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# Web-Conferencing Systems (WCS): Individual, Group or Full-Class Teacher Education Format?

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**Abstract:** Web-conferencing systems (WCS) are gaining momentum in the implementation of distance learning for young people, especially during and after the spread of COVID-19. In this regard, it seems urgent to identify technologies for distance learning education that correspond to modern teacher education to the fullest and are effective, user-friendly and convenient for all subjects of the educational process. This experiment revealed the most popular formats of communication for long-distance students in the implementation of future teachers' professional training by means of video conferencing on the Zoom platform. The analysis of the implementation of various formats of interaction based on the questionnaire of research participants demonstrated a positive trend in the level of user expectations from educational interaction, technical preferences and students' attitude to distance learning by means of web-conferencing. The implementation of distance learning using web-conferencing in group and full-class formats of interaction made it possible to increase social presence through the interactive cooperation of the students with each other and with the teacher in the educational and social context. These formats enhance social and cognitive interaction, thus developing key competencies in future teachers related to the ability to implement effective communication when working in a teaching team. It causes an increase in educational efficiency level and is critical, since it allows information to be obtained through interaction with each other and with the content presented on the screen. Thereby, educational distance communication with the help of web-conferencing should be considered as a new form of social and educational communication in the implementation of professional training rather than as a technical non-traditional tool for teacher education.

**Keywords:** web-conferencing systems; distance learning; student teachers; professional training; individual; group; full-class; format of interaction; Zoom

## 1. Introduction

Today, we all witness the support of open, flexible and mobile education [1]. After decades of implementing traditional educational technologies in higher and secondary education, distance learning is taking the lead in the educational process [2,3]. The unstable epidemiological situation dictates new conditions, thus making this form of interaction the main, if not the only, possible form of education [4,5]. This development is characterized by the fact that the education system had to endure an unexpected catastrophe to rethink the traditional approach to the educational process, despite scientific research towards the introduction of distance technologies long before the COVID-19 pandemic spread [6,7]. In the modern situation, when distance learning technologies are urgently implemented without an appropriate analysis of scientific data on the theoretical and practical justification of innovations through short-term and ill-considered actions, many unexpected serious problems appear [1,8,9]. The key issue is the negative experience in the use of these

technologies by teachers and students [10,11]. The ill-conceived implementation of distance learning technologies, as recent practice shows, does more harm than good in the long term [12,13]. The hasty introduction of distance learning is a system that can be seen as "sending a high-speed train along old rails not intended for it" [14].

The urgent introduction of distance learning risks creating the wrong public attitude to the benefits of this open and flexible education, as well as remote education in general [3,8]. In implementing distance learning education without prior training, when students, parents and teachers systematically face technical problems, users mistakenly find the origins of inefficiency in the methodology of distance education [1,6], rather than in the corresponding technical capabilities of the system of its rapid distribution [4,5]. This ultimately reduces the effectiveness of recent scientific success in online education, both from the methodological and technological areas of the concept [7,15]. This issue is becoming more and more intense in teacher education in the United States and Western Europe. The main competence of the future teacher necessary for full-fledged professional activity is recognized to be the ability to work in a team to implement high-quality communication and educational interaction [16,17]. According to studies in five higher education European institutions (England, Finland, Greece, Ireland, and Portugal), it is very important to search for a high-quality model of distance learning using a remote communication format; this will be most effective in modern teacher education [18]. Web-conferencing systems (WCS) are collaborative communication systems that allow for virtual meetings between participants over the Internet remotely [19]. Web conferencing or video conferencing systems such as Zoom and Microsoft Teams have gained particular popularity since the beginning of the 21st century [19,20]. Initially, they were used in the implementation of a business system to improve the conditions for professional interaction between companies when working remotely [21] or in web-based consultations in the healthcare system [22]. Today, WCS technologies are communication, collaboration and learning tools that can be accessed from desktop and mobile devices and are available on various platforms [15,23]. WCS support audio and video calls, messaging, content and screen sharing, recording of conferences and various meetings [24,25]. This technology has become especially wide spread due to COVID-19 during the lockdown [2,26]. Various educational activities are increasingly offered online, with a significant proportion of young people preferring online activities to off-line ones [7–19]. Some students start focusing on online lectures offered by well-known universities, thereby not attending a regional or local university [19,27]. The spread of technologies for student interaction with a real teacher and a virtual lecturer improves the quality of teaching in both formats [10,28]. Because of its openness and flexibility, WCS technology allows for continuous improvement and adaptation to the needs of the education system [25].

