

ICHEU 2021
International Conference «Humanity in the Era of Uncertainty»

**DESIGNING THE LEARNING PROCESS FOR TECHNICAL
UNIVERSITY STUDENTS IN CONDITIONS OF UNCERTAINTY**

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Abstract

The ongoing pandemic that has swept across the world significantly affected the education system as well. New living conditions required a serious transformation of the educational system that had to move to online remote learning in a short time. All participants of the educational process found themselves in difficult conditions that required rapid adaptation to changes. The current extreme situation during the period of self-isolation can be described as a situation of uncertainty for all participants of the educational process. This empirical research was conducted in 2020-2021 in Samara State Technical University. Its aim is to study the situation of uncertainty in the conditions of distance, full-time and blended learning. When face-to-face classes resumed, the authors conducted a sociological survey aimed at identifying students' attitude to full-time and blended learning and made a comparative analysis of the survey's results. The study showed that students acquired new ways to respond to the challenge of changing forms of learning as well as to interact with the surrounding world. They developed unified patterns of behavioural reactions, algorithms of educational actions, which contributed to the formation of new learning patterns in the proposed conditions. The assessment of students' preferences for choosing a particular form of education led the authors to the conclusion that the future belongs to blended learning, which includes both online and face-to-face classes. In this regard, teachers need to think, develop, and modify the patterns of training modules, both online and face-to-face, in advance.

2357-1330 © 2021 Published by European Publisher.

Keywords: Education, distance learning, uncertainty, blended learning



1. Introduction

The COVID-19 pandemic has caused significant changes in the life of the entire human race. The higher educational system and all its educational institutions, in their turn, had to move to online remote learning. The Federal State Educational Standards of Higher Education (FSES HE) for technical areas of training state that in the case of using distance educational technologies as part of an educational training programme, universities and other higher educational institutions must ensure effective interaction of participants through the Internet. These regulatory documents mean only well-planned and coordinated distance learning, not a massive rapid transition of all universities to this mode. In the context of distance learning, it is particularly important to meet the requirements for the results of mastering training programmes that ensure the formation of all competencies necessary for students in the implementation of their professional activities. Many researchers note that "both students and teachers were forced to quickly adapt to new conditions and make remarkable efforts to ensure the effectiveness of the educational process implemented in these unusual conditions" (Larionova et al., 2020, p. 26). In this regard, it is crucial for university teachers to be ready to constructively design and redesign the educational process of future technical graduates and develop a strategy for introducing abrupt changes in extreme conditions.

2. Problem Statement

Many researchers have recently focused their attention on the issues of uncertainty. For example, according to Mikhina (2018), "uncertainty is multivariate and requires direction through a response to an impact, or through active conscious ordering" (p. 141). During the discussion at the scientific and practical Internet conference "Education in conditions of uncertainty", Miroshkina (2019) defined uncertainty as "a condition of pedagogical activity set by the lack of external determination of the target orientations of pedagogical activity and vectors of movement; a variety of possibilities for choosing its content, forms and methods of interactions and relationships of subjects; unpredictability of results" (p. 13). In general, uncertainty is understood as the occurrence of unpredictable conditions that require finding optimal solutions that productively affect the current situation. In particular, the extreme conditions that have arisen during the period of self-isolation because of the ongoing COVID-19 pandemic can be described as a situation of uncertainty for all participants in the educational process.

This situation caused serious problems that came up in the initial period of adaptation to distance learning. On the other hand, it also resulted in valuable experience that has been summarized and analysed in numerous scientific papers. These works are devoted to the identification of university teachers' readiness to remote work during a pandemic (Puchkova et al., 2020), to benefits and risks of implementing online learning, the assessment of students' adaptation to new educational practices (Frolova et al., 2020). They also concern possibilities of using different tools for quality remote teaching (Sorokina, 2020); to the analysis of psychological and pedagogical factors influencing students' personal characteristics (Ryabinova et al., 2020). In addition they involve understanding the experience of using optimal models of remote educational technologies, prediction of educational process development, as well as its adaptation to situations of uncertainty (Guri-Rosenblit, 2018; Khlebnikova et al., 2021; Rueda et al., 2021). Distance learning involves "the use of computer and telecommunications technologies that ensure interaction of teachers and

students at different stages of training with information network content" (Gluzman & Gorbunova, 2020), and it also takes into account the established practice of e-learning (Dwidienawati, 2021; Mahmoud, 2021). The pandemic contributed to the general transition to remote ways of working: almost all teachers were forced to look for ways to transfer knowledge over distances, to think over and implement new educational approaches, to develop new pedagogical technologies.

