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Published in the USA

European Journal of Contemporary Education  
E-ISSN 2305-6746  
2023. 12(3): 893-908  
DOI: 10.13187/ejced.2023.3.893  
<https://ejce.cherkasgu.press>

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**European Journal of  
Contemporary Education**



ELECTRONIC JOURNAL

## **Assessment by Students of the Influence of Distance Learning Technologies on the Organization of Practice as a Factor of Improving the Quality of Training**

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### **Abstract**

Under the conditions of the new sanitary and epidemiological situation, the work of the university have transformed in the field of interaction with the bases of practices and the coordination of information, network communications at specialized enterprises. The purpose of the study is to analyze students' assessments of the organization of practice in pre-pandemic education and in the shift to distance learning technologies to improve the quality of professional training in general.

The basis of methodology is the analysis and generalization of literature in describing the potential of distance technologies to support UNESCO initiatives, identifying problems of their implementation in the university educational environment, and organization of practice. The students' assessment of the influence of remote technologies on the organization of the practice was carried out during the survey through the forms of Microsoft Teams. 124 students of the Moscow Technical University of Communications and Informatics from the Faculty of Digital Economics and Mass Communications were involved in the study learning the courses "Introduction to Information Technologies" and "Information Security".

Research results. In Microsoft Teams a questionnaire has been developed containing blocks: "Distance technologies at the stages of organization of practice", "Satisfactory quality organization of practice lacking distance learning technologies", "Directions for improvement". The Moodle course implements an appropriate algorithm for organizing practice based on distance technologies.

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In conclusion, the authors describe the ways of modernization of the educational environment for practice organization in line with identified problems to enhance the quality of specialist training.

**Keywords:** COVID-19, distance learning, practice base, networking, a questionnaire, Moodle.

### **1. Introduction**

The significance of the research is specified by the following factors:

1. In response to the COVID-19 outbreak, UNESCO is not only creating an Education Coalition but also providing direct support to countries in minimizing the negative consequences of the coronavirus, closing institutions, and creating conditions for lifelong learning ([More on UNESCO's..., 2023](#)). One of the activities of the Coalition is the development of distance technologies, network communication resources, and e-learning. In particular, with their assistance, the Moodle platform becomes a partner of UNESCO, UNICEF, and the Organization for Security and Cooperation in Europe (OSCE). The international webinars, teacher conferences on the creation of high-quality online classes, and a combination of asynchronous actions (forums, quizzes) with traditional face-to-face interaction take place ([UNICEF's activities..., 2023](#)). In the area of education, remote technologies for various purposes are being improved and developed: ClassDojo, Edmodo, Zoom, Microsoft Teams, Google Classroom, Schoology, Skooler, Funzi, KaiOS, Kolibri, Canvas Network, etc.

2. The university practice, as noted by P. S. Tiwari et al., describing the experience of using distance learning technologies during the COVID-19 period, is an fundamental part of the core professional program of higher education. The practice is carried out to consolidate the theory, acquire skills, and form professional competencies ([Tiwari et al., 2021](#)). Using the example of training specialists in the professions of the space industry (implementation of simulation programs), the authors highlight the specific challenges of including distance learning technologies during theoretical training, performing scientific research, term and graduation papers. P.S. Tiwari et al. clarify the peculiarities of interaction between interns and representatives of organizations ([Tiwari et al., 2021](#)).

Many problems of practice organization using e-learning, as O.V. Lisovsky et al. prove, analyzing the possibilities of distance learning in practical skills during the COVID-19, are due to inadequate progress of the supervisory background ([Lisovsky i dr ., 2021](#)).

3. Within the framework of scientific research, an analysis of students' assessments of the educational environment depending on distance learning technologies is carried out ([Gulbianova i dr., 2021](#)). For example, I.E. Sokolovskaya studies the socio-psychological factors of student satisfaction during a pandemic ([Sokolovskaya, 2020](#)). R. Imane offers new methodological techniques for involving students, increasing their motivation and cognitive activity ([Imane, 2021](#)). The questions of the corresponding questionnaires are aimed at identifying changes in the quality of life of students, the intensity of communication in real life, and freedom of movement.

Thus, the development of e-learning is not only a forced response of international organizations, national ministries of education. E-learning and distance learning can potentially provide significant assistance in quality improvement of education, professional networking, and implementing methodological changes ([Al Lily et al., 2020](#)).

At the same time, it is obvious that many universities have experienced and are experiencing difficulties with the introduction of new technologies in the educational environment. Under these conditions, it is essential to confirm the dissemination of didactic principles and standards, which will be accepted not only at the administrative level, but also by teachers themselves, university students.

An important factor contributing to the adoption of e-learning and the organization of the practice of students by means of distance learning technologies is their perception as a relative advantage. In other words, both students and teachers must understand that the applied innovation is better than the tool or practice that it replaced.

Thus, when formulating the hypothesis, we took into account both the provisions of the works of P. S. Tiwari et al. on the need to improve the methodology for organizing practice using distance learning technologies ([Tiwari et al., 2021](#)). So are the conclusions of A. Al Lily et al. on the importance of keeping in mind the specifics of higher education when conducting virtual learning ([Al Lily et al., 2020](#)).

The hypothesis of the study is that the quality of training of future specialists will increase if, when organizing practice using distance learning technologies, the work includes:

- assessment by students of the influence of distance learning technologies on the level of organization of practice (on the issues of specially designed questionnaires);
- regard to the identified problems and areas of improvement in the algorithm for organizing practice using distance learning technologies.