In the educational space, videoconferencing is a synchronous direction of communication that supports the conversion of interactive video, voice and various educational data between two or more groups of people [26,29]. This model of educational communication allows both students and lecturers to communicate effectively in real time without delay from different physical locations, avoiding the lower level of cognitive interaction which is characterized by non-interactivity and delayed feedback in asynchronous communication [15,20]. Scientific works devoted to the organization of distance education are based on the systemic nature of video conferencing, providing real-time interaction and instant feedback; this contributes to the motivation and involvement of students in the interactive educational process [1,27].

Thanks to the multimedia capabilities of video conferencing web technologies, students and teachers in communication have the opportunity to freely express their judgments, emotions and thoughts with the help of audio, visual and verbal communication [24,28,30]. This reduces the ambiguity caused by text-only communication and enhances psychological interaction, potentially leading to high educational efficiency levels comparable to face-to-face communication [15,23]. Thus, the use of video conferencing in distance learning education can create an environment close to a real lecture one [8,25].

Video conferencing systems support the development of public and private spaces that promote the creation of communities of methodologists in higher education to advance innovations [12,29]. Nevertheless, the widespread implementation of WCS technologies for organizing "live communication", in some cases, leads to an ineffective result when it is replaced by virtual classes [26]. This problem is further exacerbated by the insufficiency of a systematic analysis of various forms of communication in video conferencing in the educational process for teachers [15,27]. A significant number of case studies around the world, in particular in the USA, can be found on using video conferencing in education [6,20]. Meanwhile the issue of studying various forms of communication in video conferencing in the process of professional training is only beginning to gain an experimental base in research [27]. From the greatest angle, this situation affects the training of future teachers. The experimental analysis of WCS technologies' implementation has not been carried out systematically until now [16]. It is practically significant to analyze the formal and informal interaction of students and teachers and their pedagogical communication during video-conferencing under the condition of distance education, for example, in England, Finland, Greece, Ireland and Portugal [17,18]. In this regard, the purpose of the study is to identify various formats of introducing WCS technologies and to determine the most effective format for educational and social interaction of student teachers based on the experiment.

## 2. Materials and Methods

The study analyzed the usage of WCS technologies on the Zoom platform in the implementation of future teachers' professional training. This platform was chosen for the study, because it differs from other technologies in five areas: simplicity (just download the application and get a link to enter the call), accessibility (works on any device and does not require a fast Internet connection), free (all functions are available completely free, including recording), reliability (it holds the load well with a large number of classes, there are no bugs—application errors), innovation (virtual background, the ability to use memes and compilations and add your own background, appearance correction functions). At various stages of the experimental study, 152 student teachers of the Glazov State Pedagogical Institute, Kazan Federal University and Kazan State Institute of Culture were involved. The experimental stage of scientific work took place for 14 weeks in 2020 from September to December. All participants of the experiment carried out blended learning. In this focus group, some of the subjects were taught in a standard communication format, and the rest of the subjects were taught remotely using WCS education on the Zoom platform. The experiment was carried out on those subjects that were taught only in a distance learning format. Monitoring was done on the basis of data analysis provided by students comparing traditional face-to-face training and training through WCS on the Zoom platform in three different formats.

The study participants were divided into 3 groups. Experimental group 1 (EG1) implemented remote interaction during the study in the classic individual format using the Zoom remote platform. This communication was designed where each participant in the educational process (teacher and students) had his own personal account and got in touch with his personal device: personal computer, tablet computer or phone. In this format, the interaction was strictly personalized, when the teacher made a reference point for intra-group communication between students. However, due to various organizational and technical reasons on the one hand, and the lack of social presence on the other hand, the students demonstrated fragmented activity in group learning [31].

In experimental group 2 (EG2), communication was oriented only in a group format using WCS on the Zoom platform. The training was implemented in small groups, in which 4–5 accounts were created, each for 4–6 students in total, and a separate account for the teacher. In this design of distance interaction, students had to differentiate strictly in small groups in separate rooms (place of residence or hostel) and implement communication in special places for video conferencing, which had to meet the following basic conditions: a projector, an interactive panel or a large screen of a personal computer. These conditions

were necessary to create the social presence of all participants in communication, not only in their small group, but also of other students who are at that moment in class as in a virtual educational space. With the help of a large screen and high-quality sound, it was natural for students to learn interactively with a teacher, carrying out not only social, but also educational interaction. This form was supposed to turn into a standard academic environment in an interactive seminar session at a higher school. The main goal of the lecturer was to create a learning space for small groups, in which each individual group could feel free and cognitively interact in both small and general learning environments. In turn, in this format of training, the teacher as well as the students used only the projector with a large screen in an educational organization for communication.

