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# Problems of Student Communication in Online Learning

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**Abstract**

Despite the lifting of epidemiological restrictions, online learning has not lost its relevance. There are noted the development of hybrid forms of education, the integration of traditional and remote work formats. In this regard, the relevance is the study of the communication process, which becomes a predicate of many dysfunctions in the education system. It is the communication between students and the teacher that is subject to the greatest transformations in the conditions of online learning. The purpose of the author's research is to analyze the experience of online learning for students of Russian universities, to identify the problems of communication between participants in the educational process in the new conditions. The authors used a set of general scientific research methods and analytical procedures (document analysis, comparative analysis, analysis of arbitrary contingency tables using the x2 criterion, etc.). A questionnaire survey of students of Russian universities was chosen as the key research method. Empirical data are presented by the results of two measurements: N1 = 1553 (2020) and N2 = 1107 (2021). The results of the study showed that in the conditions of online learning, students for the most part highlight such negative trends as “deterioration of communication skills” and “decrease in skills for live communication with a teacher”. The personal experience of students during the pandemic led to a decrease in “technological optimism” and increased the importance of personal interaction with the teacher. Respondents who rated the quality of teacher feedback excellently feel less of such online learning problems as “routine” and “heavy workloads”. The authors established the relationship between the choice of the form of education (online or traditional) and the assessment of feedback between students and the teacher. In the course of the study, an inverse relationship was established between the involvement of students in the educational process and the opportunity to ask a question (or make a comment during the lesson). Students with a high level of involvement in

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the learning process were in the most vulnerable position in terms of maintaining communication. It is concluded that communication dysfunctions are the main limitation of the effectiveness of online learning, reducing student satisfaction from the educational process.

**Keywords:** higher school, online education, communications, feedback, students, digitalization of education.

## 1. Introduction

Digitalization has become an integral part of everyday life today. Its wide distribution has affected all areas of social interaction, leaving a significant imprint on the specifics of not only receiving certain services, but also on the communication processes of key actors. The conducted studies illustrate the propensity of young people to transfer communication to online Internet communities, social networks and instant messengers. Youth use of these digital tools is observed in both informal and formal communications (Wood, Wheatcroft, 2020).

The education sector has not remained aloof from these trends. The transformation of approaches to solving educational problems and the transition to the active use of information and communication technologies in education are associated by Russian scientists with the globalization of the economy, the development of remote employment and epidemiological threats. All this in general imposes new requirements on the competencies and skills of future specialists (Eremeev et al., 2022; Reilly, Reeves, 2022). On the one hand, there is a need for changes in the training of personnel in accordance with the requirements of digitalization, on the other hand, educational practices themselves are actively changing under the influence of new conditions. In particular, learning technologies, teaching methods, criteria for assessing the quality of education are changing, which, in general, causes the transformation of communication processes in higher education.

As the results of studies conducted in 2020 by S. Sobko, D. Unadkat, J. Adams and G. Hull showed, students and digital technologies have a mutual influence on each other, as they function as elements of the "network of actors". This means that online learning in the context of digitalization has significant potential, since, according to foreign colleagues, synchronous online interaction with several digital technologies contributes to the successful formation of students' knowledge and improving the quality of task content analysis (Sobko et al., 2020). Expanding these findings, we can see that the socio-demographic characteristics of students leave their mark on the choice of digital tools and forms of communication in online learning. So, according to Ü. Çakiroğlu and M. Atabay, the exchange of information with adult students in the course of solving educational problems requires more effort on the part of the teacher. This category of students is required to review behavior patterns, bringing them into line with the characteristics of the online environment of the educational institution (Çakiroğlu, Atabay, 2022). Materials of studies conducted by L.A. Fiorini, A. Borg and M. Debono showed that online lectures were generally positively evaluated by adult part-time students, as they had a number of advantages important for balancing work, homework and study. At the same time, the issue of transforming communications for this category of students is not quite acute, although there were problems associated with the low skills of students working with digital technologies, the complexity of interaction with the teacher. A big advantage that allows students to come to terms with problems of a communicative nature is the ability to listen to lectures at a convenient time and place (Fiorini et al., 2022).

In a number of studies, these conclusions do not find sufficient confirmation. In particular, according to a number of scientists, students in online learning experience problems with time management, which leads to a decrease in self-organization, motivation, and, as a result, affects the points received (Keis, 2017). At the same time, if the teacher has established effective communications within the group, the possibility of teamwork has been built, then students will be interested in obtaining high results. It can be concluded that the digital tools used to build communication, both between teacher and student and within student groups, are of paramount importance today (Lee et al., 2019).