### **1.2. Purpose and objectives of research**

The purpose of the work is determined from the need to analyze students' assessments of the impact of distance learning technologies on the level of organization of practice to improve the quality of training of future specialists.

The objectives of the research are:

- to describe the potential of distance learning technologies to support the initiatives of the UNESCO Institute for Information Technologies in Education;
- to identify the problems of introducing distance technologies into the academic environment especially at the organization of students' internship;
- to develop and implement an algorithm for organizing practice based on distance technologies;
- to describe the directions of modernization of the electronic information and academic environment for the organization of practice under the identified problems for the quality improvement of training;
- to empirically check the impact of the proposed system of work.

## **2. Relevance**

### **2.1. Literature review**

The literature analysis was performed in the following areas:

- 1) identifying the potential of information technologies to support UNESCO initiatives, minimize the negative consequences of the coronavirus, and create conditions for continuous learning;
- 2) the possibility of using remote technologies to organize various types of practices;
- 3) the difficulties of using distance learning technologies for organizing students' practice, and the establishment of professional competencies of future specialists.

#### **2.1.1. Russian scientific and pedagogical literature review**

In their work, S.Yu. Knyazeva, D.M. Kapelyushnik, E.N. Pushkareva, summarizing the experience of the UNESCO Institute for Information Technologies in Education in Moscow, note: despite all the advantages and functionality, the initiative to escalate the quality of education through the introduction of innovative transformations relied on the use of distance learning technologies is still unrealized (Knyazeva *et al.*, 2020). They conceive of the simple transfer of offline work methods, traditional methods of interaction into a remote format as one of the reasons for the current situation.

V.A. Azev, E.V. Kobets, V.A. Vasiliev summarize new trends and strategies for integrating distance technologies in education. They indicate areas for improvement: alternative forms of obtaining information, requirements for online learning platforms and open educational resources, models for evaluating learning outcomes, research and analytical work methodology for monitoring e-learning (including the process of students' internships in obtaining professional skills) (Azev *et al.*, 2021).

N.K. Melnikov proposes using virtual platforms for organizing project activities (Melnikov, 2021). And meanwhile, scientists point out that some universities have experience of work with Internet access providers in the direction of opening equipped rooms with computers for independent work in dormitories.

Exemplified by the Faculty of Journalism of the Belarusian State University, T. V. Silina-Yasinskaya describes organizational problems, the difficulties of ensuring the continuity of the educational process and work practice (Silina-Yasinskaya, 2020). T.V. Silina-Yasinskaya notes that students, with virtually no damage to the implementation of the creative part of the practice program, could, being in a safe environment at home at the computer, collect and edit materials; apply remote forms of information retrieval; conduct remote interviews; make up layouts of

newspaper pages and mount stories; take part in the work with the Internet sites and social networks of organizations, etc. In the context of the work, we note that interaction with practice leaders from the organization was also carried out using Internet resources. For the formation of professional competencies (with the technical capabilities of the practice bases), students remotely attended planning meetings, editorial boards ([Silina-Yasinskaya, 2020](#)).

In the third block of analytical work with literature, we note the conclusions of O.V. Lisovsky et al., which systematize various technical (congestion of communication channels), philosophical and ethical (degree of trust in digital tools), organizational students), methodical (lack of effective methods, ways of interaction) and normative problems of organizing students' work experience on the basis of distance learning technologies ([Lisovsky i dr., 2021](#)).

V. Silina-Yasinskaya points out that for the first time some universities faced the need to conduct internships in online mode, some transferred internships to the next academic year ([Silina-Yasinskaya, 2020](#)). As the shortcomings of students' internships in the online space, the author highlights the inability to actually study the structure of the organization and its divisions, go on business trips, and participate in organizational and mass work.

A. Azev, E.V. Kobets, V.A. Vasiliev note that the transition to a new mode of study caused stress for all participants in the didactic process: teachers, students, heads of organizations ([Azev i dr., 2021](#)).

So, the COVID-19 pandemic made distance forms of education in demand at school and university ([Matveev i dr., 2022](#)). Kh.N. Gyulbyakova, E.A. Maslovskaya, A.Yu. Airapetova, M.V. Larsky summarize that practice is an important part of the higher education program. It must be executed in the form determined by the educational organization ([Gulbianova i dr., 2021](#)). O.G. Antonova, Yu.R. Khairullina, E.V. Shchanina establish that under the current conditions, universities have tested, various options for organizing the practice of students (postponement, full and partial transfer to a remote format, the traditional pre-pandemic version) ([Antonova i dr., 2020](#)).

Yu. Petrova and M.Yu. Pechalnov conclude that in all cases of organization of students' practice with the use of distance learning technologies, some rules are required that regulate the contractual relationship between the organization and remote student during practice; ways and nature of the use of means of professional communication; location of the workplace and the share of working time used at it ([Petrova, Pechalnov, 2020](#)).

Thus, there is a growing need to ensure the effectiveness of communication processes between all participants in the practice (heads of organizations/practice bases, practice base staff, student trainees, curators from the university).