The last experimental group 3 (EG3) carried out distance learning using WCS on the Zoom platform in the full-class format of interaction, in which only two accounts were created, on the one hand for the lecturer, and on the other hand for the students of the whole academic group of the university. When studying in this format, all communication participants interacted already in specialized classrooms of an educational organization and in the same technical conditions as in the previous experimental group. With this format, the task of the teacher was to create as close as possible the learning space of a real classroom lesson with the implementation of synchronous unhindered communication in such an educational environment [31].

Distribution of experimental samples was carried out by academic groups in the following way: EG1 (*n* = 68)—3 academic groups, EG2 (*n* = 43)—2 academic groups, EG3 (*n* = 41)—2 academic groups. To identify the effectiveness of each communication format in the implementation of distance learning, we studied the characteristics of social interaction and educational communication in relation to pedagogical feasibility, technical reliability and performance and video conferencing user-friendliness. We conducted an assessment and compared the features of various forms of education by means of a modified questionnaire [2,9,25]. The questionnaire included 18 items where students had to select the answer that best reflected the extent to which they agreed or disagreed with the given statement: "fully disagree", "disagree", "partly agree", "agree" and "fully agree" (Table 1).

**Table 1.** Questionnaire with statements on scales.

| | **Statements on the Scale "Expectation of Users"** |
|---|---|
| 1 | I can easily ask the teacher and classmates questions using the WCS. |
| 2 | Through the use of the web conferencing system, I feel as if I am in a real classroom at the institute. |
| 3 | Since the WCS is easy to under-stand, I want to use it personally in the future when training. |
| 4 | I would like teachers of other subjects to use the multimedia tools of the WCS during my studies. |
| 5 | Using the WCS encourages me to take an active part in the discussions. |
| 6 | I would like the teacher to interact with us through the WCS in the future. |
| | **Statements on the scale "User Preferences"** |
| 7 | For me, there is no difference between teaching a course through a WCS and teaching interactively in a real classroom. |
| 8 | I do not have to attend the institute, as I can study through the WCS. |
| 9 | I don't have any problems learning the subjects I attend via the WCS. |
| 10 | I prefer the subjects that I study through the WCS. |
| 11 | Training through the WCS allows you to save time spent on moving from building to building (from hostel to University building). |
| 12 | Through the use of the WCS, it is possible to study more diversely with teachers from different universities. |
| | **Statements on the scale "Attitude of users"** |
| 13 | The WCS is an obstacle for me to interact with the subject teacher. |
| 14 | The quality of auditory and visual interaction in academic subjects taught through the WCS is lower compared to real interaction. |
| 15 | If I have a choice whether to attend academic subjects through the WCS or through interaction in a real classroom, I will choose the second option. |
| 16 | The WCS does not allow me to get answers to my questions. |
| 17 | I lose motivation for professional training when training in the WCS. |
| 18 | I am concerned about the transition of education in academic subjects to the WCS. |

The "Expectation of users" scale focused on the analysis of the effectiveness of the students' educational interaction with the teacher, as well as students with each other in terms of communication, as one of the key categories of competencies formed by student teachers. Respondents expressed their opinion about the possibility of communicating and working in a team, while observing professional ethics and speech culture. Students had to correlate their answers on this scale through the prism of analyzing videoconferencing as an innovative pedagogical technology, as support for its implementation specifically for the purpose of educational interaction, rather than just showing their attitude to videoconferencing as a technical non-traditional tool for teacher education.

The "User Preferences" scale focused on collecting data to compare different formats of communication during the implementation of videoconferencing on technical convenience for social and educational interaction of students. By answering the questions presented, the students had to reflect their judgment on the relevance and effectiveness of the introduction of one format or another in the technological aspect of the implementation of video conferencing in future teacher training.

