



Performance Practice in a Pandemic: Training Ensemble Skills Using E-Tivities in Music Teacher Education

Svetlana Karkina^{1,2*}, Lyalya Faizrahmanova¹, Ilmira Kamalova¹, Gulnaz Akbarova¹ and Balwinder Kaur³

¹ Institute of Philology and Intercultural Communication, Kazan Federal University, Kazan, Russia, ² Department of Education, University of Salamanca, Salamanca, Spain, ³ Partap College of Education, Ludhiana, India

OPEN ACCESS

Edited by:

Mandeep Bhullar,
Bhutta College of Education, India

Reviewed by:

Almighty C. Tabuena,
Philippine Normal University,
Philippines
Sabina Vidulin,
Juraj Dobrila University of Pula,
Croatia

*Correspondence:

Svetlana Karkina
s.karkina@mail.ru

Specialty section:

This article was submitted to
Teacher Education,
a section of the journal
Frontiers in Education

Received: 17 November 2021

Accepted: 28 February 2022

Published: 19 April 2022

Citation:

Karkina S, Faizrahmanova L,
Kamalova I, Akbarova G and Kaur B
(2022) Performance Practice in a
Pandemic: Training Ensemble Skills
Using E-Tivities in Music Teacher
Education. *Front. Educ.* 7:817310.
doi: 10.3389/educ.2022.817310

The emergency situation due to the spread of COVID-19 has brought new requirements to Higher Education to continue the learning process. In musical ensemble class, performance practice is mandatory and plays a crucial role in musical education. The pandemic has forced all classes online, but for performance practice, it was mandatory to implement a new type of student-teacher interaction, such as e-tivity. It is a dynamic and interactive learning process led by a teacher online. The investigation of the efficiency of e-tivity for training musical ensemble skills was carried out in this paper. The research was tested through experimental work that took place at Kazan Federal University (Russian Federation). Due to a complete shift in the education process to distanced learning, all disciplines were studied online, including the specific musical courses that required collective work with face-to-face interaction. The curriculum of future music teachers includes an ensemble basic course to train students' musical performance skills in groups. For the study, 114 students from classes with instrumental and vocal ensembles were gathered and were organized by means of e-tivity based on several online tools, including Aiseesoft Video Converter Ultimate. This tool creates a video with a split-screen effect. By using such a tool, students created the video by following the teacher's instructions separately, and afterward they united their musical records in one video with a split-screen effect. At the end of the research work, musical artworks belonging to certain art styles, namely classical, Tatar and Russian folk music, and jazz, were collected. The analysis of the obtained data exhibited a high level of results in each criterion scale and effectiveness of the online work with musical ensembles. Students saw improvement in self-education by the means of creativity and critical self-assessment. The increasing frequency of students' listening of their own performance during the ensemble music-making by e-tivity brought advantages for the involuntary repetition process.

Keywords: music education, teacher, online, ensemble, skills, performance, arts

INTRODUCTION

The emergency situation caused by the COVID-19 pandemic has transformed regular educational practice from face-to-face learning to online. This process has been ongoing in the Russian Federation for more than a year and, even after returning to the traditional classroom, all regions have received government notice to impose prompt restrictions again in case of any emergency.

Today, all the schools strictly follow the guidelines issued by the government that if any student is found to be COVID positive in a medical test, the whole group of students would immediately be shifted to remote teaching and learning. So, online teaching is no longer an uncommon process and teachers have become accustomed to remote working, acclimatizing themselves to the “new normal” (Wu, 2021).

Today, teachers around the world explore new possibilities of adopting synchronous and asynchronous learning methods by using e-sources (Armellini and Aiyegbayo, 2010), such as open-source learning management system (LMS) and Moodle (Kampa, 2021). The same system is used by researchers to combine virtual learning and personal interaction (Pavey and Garland, 2004) between teachers and students in teaching foreign language courses (Llorente et al., 2014; Pinto-Llorente et al., 2018; Berardi, 2021), pedagogical courses (Perla et al., 2019; Agrati and Vinci, 2021), interactive learning activities, and exercise sciences (Picerno et al., 2019).

Delivering lectures *via* Moodle or webinar function similarly to classroom activities, whereas some other regular school practices which needed personal interaction were faced with serious challenges. For instance, laboratory hours in medicine or engineering courses need special arrangements for remote implementation (Tran et al., 2021). While discussing the technologies that allow educational process to continue in this new reality, researchers pointed out the prospective trends in e-learning and speculated the future movement from Learning Management Systems to Virtual Reality in distanced education (Bernardo and Duarte, 2020). Educators also emphasize that management of all the educational processes required more effort for developing the curricula and policymaking (Cutri et al., 2020).

Countries with a high level of cultural diversity faced significant troubles in delivering knowledge during the pandemic. In Brazil, where a large number of people from diverse minorities live in the same territory and preserve unique cultures and languages, educational policies required improvements and support from the government for students' emotional and cultural dimensions in complex times (Ivenicki, 2021). Online teaching during COVID-19 in Pakistan required accounting for culture and gender-related issues due to the country's national policy so as to “[strike] a balance between pedagogy and technology” (Abid et al., 2021).

In order to choose an effective approach for the implementation of e-learning, a comparative analysis of advantages of distanced learning in the pandemic had taken place in different fields, including humanities and tourism (Ginaya et al., 2021). To organize creative art and design courses in the practice-based educational process at the university during the pandemic, some researchers offered virtual community building “where group work, “crits” and presentations are being carried out online” (Marshalsey and Sclater, 2020). The emergency situation that emerged due to the pandemic required new methods and approaches for teaching remotely, which brought challenges for higher education.

BACKGROUND

The valuable role of digital technologies in providing unlimited access to educational resources and online interaction between teachers and students for higher education was pointed out by researchers even before the COVID-19 pandemic (González-González et al., 2018). The analysis of music delivery services like online media collections and physical libraries demonstrates that there is a dramatic increase in the demand for “free accessible streaming content *via* sites like YouTube as well as Spotify and downloads from sites like iTunes” (Johnson, 2020) as users' preferences have shifted away from traditional physical collections to online media delivery music methods. However, experts have pointed out that physical means still occupy the market as a “noticeable increase has been observed in the sales of physical albums in a few countries where digital media is predominant” (Lee et al., 2020). Thus, academic music is gradually shifting to the digital format and in the near future internet will become extremely relevant to issues in different aspects including ethics, digital support, and usage for the educational purposes.

E-Tivity in Art Education

Due to the COVID-19 pandemic, the whole educational process was shifted to the online environment where the implementation of e-tivity was needed for classroom interaction. The term e-tivity was coined by Salmon (2002) to denote a dynamic and interactive learning process in an online way led by an e-moderator, usually a teacher (Salmon, 2013) or medical helper. For example, medical helpers offered support to caregivers through an e-health technological ecosystem (García-Holgado et al., 2019). The e-tivity features in modern classrooms in different fields, including art and art education, for promoting effective ways to develop students' performance skills (Moglie et al., 2019). Designing educational process by the means of e-tivity during an emergency would be useful for the realization of musical performance practice and training students' specific ensemble skills.

The researchers have pointed out differences between traditional face-to-face classroom methods and student-teacher online interaction. They emphasized the significance of specific skills for the effective implementation of real-time online educational interaction. Some of them offered to use synchronous online lessons “as a tool to mediate and assist language learning” (Moorhouse et al., 2021). Researchers asserted that to face emergency cases it is mandatory for teachers to own a set of pivotal competencies such as- digital competence, online environment management, and online interactional competence (Moorhouse et al., 2021).

In the modern world, digital technologies have become an essential part of human life, including in art and music. The digital music chart in South Korea was taken as evidence of the effect of television singing competitions for creating new stars (Cho et al., 2019). To fulfill the music learning purposes, digital technologies can be used widely for creating art pieces, musical performance, and responding to music (Bauer, 2014).

Modern technologies are able to replace most of the personal activities in the field of music: creating the music, performing art pieces, and delivering music for listeners. As compared to previous decades, today's multifunctional working station Korg i3 provides a simple way of making music, which allows art pieces to be created for different sets of instruments from solo to orchestra quite easily (Karkina et al., 2020). This station chooses tunes and harmonies automatically according to genre and style. Also, it offers a free comparison of various groups of instruments for performing the art piece, which is unavailable or extremely difficult in real life.

Another modern device, BioMuse, produces digital sound by the light movement of human fingers and even by impulses from the cerebral cortex. As compared to the regular music-making process, which needs specific knowledge as well as huge efforts to create musical ideas and put them on paper, this new way can carry out the same process very easily. Moreover, the device eliminates the regular requirements of a musician's professional competence, as a person without any experience in the field of music is able to create the musical piece, which will be written down on paper. After that, the device can produce the final piece from the paper by listening to the artistic result. These innovations used for creating music denotes a real revolution in the field. Whereas in past centuries, every musician had to undergo many years of intensive professional training from an early age, today a person of any age can begin musical activity regardless of their specific skills. The same effect can be achieved by a midi-studio or computer lab that are widely used by musicians today, including those who do not have the required musical literacy.

