THE EFFECTIVENESS OF USING THINGLINK FOR LEARNING DIGITAL CONTENT IN WESTERN MUSIC HISTORY AMONG HIGH SCHOOL STUDENTS IN CHINA

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2024

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LUO WENTING

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THE EFFECTIVENESS OF USING THINGLINK FOR LEARNING DIGITAL CONTENT IN WESTERN MUSIC HISTORY AMONG HIGH SCHOOL STUDENTS IN CHINA

BY

LUO WENTING

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Title	THE EFFECTIVENESS OF USING THINGLINK FOR LEARNING DIGITAL CONTENT IN WESTERN MUSIC HISTORY AMONG HIGH SCHOOL STUDENTS IN CHINA
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This study aims to (1) to compare students' learning outcomes before and after using ThingLink for Learning Digital Content and (2) to examine students' satisfaction with the ThingLink for Learning Digital Content in the context of Western Music History among junior high school students in China. The study employed a one-group pretest-posttest design involving 40 students selected through purposive sampling from Kunming No.1 High School Airport Campus. The instructional intervention lasted for three weeks, focusing on the Baroque, Classical, and Romantic eras. Data were collected using academic performance tests and a student satisfaction questionnaire. The findings revealed a statistically significant improvement in students' learning outcomes after using ThingLink, along with a high level of satisfaction regarding the course's interactivity, content accessibility, and engagement. The study concludes that ThingLink is an effective tool for teaching Western Music History and offers valuable insights into the integration of interactive digital tools in music education.

Keyword : The History of Western Music, Using Thinklink for Learning, Learning Digital Content, Music Theory

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CHAPTER 1
INTRODUCTION

Background

In recent years, with the continuous reform of China's education system, Western Music History, has gradually gained recognition as an essential component of quality-oriented education (Yin & Ooi, 2024). Western Music History, plays a vital role in fostering students' aesthetic appreciation, emotional expression, and overall cognitive development (Li, 2024). Despite increasing policy support, significant challenges persist in practical teaching. Traditional music instruction methods, which rely heavily on rote memorization and passive learning, have proven insufficient in addressing students' evolving learning needs (Martin-Alguacil et al., 2024). Particularly in junior High School education, music theory—an essential foundation for music learning—often presents difficulties for students due to its abstract concepts and emphasis on memorization (Noor, 2026). Many students struggle with grasping fundamental theoretical principles such as rhythm, harmony, and melodic structure, leading to low retention rates and limited academic progress in Western Music History, (Miksza & Johnson, 2012).

Moreover, disparities in educational resources between urban and rural areas further exacerbate the challenges of Western Music History, in China (Song, 2023). While metropolitan schools benefit from well-equipped music classrooms and access to advanced instructional tools, schools in remote areas frequently suffer from insufficient teaching materials, inadequate digital infrastructure, and a shortage of trained music educators. As a result, students in these regions face additional barriers in acquiring essential music knowledge and skills. Addressing these disparities requires innovative pedagogical approaches that leverage digital technology to enhance learning outcomes and increase accessibility to high-quality music instruction (Kormos, & Wisdom, 2021).

The COVID-19 pandemic has further underscored the urgent need for digital transformation in education. The sudden shift to online and hybrid learning models posed significant challenges for music instruction, as traditional face-to-face teaching

was no longer feasible (Knaut et al., 2024). Western Music History, which traditionally relies on interactive and experiential learning, was particularly affected by the limitations of remote instruction (Yende, 2023). Many schools lacked digital resources specifically tailored for music teaching, and educators faced difficulties in maintaining student engagement in virtual learning environments (Rexhepi et al., 2024). These challenges highlight the necessity of integrating interactive digital tools into Western Music History, to ensure continuity and effectiveness in instruction.

Interactive e-learning courses have emerged as a promising solution to enhance Western Music History, through multimedia-rich, student-centered learning experiences (Wen, 2024). Studies indicate that digital tools can improve students' comprehension and retention of abstract musical concepts by incorporating visual, auditory, and interactive elements into instruction (Danso & Rousi, 2021; Parkita, 2021). Interactive learning platforms enable students to engage with music theory in a more dynamic and immersive manner, fostering deeper understanding and sustained interest in the subject (He, 2023). Additionally, digital platforms facilitate self-paced learning, allowing students to review course materials at their convenience and reinforce their knowledge through interactive exercises and assessments (Ibrahim et al., 2023).

ThingLink, a cloud-based interactive learning tool, presents a novel approach to enhancing Western Music History, by allowing educators to integrate multimedia elements such as text, images, videos, and audio annotations into digital learning environments (ThingLink, n.d.). This technology can be particularly beneficial for teaching music theory, as it enables students to explore historical contexts, musical compositions, and theoretical concepts through an interactive interface. For instance, educators can design a timeline of music history embedded with audio samples, allowing students to listen to representative compositions while learning about their cultural and historical significance (Batista et al., 2022). Research has shown that such interactive approaches can significantly enhance students' engagement, memory retention, and overall academic performance (Roslan & Sahrir, 2020).