The diagnostic scale "Attitude of users" made it possible to implement comparative monitoring from the organizational conditions for the implementation of web conferences to the motivational and value-based attitude of students in general to the implementation of videoconferencing in a teacher training institution. Answering questions on this scale, the students had to evaluate the benefits of videoconferencing form used in their experimental sample for teacher training. After self-reflection, they had to predict the positive or negative consequences of the further introduction of various forms of video conferencing in the educational process of a teacher training university.

After the implementation of the experimental work and after giving the answers to the 18th question all participants were to reveal positive and negative points in the implementation of training by means of WCS technologies on the Zoom platform. Student teachers had to answer the key question of the study: "Is the videoconferencing form in their experimental sample an effective form for educational and social interaction?"

*Statistical analysis*: the mathematical significance of the difference was fixed on the basis of the chi-squared ($\chi^2$) method at $p < 0.01$ and $p < 0.05$. For mathematical monitoring, this method was used because the ranking was not numerical, but categorical according to the following five levels: "fully disagree", "disagree", "partly agree", "agree" and "fully agree". The significance of the difference was recorded between the obtained levels of each EG on each scale before and after the experiment. Due to the fact that the experimental samples were different in quantitative composition, the obtained data were converted into percentages.
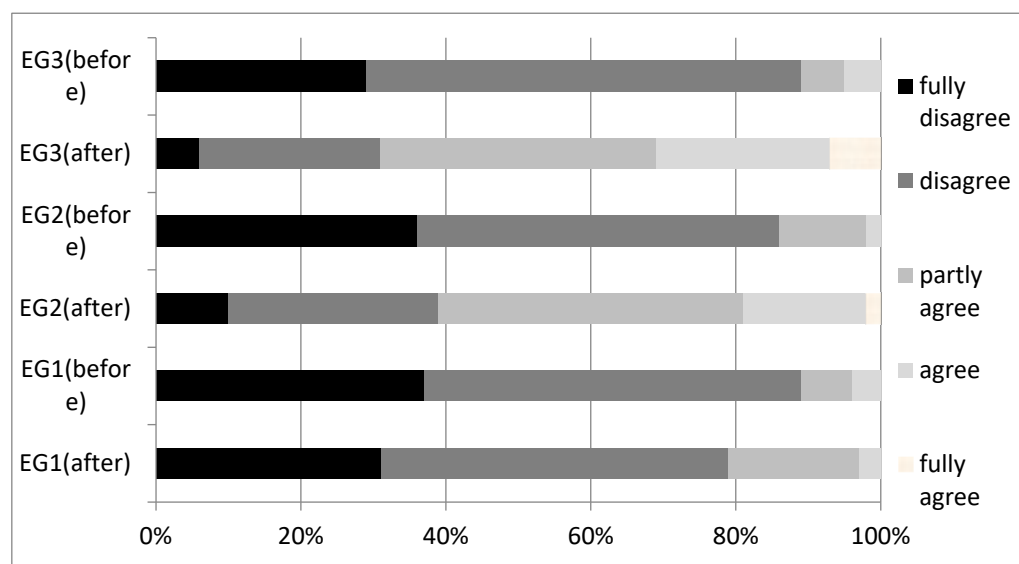
## 3. Results

During the spread of the COVID-19 pandemic, the momentum to shift to online distance learning has required many student teachers to rely on video conferencing systems for simultaneous communication [6]. This emergency response to physical distancing proved challenging for future educators since it was urgent and unplanned [26]. This has caused an exorbitant amount of stress and anxiety among students who were not previously familiar with distance learning prior to the pandemic to cope with unpredictable changes in the implementation of the learning process [4,12]. The transition to emergency distance learning has partly exacerbated the digital divide and made it difficult to provide students with equal opportunities for online learning, as well as raised concerns about the availability of digital resources, data and privacy [20,27]. However, the analysis of the implementation of various forms of distance learning based on a survey of study participants revealed a positive result in the five main analyzed areas (pleasure from communication, flexibility of the educational process, ease of learning, social interaction and technological solutions) for each scale of the questionnaire. The questionnaire was carried out before the start of the experiment (the first week of September) and after the end of the experiment (the second week of December). Monitoring of the data obtained was performed separately for each

scale by counting the results for each level of response within each experimental group and the five values obtained for each level were converted into percentages.

