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The Application of Virtual Reality Technology to Enhance Students' Chorus Conducting Performance in a Technology Institute in Southeast China

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Abstract

This research aimed to investigate the effectiveness of the application of VR technology as a supplementary tool for enhancing students' chorus conducting performance and determining the students' satisfaction with using VR technology to enhance students' chorus conducting performance. A mixed research design was used for this study: quasi-experiment as quantitative research and face-to-face interview as qualitative research. The participants in this study were 60 music students at Changshu Institute of Technology. Aged 18- 20 years and are music teacher majors. The participants in the quasi-experiment were divided into two groups: 30 participants for the control group and 30 participants for the experimental group. Ten students were recruited from the experimental group to conduct face-to-face interview. A traditional classroom was used for the control group and blended learning with VR technology integration was developed as a supplement for the experimental group. The researcher employed an independent sample T-test to test the hypotheses and content analysis to analyze qualitative data. The results revealed that four variables had higher scores and there was significant improvement in the conducting skills of students in the experimental group than in the control group. The results revealed that blended learning using VR technology serves as an effective learning tool to improve student chorus conducting performance. The students presented a positive reflection and satisfaction toward using VR technology to enhance students' chorus conducting performance throughout the teaching and learning process.

Keywords: choir conduct，chorus conductor Performance，VR Technology，blended learning

Introduction

Chorus is an ancient art that has developed for thousands of years. Chorus is a collective art of singing. In the chorus, people are divided into several sound parts. They use different melodies and sing at the same time. Such performing teams are called choirs (Grove, 1922); However, the chorus conductor has been the most popular and important musician (Kennedy, 1934) since the 19th century. In recent years there has been a remarkable development in conducting a choir. The

chorus conductor now could make use of VR technology to conduct a choir.

Virtual Reality (VR) technology is a new virtual reality experience model in the Internet era. It originated in the United States and uses virtual three-dimensional image technology to form visual and sensory levels, similar to the real experience effect. This innovative technology has assisted not only choir conductors but also music teachers in teaching students of music how to conduct a choir. This innovative development ideas can open new resources for the field of art education. Designing a curriculum for teaching students how to conduct a choir with the integration of VR technology is another platform of providing good learning experiences and an experimental direction of teaching reform that are beneficial to teachers and students (Zhou, 2013). Choral Conducting Teaching faces the problem of the identity crisis of the traditional spoon-feeding on the construction of a novel interaction mode (Donglan, 2015). Therefore, the special consideration today the innovative technologies in Choral Conductor Training leads to the cultural formation of future musical arts teachers. Choral Conducting Teaching in Normal University should be a teaching model that emphasizes music theory literacy and artistic practice skills and the cultivation of high-quality music talents with certain innovative capabilities.

The conceptual design of this study is based on the present situation and the deficiency of chorus conducting teaching in colleges and universities. During the research, the problems, difficulties, and bottlenecks existing in education are analyzed from the current teaching of the chorus conducting curriculum in colleges and universities. On this basis, the feasibility of VR technology entering this teaching field is discussed. By practicing chorus conducting in VR, more people can experience chorus conducting, train more conductor talents, and allow chorus conductor to learn this practice to the maximum extent that can effectively let the chorus conductor receive high-quality training. At the same time, it can reduce the learning cost of students enrolled in a conducting a chorus course.

Research Questions

1. How effective is the application of VR technology in enhancing students' chorus conducting performance?
2. What is the difference between the chorus conducting performance of students in the experimental group using blended learning with VR technology software and students in the control group using traditional learning?
3. What are the students' attitude toward using VR technology to enhance their chorus conducting performance?

Research Objectives

1. To develop blended learning with VR technology software as a supplementary tool to enhance students' chorus conducting performance.
2. To investigate the effectiveness of blended learning with VR technology software to

enhance students' chorus conducting performance.

3. To determine students' attitude toward using VR technology software as a supplementary tool to enhance their chorus conducting performance.

Significance of the Study

The research study results could fill a new vitality to traditional music teaching methods, integrating digital software in teaching chorus conducting. With the application of VR technology, this research can solve the practical difficulties in music instruction, encourage students to quickly master new methods of chorus conducting in and out of the classroom, form good self-study habits, and effective self-assessment standards to promote learning efficiency, and improve their chorus conducting performance ability. In addition, the teachers could utilize this technology as a supplementary tool in teaching music courses to improve students' chorus conducting performance.