It is also noted that a change in the context of the teacher's work can lead to the loss of the teacher's professional identity. This dysfunction, according to M.K. Christensen, KJ.S. Nielsen and L.D. O'Neill is related to the fact that external conditions and factors of the educational process implementation transform the teacher's behavior. For example, the scaling of digitalization processes has led to a change in the very approach to organizing feedback between a teacher and a

student. There is a difficulty in using the "feeling of the class" in the work of the teacher, a decrease in mutual visual contact and the absence of non-verbal communication from students. The research results allow us to conclude that the digitalization of education actualizes the problems associated with the teacher's inability to fully adapt their work to the needs of students, which also reduces their motivation and job satisfaction (Christensen et al., 2022). The development of the digital industry has also contributed to the professionalization of the development of online courses. In particular, the teacher today can access online educational marketplaces and purchase educational materials. This approach differentiates educators into entrepreneurs (producers) and consumers of educational content (Shelton, Archambault, 2020). The results of studies conducted on the basis of Thai educational institutions showed that most teachers have the necessary knowledge to develop educational content for online learning. However, the formation of its communication elements requires them to develop administrative and leadership skills (Wetcho et al., 2022).

In this regard, of interest are studies that reveal the stereotypes of perception of the digitalization of education, their impact on the formation of digital trust and loyalty of teachers to the introduction of digital technologies into the educational process (Matsiola, 2019). According to Nazarov, the effectiveness of these processes is associated with the development of the information and communication infrastructure of educational institutions, the reduction of the technological and competence digital inequality of the subjects of the educational space (Nazarov, 2021). It can be added that the formation of integrated educational resources and high-quality digital content can be a condition for increasing the effectiveness of the digitalization of education.

The development of online learning, an increase in the amount of remote interaction between a student and a teacher requires close attention of researchers to the communication component of this process. The experience of Chinese schools has shown that feedback during online interaction in the context of a pandemic and the transition to a remote format was not sufficiently developed. In particular, online learning used relatively simple digital methods to support the educational process, which became an obstacle to the introduction of creative approaches to learning and taking into account the individual needs of students (Shi, Fan, 2021). The experience of US educational institutions, in turn, showed cognitive tension in the perception of online communications by students. Thus, educational institutions focused on ensuring the diversity and safety of interaction, while the request of the students themselves lies in the plane of establishing clear norms of interaction, expectations in terms of reducing communication barriers (Pham et al., 2022). According to L.S. Neuwirth, S. Jović and B.R. Mukherji higher education institutions have provided training for teachers to maintain the quality of education through virtual classrooms during the pandemic, but little attention has been paid to student adaptation. It requires scientific understanding of the forced transition to virtual classrooms, the creation of etiquette in online learning, which will maintain the effectiveness of the educational process (Neuwirth et al., 2021). Developing these ideas, N. Alsuwaida emphasizes that the COVID-19 pandemic has created a need to quickly adapt to the online group work environment. This approach required educators to develop a clear plan and use forms of communication that would help keep students motivated to interact and collaborate successfully in an online learning environment (Alsuwaida, 2022).

Despite the removal of pandemic restrictions in the education system, the request for the development of hybrid forms of education and the expansion of the online component of the educational process has been updated. These trends require a more detailed study of communication processes, as an element that is undergoing the greatest transformation.

The purpose of the study was to analyze the experience of online learning for students of Russian universities, to identify communication problems for participants in the educational process in the new conditions. The following research tasks have been set:

Analysis of students' assessments of the characteristics of the educational process in the context of online learning;

Identification of positive and negative recent digitalization in terms of its impact on the communication process of students;

Assessment of the quality of feedback between the subjects of the educational process in the context of online interactions.

Research hypothesis: communication dysfunctions are a key limitation to the effectiveness of online learning, the lack of communication with the teacher significantly reduces student satisfaction with the conditions of the educational process.

Additional research hypotheses were:

- Maintaining a stable student-teacher feedback increases the effectiveness of online learning, reduces the risks of the destructive consequences of digitalization.
- Students with a low level of involvement in the learning process experience the greatest difficulties in communicating in an online learning environment.

## 2. Methods

The authors used a set of general scientific research methods (systematization, generalization, etc.) and analytical procedures (document analysis, comparative analysis, analysis of arbitrary contingency tables using the x2 criterion, etc.). A questionnaire survey of students of Russian universities was chosen as the key research method. The survey was conducted online using a google form.

Empirical data are presented by the results of two measurements: $N_1$ = 1553 (2020) and $N_2$ = 1107 (2021). The tools of the first wave included blocks of questions that related to students' perception of the digitalization of education, assessments of the negative and positive consequences of this process. The tools of the second wave duplicated the basic part of the questionnaire, which made it possible to conduct a comparative analysis of students' assessments. In addition, the questionnaire was expanded in terms of analyzing the dysfunctions of communication, control and assessment of knowledge in the context of digitalization.

This article presents a description of the second wave of the study, the materials of the first are used to compare and clarify some data, reflect the dynamics or changes in students' value judgments on issues that are significant for the study. Although the use of non-probability samples makes comparisons over time difficult, a number of relationships were nonetheless identified across the results of the two waves of the study. In both cases, respondents were recruited using two strategies:

- A personal invitation to participate in the survey was sent out among students with a high degree of activity in social networks and communities. They were also asked to send a link to the questionnaire to their friends and acquaintances, which made it possible to form a chain of respondents passing the invitation to each other (snowball method)
- A “linear” sampling was carried out with an impersonal invitation of respondents (a link to the survey was posted in student social networks and communities).

