

Sustainable Education in Self-isolation and the Prospects of Hybrid Learning

Zhanna Mikhailovna Moroz^a, Lyudmila Viktorovna Kalyagina^b
Krasnoyarsk Institute of Railway Transport, Krasnoyarsk, Russia

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Abstract: The article is devoted to the issues of education in higher educational institutions in the interests of sustainable development under conditions of self-isolation. The empirical study was conducted to identify the problems that students had faced during the on-line learning. The authors analyzed the experience of distance learning and they gave the quantity assessment of the prospects for the transition to blended learning. The paper analyzes the assumption about the difficulty of adaptation of junior students of technical specialties to the full acquisition of knowledge via the Internet, and it also determines the importance of hybrid methods of conducting classes.

1 INTRODUCTION

At the World Earth Summit in Rio de Janeiro in 1992, the basic principles of sustainable development were developed for the first time, which defined the basic directions of education for sustainable development and the trends in the new approaches to education (ESD).

The heads of all countries unanimously adopted "Agenda 21 (Agenda 21)" at the World Earth Summit, where in chapter 36 "Education for sustainable development" there has been stated that "education is the foundation of sustainable development" (Coptuyugue, 1992).


Paragraph 12 notes that "the implications of the new understanding of "education for sustainable development" for the education systems are serious and involve the significant rethinking of the importance of the formal education systems in many countries, which are no longer considered to be acceptable to meet the needs of the society and production (traditionally, the goal of education was mainly to transfer knowledge, skills and values)". Education is considered as a lifelong process that must not only be corrected, but also changed and transformed, or in other words, it is necessary to move from "for life" education to "through life" education.


Agenda 21 sets out the basic principles of education for sustainable development which are based on:

- universality, continuity and informality of education;
- interdisciplinary approach;
- teaching methods based on the transition from teaching to joint active cognition, the development of systematic thinking and skills;
- partner interaction between the teacher and the student, joint discussion and informed decision-making;
- partnership of education and business;
- comprehensive support by the state and the society.

A new type of education that forms the world outlook within the framework of sustainable development includes the following trends:

- variety of forms and methods;
- continuity of different levels of programs;
- the relationship between the programs of the same level as well as the programs of different levels;
- adaptability;
- consideration of the local characteristics;
- unity of comprehensive and vocational education; - practicality,

^a  <https://orcid.org/0000-0003-0041-8477>

^b  <https://orcid.org/0000-0002-0617-1017>

- aimed at solving the problems of production and society, taking into account the local, regional and national characteristics.

2 CONTINUITY OF EDUCATION IN THE CONTEXT OF THE PANDEMIC

The conditions of self-isolation during the pandemic accelerated the transition to the on-line learning using distant learning technologies, which proves the relevance of the adopted theses of Agenda 21 in practice. The new way of life and the challenges of the time dictate the need to introduce changes to the educational programs, the development of advanced and up-to-date methods of lifelong learning in the interests of sustainable development.

In 2020-2021, the alternative means of communication and interaction between teachers and students were developed, in most cases, the Internet-based technologies replaced the traditional classes with the use of blackboards and chalk. Digital learning has become the new format of education, which allowed us to practice the skills of instant response to changes, to act in a situation of uncertainty, to be flexible.

During the pandemic, various approaches to distance learning were used: the language applications, the virtual learning, the video conferencing tools, and the software for on-line learning. In particular, in the process of the continuous educational process, the on-line conferences via Zoom or Skype platforms, the on-line training via Moodle platforms were actively used.