### **2.1.2. Foreign literature review**

In the first analytical direction, we note the results of studies by K. Shahid, Q. Yang, Z. Xingqi ([Shahid et al., 2019](#)). The scientists substantiate and prove with empirical data that modern software tools have powerful tools for working with textual, numerical and graphic information, which forms the educational environment foundation in the situation of the COVID-19. In their opinion, a qualitatively new global learning environment is being formed. M. van der Velde and ed. note that there are new functionalities and services for performing practical tasks, exercises and tests; listening to online lectures; downloading materials for self-study; activating the work of chats and receiving prompt feedback from participants in didactic networking ([van der Velde et al., 2021](#)). D.B. Ramos et al. present an approach to developing a learning trajectory model in the e-learning system ([Ramos et al., 2021](#)). The authors demonstrate how the model can be used for visual representation of the learning trajectory (including the process of students' internship), behavior analysis.

D. Fujs et al. note that online learning has become a necessity in modern society ([Fujs et al., 2022](#)). Due to the COVID-19, being indoors in groups has become a big problem. There was a need for social distancing and forced quarantine. For this reason, educational organizations are switching to distance learning. The authors consider the didactic potential and tools of video conferencing. The authors prove that, thanks to the development of modern software solutions, communication technologies and the construction of video conferencing, it was possible to activate the students' cognitive activity, maintain discipline, diligence, and direct cognitive activity ([Fujs et al., 2022](#)).

A. Al Lily et al. note that the need for e-learning is undeniable. Nevertheless, in practice, both students and teachers experience serious problems that hinder successful learning. Scientists

analyze how e-learning is developing in the Arab world, what its place is in the general and higher education of the Arab countries (Al Lily et al., 2020).

A. Al Lily et al. highlight the potential social benefits of ICT: meeting the increasing public demand for education due to population expansion and the associated growth in students; desire for various forms of education; the need for professional mobility of workers in a developing country, the development and retraining of personnel; promoting the education of girls and adults in the Arab world, etc. (Al Lily et al., 2020). A. Al Lily et al. highlight real difficulties with adapting to online classes; low computer literacy, technical problems; inept use of time; weak self-motivation (Al Lily et al., 2020).

As part of the second direction, we note that J. N. Al-Karaki et al. describe the methods of conducting educational practices of students with the benefit of virtual laboratories (Al-Karaki et al., 2021).

Valuable for the presented study is the remark of A. All Lily et al., that virtual lectures are great, but what about practical exercises and practice? The specificity of higher education is such that most of the formed professional competencies of a future specialist are inextricably linked with forms of education that require personal presence (Al Lily et al., 2020). Many of the students will have final and qualifying exams, accreditation procedures. Scientists also describe the psychological problems of distance learning during a period of increased stress.

In the third block of analytical work with the literature, we note the position of V. Kuleto et al. determine that institutions that had the experience of organizing a remote format of classes (for example, for part-time students) were the fastest to adapt to the new mode of study due to quarantine (Kuleto et al., 2021).

So, in conditions of isolation, it becomes particularly hard to manage conflict resolution, provide a sufficient level of students' motivation, and maintain the high-quality formation of competencies in the direction of training (Kanetaki et al., 2021).

Thus, conducting an integrated and comprehensive assessment by students of the stages of organization of practice in pre-pandemic education and in the transition to distance learning technologies will provide additional resources for quality improvement of professional training in the chosen specialty; developing the ability to make independent judgments and conclusions, developing skills for an objective valuation of scientific information, etc.

### **3. Materials and methods**

#### **3.1. Theoretical and empirical methods**

We used the following methods in our research: theoretical analysis and generalization of literature in describing the potential of distance learning technologies to support UNESCO IITE initiatives, identifying problems of their implementation in the academic environment, organization of practice.

The students' evaluation of the impact of distance learning technology at the level of practice organization was accomplished in a specially conducted survey. It was implemented using forms in MS Teams. The following reasons are responsible for the choice of a software: management of the security policy at the institute; each team (preparation profile) could quite quickly set up a tab, create a new/add an existing form to collect answers or demonstrate survey results; support collaboration with team members, create notifications for a form, or conduct a quick survey only in your group. It is the latter possibility that makes it probable to consider the details of training, the peculiarities of the organization of a particular type of practice, and the formed competencies.

Forms in MS Teams contained questions (choice, multiple choice, matching, assessment of a statement on a scale, entering your own answer) developed and structured by the authors pursuant to the research hypothesis. The following blocks were provided in the questionnaire for students: "Distance educational technologies at various stages of organization of practice" (assessment of the spectrum, the validity of the choice and problems of the software and hardware used separately for the university and practice base); "Satisfactory quality organization of practice lacking distance learning technologies (directly at the enterprise, in the organization)"; "Satisfactory quality organization of practice of practice using distance learning technologies"; "Directions for improving the actions of the university/base of practice in remote interaction". An algorithm for conducting practice was proposed as a result of processing the questionnaire distance learning technologies. It is presented below in the form of a Moodle course.

The base of the experiment is the Moscow Technical University of Communications and Informatics. When forming the experimental and control groups, the results of previous educational and research activities of students, reflected in individual educational routes, expert opinions of teachers of the courses Introduction to Information Technology, Information Security, self- and mutual assessment were analyzed. The final diagnostics took into account points from the head of the practice at the organization and from the university, marks for the report and the implementation of an individual task, self- and mutual assessment, public reports.

To determine the future specialists' quality of training in the course of various types of practices, the levels "high", "low", "medium" were introduced. The methodology for determining the levels is described below (program and results of the study). On average, the age of the participants was 22 years (50 % girls and 50 % boys). The size and composition of the sample is justified by the specifics of the study.