When developing the survey methodology, the authors focused on studying the opinions of students in the humanities. This is due to the fact that STEM students have a higher level of development of digital competencies and knowledge in the field of digital technologies, and higher educational institutions with a technical profile use more modern digital technologies and teaching methods. At the same time, the spontaneous nature of the selection of respondents could contribute to the distortion of the original sample, which can be considered as some limitation of this study. In the socio-demographic block of the questionnaire, the authors deliberately omitted the question of the student's specialty.

The distribution of respondents by courses of study (survey 2022) is as follows: bachelor's / specialist's degree – 81.2 % (of which: 1st year – 19.1 %; 2nd year – 15.3 %; 3rd year – 18.3 %, 4 course – 20.0 %, 5 course – 8.5 %); magistracy - 10.3 % (of which: 1st year - 3.7 %; 2nd year – 5.2 %; 3rd year – 1.4 %); other (postgraduate, residency, college, vocational school) – 8.5 %.

## 3. Results

As the results of the study showed, most students positively perceive various aspects of the educational process in the context of digitalization. However, questions of communication with the teacher are assessed by students ambivalently. On the one hand, the vast majority of respondents (61.0 %) believe that communication with the teacher is becoming more accessible, on the other hand, approximately the same proportion of respondents (58.8 %) believe that there was “not enough” time communicate with the teacher (Figure 1).

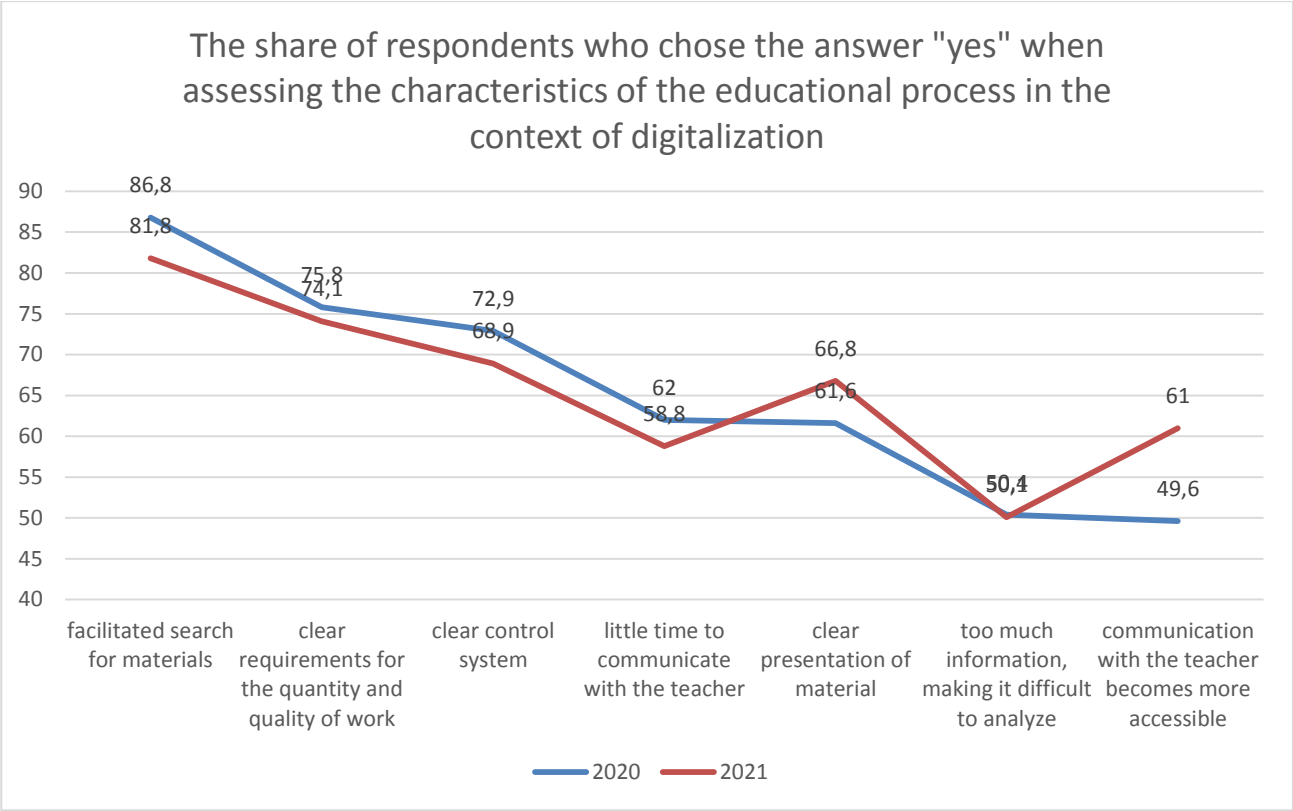


**Fig. 1.** Distribution of answers to the question: “Evaluate the characteristics of the educational process in the context of digitalization using a personal example?”, %

At the same time, a comparison of the two waves of the study illustrates the growth in the number of students who are more optimistic about a number of characteristics of the educational process in 2021. For example, the proportion of students who believe that in the context of digitalization, communication with a teacher is becoming more accessible (49.6 % in 2020 and 61.0 % in 2021), and the presentation of materials is understandable (66.8 % – 2021 and 61.6 % in 2020). At the same time, the materials of the study of two waves showed the absence of significant discrepancies in the students' assessments of the "new digital" characteristics of the educational process. Both in 2020 and 2021, based on personal experience, students quite optimistically describe such aspects as clear requirements for the quantity and quality of work, a clear control system, and facilitated material search. It can be assumed that the intensive introduction of digital technologies into the educational process during the pandemic contributed to the creation of an electronic educational environment at universities, within which it became possible to systematize materials and ensure transparency in the control of assignments.