Literature Review

The History and Development of Chorus Teaching in Chinese Universities

For the history of Chinese chorus conductor, the study holds that the chorus music of country was first introduced from the West. It is deeply influenced and influenced by the broad and profound Chinese culture with a history of five thousand years of civilization and the anti-imperialist and anti-feudal revolutionary struggle carried out by the Chinese nation in the past hundred years. (Ma.2008) The May 4th Movement is of great epoch-making significance to promote the development of Chinese chorus music. It is from this period that the development of Chinese chorus music has a very distinct political nature and is always consistent with the future and destiny of the country and the civilization of the society. Progress is closely related.

The research holds that: in the past 30 years of reform and opening up, China's chorus industry has flourished, and the audience has become wider and wider. Although people like the art of chorus, some people still have a superficial understanding of chorus, which has led to a low level of overall chorus in China and lack of chorus conductor talent. These phenomena are also deep-seated manifestations of the backwardness of basic education in Chinese chorus. It analyzes the mode, curriculum, content, and related issues of chorus education in Chinese colleges and universities, briefly introduces the current situation and development of chorus education in my country and puts forward suggestions for deepening chorus education. Ma.2008)

Colleges and universities should play a leading role and inject new vitality into the development of chorus in China. blood. The research involves that since the founding of New China, the development of chorus and conductor art has experienced a starting stage, exploration stage, development stage and diversification stage. It not only takes root in China as an art, but also is an important course of music major in colleges and universities.

Leadership and Chorus Conductor Performance

The conductor skill affects the aesthetic of choir members to a great extent. Whether the conductor's dress or the cooperation with the singing team, or the conductor's temperament and internal beauty are very important (Wang, 2013). As an art performer, a conductor is different from a director. The conductor not only undertakes the task of the director, but also plays the role of the actor; therefore, the conductor skills must be outstanding especially his posture, the key to posture beauty lies in internal and external unity (Xie, 2021)

Everything starts from the feelings of music, grasps the accurate conducting plan, and transforms the action into the subconscious. However, external means of conducting will inevitably produce many disadvantages. The weaknesses of the choir conductor are less singing, less listening, no ability to analyze works and fewer practical activities involved in rehearsals. At the same time, they must have the ability to adapt or create a chorus for their choir, so each professional chorus conductor must study a variety of music disciplines, including choir conduct, piano, conducting skills, composition, and composition skills and literature, and other music-related disciplines as well as psychology. Conducting is an indispensable part of chorus performance and has an important influence on the whole chorus performance.

VR Technology: The Feasibility of VR Integrating Science

VR technology is closely related to entity teaching in colleges and universities. It can be said that without the physical face-to-face teaching in colleges and universities, there can be no opportunity for VR technology to exert its ability in the field of education. Nevertheless, VR technology has incomparable advantages over the traditional teaching mode. In the current educational environment in China, equal opportunities in education do not represent the equal allocation of educational resources. Technological innovation such as VR technology can realize the redistribution of educational resources. As far as the teaching field of chorus conduct in colleges and universities is concerned, VR technology can also play special functions. (Ma.2008)

Firstly, the integration of VR technology into the chorus conducting curriculum is established at the technical level, whether it is the hardware configuration provided by the main body of university education at present, or the degree of acceptance of technical operation by teachers and students. VR technology can be applied to the teaching field without hindrance. Secondly, from the perspective of compatibility, the teaching content provided by VR technology is to supplement, enrich, refine and revise teachers' teaching, and to provide many new theoretical ideas, which is convenient to encourage innovative thinking, and will not hinder and affect the normal classroom progress. In addition, VR technology can display practicality and application intuitively through various forms and has a sense of science and technology and advanced consciousness. Puting aside the obscure book knowledge and present the handout content with the most intuitive technical means, VR technology is a valuable learning opportunity for both teachers and students in chorus conducting teaching.

VR has covered industrial manufacturing, power energy, military industry, education and training, entertainment, film and television, medical technology, and other fields from the content point of view. From the trend, whether the market, technology, or awareness, more VR-related vision has been gradually realized and developed. Whether virtual reality technology can make human beings realize more comprehensively in the virtual world or whether "virtual reality" can make people live more comprehensively in the virtual world, the complexity of virtual reality may never be known. However, the development of virtual reality technology is continuous, and shows rich connotation of modern technology. Virtual reality technology based on artificial intelligence transforms real scenes and physical and mechanical equipment into virtual reality products through three-dimensional display technology, scene modeling technology, natural interaction technology, activity capture, and other sensory interaction technology.