Statistical processing of the results was performed as follows:

1) Fisher's test was used to verify the reliability of the data obtained from the questionnaire materials, in accordance with the research hypothesis;

2) Pearson's chi-square test –  $\chi^2$  was used to identify statistically significant differences between students in the experimental and control groups in levels of professional training.

### **3.2. The base of research**

The main goal of the experiment was to assess the educational value of activities for the comprehensive and systematic assessment by students of various stages of practice and its types in pre-pandemic education and in the transition to remote learning technologies to measure the progress in the quality of professional training of future specialists.

The study covered 124 students of the Moscow Technical University of Communications and Informatics from the Faculty of Digital Economy and Mass Communications while studying the courses "Introduction to Information Technologies" and "Information Security"(theoretical analysis of the topic "Message, data, signal, attributive properties of information, quality indicators information, forms of presentation of information", "Information transmission systems", etc.). Students in the areas of training: 42.03.01 Advertising and public relations (profile Advertising and public relations in the industry); 38.03.01 Economics (profile: Economics and organization of IT business); 38.03.05 Business informatics (profile: Digital solutions for Business) were included in the study.

Industrial practice and project activities are implemented in leading IT companies, telecom and media industries, digital advertising, and PR agencies. The study was conducted from 2020 to 2022. From October to December 2020 (during the COVID- 19) it was carried out remotely.

### **3.3. Stages of research**

At the preparatory stage of the experiment, the potential of new information technologies was determined to minimize the negative consequences of the coronavirus and create conditions for continuous learning and organization of practice.

The possibilities of using remote technologies for organizing various types of practices were clarified as follows: professional network communication between the participants of the practice using available means of communication; prompt informing about current or upcoming events; exchange of files of different formats; assessment of theoretical knowledge, professional skills, and competencies in the direct performance of labor activity (surveillance through webcams); holding consultations; organization of public reports and individual tasks. Various learning platforms (EkStep, Moodle, Canvas Network, Coursera), services for working with mobile phones (Cell-Ed, Eneza Education, Funzi, KaiOS, Ubongo, Ustad Mobile), online courses and online communities (ClassDojo, Paper Airplanes), tools and resources for managing and remotely interacting with students (Google Classroom, Schoology, MS Teams) were analyzed by the authors.

In line with the register of collective agreements on the practical training of students between the institute and enterprises, an assessment of the readiness and capacity of institutions to conduct internships using distance learning technologies (technical, organizational, managerial, information) was made.

Further, the leaders of the practice from the university determined the quality of theoretical knowledge, professional skills, and abilities of students; their abilities to search for information, make organizational/managerial decisions in the area of professional activity, apply knowledge to

solve practical problems, make independent judgments, objectively evaluate information, etc. The results of students' educational and research activities from individual educational routes, expert opinions of teachers of the courses "Introduction to Information Technology", "Information Security", and self- and mutual assessment were analyzed. The obtained data was processed according to the procedure defined in paragraph 4.

Based on the initial diagnosis, each student got a score of 0 to 35 points. Therefore, we could collect data on 124 students, and divided them into two groups of 62 people each called the experimental and control groups. The sample was not random. The experimental group was made up of 50 % girls and 50 % boys.

The second stage of the experiment was designed to determining (possible postponements) the timing and structure of the practice, preparation of application forms for selecting a base of practice, formulating a list of individual tasks. The content of the sections of the practice was determined by its type, form of conduct (stationary, visiting).

The third stage of the study includes the entire schedule of organization by curators from the university of students' practice at enterprises, institutions in the areas of training.

#### **4. Results**

##### **4.1. Studying the conditions and experience of conducting an internship using distance learning technologies at the Moscow Technical University of Communications and Informatics**

Distance educational technologies are used at the Moscow Technical University of Communications and Informatics by virtue of the Federal Law "On Education in the Russian Federation". The organization of students' practice at the university as an integral stage in the future specialists training is performed using e-learning, distance learning technologies. In the context of the study, by conducting practice in a remote format, we mean the interaction of all its members at a distance using telecommunications and the Internet, the use of new work algorithms. At the same time, all components inherent in practice (goals, content, methods, organizational forms and means, control) remain unchanged.

The performed literature analysis lets us to infer that practice is also a unit of the core professional program of higher education; and an element of the educational process, which allows you to navigate the labor market, find yourself in your future profession. The means of communication used for conducting practice in a remote form of the Moscow Technical University of Communications and Informatics are the LMS Moodle, corporate email, Zoom and services similar to Zoom. The base for the practice of students is laboratories, training centers, subdivisions of the research part, in which the level of the state of documentary support for management, organization of information support corresponds to the direction/profile of training. If the sanitary-hygienic, technical, organizational and managerial conditions comply with the requirements for internship using distance learning technologies, an agreement on internship is concluded with the enterprise.

To understand the didactic potential of using distance learning technologies at various stages of practice and its types, in identifying problems and in order to determine areas for improvement at the faculties of digital economy and mass communication, the heads of the practice initiated measures to conduct a comprehensive and systematic assessment by students of a new learning format. The authors developed a questionnaire, which was originally offered to students through Google Forms, but was subsequently transferred to the MS Teams space. Immediately during the webinar on this platform, you can get the views of the participants in various data presentation formats, without switching to other applications. The following is the structure and content of the questionnaire.