An analysis of arbitrary contingency tables using the $\chi 2$ criterion showed that when the number of degrees of freedom is 6, the value of the $\chi 2$ criterion is 23.036. The critical value of $\chi 2$ at the significance level $p=0.01$ is 16.812. The relationship between factor and resultant signs is statistically significant at a significance level of $p < 0.01$ (Figure 2).

The pandemic and its accompanying online learning have not made significant changes in the specifics of the perception of the digitalization of education. Despite the fact that the majority of students perceive digitalization as a generally positive phenomenon (83.9 % in 2021), nevertheless, respondents identified a number of its negative consequences (Figure 2). The data obtained allows us to conclude that "deterioration in interpersonal skills" remains the most pronounced problem for the majority of students (50.8 % in 2021 and 58.3 % in 2020).

In the second wave, there is an increase in the share of respondents who single out as a negative consequence of the development of digitalization – “a decrease in concentration of attention, distraction from educational goals” (up by 5.1 %). However, there is no negative trend in other indicators.

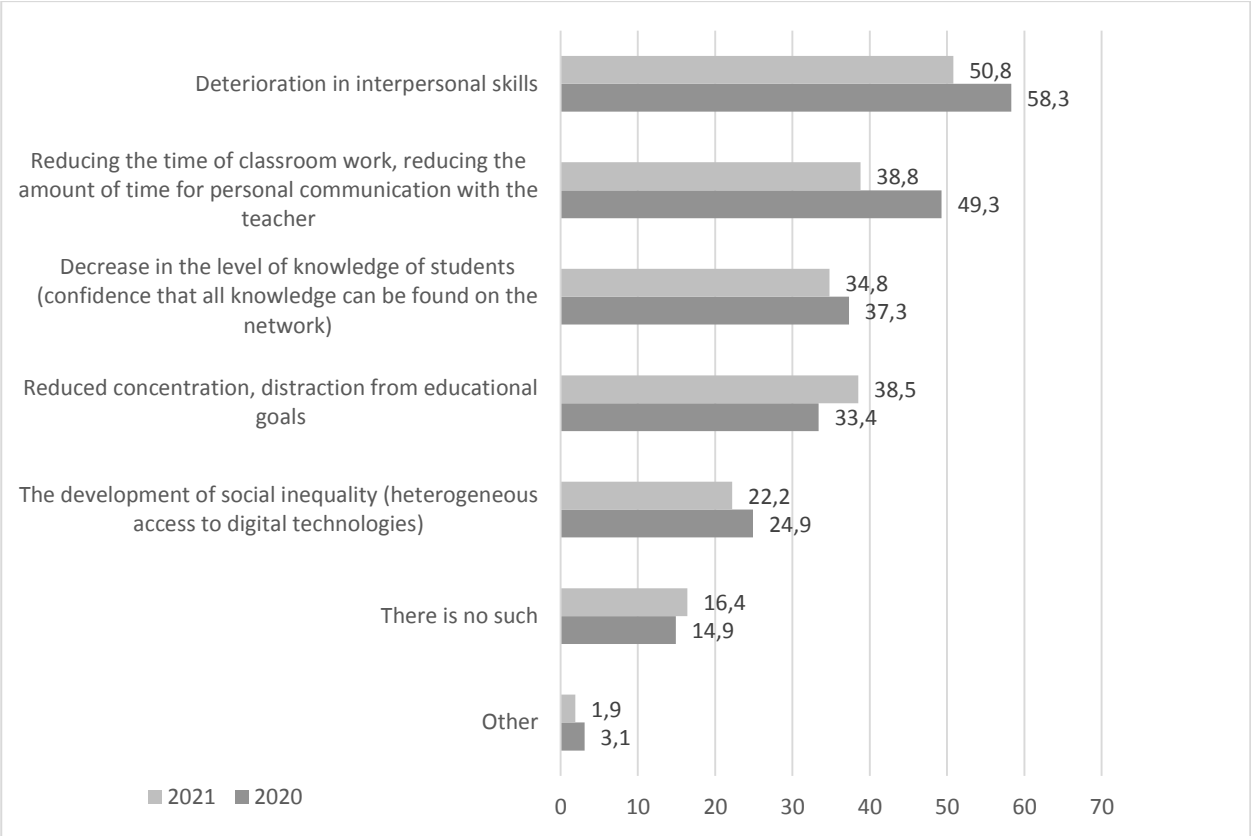


**Fig. 2.** Distribution of answers to the question: "Negative consequences of the development of digitalization can be ...?" (multiple choice answers) in 2020 and 2021, %

The analysis of the research materials illustrates some disappointment of students in the positive consequences of the digitalization of education after gaining the experience of online learning during the pandemic (Figure 3). In particular, in the second wave, there is a decrease in the share of respondents who share the opinion about the growing interest in learning in the context of digitalization (less by 10.8 percentage points), the possibility of exchanging experience, cooperation in the information environment (less by 11.8 percentage points).

