020): “A lecture attended by 20 students is not needed online or offline. This is just a bad lecture. Bochum University has an auditorium for 1200 people, and lectures are delivered there without a microphone – the acoustics are excellent. So, when lectures are delivered in this huge auditorium, even steps are much-needed as a place to sit on, and mobile phones are not needed at all. Information is now easy to find on the Web, as well as lectures of eminent scientists. But problematising lectures ... are more beneficial when listened to, as they say, live”.

Conclusion

The introduction of digital technologies into university education made it possible to gain positive experience in organizing the practical training of students while implementing new projects, such as the educational intensive "Be in the figure 25.25", the call center of IT volunteers, "Online - counselor", "Virtual pedagogical simulator ", and others. The main problems of digitalization of education in the Ural State Pedagogical University are identified: the increased volume of work of teachers, technical problems, methodological problems, motivation and involvement of students, digital competence of all the parties involved in the educational process, lack of digital culture. The prospects for the development of digitalization at the university are outlined: the creation of new educational content, the development of infrastructure and information environment, the introduction of distance technologies, online learning, inevitable changes in traditional forms and methods of teaching, changing requirements for teachers and students, expanding the students' project activities and distance additional education for children, education of digital culture, psychological preparation for distance learning. The accumulation of educational content will contribute to the individualization of education. The individual educational trajectories will be implemented using the elective content of curricula and the content of disciplines and practices. This can lead to the modernization of the organizational structure of the university and educational activities with the use of special pedagogical technologies.

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