3. Research Questions

The main tool for remote interaction between teachers and students at Samara State Technical University (SSTU) is an automated information system (AIS) with the ability for all participants of the educational process to collaborate while using a so-called "Personal Office" (PO). PO provides a systematic approach to the organization and management of the learning process, integrates various types of educational and methodological resources, allows teachers and students to attach, send, evaluate, comment on completed tasks or ask questions. It also has the ability to facilitate teacher-student communication through a built-in chat. Lectures and practical classes are conducted by teachers in the video conferencing format based on VooV and BigBlueButton platforms. The experience of practical pedagogical activity of SSTU staff shows that the University Department of Informatization and Telecommunications managed to quickly cope with the task of emergency creation of PO for students and teachers during the pandemic. The AIS system with a built-in PO makes it possible to control the educational process and flexibly manage it in accordance with the requests and recommendations of its users (Gridina & Chekanushkina, 2020).

4. Purpose of the Study

The purpose of the work is to demonstrate positive and negative aspects of distance, full-time and blended learning, as well as the possibility of their combination and interrelation.

5. Research Methods

For this study, the researchers employed such empirical methods as a sociological survey and a method of statistical data processing. They also developed a questionnaire aimed at identifying students' attitude to the introduction of distance learning at the university, its advantages and disadvantages, as well as to blended learning. The questionnaire was compiled and distributed through Google Forms. 4,000 respondents answered the questionnaire (1-4-year students of technical departments from eight SSTU faculties).

6. Findings

The majority of the survey participants noted that after returning to full-time classes, they experienced certain difficulties (70% respectively). Only one third of students noted that it was quite easy for them to resume online classes. Respondents associate these difficulties with a number of reasons: they lost the habit of attending full-time face-to-face classes, had to change their studying habits again and plan their working day differently (72.4%), the rhythm of "educational work" and "rest" was lost (55.1%). There

was a decrease in working capacity (36.2%); it was felt that during the quarantine there was an "emotional burnout" of teachers (16.3%). Half of the respondents noted that after returning to full-time classes, they still have distant classes with teachers over 65 years old. 43% of students noted that after returning to traditional classes, the academic load on students increased. More than 40% of students indicated that after returning to face-to-face classes, teachers began to assign more homework, while the need to work in PO remained. All that significantly increased their academic load.

A separate block of questions was devoted to the advantages and disadvantages of distance, full-time and blended learning. Students were supposed to answer and explain what learning mode they preferred.

According to the survey results, most students (63.8%) chose blended learning as the most convenient and effective form of studies. Currently, there are various approaches to the definition of this learning mode. The concept of "blended" implies a combination of various educational elements. Different means, forms and methods of training can be blended. In the context of the pandemic, the education system has undergone serious transformations towards e-learning, which have significantly affected the rise and development of blended learning. Blended learning is understood as learning that combines face-to-face teaching and online instruction. Many domestic and foreign authors support this point of view (Glotova, 2019; Graham, 2013; Nagaeva, 2016).

24.5% of students expressed their preferences for full-time education only, while only 10.7% supported distance learning. At the same time, most students prefer blended learning in such a way when lectures are held remotely, and practical or laboratory classes are held in person. Students have repeatedly mentioned that while giving answers to "open questions" in the questionnaire. It is more convenient for students to get hold of course content in the classroom (43.4%). Thus, most students, after returning to face-to-face classes, express their preferences for blended or full-time education.

Let's consider what advantages and disadvantages students distinguish in each learning mode.