Of interest is the fact that in 2021 there is a slight increase in the proportion of students who believe that there are no positive consequences of digitalization (6.1 % in 2020 and 8.9 % in 2021). In general, it can be seen that in a larger number of respondents' answers, the obvious technical aspects of digitalization are noted, which are more likely to be related to the informatization of the educational space (accessibility of educational materials, the opportunity to study regardless of the territorial location). The benefits in the content aspect of digitalization are less reflected in the respondents' answers. This may be a consequence of the low focus of universities on resource support for digital innovations that affect the tools and technologies of the educational process.

An analysis of arbitrary contingency tables using the $\chi 2$ criterion showed that when the number of degrees of freedom is 6, the value of the $\chi 2$ criterion is 31.283. The critical value of $\chi 2$ at the significance level $p = 0.01$ is 16.812. The relationship between factor and resultant signs is statistically significant at a significance level of $p < 0.01$ (Figure 3).

Taking into account the fact that the majority of students see the deterioration of communication skills and the reduction of time for live communication with the teacher as negative consequences of digitalization, the respondents' assessments in terms of detailing this aspect are of interest (Table 1). In particular, among the respondents who rated the quality of feedback from the teacher excellently, the share of those who single out "routine" (14.5 %) and "heavy workloads" (15.2 %) as factors reducing the effectiveness of online learning is smaller (below average values in the sample by 4.8 percentage points and 2.9 percentage points, respectively). Ambiguous results were obtained in terms of students' assessment of the lack of

personal communication with the teacher. Among respondents who rated the quality of feedback from the teacher as "bad", the proportion of those who note the lack of personal communication as a factor in reducing the effectiveness of online learning is higher (38.7 %, which is 7.8 percentage points higher than the average values for the sample). At the same time, among the students who rated the quality of feedback from the teacher as "excellent", there is also an excess of the proportion of respondents who noted the lack of personal communication as an influence factor (35.9 %, which is 5.0 percentage points higher than the average values for the sample).