One can say that during the period of self-isolation, the electronic educational environment was created and tested, including a wide range of tools: lectures with feedback, webinars, video lectures, logic schemes, adaptive test trainings, testing and certification programs, online consultations, debate tournaments, quizzes, on-line learning, on-line meetings with interesting people, remote creative laboratories, on-line exams, synchronous and asynchronous interaction of participants of the educational process and the formation of the electronic portfolio of students. The access to the electronic educational resources was carried out through the student's "Personal Account" on the website and in the automated information system Platonus. At the same time, various services for interactive visualization began to develop. For example, the Padlet service allows you to draw, share

files, show pictures and texts simultaneously, which resembles an on-line whiteboard. Padlet allows you to work both in real time, to illustrate and put down ideas during discussions, and to use the service at the data storage location. The Figma service allows you to create complex structures and draw diagrams, which is important for designers and architects. It is convenient to organize your work in Trello, since you can use the Trello service to assign tasks and mark the performer, give comments, store files, give urls, set reminders, manage multiple projects and have personal files.

Krasnoyarsk Institute of Railway Transport, which is the branch of the Irkutsk State University of Railway Transport, has developed the instructions for the work with remote access to the UIS: instructions for checking your computer for malware, instructions for using corporate mail via the WEB interface, instructions for creating a group conference in Microsoft Teams, instructions for setting up a VPN connection on Windows 7.

3 RESEARCH METHODOLOGY

The authors of the article conducted an empirical study to identify the problems the students had faced during the on-line learning, to analyze the experience gained and the prospects for transition to blended training. The first-year students of Krasnoyarsk Institute of Railway Transport of technical specialties of full-time and part-time departments were the respondents. The hypothesis of the study was to test the assumption about the difficulty of adapting the junior students of technical specialties to the full acquisition of knowledge via the Internet in a higher educational institution, as well as to confirm the exceptional importance of traditional methods of conducting classes in specially equipped classrooms of the educational institution. It was important to evaluate the students' experience of on-line learning and their readiness to come over to blended learning. The anonymous handout questionnaire was used as the method of empirical research, based on the continuous classroom survey of the first-year students of the "Train Traffic Support Systems" and "Operation of Transport and Technological Processes" specialties. This method allowed us to interview the sufficient number of the respondents in a short time for the pilot study. Secondly, the anonymous nature of the survey allows us to count on the answers of the respondents to be frank, and thirdly, the questionnaire method is convenient from the point of view of processing the results.

The special questionnaire has been developed in accordance with the established rules of the study. The questionnaire had 20 questions, 12 of them with the answer options as "yes" or "no", which excluded the possibility of ambiguous interpretation of the question. The other 8 questions offered to evaluate the events according to the ten-point system. The explanation was given for all the questions that clarified the meaning of the special terms used and the foreign words that could be incomprehensible to the respondents.

Before starting the survey, the goals and significance of the research results were explained to the students.

4 RESULTS

All the questions in the questionnaire can be divided into three groups. The first group of the questions identified the difficulties the students had faced during the on-line learning, the second group of the questions analyzed the emotional state of the students during the on-line learning, the third group of the questions assessed the experience of learning during self-isolation and the prospects for transition to blended learning. A relatively small number of the questions allows you to analyze the answers for each group of the questions separately.

It turned out that the attitude to the on-line learning among the first-year students of technical specialties of full-time and part-time forms of training was different. For example, 43% of the full-time students had problems with transition to the on-line learning using remote technologies for the following reasons: difficulty of mastering the remote technologies (37%), difficulty of the work with lectures (28%) in DLS, difficulty of the work with laboratory work (56%) in DLS, difficulty of the work with practical tasks (35%) in DLS, problems with the Internet (9%), lack of a computer or laptop (7%). At the same time, the part-time students had significantly fewer problems in transition to the on-line learning; only 35% of the part-time students experienced difficulties in transition to the remote technologies. However, for the part-time students, all the difficulties of transition to the remote learning were due to technical problems with the Internet, which is probably explained by the fact that most part-time students are from the rural areas.

According to the evaluation done by the first-year students of the full-time department, mathematics, physics, history and physical education were the most problematic subjects for the distance learning (50%),

while the majority of the students believe that they have adapted to the on-line learning (89%). For the full-time students, Zoom is the most convenient service for conducting the on-line learning (44%), Discord was approved only by 30% of students. At the same time, 93% of the part-time students have chosen Zoom.

