

## The Quality of Higher Education in the Era of Digitalization

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The widespread dissemination of information technology inevitably leads to significant changes in various spheres of human life, including higher education. To create the necessary conditions for this, significant transformations of higher education systems are taking place around the world. In addition, the concept of quality in higher education is also undergoing changes in connection with these transformations. This research is aimed to determine the qualitative characteristics of current higher education programs that reflect the quality of education from students' perspective as well as assess whether the education programs of Peter the Great Polytechnic university are quality. The conducted research included 2 stages. The first involved defining the characteristics of quality education in the current realities. The second stage took place a year after the first survey and offered to students a survey in which they had to assess the quality of the educational programs provided. The total number of participants in the sample was 131 at first stage and 127 at second stage. It can be concluded that, from the point of view of students, the learning process is currently impossible without digital space, since students prefer to listen to lectures online, have online access to course materials, study using modern electronic devices and use electronic educational resources. The results of second survey showed the satisfaction of students with the quality of learning, but also weak spheres were determined – equipment in the campus and development of information technology skills during learning. So, the recommendation could be the renovation of equipment and introduction of an advanced course in the field of information technology..

**Keywords:** education quality, digitalization, quality assessment, online learning.

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## Introduction

The digital revolution has transformed our way of working, our working environment, our social interactions, and almost all aspects of our lives on a global scale [1]. Labor markets and work processes have transformed enormously since information and communication technologies have emerged. Many researchers of digitalization processes are confident that these conditions determine the increasing role of man and the continuous renewal of his knowledge [2]. Due to the speed of development of the digital economy in the modern world, the lifespan of a number of professions is decreasing, while the change in the content of labor contributes to the emergence of new professions. According to Oxford researchers, rapid changes in digital technologies will contribute to the fact that in the next 10–25 years about 50% of professions will disappear [3], and 67% of today's students will receive an education in professions that simply will not exist.

Based on this, there is a need to prepare students with the skills to work with modern technologies. To create the necessary conditions for this, significant transformations of higher education systems are taking place around the world. In addition, the concept of quality in higher education is also undergoing changes in connection with these transformations.

The purpose of this study is to define the qualitative characteristics of existing higher education programs, reflecting the quality of education from the point of view of students, as well as to assess the quality of educational programs of Peter the Great Polytechnic University.

## Literature review

It is widely recognized that assessing the quality of education is essential to improve future educational activities and to justify their existence and corresponding budgets. Lack of tradition and financial constraints may be the reason for the lack of consensus on what to value [4–6].

Quality definitions usually consist of inputs, processes, outputs, an administrative system, and the skill level of the participants [7]. A possible definition of the quality of education comes from the following definition of quality: “The quality of education is the degree to which

organizations implementing these educational programs increase the likelihood of achieving desired educational goals and are consistent with current professional and academic knowledge” [8]. This definition represents the idea of “quality based on production” [9] and implies that educational goals or learning objectives should be set in advance and courses should reflect the state of the art in both knowledge development and professional practice.

The quality of higher education is also controversial. Many studies are devoted to assessing the quality of education.

Bloom’s Taxonomy of Educational Objectives is a classification of what learners expect or intend to learn in their education [11]. The framework was conceived as a means of facilitating the exchange of test items between educators at different universities. Its purpose is to create banks of items, each with the same educational objective. The cognitive learning process framework is divided into six different levels and combined with different knowledge dimensions. The cognitive taxonomy was later revised by Bloom’s co-author David Krathwohl of Syracuse University in New York. The knowledge dimensions were reformulated, ranging from factual to metacognitive. The taxonomy of educational objectives is a combination of knowledge dimensions and six levels of the cognitive process framework, with each successive level requiring learners to achieve a higher level of abstraction. This taxonomy of educational objectives is a classification scheme for educational goals, objectives, and standards. It provides an organizational structure that gives meaningful meaning to the goals assigned to one of its categories, thereby improving communication [12].

Along with educational goals, learning quality assessment was pioneered in the 1950s by Donald Kirkpatrick of the University of Wisconsin, Wisconsin and his collaborators. A summary of his model is presented in a recent review [13]. Typically, training activities span a period of days or weeks. His assessment model also applies to education, spanning a much longer period. Kirkpatrick’s four-tiered mode (Reaction, Teaching, Behavior, Outcomes or Impact) does not relate to learning goals or professional and academic knowledge. However, this model is still mentioned in the literature because of its simplicity. Studies by Yu et al. [15] and Chatterjee and Agrawal [16] are good examples of workers’ educational attainment.