Mathematical and statistical processing of the questionnaire data between the experimental groups on all scales of the questionnaire before the experimental work (September 2020) revealed a non-significant result of differences at $p > 0.05$. Hence, we can conclude that the experimental samples were statistically the same in terms of the level of user expectations, preferences and attitudes of students towards distance learning using WCS technologies. It should be noted that before the implementation of the experimental work, all participants already had fragmented experience in implementing remote interaction in various interaction formats using video conferencing during the implementation of professional training since March 2020. Statistical analysis of the survey data of participants in December 2020 on all scales between all experimental samples showed the statistical significance of their difference at $p < 0.01$. This shows that the implementation of distance learning using WCS on the Zoom platform has a different effect on different forms of interaction.

The final percentages on the scale of "Expectation of users" comparing the beginning and end of the study are shown in Figure 1.



**Figure 1.** The results of the questionnaire on the scale "Expectation of users" before and after the experiment.

Statistical analysis of the values between EG2 and EG3 after the experiment (December 2020) revealed a non-significant result of the difference at $p > 0.05$ ($\chi^2 = 5.469$). Despite the fact that this coefficient has a borderline value and the indicators visually fix the higher values of satisfaction with learning in EG3 compared to EG2, the statistical data did not show the reliability of the difference. Analysis of data using the $\chi^2$ method for all groups between the values of the questionnaire on the scale "Expectation of users" before the experiment and after its implementation showed the following results: in EG1, the difference was not significant at $p > 0.05$ ($\chi^2 = 5.672$), in EG2, the significance in comparison is mathematically revealed at $p < 0.01$ ($\chi^2 = 50.787$) and in EG3, the reliability of comparison was $p < 0.01$ ($\chi^2 = 72.247$). The analysis of recorded data shows that the most significant effect from the implementation of distance learning using WCS on the Zoom platform is observed among students of EG3. A less significant, though credible effect was observed among students of EG2. The distance learning format using WCS on the Zoom platform in the individual, most standard form did not show a significant effect on the "User Expectation" scale.

For further research work, the final percentages of the questionnaire on the "User Preferences" scale were studied, comparing the beginning and end of the study; they are presented in Figure 2.
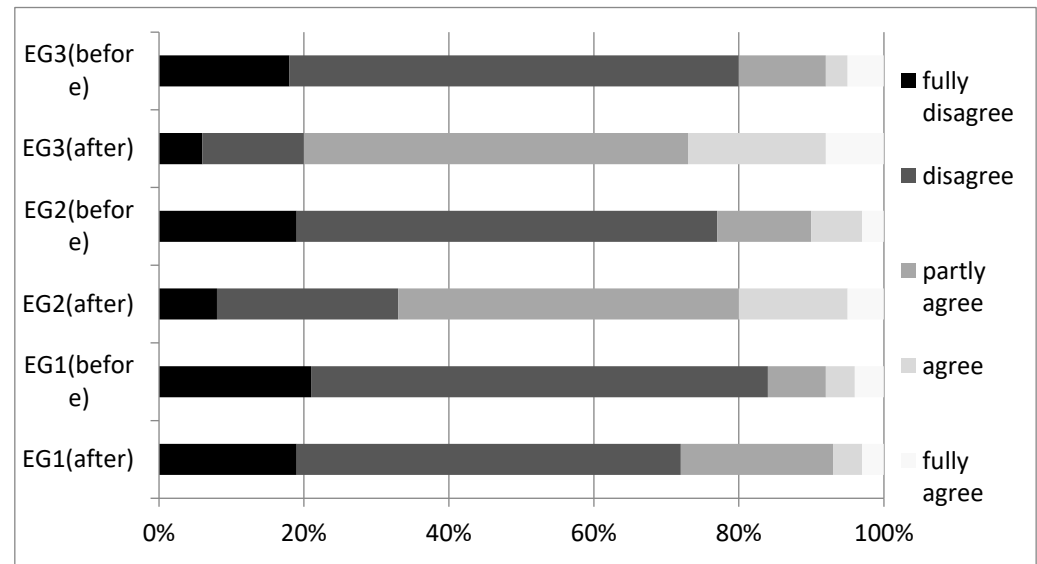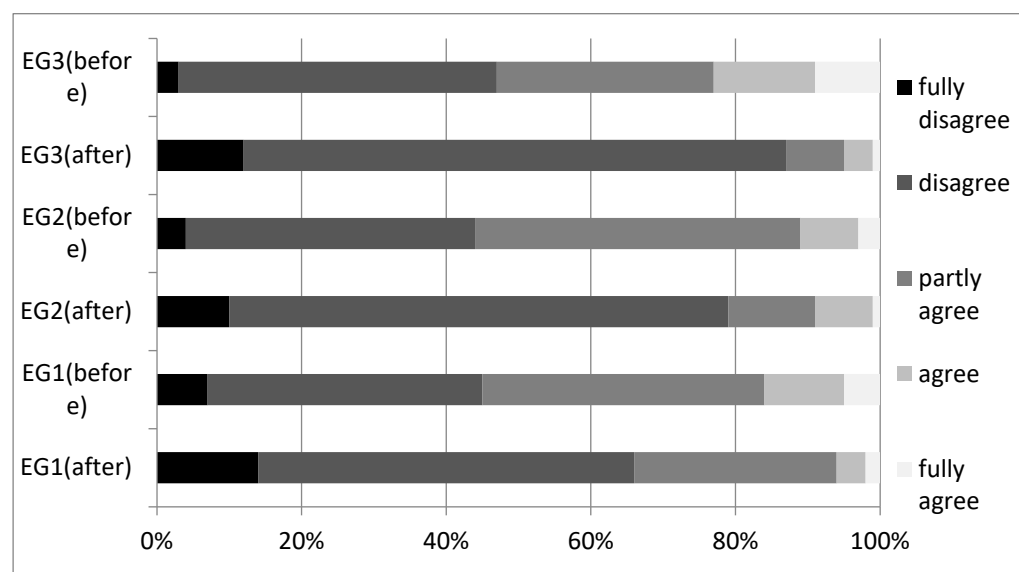