Nowadays, all kinds of network information distract people's attention, and traditional art has begun to experience network transformation. The realization of "Internet Chorus" can solve some deficiencies in chorus development. This study is mainly based on the development of chorus art under the internet background. This article takes the "Internet" as the breakthrough point and pays attention to the chorus development. Foreign research results also show that interactive teaching is a kind of teaching method that is guided by the communication and interaction between teachers and students, students and students under the influence of constructivism theory. According to the aesthetic characteristics of contemporary college students, Chorus and Conducting course teaching adopts an interactive teaching method with the help of modern scientific and technological means; the teaching is based on interest, the learning is based on the information and emotional exchange needs of teachers and students.

Chorus Conducting Performance

Chorus Conducting Performance: Refers to the artistic category of collective singing of multi-voice vocal works, with a conductor acting as a conductor, which requires a high degree of unity of a single voice, and harmony of melody between voices. The human voice has its unique advantages as a performance tool of chorus art. It can most directly express the thoughts and emotions in music works and stimulate the emotional resonance of the audience（Ma, 2008).

Gesture: The conductor uses a baton or bare hands to tap during group singing or musical ensemble. The basic principle of the action diagram is that the upbeat moves from top to bottom, and the upbeat moves from bottom to top (Ma, 2008).

Speed: Refers to tempo in music. Music is usually measured in "beats per minute" (bpm for short) as the tempo unit. Fast and slow music usually express the intensity and moderation of emotion（Ma, 2008）.

***Strength*:** In the music system, the strength of the sound is determined by the amplitude of the mechanical wave, which is in direct proportion. The greater the amplitude, the stronger the sound is, and vice versa. The strength change in music works is called "strength", which is indicated by

words or symbols, such as f (strong), P (weak), etc.（Ma, 2008）

Rhythm: The rhythm of music, refers to the length and strength of the music movement. Rhythm and beat always coexist in music, and music is organized according to the length, strength, fixity, and accuracy of their relationship （Ma,2008).

Previous Research

Through the analysis of the existing academic literature, the researcher found that the application of VR technology software in choir conduct teaching is limited. The VR hardware system involves three parts: rendering, import, and information processing. These three modules have their functions. Virtual reality presentation devices, such as display devices, can receive virtual images, including headwear devices and large content display devices. As future computer output devices, these have a common feature, that is, through contact with the eyes, to "defraud" the trust of the brain, so that people sink into this picture to build a virtual world for individuals alone; people roam in this virtual world (Angelos & Randi, 2020).

The results show that short-term real-time visual feedback training can improve the performance accuracy but does not directly affect the improvement of sound control. Research shows that multimedia assisted teaching can improve students' ability to absorb music learning, and rich content and interesting teaching courseware can improve students' interest in learning. The effective interaction between teachers and students can improve the effectiveness of multimedia music teaching (Gupta, et al.,2018) Researchers have found that using visual feedback singing software can improve the accuracy of different song sounds, and teachers can help children sing better, understand the quality of vowels, and learn how to improve their singing（Moschos, et al., 2008). Researchers hope to replace and/or enhance the current considerable diversity of terms, images, and psychological connections by using quantifiable measures that are reliable, repeatable, and recordable. It was found that the real-time visual feedback system enhanced the understanding of fundamentals, monitoring of progress, and support in practice. Therefore, real-time visual display technology has certain application value in teaching conducting.

At present, there are studies on the application of VR equipment and software, mainly focusing on the technical support provided by the software in recording and post-production. In music education or choir conduct teaching, there is no cross-border use of the software. VR equipment software has powerful computing capabilities, convenient and reasonable operation capabilities, is scientific and offers rich options in the recording environment (Nakano & Got , 2007).

Methodology

The researcher adopted the mixed research design, quantitative research, and qualitative research design divided into two stages. The first stage was quantitative research, and the second stage was qualitative research.

The researcher employed quasi-experimental research as a quantitative research design in the first stage. The researcher integrated VR technology in teaching to enhance students' chorus conducting performance in a technology institution. An experimental and control group were selected to carry out a comparative quasi-experiment. After eight weeks of the experiment, the conducting performance scores of the two groups were assessed and evaluated.