I block. Distance educational technologies at various stages of practice organization.

1.1. Assessment of the kinds of software and hardware used.

1. From the list of software and technical means of distance learning, select those that were used by the heads of the practice from the university at various stages of its organization. Software service options: Zoom, Google services, MS Teams, social networks (VK, Odnoklassniki, Instagram, Telegram Messenger, etc.), email (Yandex, Mail.ru, etc.), Moodle, YouTube, Profuturo.

1a. What service, in your opinion, should be added for the quality improvement of practical training?

1b. What service, in your opinion, is the least conducive to the development of competencies in the area of future professional activity?

2. From the list of tools, select those that were used by leaders from the practice base.

2a. What service, in your opinion, should be added to rise the efficiency of labor activity at the enterprise?

2b. What service, in your opinion, is the least conducive to the development of competencies in the area of future professional activity?

3. Establish a correspondence between the software tools and the stages of practice at which you applied them. Wording options for practice stages: Acquaintance with the institution and its structure, Analysis of organizational and regulatory and methodological documents, Work in an organizational unit, Collection of empirical material and conducting scientific research, Preparation of a report, Demonstration of the results of practice activities.

4. Specify the problems that you encountered when installing the software/direct work with distance learning technologies.

1.2. Assessment of the validity of the choice of distance learning technologies used by the practice base. Rate the degree of your (dis)agreement with the statements presented below, bearing in mind that: 1 – "strongly disagree", 2 – "rather disagree", 3 – "rather agree", 4 – "strongly agree", DK – "I don't know, it's hard to answer".

- Heads of practice at the enterprise have always expediently used the resources of distance learning technologies.

- Heads of practice at the enterprise used distance learning technologies only in critical/emergency cases.

- There are no uniform requirements for the use of distance learning technologies at an organization/enterprise/institution.

1.3. Assessment of the validity of the choice of distance learning technologies used by the university in organizing various types of practice. Rate the degree of your (dis)agreement with the statements below, meaning that: 1 – "strongly disagree", 2 – "rather disagree", 3 – "rather agree", 4 – "strongly agree", "NZ – I don't know, it's hard to answer".

- Heads of practice from the university have always expediently used the resources of distance learning technologies.

- Heads of practice from the university used distance learning technologies only in critical/emergency cases (for example, when there was a delay in submitting the final report).

- In each type of practice, the organizers from the university used various distance learning technologies.

II block. Satisfactory quality organization of practice lacking distance learning technologies (directly at the enterprise, in the organization).

1. Evaluate the quality of your results (experience, skills, marks) on a 5-point scale after completing an internship in a traditional format without using distance learning technologies: (1 – "very bad", 2 – "bad", 3 – "satisfactory", 4 – "good", 5 – "very good").

2. Rate on a 10-point scale the degree of your satisfaction with the quality of organization of practice lacking distance learning technologies: where 1 is "very bad" and 10 is "excellent".

3. Indicate the difficulties that you encountered during information interaction: with the head of the practice from the specialized institution; with the head of practice from the university.

III block. Satisfaction of students with the quality of organization of practice using distance learning technologies.

1. Evaluate the quality of your results (experience, skills, marks) on a 5-point scale after completing the practice in a remote format (1 – "very bad", 2 – "bad", 3 – "satisfactory", 4 – "good", 5 – "very good").

2. On a 10-point scale, rate your satisfaction with the quality of organization of practice in a remote format: where 1 is "very bad" and 10 is "excellent".

3. Indicate the difficulties that you encountered in information interaction by means of distance learning technologies: with the head of practice from a specialized institution; with the head of practice from the university.

IV block. Directions for improving the actions of the university/institution for organizing practice using distance learning technologies.

1. Mark the provisions / proposals that the university should implement to organize practice (using distance learning technologies) in the future:

- Replace the platform/software used to organize practice and coordinate information interaction (based on distance learning technologies).



- Expand the range of information resources and software tools for the quality improvement of interaction with the curators of practice from the university.
  - Leave only one in the list of information resources and software (for distance learning technologies) to avoid confusion and misunderstanding.
  - You don't have to change anything. Everything is fine.
  - State your offer.
2. Mark the provisions / suggestions that should be implemented by the practice base for interaction with students using distance learning technologies in the future:
- Develop requirements for the uniformity of the information resources and software used.
  - You don't have to change anything. Everything is fine.
  - It is necessary to completely modify the professional interaction at the enterprise (by means of distance learning technologies).
  - State your offer.
- V block. Evaluation for practice depending on the final report (“excellent”, “good”, “satisfactory” - credited, and “not satisfactory” - not credited).

#### 4.2. Algorithm for organizing practice based on distance learning technologies

Following the processing of the initial questionnaires, a range of software services was identified to organize the practice with the help of distance learning technologies (for use by both the university and specialized enterprises). Initially, these were two large lists with few repeating elements. For example, faculties used the following resources: social networks (VK, Facebook), Skype; Proctoring, Examus, Zoom; MS Teams; instant messengers (Telegram, WhatsApp), Classroom and other Google services; interactive boards (Idroo, Padlet). In institutions, only mail services and cloud storage, instant messengers, and social networks were used. The heads of practice decided to limit professional interaction with student interns to two official channels: MS Teams and corporate mail. These services were used for prompt and timely information, feedback, and control. All intermediate results of the practice (individual tasks, reviews and statements), reports were necessarily uploaded to Moodle.