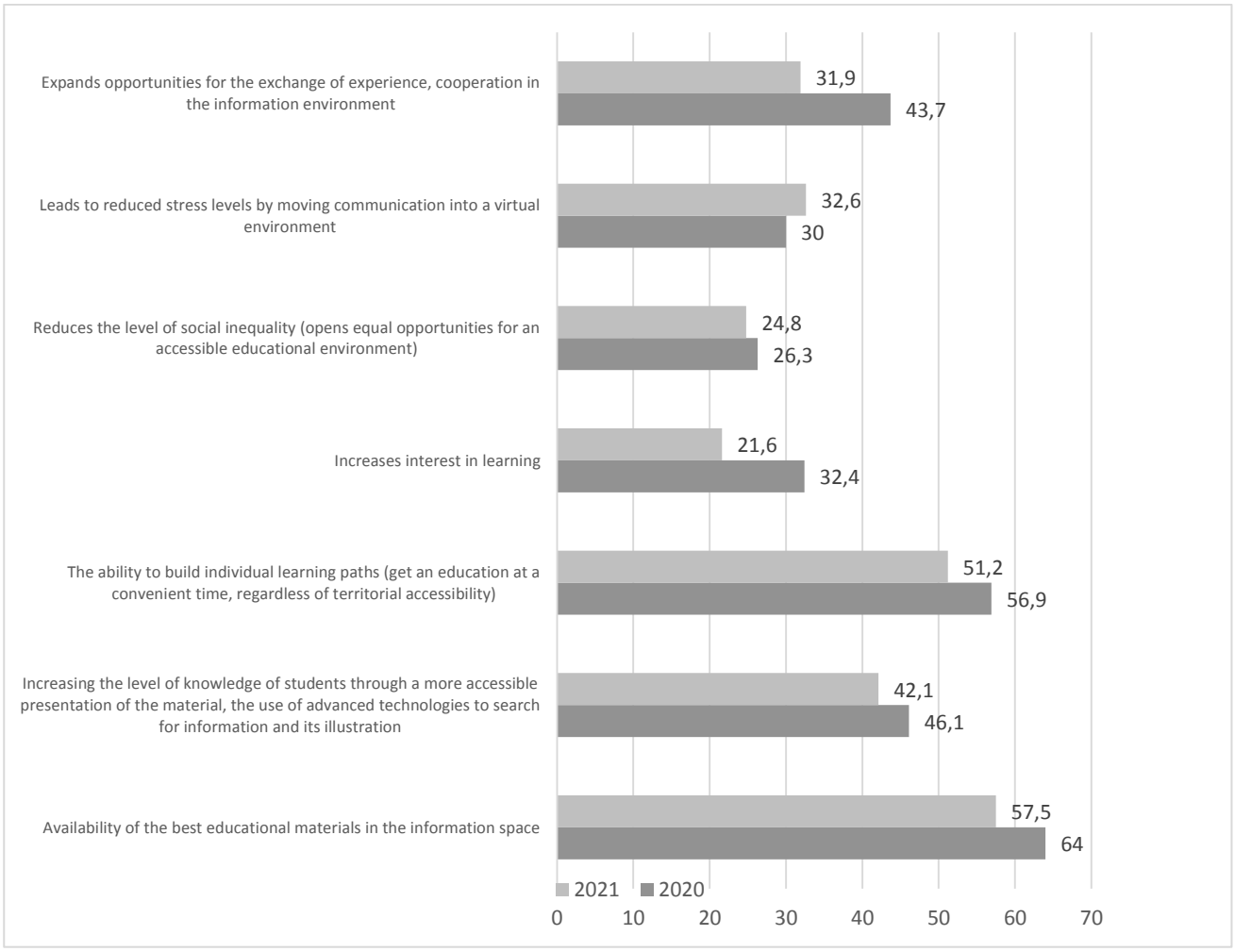


**Fig. 3.** Distribution of answers to the question: “Positive consequences of the development of digitalization can be…” (multiple choice answers) in 2020 and 2021, %

An analysis of arbitrary contingency tables using the $\chi 2$ criterion showed that with the number of degrees of freedom equal to 20, the value of the $\chi 2$ criterion is 181.122. The critical value of $\chi 2$ at the significance level $p = 0.01$ is 37.566. The connection between the factorial and effective signs is statistically significant. The results of the study showed an inverse relationship between involvement in the educational process and the opportunity to ask a question/make a comment. In particular, among those students who are not involved in the educational process and consider lectures and seminars as a background for everyday activities, the proportion of respondents who experience difficulties in communicating with a teacher is significantly lower (33.3 %, which is lower than the average values for the sample by 21.9 percentage points). At the same time, among students who demonstrate a high degree of involvement in the educational process, the proportion of those who experience difficulties with commenting and asking a teacher with a question is 68.4 % (above the average values for the sample by 13.2 percentage points).

**Table 1.** The relationship between the assessment of the quality of feedback and the reasons for the decline in the effectiveness of online learning, pers

| **How would you rate the quality of feedback between teacher and student in online learning?** | **What, in your opinion, reduces the effectiveness of online learning?** | | | | | |
|---|---|---|---|---|---|---|
| | lack of personal communication | lack of interactivity | routine | heavy loads | other | difficult to answer |
| great | 92 | 42 | 37 | 39 | 16 | 30 |
| good | 118 | 64 | 102 | 71 | 21 | 30 |
| satisfactorily | 104 | 51 | 56 | 69 | 20 | 16 |
| poorly | 24 | 8 | 12 | 11 | 7 | 0 |
| difficult to answer | 4 | 4 | 7 | 10 | 7 | 35 |

**Table 2.** The relationship between the level of involvement in the learning process in an online format) and the perception of the complexity of communication with the teacher ("ask questions or make comments"), pers.

| **How involved are you in the learning process during online classes?** | **Is it more difficult to ask questions or make comments during online classes compared to face-to-face training?** | | | |
|---|---|---|---|---|
| | Yes, much harder | Kind of harder | Nothing changed | It became easier |
| I always listen carefully and ask questions, make comments | 56 | 68 | 95 | 34 |
| I listen carefully, but I rarely or never make comments and questions | 57 | 138 | 122 | 45 |
| Partially involved, sometimes I can afford to be distracted by work/personal affairs | 68 | 130 | 91 | 27 |
| Often have to take a break | 25 | 39 | 25 | 7 |
| Not involved due to being busy at work/at home, the lecture/seminar is included in the background | 15 | 34 | 25 | 6 |

An analysis of arbitrary contingency tables using the $\chi 2$ criterion showed that when the number of degrees of freedom is 12. The value of the $\chi 2$ criterion is 26.343. The critical value of $\chi 2$ at the significance level $p = 0.01$ is 26.217. The relationship between factor and performance characteristics is statistically significant at a significance level of $p < 0.01$ (Table 2).

Thus, a relationship has been established between the student's involvement in the educational process and the difficulties in maintaining communications during online learning. However, this dependence is inverse, which did not allow us to confirm the hypothesis put forward. As the results of the study showed, students with a high level of involvement in the learning process experience the greatest difficulties in communicating in an online learning environment (they always listen carefully, ask questions, make comments). Most of the respondents (48.9 %) prefer to study remotely, online. During the study, it was found that the choice of the form of education is determined by the assessment of the quality of feedback between the student and the teacher (Figure 4).