Some researchers figure out the analogy between computer based composers' activity and traditional music practice: as well as e-composer needn't knowledge of music theory elements, routinely a pianist does not learn how to tune the wooden piano (Humberstone, 2021). According to them, a computer is a wonderful tool that promotes the creation of music in different genres and styles, and at the same time avoids mistakes and corrects them. Simplification of the process makes it cheaper by allowing the use of digital tools to create musical backgrounds for movies or TV shows that fully meet the general needs of such genres.

Availability of musical collections and teaching instructions in open Internet resources provides opportunities for music self-education and there are a lot of people in the younger generation who have learned to play musical instruments by watching YouTube (Humberstone, 2021). Besides the free access to music collections and opportunity for self-learning, online technologies also offer benefits of connecting with students' cohorts synchronously, yet interaction with remote communities in some cases, including during emergency times or over geographical distances, may be difficult. Bridging the gap between teachers and students by using online technology can be a pivotal means for delivering music educational content to remote communities (King et al., 2019). The links between online communities can provide access for participants from far-flung regions to public events, such as music festivals in big countries like China (Lei and Li, 2021). So, online

technologies have become a widely used set of tools today, which provide access to educational content from teachers to students using e-tivities for synchronous interaction for the purpose of merging participants in a learning cohort and establishing active collaborative relations.

Teaching Music Remotely

The importance of teaching music online in higher education has increased over the decades. The issues of distributed music pedagogy using live-streaming and video recordings, the implementation of active learning strategies, and recommendations on how to teach music online at universities are frequent topics of discussion among researchers (Merrick and Johnson, 2020). At the same time, universities have started promoting online courses for learning music. Such courses were loaded on world-leading platforms like Coursera, Udemy, EdX, Udacity, Skillshare, and Stepik. Universities provide massive open online courses for distributed and/or individual learning as well as for advertising purposes. Some of these courses include paid or partially paid content, although most of them are usually free. The courses are available without any social, location, or time limits; often they are also translated into different languages such as English, Spanish, Chinese, Russian, and many other languages which could be switched by subtitles.

At Coursera, a leading platform that offers a wide range of courses and covers all university subject areas, we have found many courses based on teaching music. So, these courses cover the music areas such as- history and theory of music, composition and musical production, traditional and modern genres, as well as styles. We have also found significant courses in the framework of this study for teaching the digitalization process in music art: "Electronic Music Production" and "Creating Sounds for Electronic Music" (Berklee College of Music, United States), "Fundamentals of Audio and Music Engineering" (University of Rochester, United States), "Audio Signal Processing for Music Applications" (Universitat Pompeu Fabra of Barcelona, United States), and "Tecnologia musical con software libre" (Universidad Nacional Autonoma de Mexico, Mexico). As well as the number of courses for training musical performing skills in the Coursera, we also found a valuable course for our work about music ensembles: "Fundamentals of Rehearsing Music Ensembles" (The University of North Carolina at Chapel Hill, United States). Research findings reflect the readiness of a large segment of society to teach music online. Evidently, the lockdown due to the COVID-19 pandemic significantly accelerated the process of implementing online teaching practices at universities.

Researchers pointed out that due to the coronavirus pandemic, use of digital media has become a regular activity in musical practice all over the world. Since musicians could no longer play face-to-face shows, which had a negative effect on their finances, they preferred to perform online to keep their interaction with the audiences (Rendell, 2021). At the same time, researchers stated that the interaction with remote participants in music activity needs technical support like music performances or masterclasses (King et al., 2019). Since the year 2020, the process of re-examining the teaching strategies for redesigning music education for effective online delivery and implementing the

active learning designs in online environment has begun (Phipps, 2021). In these frameworks, the comparative analysis of music teachers' practices and perceptions of traditional classrooms with professional experience in online teaching became more relevant (Johnson and Stanley, 2021).

The issue of the possibility to improve musical performance skills by the means of online courses was stated as a major challenge in modern reality (Karkina et al., 2021). Researchers pointed out that the online interaction for specific learning purposes such as training musical performance skills needs new tools, approaches, and teaching style (Pike, 2017). In this context, we would like to emphasize a research work that describes experimental piano lessons for those who are deprived of the opportunity to learn music. For this purpose, the author provided online lessons by Skype. It is noteworthy that the process of developing musical performance skills was conducted without face-to-face interaction at all. Despite such restrictions, the experience demonstrated success. After analyzing the results, the author recommended upgrading the online instructions provided by the teacher, which should be delivered in a more direct way than the traditional class (Pike, 2017).

Therefore, the previous analysis highlighted the relevance of various issues related to online music teaching, including the training of musical performance skills that can be delivered in a synchronous or asynchronous online way for individual work. In this context, it seems important to clarify the possibility of teaching musical activities as well as providing experiences remotely to the students in group forms.

Music Ensemble Online Ensemble Practices in Music Education

The musical ensemble class is a mandatory performance practice in music education. It plays a valuable role for future professionals by developing musical instruments or singing skills. When studying in group classes, students become more attentive performers as they get the opportunity to listen to all other participants except themselves. Each musician in the ensemble needs to directly follow the general plan along with other participants and adjust their own playing style while responding quickly to sudden changes. Moreover, the systematic ensemble training process brings benefits in developing students' musical knowledge, technical, communicative, and critical skills (Andang'o, 2019), and ability to work in a team (Gaunt and Treacy, 2020). While playing in an ensemble, students learn the musical repertoire more comprehensively and have intensive concert practice. The advantages of this class include improving listening skills, music analysis, as well as interpretation and making new art decisions (Jones, 2015).

Based on standards in music education, the music school curricula include several types of ensemble activities: Vocal and instrumental ensemble performance. Researchers characterize the ensemble activity as essential in school education as it emphasizes on the improvement in ensemble practices among students, "teamwork and collaborative learning" (Gaunt and Treacy, 2020). Teachers pointed out more benefits of school

ensemble activity for students, such as improving listening skills, musical problem solving, making musical decisions, and arranging musical art pieces (Jones, 2015). For educational work, ensemble activity was noted as having high relevance, especially by using an integration approach to combine art group performance in music, dance, and theatrical elements to create a spectacle (Stakauskaitė, 2021). The collaborative learning experience in musical performance allows experimenting with a variety of genres and styles, including jazz and modern techniques, beyond the regular school classes which "enhance student learning and potentially enculturate richer and more sophisticated musicianship in students and develop their creative abilities" (de Bruin, 2021).

The features of music as a fundamental channel for human communication makes it a universal means for the development of people's culture in all countries. In musical creation and performance in Africa, researchers emphasize on the "importance of the group over the individual" and describe traditional forms of music activity, such as choral and instrumental ensembles (Andang'o, 2019). At the same time, the authors affirmed the educational effects including advantages for personal improvement like listeners' perceptions, which do not depend on ensemble size or repertoire difficulty (Silveira and Silvey, 2020). Also, these effects spread far beyond the school classroom; a variety of people's cohorts who participate in music ensembles indicated benefits of non-formal learning for developing musical competencies (Haning, 2019).

Teaching Ensemble Online

The background of teaching musical ensemble online was developed by researchers who studied group methods and their implementation by digital technologies. In the last decade, these methods were introduced during leisure hours for third-year learners, who "returned to music study as a means of developing new or neglected musical skills" (Pike, 2011). In this study the author offered piano ensemble training to the retired students by using the portable MIDI keyboards, so the students get an opportunity to enjoy collaborative musical performance practice. Researchers have pointed out valuable physiological, educational, and social benefits in the promotion of musical practice (Pike, 2011).

Before the COVID-19 pandemic, studies were more focused on using digital tools to improve the music ensemble group performance quality and use of audio-visual analysis allowed in the in-detail study of string ensemble performances, for instance, the vibrato patterns in its "correlation between the pitch fluctuation and the hand vibration for vibrato notes." Achieving accuracy of this element is a critical issue in long-hour musical ensemble training (Li et al., 2019). Researchers compared different paradigms of audio network performance with a laptop in order to improve the musical ensemble training process by using digital tools (Sheffield et al., 2019). The laptop ensemble organized by the means of computer technology collaboratively promotes music performance. By involving themselves in this process, participants cultivate their "ability to develop both musical and technological skills, which fits within the framework of digital musicianship, essential skills of musicians,

and music educators in the digital era” (Cheng, 2019). In addition, networking technologies indicated psychological benefits on students’ musical ensembles practice, like an orchestra. A study conducted on the experience of ensemble music-making through specially devised technology networked tablets exhibited “better engagement with the music and ultimately greater enjoyment, . . . reduce the practical problems associated with ensemble playing” (Hanrahan et al., 2019).