At the moment, the survey has been conducted three times (at the end of 2020, at the end of 2021, at the end of 2022).

Analyzing the data, we conclude that if at the first stages of practice students noted the poor quality of communication channels (34 %) and material and technical base (18 %), insufficient coordination of the work of the university and the specialized organization (10 %), then at the moment they are already worried about the content of individual tasks (17 %), deadlines (13 %).

Statistical processing of the data obtained was performed to prove the validity and reliability of the developed questionnaire in terms of confirming the hypothesis (Table 1).

**Table 1.** Evaluation of the impact of complex work on the success of the practice completion

Group Details	Before the experiment		After the experiment	
	Control group	Experimental group	Control group	Experimental group
Percentage of students who successfully completed the practice	51,6 % (32)	52,4 % (31)	67,7 % (42)	93,5 % (58)
Percentage of students who failed the practice	48,4 % (30)	47,6 % (31)	32,3 % (20)	6,5 % (4)

An online calculator (<https://www.psychol-ok.ru/statistics/fisher/>) was used for the calculations. The critical value of the Fisher criterion for a significance level of 0.05 ( $\varphi_{crit}$ ) is 1.64.

We have accepted the following hypotheses:

H<sub>0</sub> - the proportion of students who completed practice using distance learning technologies in the experimental group is less than in the control group;

H<sub>1</sub> - the proportion of students who completed practice using distance learning technologies is more in the experimental group than in the control group.

Before the start of the experiment the initial empirical value of the Fisher criterion is 0.157 ( $\varphi_{emp} = 0.178 < \varphi_{crit} = 1.64$ ). Therefore, the hypothesis H<sub>0</sub> is accepted prior to the start of the experiment. After the experiment the value of the Fisher criterion is 3.858 ( $\varphi_{crit} = 1.64 < \varphi_{emp} = 3.858$ ), so the hypothesis H<sub>0</sub> is rejected and H<sub>1</sub> is accepted.

Thus, the system of activities of the head of practice from the university with students to identify problems and determine areas for improving the work of the faculty following the blocks of the questionnaire created by the authors of the study had an objective impact on the success of their practice with the help of distance learning technologies.

The result of processing the received materials for all blocks of the questionnaire is a generalized algorithm for organizing practice using distance learning technologies. Tasks of practical training: formation of universal and professional competencies through the application of theoretical knowledge; student mastering of forms and approaches of working with information; acquisition of professional experience.

Stage 1 (six weeks before the start of the practice): to conduct a survey of students about the choice of the base of practice using distance learning technologies; find out the presence of target students.

Stage 2 (five weeks before the start of the practice): contact the practice base, agree on the admission of students for practice.

Stage 3. To issue, with the help of distance learning technologies, a form of an individual agreement to students who have chosen an internship in organizations with which there is no collective agreement. Sign an individual contract, send a scan to the head of the practice through the university official channels. Request in the same way from the target audience letters (scans) from the relevant organizations.

Stage 4 (four weeks before the start of the practice): issue a memo, practice schedule, safety journal. Submit content to Moodle.

Stage 5 (a week before the start of the practice): prepare for the organizational meeting using distance learning technologies. Check for an application for an internship, individual assignments for each student, an internship report template. Include in the practice report a route sheet for the head of the practice from the relevant organization (list of competencies for assessment, control procedures). Post documents in the appropriate steps of the Moodle course.

Stage 6 (two to three days prior to the start of the practice): hold an organizational meeting for the practice in MS Teams. Explain the principles of interaction and completion of sections of Moodle. Discuss and fix the deadlines for the submission of materials for each section of the practice.

Create a channel in social networks with the participation of managers from the relevant organization, post an individual task of students in the channel.

Stage 7 (first day of practice). Organize a safety briefing (a separate section in the Moodle course). Here, support is provided to inform the employee about rules such as internal working regulations, occupational safety, fire protection, hygiene and epidemiology regulations and hygiene standards, as well as induction briefings and workplace briefings.

Stage 8 (first week of practice): put on an individual task the signatures of those responsible for the practice from the university and the relevant organization. Post a signed individual assignment in Moodle.

Stage 9 (internship): by means of distance learning technologies (through the MS Teams video channel) to observe the activities of students. Check assignments, control and coordinate the interaction of students with the practice base through a channel created in social networks.

10 stage. 4-5 days before the credit for practice in the Moodle course (step "Report on practice"), students attach the appropriate document.

3-4 days before the internship test, the head of the university starts checking the students' reports, if necessary, sends them for revision. When the final drafts are evaluated as an answer, the signed title page is also attached in Moodle.

11 stage. 1-2 days before the test for practice, it is necessary to transfer to the department in printed form: calendar plans-schedules (with signatures and seals); individual contracts (with signatures and seals); completed individual task (with signatures and seals) – original; review of

the head from the profile organization (with signature and seals) – original; practice report (title page, table of contents, text of the report) – bound in a binder.

12 stage. Organize the public report through a team meeting in the MS Teams video channel.

### **4.3. Experimental evaluation**

#### **4.3.1. The ascertaining stage of the experiment**

In the sampling procedure, practice leaders from the faculty and curators of relevant training areas from the practice organization sector are involved.

The selection of participants for the experiment and the sample size are justified by the specifics of the study, the correspondence of the profile of the practice base (its divisions) to the profile of the training program; the availability of distance learning technologies to provide practice in an online format.