**Figure 2.** The results of the questionnaire on the scale "User Preferences" before and after the experiment.

Mathematical and statistical processing of the data obtained between EG2 and EG3 after the experiment (December 2020) revealed a non-significant result of the difference at $p > 0.05$ ($\chi^2 = 4.911$). Analysis of data using the $\chi^2$ method between the values of the questionnaire on the "User Preferences" scale before the experiment and after its implementation showed the following results among the groups: in EG1, the difference was not significant at $p > 0.05$ ($\chi^2 = 6.933$), in EG2, the difference was significant at $p < 0.01$ ($\chi^2 = 40.278$) and in EG3, the reliability of comparison was at $p < 0.01$ ($\chi^2 = 74.506$). The analysis of the recorded data shows that the most significant effect in terms of students' preferences in the implementation of distance learning by means of WCS is observed in the participants of EG3. A less significant, though credible effect was observed among students of EG2. The distance learning format using WCS on the Zoom platform in the individual form did not show a significant effect on the "User Preferences" scale.

For the subsequent analysis of the implementation of the experimental work, the overall percentage scores from the questionnaire on the "User Attitude" scale were studied with a comparison between the beginning and end of the study, which are presented in Figure 3.

Statistical analysis of the values of EG2 and EG3 after the experiment (December 2020) revealed a non-significant result of the difference at $p > 0.05$ ($\chi^2 = 2.565$). Data analysis using the $\chi^2$ method between the values of the questionnaire on the "User Attitude" scale before the experiment and after its implementation showed the following results for experimental samples: in EG1, the significance of the difference was at $p < 0.05$ ($\chi^2 = 10.869$), in EG2, the significance in comparison is mathematically revealed at $p < 0.01$ ($\chi^2 = 30.392$) and in EG3 the reliability of comparison was at $p < 0.01$ ($\chi^2 = 38.168$). Comparison of the obtained indicators indicates that students of EG1 had the greatest negative attitude towards the implementation of distance learning with the help of a WCS on the Zoom platform. Nevertheless, in comparison with other scales, the students of EG1 during the experiment changed their opinion about the distance learning format for the better. Significance of the difference ($p < 0.01$) between students' attitudes to the use of videoconferencing in educational and social interaction before and after the experiment was recorded in students of EG2 and EG3.

**Figure 3.** The results of the questionnaire on the scale "User Attitude" before and after the experiment.

As the comparative analysis showed, as well as on other scales, the most significant effect was in EG3. It is in this group that students understand more than others that the web conferencing system is not an obstacle to educational interaction and, in general, does not reduce motivation for professional training. They generally do not prioritize real audiences over web conferencing and are less concerned about the transition of subject education to WCS.