A new trend in online musical ensemble teaching began when the first online courses for learning to play in groups appeared. The authors of these courses provided online learning environments to engage students in learning and making by using digital “technologies (e.g., synchronous and asynchronous, multimedia)” (Lock and Johnson, 2018) to support the learning outcomes. For enhancing the educational efficacy of these courses, online collaboration was encouraged through interaction of the participants “in a virtual environment using synchronous and asynchronous tools to develop the composition project” (Biasutti, 2018). Different mixed learning method strategies were analyzed, including performance activity in the virtual environment, listening, playing musical instruments, and evaluating.

Gathering all the experience available on online teaching of musical ensemble allowed the transmission of the collaborative music-making process from the classroom to online environments successfully during the pandemic. One of the most notable projects in this area brought together participants from more than twenty countries to create, teach, and learn collaborative music through online interaction (Gibson, 2021).

Objectives

Based on the background studied, the research highlights related issues in the areas of digitization process in arts, online music education, and ensemble practice; the research objectives were stated:

- (i) Is the remote form of the vocal or instrumental ensemble music-making in music teacher education in a time of emergency providing an acceptable level of learning outcomes?
- (ii) Which methods are fostering self-education and self-preparation in future music teachers’ ensemble performance in remote educational process?
- (iii) How does the virtual ensemble practice bring benefits of training ensemble musical skills in comparison to the traditional face-to-face educational process?

Vocal and Instrumental Ensemble Remote Training Process by E-Tivity

Training music ensemble performance skills is the core of school music teacher professional competence. Lockdowns due to the COVID-19 pandemic brought unexpected changes in the classroom due to the shift of regular activities to a remote way. Despite some individual experience in training musical performance skills in the past, a systematical way of doing that collectively was unresearched. In this regard, the implementation

of e-tivity allows creating an online teaching environment as an attempt to replace physical or formal learning processes.

At the same time, remote collaborative learning cannot follow similar methods as face-to-face classrooms (Salmon, 2013). Instead, it provides several forms for student and teacher interaction, like synchronous and asynchronous ways, which should be used appropriately. Both of these ways demonstrate many advantages as compared to traditional classrooms. The synchronous method gathers a great number of participants and provides immediate feedback as well as active discussion. It is also a cost-effective method as users do not require a big auditorium or special equipment. The asynchronous environment offers engagement to participants regardless of time and location. Significantly, offline learning allows students to radically rethink study material in a broader life context. In addition, this type of interaction can be applied to a wide range of remote learning platforms, such as LMS Moodle, Blackboard, Microsoft Teams, and Zoom.

Educational activity needs to be redesigned to implement e-tivity in the university’s practical courses. For this, music performance ensemble skills by using e-tivity by means of Microsoft Teams was defined as follows (**Table 1**): creating commands (preparing the platform for remote class and its navigation), web seminar (explanation of the study purposes by the teacher, students’ engagement in the collaborative training process), task (demonstration of the musical collections and explanation of the music ensemble skills during training process phases), web seminar (discussion of the artistic idea and details of the creative process), stream (uploading of the solo music records by each student and feedback for the improvements by a teacher), chat (comparison and choosing record method and settings), stream (uploading the final music record by each ensemble), assessment (assessment of each performance done by a teacher), calendar (planning of dates for the training process), and YouTube (sharing the recordings on the public web page and comparing them). The implementation of e-tivity’s elements was organized in accordance with the steps taken for creating virtual music ensembles, designed by Cayari (2021). These steps demonstrate the sequence of the students’ artistic activity management by a teacher. For each step a suitable e-tivity was provided.

MATERIALS AND METHODS

Data Collections and Participants

The research work had taken place at Kazan Federal University (Russian Federation). Due to the complete shift of education process to distanced learning, all disciplines were studied online, including specific musical courses that required collective work with face-to-face interaction.

The future music teachers’ curriculum includes two basic courses on musical performance ensemble skills and vocal as well as instrumental ensembles. Both courses are studied from the first grade until the fourth. In these courses, a teacher gathers students collectively for music performance activity.

For the research work, 114 students from the classes of vocal and instrumental ensembles were gathered, who were involved in both types of ensembles, and were organized online due to the lockdown during the pandemic. Data were collected from one academic semester during September 1, 2020 to January 31, 2021.

Like in regular classes, a teacher merged the students from the same course in an ensemble, while several ensembles were organized over as concert groups, who performed not only for educational purposes but as official collectives. So, in total, nine different ensembles were involved in the research work, including students from grade first to fourth for singing or/and playing musical instruments in collaboration.

This work involved three teachers who had been working with students and five members of the expert board, who provided the final assessment for the ensemble performances results.

After the completion of ensemble musical performances, the students who participated in the ensembles and teachers who worked with them were asked to fill out the feedback survey forms. In total, 53 filled forms from students and eight from teachers were received and analyzed by the qualitative content method.

Design

The research work was carried out in Kazan Federal University and approved by Human Ethics Advisory Group by using the Ethical guidelines for educational research proposed by British Educational Research Association (British Educational Research Association [BERA], 2018).

The organizing process of the study included several types of activities of students and teachers throughout the academic semester. Regular education process was conducted on the platform Microsoft Teams in an online and offline way. During this process, teachers facilitated students' learning practice by:

1. Choosing appropriate music pieces for the training process.
2. Stimulating students' engagement and effective self-improvement in performing skills.
3. Mastering performing skills by each participant in the ensemble for improving the level of musical performance.
4. Making a video recording by ensemble participants.
5. The final presentation of ensemble performance and sharing the video recordings.

In this process, the teacher helped students to choose the pieces of music they would play on musical instruments or sing. During the online discussion, they clarified the features of each style and created orchestration. After that, students learned their parts of musical pieces, in consultation with the teacher online. Before the recording, students received direct instructions from the teacher with clarification of the musical performance details such as tempo, rhythm, the character of the melody, as well as recommendations for the order of the record creation. Following them, students created the recording. During the recording, students had an opportunity to listen to the previous recordings which helped them to achieve good quality in the ensemble.

In addition to the regular students' activities in the framework of the music teacher education process, more activities, such as the competition and social projects, were organized. All video recordings prepared by students were evaluated by an expert board which included the most respected teachers from the University department. Based on this assessment, the results of additional activities were determined:

1. The competition of video recordings prepared by students for ensemble performances.
2. The implementation of social projects by means of social networks, offering the video presentations for supporting specific topics such as national memorable events.

At the end of the academic semester, additional study to enquire about the satisfaction among teachers and students of online training ensemble performance skills had taken place. All the students were involved in this work. Teachers who had been working with them and the expert members were asked about their personal preferences and perceptions regarding the training process and results. Based on the opinions of students, teachers, and expert members about the online ensemble skills training practice, as well as background knowledge in this educational field, the comparative analysis of musical ensemble training processes in a traditional and online way was investigated.

Digital Tools

During the lockdown due to COVID-19, the educational activities in Kazan Federal University were organized *via* Microsoft Teams, which kept student-teacher interactions online. This tool was very useful for some regular online and offline academic activities such as lectures, seminars, testing, and some others. At the same time, the use of Microsoft Teams does not offer the service for musical collaborative interaction for ensemble activity. In order to cover educational needs, some additional digital tools were used.

The practical work was organized by means of a specific computer tool: Aiseesoft Video Converter Ultimate. This tool creates the video with a split-screen effect. By using the tool, students created the video to follow the teacher's instruction separately. After that, they merged their musical recordings in one video with a split-screen effect. This work required a more creative approach than in face-to-face interaction because digital video-making offers experiments with musical voices, changing the order of their appearance on the screen, and adding specific musical effects.

The process of ensemble video-making also differs as compared to traditional form. While normally all the participants of a musical ensemble sing and play instruments together at the same time, online musicians have to try to foster their collaborative skills through training practice and use the digital tools to change the process. Participants made one recording at a time. They needed to listen carefully to the recorded video and then add a new voice in a proper way.

Moreover, in the online educational process, digital tools for sharing music records were also used. So, social networks were chosen by students to upload their performances for final

assessment (YouTube) and social activity (Instagram). All the collections were available on the official University accounts.

Measures and Methods

The evaluation of the results was based on the mixed method using quantitative and qualitative methods.

Firstly, the students' cohorts were analyzed in terms of their music education and professional experience. The features of previous music educational experience include education in music school and college, as well as how many years a student had studied at the University. Moreover, some students already had professional experience as a schoolteacher or music artist, while others did not have any experience. The significance of the issue is determined by various levels of skills among ensemble participants in playing musical instruments that may become crucial in ensemble work. This analysis was proved by the statistical method of standard deviation in order to establish the significance of differences in students' cohorts who were merged in the ensemble collectives.

Secondly, the musical video records created by students were collected by teachers and presented to the expert board for assessment. The musical artwork performances created by students were evaluated by means of the average rating method. All musical records were compared using criteria such as art and technical level of performance, artistic style, ensemble quality, creative approach in orchestration, and video recording done with a computer app. Also, the results were analyzed by applying statistical methods of median and standard deviation which provided average result and justified the level of differences between marks given by each member of the expert board.