In the second stage, the researcher conducted a face-to-face interview after eight weeks of the experiment as a qualitative research design to determine the students' satisfaction with using VR technology to improve chorus conducting performance. Ten students were randomly selected from the experimental group as the participants. The researcher used S-CVI to evaluate the content validity of the questions by five experts in choir conduct education who hold master's degrees or above, obtained more than 20 years of teaching experience, are professional academic leaders, and are familiar with VR software.

Scope of the Population and Sample

The population of this study was 100 students from a college in the southeast china. The researcher employed a purposive sampling method. The sample was 60 ~~to~~choir conduct course. Thirty students were assigned to the experimental group and 30 for the control group. Ten students were randomly selected from the experimental group for a face-to-face interview for the qualitative research.

Quantitative research: Selected 60 students from music students who enrolled in a music course from a college in the Southeast China. Based on their final choir conduct examination score in the first year. Students with 80-85 points in choir conduct score were selected. (the scoring standard is implemented according to the scoring standard for choral conducting courses formulated by the school's educational affairs department). Thirty students were assigned in the the experimental group and the other 30 students for the control group.

Qualitative research: Face to face interview was conducted with 10 students. Simple random sampling techniques were employed to select 10 students from the experimental group. Detailed results of the interview were recorded for qualitative data and content analysis.

Scope of Research Instrument

Stage 1: Quantitative Research: There are two research instruments for quantitative research in the first stage as follows.

1. Instructional Plan with integration of VR technology software as intervention for quasi experiment.

A course was developed and designed as a research intervention and instrument for quasi-experiment research. The VR Technology is integrated into the instructional plan based on course objectives, course descriptions, contents, teaching method, and evaluation. According to the

Ministry of Education requirements, Jiangsu Provincial Department of Education has formulated a detailed curriculum standard for normal universities, which all universities in Jiangsu Province must implement. This is the curriculum standard adopted by a university in Southeast China. This curriculum standard stipulates that the Chorus Conducting course is arranged, and the students' choral conductor skills will be assessed in each semester's mid and final examinations.

A music course adopted the form of group teaching; each class includes eight students. Each group has two classes a week. Each class, with eight students, lasts for 180 minutes. Each student in the class has to practice chorus conductor according to the teacher's guidance to improve the performance. The researcher had to complete a total of 8 weeks (20 classes per week) for both the experimental and control group. The study included a four-voice chorus for eight weeks of the overall study. The final exam requires students to complete a four-voice chorus. The assessment method is a blind test and consists of more than two teachers. All students in the two groups are evaluated. Finally, the researcher summarized the results and compared the two groups of students from the control and experimental groups.

2. Using VR technology to improve chorus conducting performance

Virtual reality equipment consists of VR glasses as the main body. VR head-mounted display uses head-mounted display devices which make users experience a virtual environment. The principle is that the left eye and the right eye screen display images of the left eye and the right eye, respectively, while the human eye obtains this information to produce a stereoscopic sense in the brain. Many cheap VR glasses in the market need to use mobile phones. This can be done by adding a 4.7-6.0-inch phone to VR glasses and downloading the corresponding application on the phone. Because the phone is worn in glasses, the user will not be able to operate the phone, so the head control mode or Bluetooth handle will be used to operate it. A more expensive VR multi-in-one machine on the market is more convenient. VR glasses work like our eyes. Two lenses are equivalent to the eyes but far less clever than the eyes.

Furthermore, VR glasses usually divide the content into two parts and achieve superposition imaging through the lens. The ideal state is the center of the pupil of the human eye, and the center of the lens and the center of the screen should be in a straight line. Currently, it is necessary to adjust the "pupil distance" of the lens to coincide with the pupil distance of the human eye and use the software to adjust the image center to ensure three lines to obtain the best visual effect. Some household devices are physically adjusted, while others, such as the Storm Mirror, are adjusted by software. Pupil distance needs to be adjusted by the upper knob, while SVR glasses need to be adjusted by the software.

The students who participated in the research study were introduced to the use of the equipment before the experiment. The experimental group used the VR equipment. They were given demonstration on the use of the VR equipment and were given time to practice using it to improve action accuracy. After class, students can continue practicing by using the exercises given by the researcher. The control group was taught using the traditional teaching methods in

traditional classrooms.