The sample of students was not random. The representativeness of the sample is mainly ensured by the method of selecting its participants (respondents). Let's describe its procedure.

Heads of practice from the university determined the quality of theoretical knowledge, professional skills and abilities of students; their abilities to search for information, make organizational/managerial decisions in the area of professional activity, apply knowledge to solve practical problems, make independent judgments, objectively evaluate information, etc.

The results of educational and research activities of students from individual educational routes, expert opinions of teachers of the courses "Introduction to Information Technology", "Information Security", self- and mutual assessment were analyzed. The received data were processed according to the following algorithm:

1. In the course of self-assessment, the student was asked to determine the quality of their educational results on a 5-point scale (professional experience, skills, marks), where 1 is "very bad", 2 is "bad", 3 is "satisfactory", 4 – "good", 5 – "very good".

2. The same procedure was carried out during mutual evaluation (only in relation to other students of the group).

As a result of these two procedures, the student could receive a maximum of 10 points.

3. Experts/teachers in academic disciplines set their scores separately for the entire set of general professional (for example, the student's ability to search, critically analyze and synthesize information) and professional (for example, information and reference work with documents of organizations) competencies. According to the results of the peer review, the student could also receive a maximum of 10 points.

4. Data from the individual educational route of the student were analyzed, namely, for the last three control activities (test, project, independent task). The values of the indicators were added up. The student could receive 15 points maximum.

So, as a result of the initial diagnosis, each student scored from 0 to 35 points. Based on the results of measurements, the quality of training of future specialists was determined. Under the quality of training, it was decided to understand the compliance of the level of training of a specialist with the requirements of the professional environment in which he will work.

Methodology for determining the level: from 0 to 15 points (inclusive) – "low", from 16 to 29 points (inclusive) – "medium" and "high" in all other cases. Thus, it was possible to collect data on 124 students, from which the experimental and control groups (62 people each) were formed. The sample was not random. The experimental group consisted of 50 % girls and 50 % boys.

#### **4.3.2. Forming stage of the experiment**

This stage of the experiment was supervised by the practice organization sector. Its representatives carried out the direction for practice of students mastering educational programs of higher education – bachelor's and specialist's programs. They also provided advice on paperwork.

The practice organization sector carried out centralized activities to familiarize with the rules of labor protection, as well as with the internal labor regulations in organizations.

When organizing practical training, specialized organizations created conditions for the implementation of the components of the educational program, provided equipment and technical training aids in an amount that made it possible to perform certain types of work related to the future professional activities of students.

As noted earlier, for students in the control group (who also had internships using distance learning technologies), the algorithm of work and the questionnaire from paragraph 4 were not

implemented. They performed tasks according to the standard of the training program, according to the schedule and plan of the corresponding type of practice. Participants in the control group interacted with specialized organizations using e-learning technologies. However, students' assessments, their opinions and conclusions on the level of practice organization were not analyzed separately.

#### 4.3. 3. Control stage of the experiment

At the control stage of the experiment, a comprehensive assessment of the quality of training of future specialists was again carried out.

The scores for self-assessment in the control group were determined according to the same rule as in the input dimension. In the experimental group - according to the answers from the questionnaire (item 1 from block III). The evaluation process has not changed. According to the results of preparing practice materials, completing an individual task, defending a report, a student could receive from 0 to 15 points. Each of the activities was evaluated by the head of practice from the university separately from 5 points. The head of practice from the organization also put marks in his review. He distributed points separately for the entire set of general professional and professional competencies. The maximum student could receive 10 points.

So, as a result of repeated diagnostics, each student scored from 0 to 35 points. Information about the levels of the quality of training of future specialists before and after the experiment is presented in [Table 2](#).

**Table 2.** Results of the level of specialist training to the requirements of the professional environment

Level	Groups			
	The experimental group (62 students)		The control group (62 students)	
	Before the experiment	After the experiment	Before the experiment	After the experiment
High	5	15	5	7
Medium	30	39	32	35
Low	27	8	25	20

The following hypotheses were accepted:

- H<sub>0</sub>: the level of training of a specialist to the requirements of the professional environment in which he will work in the experimental group is statistically equal to the level of students in the control group;

- H<sub>1</sub>: the level in the experimental group is higher than the level of the control group.

For  $\alpha = 0.05$ , according to the distribution tables,  $\chi^2_{crit}$  is equal to 5.99. Thus, we get:  $\chi^2_{obs.1} < \chi^2_{crit}$  ( $0.14 < 5.99$ ), and  $\chi^2_{obs.2} > \chi^2_{crit}$  ( $8.27 > 5.99$ ). Therefore, the shift towards improving the quality of professional training of students can be considered not accidental.

#### 5. Limitations

This study has possible limitations:

1. Formation of questions for the author's survey in MS Teams was carried out in such a way as to ensure that the control and experimental groups had the same opinions about the quality of the practice organized by the university, the rank of satisfaction with working with the bases of internships.

2. An important condition is that throughout the experiment, the organization of practice using distance learning technologies, the algorithm of work and the questioning were performed by the same teacher. Questions of the questionnaire were not modified.

3. Evaluation based on the results of work experience is carried out on the basis of the results confirmed by the documents of the relevant organizations.