The ensemble video recordings of students who had taken part in the competition were uploaded on YouTube. The expert board chose the best performances among them by ranking and elected the winners. Some video recordings were also selected for social projects. These projects promoted the memory of noticeable national events by sharing the artistic images on the social network site Instagram. Afterward, the number of views and likes (signs given by users showing their appreciation) (how many times users watched the video) were counted. Also, network users' comments below the video recordings were studied.

The pivotal meaning for the study was provided by the qualitative method of feedback survey. Unlike the interview method, this method allowed to collect massive data directly without consuming much time in personal discussion. By the means of two surveys, students and teachers were asked questions about the convenience of the online environment for musical training, their perception of the training process, and the final self-assessment of the created video. A qualitative content analysis method was used to study the data, which allowed interpretation of the meaning of received sentences through identification of valuable aspects according to the research content.

Finally, the traditional and online methods of musical ensemble training were studied by using a framework analysis method. This analysis allowed us to establish differences between two different forms of interaction as well as the similarities and benefits of each of them.

RESULTS

Demographics

Due to the research purpose, the main characteristics of students who participated in the investigation were studied. **Table 2** summarizes the demographics of the students who participated in the musical ensembles. It demonstrates the classification of the students on the basis of variables such as gender, age, grade, and previous school level. The characteristics were grouped in accordance with the number and type of ensemble, because in the majority of ensembles students performed only one way, either vocal or instrumental, while in several ensembles these two ways were combined.

It was realized that the majority of students are females, 18–23 years old, and graduated from music college. There are only a few students 24 years old or older. A small cohort of students had never studied at a music school. Also, several students did not study at a music college and entered the university after graduating from general and music schools. It seems to be significant to point out the differences in the total number of participants in ensembles. The vocal as well as instrumental ensemble, are mandatory according to the curricula of the future music teacher education program. So, these were studied by all students from the same grade. Each student from the same grade participated in both ensembles: vocal and instruments. At the same time, there was another type of ensemble that combined the vocal and instrumental performances and was completed by students from different grades, who demonstrated a high level of musical skills in order to take part in concert performances.

The analysis of the results lets us state approximately similar levels of students' characteristics in all ensembles (**Table 3**). The standard deviation calculations demonstrated the absence of sufficient variation in demographics in each type of ensemble ($SdD < 1.5$). The low indicator of standard deviation exhibits similar features of students in all ensembles.

Video Evaluation

At the end of the academic semester musical artworks belonging to different art styles, such as classical, jazz, Tatar, and Russian folk music, were collected. The students' ensemble performance videos were evaluated by a set of criteria by members of the expert board. **Table 4** demonstrates the average ratings for each ensemble, which were calculated on the basis of results obtained by using statistical methods of median and standard deviation. A 10-points scale was used for the evaluation, where 0 is the lowest and 10 the highest result. This scale was ranged by using the grades: unacceptable (0), barely noticeable (1), slightly noticeable (2), quite noticeable (3), strongly noticeable (4), definitely revealed (5), sufficiently pronounced (6), clearly expressed (7), strongly expressed (8), convincing (9), and excellent (10).

The analysis of the median results showed the acceptable levels of art and technical performance presentation by students, although they had been improving their musical skills during the pandemic at their homes mostly through self-practice. The experts noted the high level of creativity in the majority of videos

TABLE 1 | Elements of e-tivity for creating a virtual ensemble by means of Microsoft Teams resources.

Elements of e-tivity*	Steps for creating virtual music ensembles**	Microsoft teams resources
Title: Musical ensemble performance practice in a remote way	–	Creating the command
Purpose: Organizing the students' training process in vocal and instrumental ensembles remotely and recording the music video to upload on the Internet	Identifying objectives and desired outcomes	Web seminar
Brief summary of overall task: under teachers' guidance, students study and choose the musical art pieces for the performance in ensemble and prepare the recordings from the mp3 and web collections	Selecting repertoire	Task
Spark: What is the character of a music art piece? How should it be performed? Which expressive means, including tempo, volume changes, touches, and timbre, should be used?	Developing learning resources	Web seminar
Individual contribution: Clear teacher instructions for each student for his/her solo recording in order to improve the performance according to the spark.	Creating an anchor	Stream
Dialogue begins: 1. Discussion between all the participants on method and settings for recording: computer tool (Aiseesoft Video Converter Ultimate), audio-only/audiovisual ensemble, file formats (mp3, mov, avi), settings (1080p, 4K video, 96 kps) 2. Students' collaborative works for compiling the final record by adding solo voices to a shared music file	Choosing a recording method	Chat for all the participants (i.e. Forum)
E-moderator interventions: summarizing, giving feedback, and teaching points for the finalized ensemble music art pieces performed by students	Setting up a collection platform	Stream
Schedule and time: making a detailed plan in the academic semester from September 1, 2020 to January 31, 2021 for students musical training activity, and finalizing the performance records	Editing in postproduction	Assessment
Next: Sharing records on YouTube for comparison and public evaluation, getting the final score, discussing the results, and revealing best trends	–	Calendar
	Distributing the product	YouTube

*Was designed by Salmon (2013) as a framework for the e-tivity in the classroom.

**Was designed by Cayari (2021) for virtual ensembles classes.

TABLE 2 | Sample demographics.

Variables	Attributes	Total number of students due to the characteristic	Instrumental ensembles		Vocal ensembles		Vocal and instrumental ensembles	
			N	%	N	%	N	%
Sex	Male	19	13	68.42	10	52.63	6	31.57
	Female	95	69	72.63	51	53.68	26	27.36
Age	18 Years old	9	8	88.88	8	88.88	1	11.11
	19 Years old	15	12	80	12	80	3	20
	20 Years old	35	24	68.57	24	68.57	8	22.85
	21 Years old	21	13	61.9	7	33.33	8	38.09
	22 Years old	20	15	75	6	30	5	25
	23 Years old	11	7	63.63	3	27.27	1	9.09
	24 And elder	3	3	100	1	33.33	–	–
Grade	I	31	31	100	31	100	–	–
	II	21	18	85.71	18	85.71	3	14.28
	III	24	12	50	12	50	12	50
	IV	38	21	55.26	–	–	17	44.73
Previous school level	General school	7	7	100	4	57.14	–	–
	Music school	21	17	80.95	14	66.66	4	0.84
	Music college	28	15	53.57	11	39.28	13	19.04
	Music school and college	58	43	74.13	11	18.96	15	25.86
Total number of students		114	82	71.92	61	53.5	32	28.07

TABLE 3 | Level of differences in demographics.

Variables	Instrumental ensembles	Vocal ensembles	Vocal and instrumental ensembles
Sex	1.383634	1.393806	1.457332
Age	0.938344	0.676304	0.786556
Grade	0.236536	0.235545	0.172627
Previous school level	0.985754	0.789533	0.452865

in the terms of voice performance and computer processing. The results were obtained by applying statistical technique of standard deviation, where the low indicator ($SdD < 1.6$) in assessment variability was received.

Social Engagement

The critical role of music activity for social development was emphasized by many researchers. In the last decades, the use of mobile networks in relation to the complex global political diversity has increased in popularity through the promotion of intercultural projects in music teacher education (Westerlund et al., 2021). Researchers appreciate the “sustainable music-centered community collaborations,” (Frishkopf, 2021) and for any music style they promote the capacity to transform these networks “toward global human development” (Frishkopf, 2021).

In addition to regular academic activity, students’ participation in competitions and social projects enhance future music teachers’ social interaction and develop their understanding for the human-centered function of the profession.

Competition Results

After the final assessment of academic ensemble performance results, the expert board recommended some students to participate in the music competition. Three nominations for the competition were established:

1. Vocal ensembles
2. Instrumental ensembles
3. Vocal and instrumental concert ensembles

All the video recordings were uploaded on a YouTube channel. The ranking among them was carried out using several elements:

1. Jury evaluation
2. The number of views on YouTube
3. The number of viewers giving positive remarks

The jury evaluation was provided by the same method as for the video results (4.2). A ten-points scale was used for each criterion: art level of performance, technical level of performance, artistic style, ensemble quality, creative approach in orchestration, and video recording with computer app. Then the results were computed by calculating median, which excludes too high and too low scores from the results.

The obtained results allowed to establish the winners in the online ensemble competition (Table 5). It seems to be valuable to note that the viewers’ perception was very close to the opinion of the jury (having rich professional experience). The performances of two concert collectives, which were highly appreciated, won the best awards (18–25 scores); likewise, the collectives who demonstrated comparatively lower quality in their online performance were awarded second (12–17 scores) or third (6–11 scores) place in the competition.