In the first and second week, students in the experimental and control group were evaluated as to the gestures of the second and third beat in the command, with a maximum score of 20 points. In the third and fourth week, the gestures of the fourth and fifth beats in the command were evaluated; The sixth and seventh beats were evaluated in the fifth and sixth weeks. In week 7 and week 8, the speed of command was evaluated. In the ninth and tenth week, the strength control was evaluated. Twenty points were allotted to each of the 5 items.

Table 1

Evaluation of Student Chorus Conduct skill

	First week	Second week	Third week	Fourth week	Fifth week	Sixth week	Seventh week	Eighth week	Ninth week	Tenth week
2-beat，3-beat diagram	10	10								
4-beat，5-beat diagram			10	10						
6-beat，7-beat diagram					10	10				
Fast and slow control							10	10		
Strength control									10	10

Finally, the experimental and control group took the final examination and the scores for each criterion were collected. There were two examination judges who evaluated the performance of the students in the control and experimental group. The judges were chorus teachers. Students completed conducting a four-part chorus song; the average score is final according to the scoring criteria. The scores of the two groups were then compared.

3.Assessment and Evaluation of Conducting Chorus Performance: The researcher used the score standard of the Chorus Command examination of a university in Southeast China to comprehensively evaluate students' command ability, which is formulated according to the relevant requirements of the Ministry of Education and the Education Department of Jiangsu Province which meet the standards of talent training and professional requirements. The conducting skill evaluation adopted the score standard of chorus conductor of ordinary universities in China, with a full score of 100 points. The average score is the final score. Conducting skills mainly consist of conduct action, rhythm, strength, speed, thought, emotion, and style. However, the emotion and style cannot be shown by VR equipment; therefore, VR equipment can be used for training conducting in four aspects: conduct gesture, rhythm, strength and speed.

Table 2

Evaluation Criteria for Conducting Command

	Excellent	Good	Passing	Fail
Conduct gesture	>25	25—20	19—15	< 15
Rhythm	> 25	25—20	19—15	< 15
Strength	>25	25—20	19—15	< 15
Speed	>25	25—20	19—15	< 15

Table3

The Score Standard of Chorus Conducting Examination

Scoring Criteria	**Excellent**	**Good**	**Pass**	**Failed**
When directing a multi-voice chorus, the correct command method to deal with the change of timbre is used.	>20	20—15	14—10	< 10
When directing a multi-voice chorus, rhythm changes are handled in a correct manner.	>20	20—15	14—10	< 10
When directing a multi-voice chorus, volume changes are handled in the correct way.	>20	20—15	14—10	< 10
In a multi-part chorus, the melody of each part is directed with the correct conducting icon.	>20	20—15	14—10	< 10
When directing a multi-voice chorus, all the emotional signs in the score were correctly directed.	>20	20—15	14—10	< 10

The final exam requires students to complete conducting a four-voice chorus. The assessment method is a blind assessment done by two teachers. All students in the two groups were evaluated. Finally, the researcher summarized the results and compared the scores of the students in the control and experimental group.

Stage 2: **Qualitative Research:**

In the second stage of this study, the researcher employed a qualitative research method by using face to face interview. Ten students were randomly selected from the experimental group to determine the students' satisfaction with using VR technology to enhance their chorus conducting performance to determine the scientific nature, rationality, effectiveness, and progress of VR technology software application.

Validity of the Interview Questions

The validity of the interview question was evaluated by using S-CVI by three experts teaching in the field of chorus conducting and familiar with technology, hold a master's degree or doctoral degree, have more than 20 years of chorus conductor teaching experience, have rich experiences and mastered the teaching with VR technology software. The result of the content validity of eight questions was 0.95. Thus, the content validity of the eight questions was valid and acceptable to evaluate the students' satisfaction with using VR technology software in the experimental group.

Scope of Data Analysis

There are two parts of the data analysis: analysis of the quantitative data and analysis of the qualitative data.

Quantitative Data Analysis The researcher employed descriptive statistics: frequency, percentage, mean and standard deviation. Independent sample t-test was conducted to test the hypotheses to determine if there was a significant difference in student chorus conductor performance between the control group (traditional teaching) and experiment group (blended learning with integration of VR technology software) in a choir conduct course.