As a result of the received level data, it is the communication of the full-class interaction format that reaches the highest level of efficiency to create the most natural high-quality communication between all participants in the educational process. When implementing such a training session in the classroom, it is possible to achieve such a level of educational interaction and involvement of students in cognitive activity in solving learning goals in the classroom that the virtuality of the teacher in the classroom will become almost invisible.

Analysis of the questionnaire data showed that part of the study participants focused on evaluating Zoom features, such as screen and application sharing, transfer of accompanying materials during the lesson and annotation tools that make it easier to explain and understand the content. Some participants singled out the Zoom function of instant response with the possibility of online survey and quick interaction. Foreign students noted the feature of adding subtitles for conversations in different languages, which somewhat helped to effectively solve problems of accessibility and language barriers. Some students highlighted the convenience of using the recording and playback functions on the Zoom platform. The online classroom records were then made available to learners who missed a particular class. Some students noted that video conferencing systems help them to carry out pedagogical communication, since they cannot speak out in public in a real classroom format. What is especially important is that students pointed to the possibility of face-to-face communication between group mates in the implementation of group and full-class interaction format. According to the students, this is critical as it allows them to get information through interaction with each other and having the content on the screen. Synchronous discussions took place between students in small and large groups, and students in groups could share their opinions in person, as well as share screens with classmates remotely, thereby facilitating educational discussion, explaining one or another's point of view. Students implementing the group format of interaction noted the convenience of the mute and turn off the sound, turning the camera on and off and remotely controlling presentations functions when implementing active discussions within a small group.

Thus, the statistically confirmed difference in the implementation of student learning in the three experimental samples was based on the uniqueness in each focus group of the social and educational interaction between all participants in the educational virtual space. According to the results, communication of students from EG3 in the third format showed significance as a positive effect for the full implementation of the most natural, standard full-time education.

It is the implementation of distance learning using WCS when interacting only in two accounts, on the one hand for the teacher, and on the other hand for the students of the entire academic group, and not each one individually, that makes it possible to achieve the greatest efficiency in communication. During this kind of communication in distance learning classes, students actively interacted with each other and with the teacher. It should be specially noted here that in certain communication situations, students did not notice the virtual presence of the teacher in the classroom.

In turn, according to the results of the study on three diagnostic scales, training on 4–5 accounts can also be effective. Distance learning in EG2 for small groups of students of 4–6 people at one personal computer also allows implementing the best distance educational communication. In this format, the communication was implemented in the classroom even better, in comparison with EG3. It is very important for solving this kind of problem in the system of Russian higher education.

## 4. Discussion

One of the main objectives of the study was to analyze how the WCS technologies in various formats support online education. Since many educators may not have much experience with videoconferencing, this experiential evaluation can provide recommendations for each of the evaluated WCS-based distance learning implementation formats on the Zoom platform regarding their effectiveness in learning [26]. The experimental results give teachers the opportunity to make the right choice when organizing communication with the use of distance learning WCS technologies and help them determine the format that is most effective in a particular academic subject and stage of student learning [5,13]. Nevertheless, as some authors argue [20,29], based on research in various parts of the world (North and South America) the introduction of innovative video conferencing technologies should not be the only way of solving interaction problems in distance learning [2,6]. It should be especially noted that it is necessary to use blended learning in various communication formats to improve the quality of education of student teachers, which are posed as priority issues both in Russia and in the USA [10,28]. The key task of WCS at the university may be to reduce absenteeism among students in full-time format as studies with students in the USA show [25]. Moreover, video conferencing systems increase the ability of teacher training colleges, using the example of educational organizations in the UK, to provide academic support that does not require a physical presence on campus or in the city [15]. As a result of the received level data, it is the communication of the full-class interaction format that reaches the highest level of efficiency to create the most natural high-quality communication between all participants in the educational process. When implementing such a training session in the classroom, it is possible to achieve a level of educational interaction and involvement of students in cognitive activity in solving learning goals in the classroom that the virtuality of the teacher in the classroom will become almost invisible.