Social Project Activity

Several videos prepared by students were selected for social projects. Due to the noteworthy national events, famous Tatar poet Gabdulla Tukay’s anniversary and memorable events of World War II, student ensembles performed music art pieces on the Tukay lyrics or Soviet war songs. Students were asked to upload the recordings on the department’s official social page on Instagram. Among other musical artists who supported the project, the student’s ensembles work was noticeable because nobody except them presented the memory images in the form of ensemble music.

TABLE 4 | Video evaluation results.

Ensembles	Criteria (average rating)*						Median	Standard deviation
	1	2	3	4	5	6		
1. Instrumental ensemble of 1st grade students	6	5	6	5	7	7	6	0.894427
2. Vocal ensemble of 1st grade students	6	6	5	5	7	8	6	1.169045
3. Instrumental ensemble of 2nd grade students	6	7	5	4	6	8	6	1.414214
4. Vocal ensemble of 2nd grade students	6	6	6	5	7	8	6	1.032796
5. Instrumental ensemble of 3rd grade students	4	6	6	6	7	9	6	1.505545
6. Vocal ensemble of 3rd grade students	5	5	6	6	7	9	6	1.505545
7. Instrumental ensemble of 4th grade students	5	6	7	7	8	9	7	1.414214
8. Vocal and instrumental ensemble “Bajram”	8	9	8	9	9	10	9	0.752773
9. Vocal and instrumental ensemble “Zarnitsa”	9	9	9	9	9	10	9	0.408248

*Criteria: 1. Art level of performance; 2. Technical level of performance; 3. Artistic style; 4. Ensemble quality; 5. Creative approach in orchestration; 6. Video recording by computer app.

TABLE 5 | Competition results.

Nominations and competitors	Criteria			Total result (median)	Competition score
	Jury evaluation (median)	Number of views	Positive marks		
Vocal ensembles					
Vocal ensemble of 1st grade students	6	15	9	9	III
Vocal ensemble of 3rd grade students	6	17	9	9	III
Instrumental ensembles					
Instrumental ensemble of 2nd grade students	6	16	11	11	III
Instrumental ensemble of 4th grade students	7	20	14	14	II
Vocal and instrumental ensembles					
Vocal and instrumental ensemble "Bajram"	9	23	18	18	II
Vocal and instrumental ensemble "Zarnitsa"	9	30	25	25	I

On the social network Instagram, seven thematic musical ensembles were uploaded. Three of them demonstrated songs using the Tukay lyrics, while four ensembles presented Soviet war songs. The results were obtained by counting the number of views on the social page and positive remarks given by users. The analysis indicated the high level of evaluation by social users (Table 6). Besides, the comments below the videos were read and systematized. It was also noted that all of them displayed positive users' perceptions, consisting of warm emotional appreciation and good wishes to performers.

Students' and Teachers' Satisfaction

The qualitative results were collected through a feedback survey and by using a qualitative content analysis method. Two surveys were conducted on students and teachers to find out their perceptions of online interaction in the ensemble class and self-assessment of the final performance works. The survey for students included questions on the educational process, while the survey for teachers was focused on the implementation of pedagogical technologies and reflection of the educator. The surveys contained open-ended questions. In total, 53 correctly filled forms from students and eight from teachers (Table 7) describing their general assessment, problems, and benefits of the online study process for ensemble class were collected.

The analysis of the demographics (Table 7) let us state statistical differences of the student's and teachers' features which were significant ($SdD > 6.3$ for students and $SdD > 2.8$ for teachers) to suggest that received data could be objective for the content analysis when they were provided by participants with different backgrounds and characteristics.

For the first question to the students about their previous experience of studying online in an ensemble class these answers were received:

The online interaction in the ensemble class was the first experience of the group musical performance training process.

I had never before heard about the online ensemble training practice, I really believed this is impossible.

The identical question to teachers gathered similar replies in general, but several people answered that they read research papers where objectives about online musical training in small

groups, as well as merging communities for sharing the musical experience online, were stated.

The idea appeared in the world in the last decades, so in the pandemic time we appraised this experience more seriously.

The critical question in the survey was about the convenience of the online education process in big groups. The majority of students replied that using computer apps for recording was comfortable enough, but the training process needed more effort, as well as the ability to organize productive self-improvement practice.

Making video recordings at home was pleasant in general, but needed hard self-preparation practice, moreover, I had had a lot of attempts, before recording an appropriate video for sending.

Teachers' answers demonstrated another aspect of online student-teacher interaction:

Watching all the videos sent by each student required more time than usual. During the regular face-to-face class, I listen to the performance in ensemble, and solo or small group voices when it is necessary. Before the pandemic I, 5 h per week was enough for the work with an ensemble, while sitting at home I listened to them mostly solo versions before they were able to merge the videos, so, the process was two or three times longer.

The work with students in online musical performance classes needs another type of instruction. It was impossible to consult them in my usual way when I thoroughly describe any artistic detail. I had to refine my instructions in order to deliver them more directly.

The pivotal question in the survey was about the general perception of the efficacy of the online educational process and self-assessment of its final results. Students pointed out the problems among significant benefits for their professional development:

The experience was very unique but fruitful. The practice of video performance creation by computer is extremely relevant for fostering professional skills.

The process was hard and attractive at the same time. In the end, we received the wonderful music video collection for the promotion of our professional interaction with the community.

TABLE 6 | Social projects activity results.

Ensemble music performances	Criteria			Total result (median)
	Number of views	Positive marks	Positive comments	
Tatar poet Gabdulla Tukay anniversary				
Vocal ensemble "Mother's language"	78	54	7	54
Instrumental ensemble Waltz from the ballet "Shurale"	56	20	3	20
Vocal ensemble «Native village»	47	18	5	18
Memory of world war II				
Vocal ensemble Soviet song "Katyusha"	95	67	7	67
Vocal ensemble Soviet song "Dark night"	56	30	2	30
Instrumental ensemble A. Joyce "Autumn dream"	45	15	3	15
Vocal and instrumental ensemble A.Pahmutova "Let's bow to the great ones of those years"	98	70	5	70

Teachers also pointed the uniqueness of the experiment. The majority of them agreed that it has opened new professional trends. Teachers stated high achievement level in the musical performance because students listened to themselves more critically. They concluded that the benefits of online practice allowed the analysis of the regular training process in a new aspect:

Although we will return to our regular face-to-face teaching soon, definitely, I will implement some achievements from our online training process, which foster the students' critical self-assessment and creative skills.

The obtained results demonstrated the significant role of online interaction in ensemble class in figuring out achievements and benefits of music performance practice in fostering future music teachers' professional skills.

A Comparison Between Traditional and E-Tivity in Ensemble

The last step of the experimental work included a framework analysis of the traditional and online ways of musical ensemble training. The qualitative results were obtained by comparing the data of weaknesses and benefits of the two ways of the educational processes. The data were systematized in **Table 8**.

The obtained results demonstrated the weaknesses of online musical ensemble training in comparison with face-to-face teaching in terms of interaction among students' groups as well as the opportunity to learn teachers' emotional reactions for the teaching and learning process. At the same time, more benefits were found for the possibility to implement online educational activities, which were unavailable in traditional teaching. It is crucial to emphasize the multidisciplinary approach in fostering future music teachers' professional skills in online ensemble education by including areas of professional activities such as digitalization and social networking featuring the pivotal modern world trends.

DISCUSSION

Vocal and/or Instrumental Ensemble Online Performance Practice

In the last decades, online learning has gradually become a pivotal issue in the modern education system and an important trend for future development. However, this trend has only partially affected music education, especially musical performance practice. In the recent past, the use of platforms such as Coursera to provide online experience in training music performance skills, individual researchers' experimental work, and delivering music lessons while bridging the limitations of time or location was extremely unique (Pike, 2017). We did not find any research describing an experience of teaching musical ensemble skills online before 2020 in the databases Scopus, Web of Science, or Eric. Several works studied the benefits of improvements in technological skills (Cheng, 2019) or psychological personal development (Hanrahan et al., 2019) to perform music collaboratively using a laptop; some papers also presented the social collaboration involved in ensemble music-making online (Lock and Johnson, 2018), but nobody demonstrated the training musical ensemble skills online.

The noticeable changes in the music education field appeared after the world lockdown due to the COVID-19 pandemic in 2020, when universities all over the world were forced to shift the educational process from face-to-face to online. The new way of teaching required not only digital tools for delivering teachers' instructions but a set of methods for facilitating student-teacher online interaction. The first year of online teaching experience during the pandemic was studied in all the subject fields including music education. Among them, research works had been describing the achievements stated through the experimental work in training music ensemble performance skills online (Gibson, 2021).