Qualitative Data Analysis of the Face-to-Face Interview: The data from the face-to-face interview were analyzed using content analysis and inductive and deductive method to determine the choir conduct students' satisfaction with using VR technology software to enhance chorus conductor performance.

Results

Quantitative Data

Demographic Information

The study participants were 60 sophomore students from the music department in a college in the southeast China. The participants were 43 females (71.70 %) and 17 males (28.30%). There were 8 participants (13.30 %) who were 18 years old. Thirty-one (51.70 %) were 19 years old. Twenty-one (35%) participants were 20 years old, as shown in Table 4.

Table 4

Age and Gender of Participants (N=60)

Age & Gender	Frequency	Percent
18 years old	8	13.33
19 years old	31	51,70
20 years old	21	35.00
Male	17	28.30
Female	43	71.70
Total	60	100
Male	17	28.30
Female	43	71.70
Total	**60**	**100**

Descriptive Statistics of the Main Variables

The mean values and standard deviation of test scores of students in gesture, rhythm, speed and strength in the experimental group and control group are shown in table 5.

Table 5

Mean and Standard Deviation of Chorus Conductor Performance Scores of Experimental and Control Group (N=60)

Variable	Group	N	Mean	S.D.
Gesture	experiment	30	22.0667	0.2864
	control	30	19.0667	0.2612

Rhythm	experiment	30	21.8833	0.2357
	control	30	18.9667	0.2581
Speed	experiment	30	21.7833	0.2611
	control	30	19.6333	0.2896
Strength	experiment	30	21.9333	0.3438
	control	30	19.6333	0.2993
Overall	experiment	30	87.667	1.1271
	control	30	77.300	1.1083

As can be seen in table 5, the scores of students in gesture, rhythm, speed, and strength in the experimental group are higher than the scores of students in the control group. The differences between the experimental group and the control group scores were gesture (3), rhythm (2.92), speed (2.15), strength (2.30) and the total score (10.37). The biggest difference is the gesture, while the smallest difference is speed.

Quantitative Part

There are four hypotheses tested in this study:

Hypothesis 1

$H_0$1: There is no difference in the scores of students in the blended learning class and students in the traditional class in terms of gesture movement in conducting chorus.
H_a1: There is a difference in the scores of students in the blended learning class and students in the traditional class in terms of gesture movement in conducting chorus.

Table 6 shows the significant differences in the gesture movement scores of students in the experimental and control group, t (29), =7.737, p=.000.

Table 6

Independent Sample t-test for Gesture Movement Scores of Students in the Experimental and Control Group

	Mean Difference	SD	Sig.	N
Experimental & Control Groups	3.0000	0.1380	,000	60

Hypothesis 2

$H_0$2: There is no difference in the scores of students in the blended learning class and students in the traditional class in terms of Rhythm.

H_a2: There is a difference in the scores of students in the blended learning class and students in the traditional class in terms of Rhythm.

Table 7 shows the significant difference in the rhythm scores of students in the experimental and control group, t (29), = 3.489, p=.000.

Table 7

Independent Sample t-test for Rhythm scores of Students in the Experimental and Control Group

	Mean Difference	SD	Sig.	N
Experimental & Control Groups	2.917	-0.1222	.000	60

Hypothesis 3

$H_0$3: There is no difference in the scores of students in the blended learning class and traditional class in terms of the speed change.

H_a3: There is a difference in the scores of students in the blended learning class and traditional class in terms of the speed change.

Table 8 shows the significant difference in the speed scores of students in the experimental and control group, t (29), =5.531, p=.000.

Table 8

Independent Sample t-test for Speed Scores of Students in the Experimental and Control Group

	Mean Difference	SD	Sig.	N
Experimental & Control Groups	2.15	-0.1557	.000	60

Hypothesis 4

$H_0$4: There is no difference in the scores of students in the blended learning class and traditional class in terms of strength change.

H_a4: There is a difference in the scores of students in the blended learning class and traditional class in terms of strength change.

Table 9 shows the significant difference in the strength scores of students in the experimental and control group, t (29), = 5.045, p=.000

Table 9

Independent Sample t-test for Strength Scores of Students in the Experimental and Control Group

	Mean Difference	SD	Sig.	N
Experimental & Control Groups	0.610	- 0.2437	.000	60

The four hypotheses revealed that the hypotheses were statistically significant differences of 0.5 between the control and the experimental groups. Therefore, it was supported that blended learning with integration of VR technology software was an effective learning tool to improve the students chorus conductor performance.