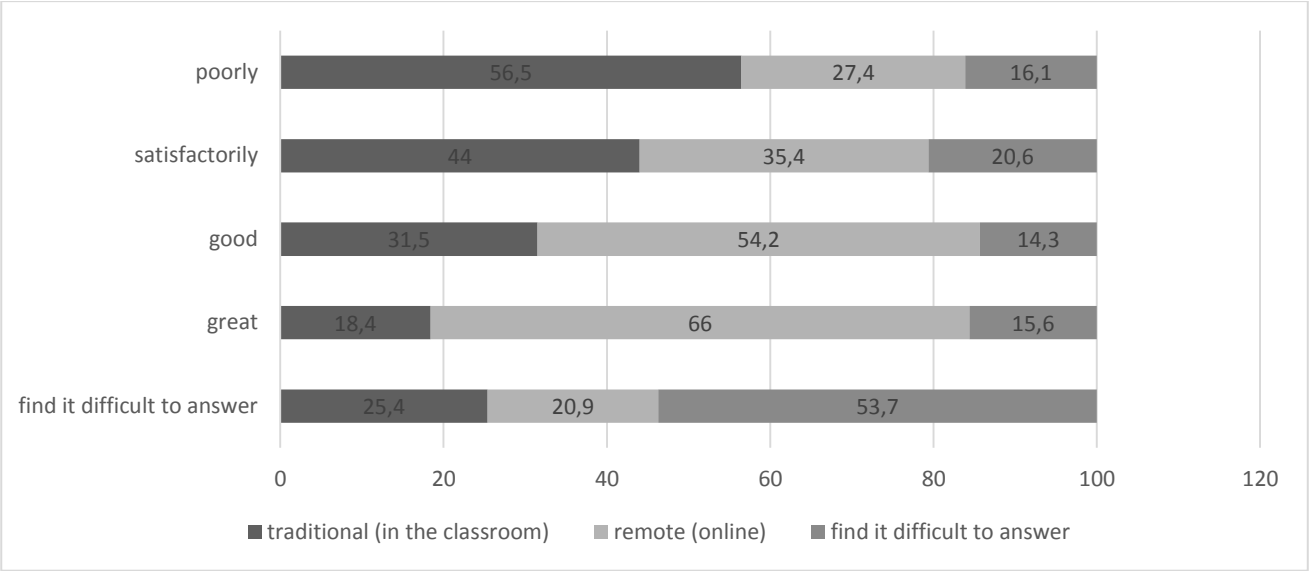


**Fig. 4.** Dependence of students' assessments on the quality of feedback between the student and the teacher on the choice of the form of education, %

Among those who rated the quality of feedback as excellent, the proportion of students who prefer distance learning is significantly higher (66 %, which is 17.1 percentage points higher than the average). Poor communication with the teacher in the online learning mode forms the student's refusal of remote education, this group of respondents, for the most part, opted for traditional study in the classroom (56.5 %, which is 22.9 percentage points higher than the average values).

An analysis of arbitrary contingency tables using the $\chi 2$ criterion showed that when the number of degrees of freedom is 8, the value of the $\chi 2$ criterion is 136.295. The critical value of $\chi 2$ at the significance level $p = 0.01$ is 20.09. The relationship between factor and resultant signs is statistically significant at a significance level of $p < 0.01$ (Table 3).

**Table 3.** The relationship between the choice of the form of education and the assessment of the quality of feedback between the teacher and the student in online learning, pers.

| **What form of education do you prefer: traditional (in the classroom) or remote (online)?** | **How would you rate the quality of feedback between teacher and student in online learning?** | | | | |
|---|---|---|---|---|---|
| | great | good | satisfactorily | poorly | difficult to answer |
| traditional (in the classroom) | 47 | 128 | 139 | 35 | 17 |
| remote (online) | 169 | 220 | 112 | 17 | 14 |
| difficult to answer | 40 | 58 | 65 | 10 | 36 |

An analysis of the research materials allows us to conclude that the attitude to online learning is based on the personal experience of the student and, first of all, on the assessment of the quality of communications with the teacher. With a certain degree of probability, we can assume that the personal contribution of the teacher, his desire and ability to maintain stable feedback with students determines the effectiveness of online learning.

## 4. Discussion

The results of the study showed an ambiguous perception of the quantitative and qualitative characteristics of the communication process between a student and a teacher in the context of digitalization. Despite the availability of communication, which is achieved through the active introduction of information technologies into everyday life (gadgets, instant messengers, etc.), almost $^2/_3$ of students note that there is not enough time for personal interaction with the teacher. Considering the qualitative characteristics of the communication process in the context of

digitalization, students note their concreteness, severity and certainty ("a clear control system", "clear presentation of the material", "formation of requirements", etc.).

An optimistic tone in the overall perception of online learning is typical for many foreign studies. At the same time, the possibility of continuing communications becomes an important predicate for the formation of successful adaptation strategies in the transition to a new learning format. D. Homer notes that "peer relationships and collaborative learning are the key to success" (Homer, 2022).

Despite the positive tone taken by students in assessing communication processes in the context of digitalization, the negative consequences of introducing digital technologies into the educational process were highlighted. Communication dysfunctions were in the top lines of the conditional anti-rating of students. In the answers of the respondents, there is an appeal to both objective factors of the deterioration of the communication process ("decrease in the time of classroom work, live communication"), and to subjective ones ("deterioration of interpersonal communication skills", "decrease in concentration"). This problem is also typical for foreign countries, scientists pay attention to the lack of social-emotional interactions during online learning (Kalmar et al., 2022).