Fostering Self-Improvement in E-Tivity Training Musical Practice Skills

The critical challenge in online education during the pandemic was the management of students' self-practice without face-to-face interaction with a teacher. In traditional class, students

have the opportunity to follow their mentor, copy his/her hand position, and observe the way of pressing the keys and creating an artistic image. In personal conversation, a teacher feels themselves comfortable sharing memorable life experiences in order to engage students or show emotional perception. Using e-tivity for the interaction needs direct instructions due to a noticeable slowdown in the transmission of the information in the dialogue forms. So, the students' home practice for their self-improvement is needed to be done in an effective way to allow teachers to manage the training process. In addition, online training of musical ensemble skills requires appropriate computer apps for merging solo voices into the ensemble performance.

Critical Self-Assessment in Improving Musical Performance Skills

Critical self-perception has a pivotal role in developing a future musician. However, in the traditional classrooms this process is faced with difficulties. The majority of students need huge efforts in learning to listen to themselves from the outside. There is a well-known phenomenon that a musician in an orchestra is able to hear his own voice only and sometimes has no direct perception of the full orchestral sound while performing a musical art piece. Explicitly, the same problem features the students' ability to hear the full ensemble sound. This gap in the perception limits the ability to analyze the musical performance in order to improve it.

During the emergency time, teachers noted that with the use of e-tivity, there was an increasing tendency among students to improve the performance with home training. When the students were instructed by the teacher to record themselves in the video and send it to the teacher, they became more attentive listeners. Watching the video promoted students' self-assessment from the outside and with repetitive attempts they tried to remove the mistakes and improve the performance. They demonstrated a strong wish to send the best recording to their teacher. Moreover, they exhibited a very critical approach in assessing their own attempts in order to demonstrate the perfect performance for other ensemble participants, which will be merged in a final recorded music art piece.

Creative Approach in E-Tivity Ensemble Music-Making

Traditional ensemble class promotes the student-teacher interaction following the model of supervisor and subordinates. Primarily, all the musicians must listen carefully to their conductor. Their personal artistic preferences or opinions cannot be supported in order to keep the balance and reach the high quality of coherence of the ensemble. That is why misunderstanding between musicians and the conductor can mislead the group work or make it less productive.

The e-tivity offers another type of student-teacher interaction, where not only can the teacher be a supervisor, but any student can take the role of leader and even each of them for a while. Making the video by e-tivity represents the process when each participant adds his own voice to the recording, which was previously prepared by his colleagues. This addition can be

transformed by a chosen musical instrument, vocal voice, or text variability. After recording all the voices, participants can modify the video with specific effects in order to implement an artistic image. This process needs the active engagement of each participant by using a creative approach in online ensemble music-making.

Repetition Priming in Music

During self-training practice on e-tivity, students needed many repetitions to get perfection in the musical video recording created by them. In addition to the benefits of this process, critical self-assessment and development of the creative skills demonstrated unpredictable achievements and rapid improvement in the musical performance of the students, who took more attempts in making a video. In order to clarify this fact, the research background was studied.

In the psychological field, the concept of repetition is widely known. The study of the early stages of language learning showed the impact of high-frequency marker words that "may assist early grammatical categorization" (Frost et al., 2019). In

TABLE 7 | Sample demographics.

Variables	Attributes	Total number of persons due to the characteristic	
		N	%
Sex	Male	14	26.4
	Female	39	73.5
Standard deviation		16.76677	
Age	18–20 Years old	27	50.9
	21–23 Years old	25	47.1
	24 And elder	2	3.77
Standard deviation		16.26346	
Grade	I	12	22.6
	II	16	30.1
	III	17	32.07
	IV	8	15.09
Standard deviation		6.363961	
Previous school level	General school	2	3.77
	Music school	9	16.9
	Music college	13	24.5
	Music school and college	29	54.7
Standard deviation		11.31371	
Total number of students		53	100
Total number teachers	Female	8	100
	Higher education	2	25
	Candidate degree	6	75
Standard deviation		2.828427	

TABLE 8 | A comparison of traditional and online musical ensemble training.

Educational activities	Face-to-face musical ensemble training	Remote musical ensemble training	Availability
Student-teacher interaction	Yes	Yes	
Student-student interaction	Yes	Yes	
Emotional teacher' assess	Yes	No	
Direct teacher' instruction	Yes	Yes	
Personal interaction with teacher	No	Yes	
Critical self-assessment	No	Yes	
Stimulation musical performing self-practice	No	Yes	
Improvement computer skills in the music professional field	No	Yes	
Creative musical interpretation	No	Yes	
Social networking professional activity	No	Yes	

the research of memory, recognition established the appearance of testing and guessing benefits only after enough repetitions of the study cycle and the task by the instructor (Huff et al., 2018). In another study, a strong correlation between repetitive activity and retention of anatomical knowledge was figured out; at the same time, there were no significant differences due to the type of repetition activity in effect on knowledge (Kooloos et al., 2020). Well-known psychologists' recommendations for the study pointed out repetition as a crucial factor for successful learning. They also emphasized that in such a way a person is able to remember most of the information.

The valuable role of repetition in music had been studied in the last decades. The experimental results for singing a heard melody demonstrated the higher speed in responding by the participants who repeated the tones (Hutchins and Palmer, 2011). This effect in music was compared by authors with the same activity in learning a language. Another research work indicated the repetition effect for emotional response of listeners "in the perceptual segmentation of musical structure" (Livingstone et al., 2012). The authors stated the impact of involuntary musical imagery, which was stimulated by familiar songs, especially learned from the early childhood (Byron and Fowles, 2015). Moving further, Bernstein offered the concept for describing the training process as "repetition without repetition" (Ito, 2015) which emphasized the crucial meaning of perception for guiding motor behavior including musical performing skills (Ito, 2015).

The detailed research of the issue of repetition in music trends beyond the subject of music as well as Art in general, and needs deep multidisciplinary learning including psychology. In

the framework of this paper, it points out the trends for future research based on the determination of the effect in order to use it for technological improvement in the music education based on psychological data.

CONCLUSION

The ensemble performance is a significant part of the musical education system and professional preparation process of future music teachers. The unique feature of the ensemble skills training process requires close interaction between all the participants in order to create musical artwork together. Due to the pandemic when the educational process was shifted to the online environment, the realization of such courses for an instrumental ensemble was looked at.

Following the objectives stated in the paper, obtained experimental data and analyzed results were concluded:

1. Due to a lack of face-to-face interaction in a time of emergency, the vocal or instrumental ensemble performance as a mandatory learning activity in music teacher education can be organized through e-tivity. In order to implement it, a new teaching strategy was designed. This strategy included online student-teacher interaction and use of e-tivities on the platform- Microsoft Teams and special digital applications such as Aiseesoft Video Converter Ultimate which allows creating a video by combining several sources. During the recording process, each student listened to all previous performances and made efforts to follow the musical style step-by-step, trying to create a good ensemble. The obtained results proved the effectiveness of the remote performance practice by using e-tivities because all the students showed an acceptable level.
2. This process needs specific methods, which were established through the experimental work. The methods of critical self-assessment and creative approach that allow to foster self-preparation in future music teachers' ensemble performance and remote educational process.
3. Using the e-tivity can be significant and useful for improving the musical performance training process and developing the ability to play musical instruments or sing in an ensemble. The training in such a way brings some benefits including the possibility to listen carefully to any part of the musical piece performed by other participants in the process of creating an ensemble. Students' valuable achievement in the implementation of such a way is to look at the musical piece from a new side which could be pivotal for making new art decisions. In the research process, additional correlations between the students' repetition process in the form of involuntary engagement and improvement of musical performance due to the psychological aspect, which allowed to point new trends for future research works, were established.

The study confirmed the possibility of remote learning in the field of music education. The highlighted some

benefits of online interaction for global projects (Rofe and Parker, 2017). So, any music group can invite a well-known musician for direct collaborative artistic work despite the location gap. Besides, the musicians can continue the ensemble activity in extreme conditions, such as the COVID-19 lockdown. This work facilitates the development of the performance activity by social networks and promotes image-making policy of the educational institutions. Taking into account the highest score results demonstrated by the concert ensembles during the experiment, it seems to be valuable to point out the trend for curricula improvement. Nowadays the academic plan for the future music teachers in the Kazan Federal University does not include courses for teaching mixed ensembles. The reflection of the research results let us state the need to discuss the possibility to upgrade the curriculum in the future.

Undoubtedly, traditional face-to-face classrooms' academic patterns, if followed in online classes, will never bring satisfaction. Some researchers noted the strong preferences of in-person interaction by music ensemble participants after the online interaction through the pandemic (Salvador et al., 2021). In this respect, the development of the educational interaction in a remote way needs to redesign the online courses from information delivering model to e-moderating (Salmon, 2013). The future effective learning environments should provide high-level management of students' work by using different e-tivities. A teacher should become an e-tivity designer to ensure effective remote learning, enhance the systematic way for engaging students in the learning process, cover the regular course content, and to ensure required learning outcomes.