This study aims to investigate the effectiveness of ThingLink-based interactive e-learning courses in teaching music theory to junior High School students in China. Specifically, the research seeks to compare the learning outcomes of traditional teaching methods with those of ThingLink-assisted instruction. The study focuses on three key aspects: (1) the development of an Using ThingLink for Learning Digital Content for junior High School Western Music History, in China, (2) its role in increasing students' academic performance in learning music theory, and (3) students' satisfaction on the Using ThingLink for Learning Digital Content. Given that music theory forms the foundation for students' overall musical development, improving instructional approaches in this area can have long-term benefits for Western Music History, as a whole.

As the digital era continues to reshape educational paradigms, traditional teaching methods alone may no longer be sufficient to meet the demands of modern learners (Almazroa & Alotaibi, 2023). Integrating interactive digital tools such as ThingLink has the potential to revolutionize Western Music History, by providing students with more engaging, accessible, and effective learning experiences. This study provides empirical evidence on the pedagogical benefits of ThingLink in Chinese junior High School Western Music History,, contributing to the broader discourse on digital learning innovations. The findings of this research will offer theoretical insights and practical recommendations for the future development of music instruction in junior High School education.

Research Questions

1. How effective is the use of ThingLink for learning digital content in junior high school Western music history?

2. Does the use of ThingLink for learning digital content lead to improved student learning outcomes?

3. To what extent are students satisfied with learning through ThingLink for digital content in Western music history?

Research Objectives

1. To examine the effectiveness of the Using ThingLink for Learning Digital Content in junior high school Western Music History.

2. To investigate whether the use of the Using ThingLink for Learning Digital Content leads to improved student learning outcomes compared to traditional teaching methods.

3. To explore the extent to which students are satisfied with learning through the Using ThingLink for Learning Digital Content.

Research Hypothesis

Research Hypothesis 1: There is a statistically significant difference in students' learning outcomes before and after using **ThingLink for Learning Digital Content** in Western Music History.

Research Hypothesis 2: Students exhibit a high level of satisfaction with learning Western Music History through **ThingLink for Learning Digital Content**.

Scope of the Study

This study examines the effectiveness of the Using ThingLink for Learning Digital Content in junior High School Western Music History, specifically focusing on its impact on students' understanding of Western Music History and music knowledge. The scope of the study includes the research population and sample, research design, experimental materials, research instruments, and data analysis methods.

Research Population and Sample

The population of this study consists of Grade 10 students (approximately 400 students) from Kunming No.1 High School Airport Campus, located in Yunnan Province, China.

The sample for this study was selected through purposive sampling, in line with the pre-experimental one-group pretest-posttest design. A single class of 40

students was chosen based on similar academic performance in music to serve as the experimental group. All students in the selected class participated in both the pre-test and post-test phases of the study.

The entire instructional intervention was conducted by the same music teacher to ensure consistency and fairness in teaching practices throughout the study period.

The selection of Kunming No.1 High School Airport Campus was based on its representativeness as a large-scale educational institution that includes a variety of school types. Its diversity and scale make it an appropriate and valuable setting for conducting this research and for drawing conclusions that may be informative to similar educational contexts.

Research Design

This study employs a **pre-experimental research design**, specifically a **one-group pretest-posttest design**, to investigate the impact of using **ThingLink for Learning Digital Content** on students' learning outcomes in Western Music History and music theory.

The research procedure consists of the following steps:

1. **Pre-test**: Before the instructional intervention, all participants complete a pre-test to assess their baseline knowledge of Western Music History and fundamental music concepts.

2. **Instructional Intervention**: All students in the group receive instruction through **ThingLink for Learning Digital Content**, which integrates multimedia elements such as images, audio clips, videos, and interactive hotspots to enhance learning engagement and conceptual understanding.

3. **Post-test**: After the completion of the three-week instructional period, all participants take a post-test to evaluate their learning progress and determine the effectiveness of the digital content.

Experimental Materials

The materials used in the experiment include:

1. **The Using ThingLink for Learning Digital Content**, which incorporates multimedia elements to teach Western Music History and music concepts.

Table 1 Time table of the Using ThingLink for Learning Digital Content and traditional course

Week	Date Range	Topic	Learning Content (details of two type of courses were shown in appendix)
1	Nov 4 - Nov 8, 2024	Baroque Era	Historical background, key composers, musical characteristics, representative works.
2	Nov 11 - Nov 15, 2024	Classical Era	Historical background, key composers, musical forms, stylistic features.
3	Nov 18 - Nov 22, 2024	Romantic Era	Historical background, key composers, emotional expression, nationalism in music.

2. **Academic Performance Tests in Music Theory**.