Before the spread of the pandemic, the lack of this virtual interaction was one of the reasons why teachers specializing in the implementation of distance learning felt socially isolated and often "deprived" [7,12], but during the crisis, remote work and face-to-face interaction began to go hand in hand. The results obtained in this research showed that it is very important to differentiate remote interaction in various formats for effective communication. This, in turn, makes it possible to increase the smooth transition from virtual distance learning to natural face-to-face interaction through the creation of a group space [24,25,31]. Studies in Russia, Turkey and the United States show [4,26], creating an educational environment at home, for example, by putting on appropriate clothes and

setting a timetable for training sessions [9,25,26], does not lead to an effective result. In some cases, for example based on a study from Cyprus, it also leads to physical and mental exhaustion of participants in virtual interaction [1]. However, in group and full-class formats of interaction, WCS provide access to remote resources, overcoming geographic and social distances [20]. It is on the basis of synchronicity, interactivity and the transfer of the emotional state compared to other media, video conferencing in these formats is perceived not only by Russian students, but also by students from North and South America, as the closest available technology for educational interaction [25,29].

This form of professional training organization faces a number of technical problems: the lack of teachers' competence to install and set WCS and absence of specially equipped workplaces outside the home [3,24]. Social and personal problems are manifested, such as the fear of being seen in the frame at home, thereby opening up a personal space that is usually not prepared for video conferencing [26,29]. However, the data obtained after the experiment indicate that the use of group formats should be used more systematically, and maybe not only in professional activities, but also in their daily student life. The introduction of WCS technologies allows rationalizing the system of face-to-face education, where there is much infrastructure that supports professional training: educational classrooms, library resources, housing, employment services and health services [3]. Compared to face-to-face education, video conferencing is simpler and can become a faster and cheaper technology under certain conditions [6,24].

The implementation of distance learning through video conferencing allows for the creation of a social presence; however, physical distance is still perceived as an obstacle to effective communication, co-operation and the establishment of educational trust [19,25]. Although remote technologies have made the world more compacted, they have not overcome all possible barriers. Here we focus on the American experience, as the most advanced and the birthplace of Zoom [8,17,28], as learners continue to have stronger relationships with those who are physically close [1,18]. It is in this direction that the results of the experiment show motivational effectiveness on the part of students in the implementation of web conferences in small groups of 4–6 students, for joint virtual and social educational contact. Therefore, even if technology allows for remote communication and collaboration, it can only solve the "distance problem" to a limited extent [6,16,24]. However, when organizing professional training in the formats of interaction proposed in this study during video conferencing, this problem is already being solved statistically reliably. The group format of WCS proposed in the study complies with the basic provisions of remote communication and preventive self-isolation regime, since training is carried out in small groups and guarantees the appropriate distance between students during the interaction. In turn, the full-class format of WCS implementation, tested in the study, allows for effective and high-quality professional training for teachers in self-isolation mode. Based on the use of this format of distance communication, non-staff teachers can implement the educational process without coming to the university campus. However, as experts emphasize [7,25], for the active and large-scale use of WCS technologies in the educational process, it is necessary to adapt the theoretical and methodological parts of pedagogical process to this new digital paradigm.

## 5. Conclusions

The COVID-19 pandemic has made everyone realize that educational organizations play a key role in the socialization and education of the younger generation. During the pandemic, it turned out that the majority of parents, schoolchildren and students were not sufficiently prepared to perform many educational functions at home. Self-education and self-study together make a complex cognitive and social process that requires a significant level of self-organization, willpower and fortitude on the part of all participants in the educational process. As the results of the experiment showed, it is the introduction of WCS technologies in group and full-class interaction formats that contributed to the creation of "live communication".

Correspondingly, the results of the experiment show that group and full-class for-mats of interaction in video conferencing are a very important information technology today as the main support for face-to-face learning in the professional training of student teachers, namely, the formation of student teachers' ability to work well in a team.

There is a common view in the media that this form of distance learning is a short-term solution and will cease to exist as soon as the epidemiological problems decrease; however, this is not scientifically confirmed and is still a debatable opinion. Now we need to rethink the implementation of traditional educational technologies and build a systematic and effective blended learning strategy using WCS technologies. It is high time we paid attention to this experience and started taking small but constructive steps to reconsider and change the structure of learning.

Despite systematic improvements in the infrastructure behind the adoption of WCS technologies, such as faster Internet connection and increased use of mobile devices, persistent technical issues have resulted in the constant perception of WCS technology as a "second class" environment, creating barriers to its widespread adoption and use. Nevertheless, the experimental data obtained prove that the distance education space created with the help of technology should be considered as a new evolutionary stage in the implementation of pedagogical communication. Modern information technologies orient the pedagogical community to think innovatively in order to create various effective solutions, which, in turn, will satisfy the needs of modern students and, in general, all participants in the educational and scientific space.

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