LIMITATIONS

The authors in the research studied the students' experience of online ensemble practice in big groups in order to provide the evaluation tools designed by regular criteria. Another purpose in selecting the research scope was to study the identical ensemble practice. In these frameworks, it seems to be significant to point out the limitations, such as the gap in analysis of online ensemble activity of small groups, despite there being a mandatory course in future music teachers' curricula for a chamber ensemble. All the students were obligated to participate in the ensemble, where only two persons took part. In the majority of chamber ensembles, students played the piano, violin, guitar, flute, or folk instruments. During the pandemic, students were trained online, and some of them created the videos by using computer apps. We did not include them in the research scope due to the differences in evaluation criteria, because in this type of ensemble the criterion as "creative approach in orchestration" was excluded. Moreover, the number of participants was too big, so the gap in conditions for reaching good quality in the coherence of musical performance was unbridgeable.

The time limitation was also noted. All the results were counted right after the pointed period January 31, 2021. Despite

this, it was discovered that videos uploaded on social network sites have increased since the assessment: the number of views, positive remarks, and comments continue to grow. This fact indicates the high quality of work done by the students, which attracted a wide audience, but due to the time limits established for the research, these data could not be taken into account.

FUTURE WORK

Due to the benefits obtained by prolonged repetition for students' self-improvement musical performance skills, the future direction of the multidisciplinary research work was determined. The background of the concept of repetition in psychology and science should be studied in more detail and its value should be argued in the context of training musical performance skills. The future experimental work will allow establishing a correlation between psychological determinants of listening activity and learning outcomes of the training process in musical performance practice. We recommend starting from the detailed research on Bernstein's theory "repetition without repetition," studying the issue objectively in a multidisciplinary context including linguistic, music, and psychology, and proving the hypothesis by the data received from the different music performance classes (vocal singing, piano, violin) as well as many other specializations as possible.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The research work was approved by Human Ethics Advisory Group of Kazan Federal University by using the ethical guidelines for educational research proposed by the British Educational Research Association [BERA], 2018. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

This research was the result of the collaboration of all the authors. However, sections "Introduction", "Background", "Materials and Methods", and "Discussion" are attributed to SK; section "Conclusion" to SK with BK; and sections "Results", "Limitations", and "Future Work" to LF, IK, and GA.

FUNDING

This manuscript has been supported by the Kazan Federal University Strategic Academic Leadership Program (PRIORITY-2030).

REFERENCES

- Abid, T., Zahid, G., Shahid, N., and Bukhari, M. (2021). Online teaching experience during the COVID-19 in Pakistan: pedagogy–technology balance and student engagement. *Fudan J. Humanit. Soc. Sci.* 14, 367–391. doi: 10.1007/s40647-021-00325-7
- Agrati, L. S., and Vinci, V. (2021). Virtual internship as mediated experience. The Educator's training during COVID19 emergency. *Commun. Comput. Inform. Sci.* 1344, 170–183. doi: 10.1007/978-3-030-67435-9_14
- Andang'o, E. A. (2019). "Africanising the music classroom through choral and instrumental ensembles: The Kenya music festival and Nairobi orchestra as music education resources," in *Music education in Africa: Concept, process, and practice*, ed. E. Achieng' Akuno (London: Routledge), 201–215. doi: 10.4324/9780429201592
- Armellini, A., and Aiyegbayo, O. (2010). Learning design and assessment with e-tivities. *Br. J. Educ. Technol.* 41, 922–935. doi: 10.1111/j.1467-8535.2009.01013.x
- Bauer, W. I. (2014). *Music Learning Today: Digital Pedagogy for Creating, Performing, and Responding to Music*. New York, NY: Oxford University Press.
- Berardi, S. (2021). Creating an online Russian as a foreign language course during the covid-19 epidemic. *Russ. Lang. Stud.* 19, 7–20. doi: 10.22363/2618-8163-2021-19-1-7-20
- Bernardo, N., and Duarte, E. (2020). Design, education, and the online tech-pandemic. *Strateg. Design Res. J.* 13, 577–585. doi: 10.4013/sdrj.2020.133.22
- Biasutti, M. (2018). Strategies adopted during collaborative online music composition. *Int. J. Music Educ.* 36, 473–490. doi: 10.1177/0255761417741520
- British Educational Research Association [BERA] (2018). *Ethical Guidelines for Educational Research*, 4th Edn. London: British Educational Research Association [BERA].
- Byron, T. P., and Fowles, L. C. (2015). Repetition and recency increases involuntary musical imagery of previously unfamiliar songs. *Psychol. Music* 43, 375–389. doi: 10.1177/03057356113511506
- Cayari, C. (2021). Creating virtual ensembles: common approaches from research and practice. *Music Educ. J.* 107, 38–46. doi: 10.1177/0027432121995147
- Cheng, L. (2019). Musical competency development in a laptop ensemble. *Res. Stud. Music Educ.* 41, 117–131. doi: 10.1177/1321103X18773804
- Cho, D., Lee, S. H., Yoo, Y., and Chu, H. (2019). Television singing competitions create stars? Empirical evidence from the digital music chart in South Korea. *J. Cult. Econ.* 43, 1–20. doi: 10.1007/s10824-018-9327-3
- Cutri, R. M., Mena, J., and Whiting, E. F. (2020). Faculty readiness for online crisis teaching: transitioning to online teaching during the COVID-19 pandemic. *Eur. J. Teach. Educ.* 43, 523–541. doi: 10.1080/02619768.2020.1815702
- de Bruin, L. R. (2021). Collaborative learning experiences in the university jazz/creative music ensemble: Student perspectives on instructional communication. *Psychol. Music* doi: 10.1177/03057356211027651
- Frishkopf, M. (2021). "Music for global human development," in *Transforming Ethnomusicology volume II: Political, Social & Ecological Issues*, eds B. Diamond and S. E. S. Castelo-Branco (Oxford: Oxford University Press), 47–66. doi: 10.1093/oso/9780197517550.003.0003
- Frost, R. L. A., Monaghan, P., and Christiansen, M. H. (2019). Mark my words: high frequency marker words impact early stages of language learning. *J. Exp. Psychol. Learn. Mem. Cogn.* 45, 1883–1898. doi: 10.1037/xlm0000683
- García-Holgado, A., Marcos-Pablos, S., and García-Peñalvo, F. J. (2019). A model to define an eHealth technological ecosystem for caregivers. *Knowl. Inform. Syst. Technol.* 3, 422–432. doi: 10.1007/978-3-030-16187-3_41
- Gaunt, H., and Treacy, D. S. (2020). Ensemble practices in the arts: a reflective matrix to enhance team work and collaborative learning in higher education. *Arts Human. High. Educ.* 19, 419–444. doi: 10.1177/1474022219885791
- Gibson, S. (2021). Shifting from offline to online collaborative music-making, teaching and learning: perceptions of ethno artistic mentors. *Music Educ. Res.* 23, 151–166. doi: 10.1080/14613808.2021.1904865
- Ginaya, G., Somawati, N. P., and Matarani, I. G. A. B. (2021). Implementation of e-learning for ESP in tourism during the covid-19 pandemic. *J. Lang. Teach. Res.* 12, 572–578. doi: 10.17507/jltr.1204.07
- González-González, C. S., García-Holgado, A., García-Peñalvo, F. J., and Mena, J. (2018). "Towards equality in higher education: innovative teaching experiences in computer education," in *Paper Presented at the ACM International Conference Proceeding Series*, Palma. doi: 10.1145/3233824.3233869
- Haning, M. (2019). "Everyone has a voice": informal learning in student-led collegiate a cappella ensembles. *Bull. Council Res. Music Educ.* 219, 61–76. doi: 10.5406/bulcoursmusedu.219.0061
- Hanrahan, F., Hughes, E., Banerjee, R., Eldridge, A., and Kiefer, C. (2019). Psychological benefits of networking technologies in children's experience of ensemble music making. *Int. J. Music Educ.* 37, 59–77. doi: 10.1177/0255761418796864
- Huff, M. J., Yates, T. J., and Balota, D. A. (2018). Evaluating the contributions of task expectancy in the testing and guessing benefits on recognition memory. *Memory* 26, 1065–1083. doi: 10.1080/09658211.2018.1467929
- Humberstone, J. (2021). "Informal and open learning," in *Proceedings of the Lecture 27 from The Place of Music in 21st Century Education MOOC*. Sydney, NSW, 1–5. doi: 10.13140/RG.2.2.19509.40161
- Hutchins, S., and Palmer, C. (2011). Repetition priming in music. *Psychol. Pop. Media Cult.* 1, 69–88. doi: 10.1037/2160-4134.1.S.69
- Ito, J. P. (2015). "Repetition without repetition: how Bernstein illumines motor skill in music performance," in *Anticipation: Learning from the Past. Cognitive Systems Monographs*, Vol. 25, ed. M. Nadin (Cham: Springer). doi: 10.1007/978-3-319-19446-2_14
- Ivenicki, A. (2021). COVID-19 and multicultural education in Brazil. *Perspect. Educ.* 39, 231–241. doi: 10.18820/2519593X/pie.v39.i1.14
- Johnson, D. C., and Stanley, A. M. (2021). A pilot project exploring rural classroom music teachers' perceptions and practices via an online professional development course. *J. Music Teach. Educ.* 30, 99–114. doi: 10.1177/10570837211008658
- Johnson, K. D. (2020). The changing face of academic music media collections in response to the rise of online music delivery. *Notes* 77, 191–223. doi: 10.1353/not.2020.0092
- Jones, S. K. (2015). An exploration of band students' experiences with informal learning. *Bull. Council Res. Music Educ.* 206, 61–79. doi: 10.5406/bulcoursmusedu.206.0061
- Kampa, R. K. (2021). Teaching through a pandemic: classes of khallikote university go air and online. *Libr. Philos. Pract.* 2021, 1–13.
- Karkina, S. V., Batoryshina, G. L., and Valeeva, R. A. (2020). "A sustainable approach to music education: towards a cultural ecology in the digital age," in *Proceedings of the 8th International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'20)*, October 21–23, Salamanca, 535–541. doi: 10.1145/3434780.3436643
- Karkina, S. V., Mena Marcos, J. J., and Valeeva, R. A. (2021). "Improvement of art creative skills by the means of signature pedagogy in online musical education," in *Proceedings of the Communications in Computer and Information Science*, Vol. 1344, (Cham: Springer), 86–99. doi: 10.1007/978-3-030-67435-9_7
- King, A., Prior, H., and Waddington-Jones, C. (2019). Connect resound: using online technology to deliver music education to remote communities. *J. Music Technol. Educ.* 12, 201–217. doi: 10.1386/jmte_00006_1
- Kooloos, J. G. M., Bergman, E. M., Scheffers, M. A. G. P., Schepens-Franke, A. N., and Vorstenbosch, M. A. T. M. (2020). The effect of passive and active education methods applied in repetition activities on the retention of anatomical knowledge. *Anat. Sci. Educ.* 13, 458–466. doi: 10.1002/ase.1924
- Lee, M., Choi, H. S., Cho, D., and Lee, H. (2020). Can digital consumption boost physical consumption? The effect of online music streaming on record sales. *Decis. Support Syst.* 135:113337. doi: 10.1016/j.dss.2020.113337
- Lei, W. S. C., and Li, C. C. C. (2021). The mechanism of linkages between online community participation and festival attendance: a case study of a Chinese music festival. *Event Manag.* 25, 27–40. doi: 10.3727/152599520X15894679115457
- Li, B., Xu, C., and Duan, Z. (2019). "Audio-visual source association for string ensembles through multi-modal vibrato analysis," in *Paper Presented at the Proceedings of the 14th Sound and Music Computing Conference 2017, SMC*, Espoo, 159–166.
- Livingstone, S. R., Palmer, C., and Schubert, E. (2012). Emotional response to musical repetition. *Emotion* 12, 552–567. doi: 10.1037/a0023747
- Llorente, A. M. P., Gómez, M. C. S., and García-Peñalvo, F. J. (2014). "Assessing the effectiveness of a technological model to improve written skills in English in higher education," in *Proceedings of the ACM International Conference Proceeding Series*, Salamanca, 69–74. doi: 10.1145/2669711.2669881