Table 1: Students evaluation of traditional, on-line, and blended learning models (% of the number of respondents).

Evaluation	Traditional	On-line	Blended
10 points	23	21	42
9 points	0	7	7
8 points	14	21	7
7 points	7	0	7
6 points	28	14	14
5 points	28	36	23

The study showed that the students did not experience stress during the transition to the on-line learning, 92% of students felt calm, 8% of students were afraid of not having time to complete all the tasks done by the teachers and not to pass the exam.

The need for live communication with teachers is more necessary for full-time students studying technical disciplines (89%) than for students studying social and humanitarian disciplines (11%). The part-time students of technical specialties are less dependent on a teacher (62%), but everyone needs to communicate with their classmates. At the same time, the majority of students of the part-time department received support from their teachers during the period of self-isolation (79%).

The part-time students (84%) experienced more comfort during the on-line learning than the full-time students (74%). The result is obvious and it can be explained by the fact that the part-time students have more free time both for their work and for their personal life. As a rule, the part-time students are mature people who, in addition to studying, are still busy at work, and they have families. At the same time, the majority of the full – time students are school graduates, they do not work and do not have their families.

The graph in Figure 1 shows the students answers to the questions that have two possible answers-yes/no. The questions with the point score are not shown in Figure 1, and they were analyzed separately.

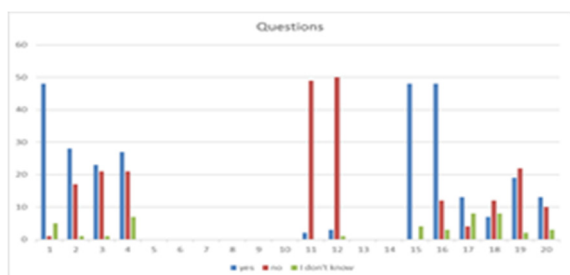


Figure 1. Summary graph of the student responses.

The points were used to evaluate the various learning models, the choice of the educational platforms, the labor costs for preparing teacher assignments during the on-line and classroom learning, and the emotional state of the students during distance learning at the period of self-isolation. The answers of the students of different forms of education to such questions are given in this article.

It should be noted that the labor costs for preparing the teacher assignments during the on-line and classroom learning did not change for the majority of the students (62%), while 38% of students noted the decrease in the labor costs during transition to the on-line learning.

The majority of the students of all forms of education liked the experience gained with the use of distance technologies (89%) and many of the students are ready for "blended learning" (50%).

The positive point is that the attendance of the on-line lectures has increased in comparison with the classroom ones, the "feedback" has deepened, which allowed the teacher to control the involvement of the students in the classroom. On-line learning is asynchronous, allowing you to learn anytime, anywhere. Students and teachers do not spend time and money to get to the place of study every day, which allows you to get more free time without compromising the quality of learning and even strengthening it in some cases. The on-line learning allows students to study at their own individual pace by re-reading, skipping or speeding up their concentration at their own discretion. On-line learning requires more independent study of the task, which has the positive effect on personal development, since without the support of a teacher, the student learns the material better.

5 DISCUSSION OF THE RESULTS

Foreign studies show that students memorize by 25-60% more information during the on-line learning, compared to 8-10% when in the classroom. 81% of US college students agreed that digital learning technologies help them improve their grades (Adesoye, Davis, Del Calvo and et al., 2021).

In the study conducted by the University of California, the results showed that on-line learning contributes to solving the climate change problems; in particular, conducting classes in the online format for 100 students led to the reduction of CO2 emissions by 5-10 tons per semester (Burns, 2020).

It should be noted that the success of on-line education primarily depends on access to the Internet. The gap in inequality of opportunity is observed both between countries and between people with different income levels within a country. For example, in Switzerland, Norway, and Austria, 95% of students have a computer, while in Indonesia this percentage is 34%, according to the OECD (Bao, 2020). The students who do not have the technical capabilities for digital learning lag behind their peers, which leads to inequality in knowledge acquisition and social stratification of the society (Budenkova, 2016).