The respondents' answers about the advantages of full-time education were distributed in a descending order. Students could choose several answers. Full-time education is attractive for students because of the following reasons:

- it provides an opportunity for personal communication with classmates and teachers – 66.8%;
- it allows students to get personal advice from teachers – 65.3%;
- it forms a better knowledge base – 44.4%;
- it provides an opportunity to extend acquired knowledge while collaborating with groupmates and develop necessary practical skills – 44%;
- it allows one to understand course content better – 43.4%;
- it gives students an opportunity to receive assistance in studying from their group-mates – 39%;
- it disciplines students – 30%;
- it offers a chance to stay within the walls of the university – 25.5%.

Only 17% of students say that face-to-face classes are of little importance.

The fact is worthy of note that the largest percentage of respondents chose the answer option that mention the possibility of personal communication with teachers and other students. A clarifying question

about the degree of importance of personal consultation with teachers also showed that this indicator is extremely important for more than a third of students.

The respondents referred the following to the most important advantages of distance learning:

- the ability to plan your time – 75.5%;
- saving time and travel expenses – 74%;
- the possibility to combine work with study – 66.3%;
- the opportunity to gain knowledge in a comfortable environment – 57.7%;
- equal opportunities to receive education regardless of place of residence or state of health – 53.1%;
- improving the skills of independent work – 50%.

As disadvantages, the students noted the following:

- there are several practical skills that can be obtained only when doing real work – 58%;
- while learning online, all responsibility for the result lies with the student, which requires strong motivation and self-discipline – 48%;
- lack of face-to-face communication with fellow students and teachers – 45%;
- students are seriously overloaded with information – 39%;
- course content is greatly reduced and compressed (a reduced training format) – 32%;
- there is no control over students – 28%;
- foreign students lose their motivation to study – 11%;
- difficulties with the placement of students who come back to the university from other regions – 8.7%.

Again, here the need for personal communication and the necessity to master practical skills that can be obtained only through full-time training are evident.

To what extent do SSTU students see the need to completely replace full-time education with distance learning in the near future? The answer to this question showed that only 10% of respondents see distance learning as the future of education. Most students (42%) believe that distance learning technologies will be actively used in teaching but will not become the main ones; 33.7% are sure that learning will be rather blended, 13% are supporters of the thesis that "the future lies in personal communication between a teacher and a student".

Respondents were also asked to express their agreement/disagreement with the advantages and disadvantages of blended learning (distance/face-to-face). The most interesting answers about this learning mode are as follows:

- it reduces the cost of travel to the university – 86%;
- it provides an opportunity to study course content and do homework at a convenient time – 82%;
- it minimizes interaction with a large number of people – 79.5%.

The respondents were asked an open question about their attitude to mixed learning. The main advantages students mentioned are as follows: free time, reduced travel costs, the opportunity for nonresidents to be at home more often, to feel more confident in your answers, to process the information

received at a convenient time and in the right volume, lecture material is better absorbed remotely, you do not need to spend a lot of time in transport.

Among the disadvantages, students named insufficient amount of educational information on some topics, a long-time break between a distance and full-time class (at the same time it might be too short to get to the university in time if they have a distant class at home), high demands of teachers, high dependence on technology, poor assimilation of material, inconvenient tasks and unnecessary reports in their PO.

As in the previous study, students made a lot of comments about the university website and PO system instability, the fact that teachers load homework too late or give too little time for completing these tasks, lack of feedback from teachers. Students also stressed that online and face-to-face classes should not go on the same day and that they need longer deadlines for completing tasks in their PO.

7. Conclusion

The study reveals that students developed new ways of responding to the challenges of changing learning modes, interacting with the surrounding world as well as a new pattern of behavioral reactions and a sequence of educational actions. They contribute to the formation of new learning habits in the existing conditions (Ryabinova et al., 2020).

The new learning system described in the research is based on the adaptation of existing educational approaches and new methods that help students adopt to new conditions. The authors believe that the future belongs to blended learning, which combine both distance and face-to-face classes. Teachers need to think over in advance and design new patterns (schemes, templates, etc.) which can be used both in the classroom and in an online environment.

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