Kirkpatrick levels are results oriented and do not have a qualitative assessment of the content and processes of the course. Donabedian [17] from the University of Michigan, USA, emphasizes these aspects in his model, highlighting infrastructure, the level of knowledge provided by the course, the quality of teachers and material resources. Donabedian refers to the procedural part as well as the immediate results of the process:

- the relevance and quality of the selected educational activities and teaching materials, whether they correspond to the learning objectives, are complete and valid;
- quality of teaching, such as interactive learning and learning by doing: are all learners involved in active learning?

The various approaches to assessing the quality of education described above make it possible to single out the criteria for quality education, but not all of them are universal and suitable for all educational institutions. The era of digitalization is making its own adjustments both in the education system and in the understanding of the quality of education.

Thus, the question of our research is the following: what criteria for the quality of higher education are becoming relevant in the era of digitalization and is education at Peter the Great St. Petersburg Polytechnic University of high quality?

## **Material and Methods**

### **3.1. Research Methodology**

The conducted research included 2 stages. The first involved defining the characteristics of quality education in the current realities. For this, a survey of 3rd year students of the Humanitarian Institute of Peter the Great Saint-Petersburg Polytechnic university aged from 20 to 22 years ( $M = 21.12$ ,  $SD = 0.61$ ; 59% females) was conducted. The survey included 5 open-ended questions. The second stage took place a year after the first survey and was aimed at 4th year students of the Humanitarian Institute. Students were offered a survey in which they had to assess the quality of the educational programs provided. The total number of participants in the sample was 131 at first stage and 127 at second stage. A survey of students was conducted online using the Moodle platform. Analyses were carried out on the depersonalized data.

### **3.2. Theoretical fundamentals**

The first stage of the study includes a survey of students, which consists of both open-ended questions and questions with multiple answers. The survey is based on several fundamental theories:

- Bloom’s Taxonomy of Educational Objectives [9], as it allows you to assess the quality of higher education based on educational goals and their compliance with educational standards;
- learning quality assessment of the systems of Donald Kirkpatrick of the University of Wisconsin [13], since its four-component system allows you to assess the higher education system not only in terms of content, but specifically in terms of performance;
- Donabedian [17] assessment model from the University of Michigan, USA, which focuses on infrastructure, the level of knowledge provided by the course, the quality of teachers and material resources.

The second part of the study consists of a repeated survey of students based on the result of the first survey.

## **Results**

Characteristics of education quality survey

131 students of the Humanitarian Institute of Peter the Great Saint-Petersburg Polytechnic university took part in the survey. The survey included 5 open-ended questions, devoted to the definition of the quality characteristics of education in the era of digitalization. Students were asked to answer the following questions anonymously:

1. Describe what education must be like today to be considered good quality?
2. Highlight 2–3 main characteristics of the quality of education in the era of digitalization:
  - an accessible educational environment,
  - a high proportion of professors in the teaching staff,
  - a large number of graduates with honors,
  - high / low cost of education,
  - the use of graphic electronic material in the classroom,
  - the use of an electronic educational environment in the process training,
  - availability of an online library,
  - development of information technology skills,
  - other (describe what).
3. What type of educational activity do you prefer: online or in person? Why?
4. What attributes of the learning process do you consider necessary for the university at the present time?

5. What is unacceptable and reduces the quality of education at the university in modern conditions:

- lecturing without electronic graphic material,
- lack of electronic access to lectures,
- face-to-face studies,
- teachers without a degree,
- other (describe what).

Based on the survey results, we identified the main characteristics of the quality of education, noted by the majority of students. Thus, the students identified:

- the use of electronic graphic material in the classroom (79% of the respondents);
- development of information technology skills (67% of respondents);
- availability of access to online class materials – lectures, practical materials (53% of respondents).

Also, students contributed their ideas about what kind of education can be considered quality. According to students, in the era of digitalization, the number of distance classes should not prevail over the number of face-to-face classes. 38% of survey participants noted that lectures are convenient online, with the ability to record the broadcast and watch this broadcast at any time convenient for students. Students consider this option to be worthy of the modern digital era.

Also, students (35% of the respondents) noted that all teachers must be technically literate in order to effectively introduce electronic educational tools into their pedagogical activities.

21% of the respondents indicated that the modern equipment of the campus indicates a possible high quality of education, since modern high-tech devices will make the educational process of high quality.

And only 16% of survey participants noted high results of the educational process – successful graduates, excellent grades, good job placement after graduation from the university.

Describing what a university should not be in modern conditions, students noted:

- teachers who do not know how to use electronic educational programs and platforms;
- lack of modern computer classes;
- fully full-time education format, lack of electronic access to course materials;

- Reading lectures on the textbook without additional electronic and graphic materials.