A serious disadvantage of on-line education is social isolation, since educational institutions are centers of social activity and interaction of people, which are necessary for development and learning. Young people are deprived of the opportunity to meet and socialize with their friends, which can lead to stress and depression (Novikova, E.S., 2018).

At the same time, in the classroom, you can have a contact with each student and observe how the student copes with the task, it is easier to focus on the full-time lecture during distance learning, attention is scattered on establishing contact with students creating the right atmosphere in the on-line audience (Lebedeva, Okhotnikova and Potapova, 2016).

Remote work requires more self-discipline and self-organization. In traditional mode, there is the general information flow in the classroom, but the remote student communicates in the classroom mostly with their teacher (Kucher, 2017). As a result, only the teacher has the full picture.

It is unproductive to conduct a number of disciplines in Krasnoyarsk Institute of Railway transport remotely; in particular, it is impossible to conduct physical education classes without the necessary equipment. The students of engineering, construction and many other fields of study cannot acquire the necessary skills if they do not practice

their knowledge. It is impossible to teach and acquire professional skills in locksmithing, welding, electrical installation, turning skills, to master the mechanisms of repair and construction works, technical operation and repair of tracks without practical training, experimental installations and specially equipped laboratories.

Being at home environment, it is more difficult for a student to concentrate, and his motivation decreases due to the lack of control and the competitive environment, which can negatively affect academic performance.

Nevertheless, it should be noted that during the remote learning process, there was the need to develop a new combined model of the educational process, based on the preparation of special distance programs that contribute to the continuation of high-quality learning in the on-line mode. Both students and teachers believe that remote learning methods can complement the traditional learning process.

6 CONCLUSIONS

The paper presents the empirical study among the full-time and part-time students of technical disciplines in the form of a questionnaire, identifies the basic approaches to distance learning and defines the electronic educational environment, systematizes the advantages and disadvantages of the on-line learning, and identifies ways to develop new educational technologies.

The authors compare the traditional approach to learning using whiteboards and chalk, specially equipped laboratories, and distance education using on-line classrooms and services for interactive visualization in real time. The quantitative assessment of the type of educational services chosen by the students is given.

As a result of comparing the basic approaches to the provision of educational services, the shortcomings of the on-line learning are revealed:

- the lack of the Internet and the computer creates a gap in opportunities for obtaining knowledge, increases the social stratification of society;
- social isolation, lack of communication can lead to stress and depression;
- reduced motivation in the absence of control and a competitive environment;
- difficulty in concentrating at home;
- lack of special equipment for obtaining professional skills.

The advantages of the on-line training are identified:

- wide audience and increased attendance;
- distance and comfort;
- economy of time and money for getting to the University for students of all forms of education, as well as economy of money for living in another city for part-time students;
- asynchronous learning (classes at anytime, anywhere);
- personal development of students, contributing to an independent approach to the study of the material, learning, the development of responsibility and initiative, the management of time resources and the formation of critical thinking.
- On the scale of the national education transition to blended learning the following effects were obtained:
 - the possibility of optimization and improvement of teaching processes;
 - adaptation of educational material in a more convenient form for perception and presentation of knowledge, which saves students' time on notes
 - savings were obtained by eliminating unnecessary time losses and financial costs for conducting classroom lessons in an educational institution;
 - development of information technologies, methods of data transmission, knowledge visualization;
 - improving computer and information skills;
 - ability to teach more students;
 - active involvement of students in the learning process and the possibility of a broad discussion of the acquired knowledge and skills in the learning process.

In general, we can say that the experience of the on-line training with the use of remote technologies obtained during the period of self-isolation was positive. The majority of the students noted the high efficiency of blended learning and they are ready to use the new educational model in the near future.

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