- Lock, J., and Johnson, C. (2018). "Playing together: designing online music courses using a social constructivist framework," in *Pedagogy Development for Teaching Online Music*, eds C. Johnson and V. C. Lamothe (Hershey, PA: IGI Global), 183–201. doi: 10.4018/978-1-5225-5109-6.ch009
- Marshalsey, L., and Sclater, M. (2020). Together but apart: creating and supporting online learning communities in an era of distributed studio education. *Int. J. Art Design Educ.* 39, 826–840. doi: 10.1111/jade.12331
- Merrick, B., and Johnson, C. (2020). Teaching music online in higher education: 2020 conference report. *J. Music Technol. Educ.* 13, 95–108. doi: 10.1386/JMTE_00018_1
- Moglie, M., Simoncini, M., Mancini, E., Suraci, V., and Arnesano, M. (2019). "eLearning course design in higher education to maximize students' performance," in *Higher Education Learning Methodologies and Technologies HELMeTO 2019. Communications in Computer and Information Science*, Vol. 1091, eds D. Burgos, et al. (Cham: Springer). doi: 10.1007/978-3-030-31284-8_11
- Moorhouse, B. L., Li, Y., and Walsh, S. (2021). E-classroom interactional competencies: mediating and assisting language learning during synchronous online lessons. *RELC J.* doi: 10.1177/0033688220985274
- Pavey, J., and Garland, S. W. (2004). The integration and implementation of a range of 'e-tivities' to enhance students' interaction and learning. *Innov. Educ. Teach. Int.* 41, 305–315. doi: 10.1080/14703290410001733276
- Perla, L., Agrati, L. S., and Vinci, V. (2019). The 'Sophisticated' knowledge of e-teacher. Re-shape digital resources for online courses. *Commun. Comput. Inform. Sci.* 1091, 3–17. doi: 10.1007/978-3-030-31284-8_1
- Phipps, B. (2021). Riffing on course redesign: leveraging pedagogy for teaching music online. *Perfect Beat* 21, 63–68. doi: 10.1558/PRBT.19236
- Picerno, P., Pecori, R., Raviolo, P., and Ducange, P. (2019). Smartphones and exergame controllers as BYOD solutions for the e-tivities of an online sport and exercise sciences university program. *Commun. Comput. Inform. Sci.* 1091, 217–227. doi: 10.1007/978-3-030-31284-8_17
- Pike, P. D. (2011). Using technology to engage third-age (retired) leisure learners: a case study of a third-age MIDI piano ensemble. *Int. J. Music Educ.* 29, 116–123. doi: 10.1177/0255761410396965
- Pike, P. D. (2017). Improving music teaching and learning through online service: a case study of a synchronous online teaching internship. *Int. J. Music Educ.* 35, 107–117. doi: 10.1177/0255761415613534
- Pinto-Llorente, A. M., Sánchez-Gómez, M. C., and García-Peñalvo, F. J. (2018). A mixed methods research of pre-service teachers' perceptions about the benefits of wiki-based tasks and discussion. *Adv. Intell. Syst. Comput.* 621, 260–275. doi: 10.1007/978-3-319-61121-1_23
- Rendell, J. (2021). Staying in, rocking out: online live music portal shows during the coronavirus pandemic. *Convergence* 27, 1092–1111. doi: 10.1177/1354856520976451
- Rofe, M. S., and Parker, W. (2017). Online orchestra: Connecting remote communities through music. *J. Music Technol. Educ.* 10, 147–165. doi: 10.1386/jmte.10.2-3.147_1
- Salmon, G. (2002). *E-tivities. The Key to Active Online Learning*. London: Taylor & Francis.
- Salmon, G. (2013). *E-moderating: The Key to Teaching and Learning Online*, 2nd Edn. London: Taylor & Francis.
- Salvador, K. S., Knapp, E., and Mayo, W. (2021). Reflecting on the 'community' in community music school after a transition to all-online instruction. *Music Educ. Res.* 23, 1–17. doi: 10.1080/14613808.2021.1905623
- Sheffield, E., Thompson, W., and Berdahl, E. (2019). "Two different paradigms for network audio performance with a laptop ensemble," in *Paper presented at the Proceedings of the 2019 International Computer Music Conference, ICMC-NYCEMF 2019 - International Computer Music Conference New York City Electroacoustic Music Festival*, New York, NY, 289–294.
- Silveira, J. M., and Silvey, B. A. (2020). Effects of ensemble size and repertoire difficulty on ratings of concert band performances. *J. Res. Music Educ.* 68, 138–155. doi: 10.1177/0022429420908280
- Stakauskaitė, R. (2021). The ensembles evening: a festive ritual and a theatrical spectacle. [Ansamblių vakaras: šventinis ritualas ir teatralizuotas reginys]. *Acta Acad. Artium Vilnensis* 100, 64–98. doi: 10.37522/AAAV.100.2021.57
- Tran, A., Kerkstra, R. L., Gardocki, S. L., and Papuga, S. C. (2021). Lessons learned: teaching in-person during the COVID-19 pandemic. *Front. Educ.* 6:2021. doi: 10.3389/educ.2021.690646
- Westerlund, H., Karlsen, S., Kallio, A. A., Treacy, D. S., Miettinen, L., Timonen, V., et al. (2021). Visions for intercultural music teacher education in complex societies. *Res. Stud. Music Educ.* doi: 10.1177/1321103X211032490
- Wu, S. Y. (2021). How teachers conduct online teaching during the COVID-19 pandemic: a case study of Taiwan. *Front. Educ.* 6:2021. doi: 10.3389/educ.2021.675434

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Copyright © 2022 Karkina, Faizrakhmanova, Kamalova, Akbarova and Kaur. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.