In a study by R. Koris, F.J. Mato-Díaz, N. Hernández-Nanclares concludes that limited social interaction in online learning is becoming a key problem not only in the education system, but in the sociocultural context of communications (Koris et al., 2021). In continuation of this topic, N. Kilinc and K. Buyuk draw attention to the fact that increasing the efficiency of communication processes in the context of digitalization of education can be achieved by reducing the number of students in groups, overcoming the "mass character" in the course of training. Researchers conclude that the "presence effect" has a positive effect on learning satisfaction (Kilinc, Buyuk, 2022). Therefore, according to experts, preference should be given to such pedagogical forms, in which the personal aspect is paid more attention than the technological one (Davidovitch, Yossel-Eisenbach, 2019).

However, having experienced the practice of distance learning first hand, students in 2021 year are no longer so afraid of "deteriorating interpersonal skills" (a decrease of 7.5 % compared to 2020 year), « reducing the time of classroom work, personal communication with the teacher» (a decrease of 10.5 %). The results obtained are confirmed by other studies that illustrate the transformation of student assessments: the share of those students who considered online learning to be untenable is narrowing; there has been an increase in trust in online practices in education (Agarkov et al., 2021).

As the results of the study showed, the excellent quality of feedback from the teacher and students eliminates such limitations of online learning as "routine" and "heavy workloads". At the same time, the establishment of effective feedback does not guarantee the absence of student dissatisfaction with the decrease in time for live communication. The problems of effective feedback are also actualized in foreign studies. In particular, E. Tualaulelei, K. Burke, M. Fanshawe and C. Cameron, C. draw attention to the need for strategic planning of pedagogical touch points as a mechanism for maximizing the potential for student engagement in learning (Tualaulelei et al., 2022).

Dysfunctions of communication in the context of online learning mostly affected those students who are interested in education. The vulnerability of their position, in our opinion, is due to higher requirements for themselves and the educational process. Those students who listen carefully, strive to gain knowledge, and are oriented to study are more likely to feel the need to ask a question or clarify the material. However, for them, the opportunity to do this in an online learning environment is significantly limited. Among such students, the answer option "yes" was chosen by 68.4 %, which is 13.2 percentage points higher than the average values for the sample.

Summarizing the above, we note once again that student assessments are distinguished by an optimistic tone of statements: digitalization is seen as a technology of the future, which allows the use of previously inaccessible learning tools, network forms of interaction in the educational environment. This circumstance has left its mark on the responses received. Among the advantages of digitalization, students during the first wave of the survey more often chose the answer option "increases interest in learning", "provides an opportunity to exchange experience, cooperate in the information environment". Optimism during the second measurement is shared by a smaller proportion of respondents, as well as fears that the time for classroom work and live communication with the teacher is decreasing. The study notes a general decrease in the demand

for contact work with a teacher after gaining online learning experience during a pandemic. This trend can have far-reaching consequences, as it involves a change not only in the communication process, but also transforms the landscape of higher education itself. The authors believe that a further direction of research in the context of analyzing the consequences of digitalization should be the study of the practices of narrowing the communication space, distorting the roles of communicators, and modernizing the forms and methods of teacher contact work.

A comparative analysis of the materials of the first and second waves of the study revealed a decrease in students' assessments of the benefits of digitalization of education. It can be assumed that the experience of online learning during the pandemic left its mark on the perception of such aspects of digitalization as: "the possibility of exchanging experience, cooperation in the information environment", "growing interest in learning". As the negative consequences of digitalization, students identify: "deterioration of interpersonal communication skills", "decrease in the level of knowledge of students" and "concentration of attention, distraction from learning goals", "reduction of study time".

Thus, the main hypothesis of the study was confirmed. Communication dysfunctions are a key limitation to the effectiveness of online learning, the lack of communication with the teacher significantly reduces student satisfaction with the conditions of the educational process. In the course of two waves of the study, students singled out "deterioration in interpersonal communication skills", "reduction in the time of classroom work, live communication with the teacher" as the most significant negative consequences of digitalization. The hypothesis is proved that students with a low level of involvement in the educational process experience the greatest difficulties in implementing communications in the conditions of online learning. It is concluded that maintaining a stable feedback with students by the teacher ensures an increase in the efficiency of the educational process in the context of online learning. The development of hybrid forms of education, the integration of online and traditional forms of education is becoming a new trend in the development of higher education today, which increases the availability of education, provides flexible educational trajectories for students. Under these conditions, research aimed at finding mechanisms that increase the effectiveness of online communications is becoming highly relevant.

## 5. Limitations

The limitations of this study include the use of a random sample, which does not fully reflect all categories of students. Although the use of non-probability samples makes comparisons over time difficult, a number of relationships were nonetheless identified across the results of the two waves of the study. When developing the survey methodology, the authors focused on studying the opinions of students in the humanities. This is due to the fact that STEM students have a higher level of development of digital competencies and knowledge in the field of digital technologies. However, further analysis of communication processes requires coverage of a wider range of respondents, taking into account all the characteristics of representativeness.

In addition, the study was conducted using a questionnaire, so it is likely that social desirability may have influenced the responses.

## 6. Declaration of competing interest

The manuscript's authors declare that there is no interest in conflict, and all reference materials were dully acknowledged.

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