Qualitative Part

The researcher conducted face-to-face interview with ten choir conduct students from the experimental group for their opinions a week after the chorus conducting performance final examination to determine the students' satisfaction with using VR technology software to improve their conducting skills. The results revealed positive opinions about using blended learning with integration of VR technology software as a learning tool for a music course.

Content Analysis

Two themes emerged from the interview regarding students' satisfaction toward using VR technology software to improve their chorus conducting performance. They were helpfulness and usefulness. (1) Helpfulness is defined as the property of providing useful assistance, helpful disposition, rendering aid or assistance, (2) Usefulness is defined as the quality of being of practical use, beneficial and giving advantage. The blended learning with integration of VR technology software was effective and was considered to be a helpful learning tool that allowed students the chances to learn and practice and do self-evaluation in and outside the classroom anywhere at any time to improve chorus conducting performance. In addition, it is well fit and acceptable for the digital native students as it would bring a better learning experience for students today and the future. Students showed positive attitude towards using VR technology software and were happy and enjoyed being involved in a program that offered such a learning technology tool as supplement resource. It is beneficial for students, with all responses indicating the benefit of additional learning tool. Students also felt that the blended learning was a conducive learning environment for learning conducting skills and for enriching their learning experiences.

Discussion

According to the results of the quasi-experiment the blended learning with integration of VR technology software improved the chorus conducting performance of music students. The findings are consistent with other research studies conducted by Roukonena & Ruismakia (2016), which indicated that blended learning with technology tools made students increase the learning engagement in music and provided students with conducive learning environment, improving their learning experiences not only in the classroom but also outside the classroom through creative use of information from the internet and online learning. Moreover, the teachers could reduce lecture time and let the students initiate the productive work with creative ideas. Moschos, et.al, (2008) and Gupta, et al.(2018) stated that using visual feedback singing software can improve the accuracy of different song sounds, and teachers can help children sing better while understanding the quality of vowels, learning how to improve their singing and hope to replace or enhance the current considerable diversity of terms, images, and psychological connections by using quantifiable measures that are reliable, repeatable,)and recordable. It also was found that the real-time visual feedback system enhanced the understanding of fundamentals, monitoring of progress, and support in practice. Real-time visual display technology has certain application value in teaching singing. Moreover, Kyungjin (2019) outlined the conceptual reasoning behind and development of one such generative music system by using a simple but versatile virtual synthesizer to generate sound and sequences of repeating randomly generated notes drawn by the user in augmented reality to formulate the patterns and spatial origin of each sound contributing to

the entire generative piece. This is aligned with the study of Ma Lin (2019) which indicated that a VR technology music teaching method that combines virtual reality technology and audio processing technology enable students to learn music in a VR virtual environment. By combining vision and hearing, students' thinking is directly drawn into a virtual world and can realize the online interaction between students and teachers, which improves teaching efficiency.

Conclusion

The research study results revealed that a blended learning with integration of VR technology software was effective for improving the music students' chorus conducting performance in a technology institute in Southeast China. Additionally, qualitative data from face-to-face interview reflected a positive attitude and satisfaction toward using VR software to enhance students' chorus conducting performance. The blended learning with integration of VR software was effective and considered a helpful technology tool that allowed students the chances to learn and practice and self-evaluate their conducting skills in and outside the classroom anywhere at any time. The music students were satisfied, happy and enjoyed to be involved in a program that integrated a learning technology tool as supplement resources in teaching and learning conducting a chorus. It is beneficial for students, with all responses indicating the benefit of an additional learning tool. Students also felt that it was a convenient way to learn and evaluate their performance by themselves.

Recommendations

The findings suggest that using VR technology software to help music students in learning conducting a chorus enabled students to improve their chorus conducting performance by practicing their conducting skills after-school However, based on the results, future research can explore more technological means used with VR technology software to improve students' chorus conducting performance because even though VR technology can detect, record and compare changes in chorus conducting actions, it lacks assessment and evaluation feature of a direct scoring system and performance which could . Record the student's action process through a scientific way. Therefore, the combination of virtual reality technology and traditional chorus teaching methods can improve the evaluation of command skills. Combined with teachers' technical training, this tool can improve students' chorus command ability.

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