#### 6. Discussion

Analyzing the validity of the choice of distance learning technologies used by the practice base and the university, i.e. answers from the first block (clause 1.2 and clause 1.3), we note that 67 %

of respondents considered that the profile organization optimally uses professional network communication services.

In relation to the university, the share of such respondents was 69 %. The students' satisfaction with the quality of practice organization using distance learning technologies in the first surveys was insignificant (28 % for universities and 15 % for enterprises). When processing the materials of the latest questionnaires, these indicators increased qualitatively (70 % for universities and 64 % for enterprises).

When discussing the problems and difficulties that students encountered in practice using distance learning technologies (questions in this area are contained in each block of questionnaires), a list of the most relevant and complex was determined: technical (the quality of the Internet connection and channels for network communication, the level of software and technical equipment), methodological (lack of a unified methodology for evaluating the results of work in a remote format), communication (timely awareness of all participants in the practice, promptness of feedback), personal (motivation, independence, conscientiousness).

One of the most discussed difficulties is the coordination of information interaction through various communication channels. For example, a student wrote a response to both the head of practice from the university and from the relevant organization via personal e-mail. According to the norms of conducting practice using distance learning technologies, the teacher cannot count such an answer. A student had to duplicate the answers through three or more channels, there was confusion and excessive nervousness. This affected the quality of assignments, students' motivation and their performance.

Other discussed problems are the deadlines for submitting assignments, receiving prompt feedback.

When discussing the reasons for the influence of such a specially organized activity on the assessment by students of various stages of practice and its types based on distance learning technologies on the quality improvement of professional training, the following assumptions were formulated: new opportunities to influence the content of practice (individual tasks), manifestation of greater independence of judgment, work with electronic documents in crisis/extreme conditions, active information retrieval activities, etc.

In general, after a comprehensive and systematic assessment by students of a new format of education, 24 % of the respondents in the experimental group had a high level of training of specialists for the requirements of the future professional environment. Initially, this percentage was equal to 8 %. The share of students whose quality of future professional training was initially defined as "low" decreased from 44 % to 13 %. It is possible to state that the majority of such participants are occupied by individuals who had a basic level, i.e. made mistakes in analytical activities, at the decision-making level, in the search for organizational/managerial decisions, in an objective assessment of scientific information, etc. In the control group, the changes are less significant. For example, the proportion of students with a "high" level increased by 3 % (from 8 % to 11 %), with a "low" level – decreased from 40 % to 32 %.

In general, the pedagogical experiment indicates that the faculties conduct a comprehensive and systematic assessment by students of the organization of various stages of practice and its types in pre-pandemic education and the quality of future specialists training is positively impacted by the transition to distance learning technologies.

The research materials correspond to the priority areas of activity of UNESCO, UNICEF, the International Institute for Information Technologies in Education to minimize the negative consequences of the coronavirus, creating conditions to support quality lifelong learning ([More on UNESCO's..., 2023](#)). The obtained algorithms, procedures for the interaction of participants in the educational process, specialized organizations are possible solutions to the problems formulated in the work of O.V. Lisovsky et al. ([Lisovsky i dr., 2021](#)). Generalizations and conclusions from the study complement the provisions of V. Kuleto et al. ([Kuleto et al., 2021](#)).

## **7. Conclusion**

Higher education involves obtaining not only theoretical knowledge but also the formation of practical skills and gaining experience in professional activities. The situation with COVID-19 pandemic has qualitatively changed the format of education. The issue of conducting and organizing the practice of students in a remote mode of interaction for many areas of training is relevant. The study summarizes the experience of the Moscow Technical University of

Communications and Informatics. The university took as the basis for the transformations the students' assessment of the organization of various stages of practice and its types in pre-pandemic education and during the transition to distance learning technologies.

At present, in the electronic information and educational environment of the Moscow Technical University of Communications and Informatics, algorithms and procedures are being implemented that are aimed at supporting:

- the possibility of access to curricula, work programs of disciplines (modules), practices, to electronic educational resources;
- the possibility of holding different kinds of classes, and procedures for evaluating learning results, which can be carried out using distance learning technologies;
- the possibility of forming an electronic portfolio of the student;
- the possibility of students' interaction in the educational process, regarding synchronous and (or) asynchronous kinds of interaction via the Internet.

Particular attention in organizing the practice of students using distance learning technologies is paid to the coordination of all members in the process, timely information, prompt response, and systematic control. The range of software tools used for professional network communication is optimized in such a way as to eliminate confusion or loss during file transfer and comply with the terms of the practice plan (schedule). Since the most of the work is done by students on their own (at the workplace at home, in a hostel, etc.), the quality of the formed competencies is mainly determined by the content of individual tasks from the heads of the practice (university, enterprise). For example, when formulating individual assignments, practice supervisors are encouraged to include the following:

- be instructed to familiarize themselves with the rules of internal labor regulations, labor protection, safety, sanitary and epidemiological rules, and hygienic standards;
- apply a systematic approach to solving the tasks;
- to carry out bibliographic work with the involvement of modern information technologies;
- organize monitoring of the current system of documentary support for the organization management (using distance learning technologies) to determine the tasks for its automation;
- collect and analyze scientific and theoretical material using network resources;
- to carry out the interpretation of empirical data using automation systems and visualization of calculations.

Of course, the proposed problem solutions of organizing students' internships based on distance learning technologies are not final. However, their effectiveness in enhancing the training of future experts (in the current sanitary and epidemiological conditions) is proved using statistical data processing methods.

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