The quality of the educational programs provided

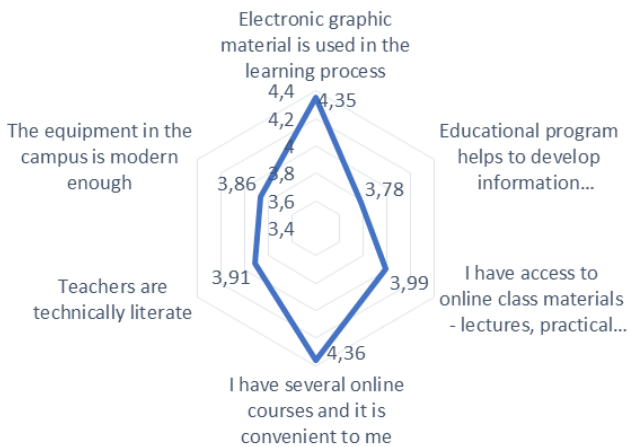
127 students of the Humanitarian Institute of Peter the Great Saint-Petersburg Polytechnic university took part in the second survey. The survey consisted of 10 items; the answers were provided using the 5-point Likert scale. Questions were based on the characteristics of education quality that were distinguished by students in the first survey. The results are presented in Table and Figure 1.

Table

### Survey results on the quality of the educational programs

Items	Average mean	SD
1. Electronic graphic material is used in the learning process	4,35	0,54
2. Educational program helps to develop information technology skills	3,78	0,63
3. I have access to online class materials – lectures, practical materials	3,99	0,37
4. I have several online courses and it is convenient to me	4,36	0,58
5. Teachers are technically literate	3,87	0,51
6. The equipment on campus is quite modern	3,90	0,59
Quality of education (average)	4,05	

### Results (average mean)



*Fig. 1. Survey results on the quality of the educational programs*

The results showed that students estimated the quality of educational programs at Polytechnic university as quite high (the average indicator is 4,04). Items on the use of electronic graphic material and availability of online lectures and seminars get the highest results while items on the equipment in the campus and development of information technology skills during learning get the lowest results. In this case the area of development can be easily defined.

## Discussion

The issues of assessing the quality of education are always controversial. In the course of our research, we analyzed the opinions of participants in the educational process – namely, students of the Humanitarian Institute of Peter the Great Saint-Petersburg Polytechnic university. Students were offered two surveys related to the assessment of the quality of education. During the first survey, students identified the characteristics of the quality of the educational process in the era of digitalization. Based on the survey results, we identified the main characteristics of higher education quality that are indicated in Figure 2.

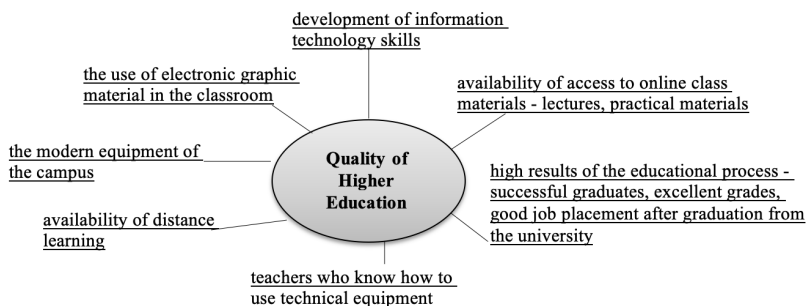


Fig. 2. The main characteristics of higher education quality

It can be concluded that, from the point of view of students, the learning process is currently impossible without digital space, since students prefer to listen to lectures online, have online access to course materials, study using modern electronic devices and use electronic educational resources. Such requirements of students oblige higher educational institutions to transform their educational programs, train their teachers, and master new ways of interacting with students. This



transformation is posing a serious challenge to the traditional higher education system.

Our research has limitations, as only students of the Humanities Institute participated in the survey. It is assumed that students of technical specialties may have a different opinion, since their training is closely related to laboratory work that requires a physical presence. This work will form the basis for future research on the assessment of the quality of higher education in the era of digitalization by the teaching staff, since teachers evaluate the educational process from a different angle.

### **Conclusion**

In the current research we collected information on the characteristic features of education quality from students' perspective. Students distinguished 6 categories that define the quality of education in the era of digitalization – the use of electronic graphic material in the learning process; development of information technology skills; the availability of access to online class materials; the availability of online lectures and seminars; technical literacy of teachers and modern equipment in the campus. Using these categories, we surveyed students to define the quality of educational programs at Peter the Great St. Petersburg university. The results of survey showed the satisfaction of students with the quality of learning, but also weak spheres were determined – equipment in the campus and development of information technology skills during learning. So, the recommendation could be the renovation of equipment and introduction of an advanced course in the field of information technology.

Thus, we determined the qualitative characteristics of current higher education programs that reflect the quality of education from students' perspective and assessed whether the education programs of Peter the Great Polytechnic university are quality from the student's perspective.

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