The Academic Performance Tests in Music Theory are designed to assess students' understanding of Western Music History and knowledge before and after the course. It consists of two versions: Test A (Pre-test) and Test B (Post-test). Test A is administered before the course begins to evaluate students' baseline knowledge, while Test B is conducted after course completion to measure learning progress.

Each test comprises 20 multiple-choice questions covering essential aspects of Western Music History.

3. **Satisfaction Assessment Questionnaire**, the questionnaire includes four key areas in the following:

Course Effectiveness – Evaluates whether the Using ThingLink for Learning Digital Content improves learning outcomes and helps students understand difficult Western Music History concepts.

Engagement & Motivation – Measures how interesting, interactive, and motivating the course is for students.

Teacher & Platform Evaluation – Assesses the teacher's proficiency in using ThingLink and the overall usability of the application.

Collaboration & Real-Life Application – Examines whether students discuss course content with peers and apply their learning beyond the classroom

Research Instruments

1. ThingLink for Learning Digital Content

The main instructional material used in the experiment is **ThingLink for Learning Digital Content**, which delivers lessons on Western Music History and basic music theory through interactive, multimedia-enhanced learning modules. These materials are designed to promote student engagement and support self-paced, exploratory learning.

2. Pre-test and Post-test Assessments

The **Academic Performance Tests in Music Theory** are research instruments developed to assess students' understanding of **Western Music History and foundational music knowledge** before and after the instructional intervention.

The test consists of two parallel versions:

- **Test A (Pre-test)**: Administered before the intervention to measure students' baseline knowledge.

- **Test B (Post-test)**: Administered after the intervention to evaluate learning gains and progress.

Each version contains **20 multiple-choice questions** covering essential topics in Western Music History. The items were reviewed by expert music educators for content validity and were pilot-tested prior to full implementation.

3. Satisfaction Assessment Questionnaire, the questionnaire includes four key areas in the following:

Course Effectiveness – Evaluates whether the Using ThingLink for Learning Digital Content improves learning outcomes and helps students understand difficult Western Music History concepts.

Engagement & Motivation – Measures how interesting, interactive, and motivating the course is for students.

Teacher & Platform Evaluation – Assesses the teacher's proficiency in using ThingLink and the overall usability of the application.

Research Variables

Independent Variable

The use of ThingLink for Learning Digital Content as the instructional method.

Dependent Variables

Students' learning outcomes, measured by academic performance on music theory tests (pre-test and post-test).

Students' satisfaction, measured through responses to the satisfaction questionnaire.

Research Duration

Semester: First semester of the 2024 academic year

Frequency: Once per week

Session Duration: 1 class hour per session

Total Instructional Time: 3 class hours over 3 weeks

Definition of Terms

To clarify the key terms used in this study and ensure consistency with the research framework, the following definitions are provided:

ThingLink for Learning Digital Content

Refers to a web-based and app-based platform used to create interactive digital learning modules. In this study, ThingLink was used to develop multimedia-based instructional materials on Western Music History, incorporating text, images, audio, videos, and interactive hotspots. The platform allows learners to explore and interact with the content at their own pace, both online and offline.

Learning Outcome

In this study, learning outcomes refer to students' ability to comprehend the content of Western Music History. This is measured by comparing the scores from the pre-test and post-test, both of which are parallel multiple-choice assessments consisting of 20 items each. The pre-test is administered before the instructional intervention to assess students' baseline knowledge, while the post-test is given after the learning activities to evaluate students' academic progress and knowledge acquisition. Both tests are designed to cover equivalent content. The comparison of pre-test and post-test scores is used to analyze whether the use of ThingLink for Learning Digital Content has a measurable effect on improving students' understanding of the subject matter.

Student Satisfaction

Refers to students' level of contentment, engagement, and perceived effectiveness of the ThingLink-based learning experience, measured through a structured satisfaction questionnaire.

Instructional Intervention

The planned teaching activity that involves the use of ThingLink for Learning Digital Content as the primary instructional tool over a 3-week period.

Academic Performance Tests in Music Theory

A pair of parallel-form assessments developed by the researcher to evaluate students' understanding of Western Music History. The tests include 20 multiple-choice questions each and are administered as a pre-test and post-test to assess changes in knowledge acquisition.

Expected Benefits

1. This study aims to develop interactive e-learning courses for music theory instruction using ThingLink, which will enhance student engagement and comprehension through multimedia annotations and immersive learning experiences.

2. The research findings will contribute to the development of instructional resources, such as *The Interactive Music Teaching Guideline for Chinese Music Educators* and *The Technical Promotion Guideline for Junior High School Western*

Music History,, providing structured frameworks for integrating technology into music pedagogy.

3. The study will offer valuable references for music educators and educational administrators considering the adoption of ThingLink in music curriculum design, assisting them in making informed decisions about implementing interactive teaching methodologies.

Conceptual Framework

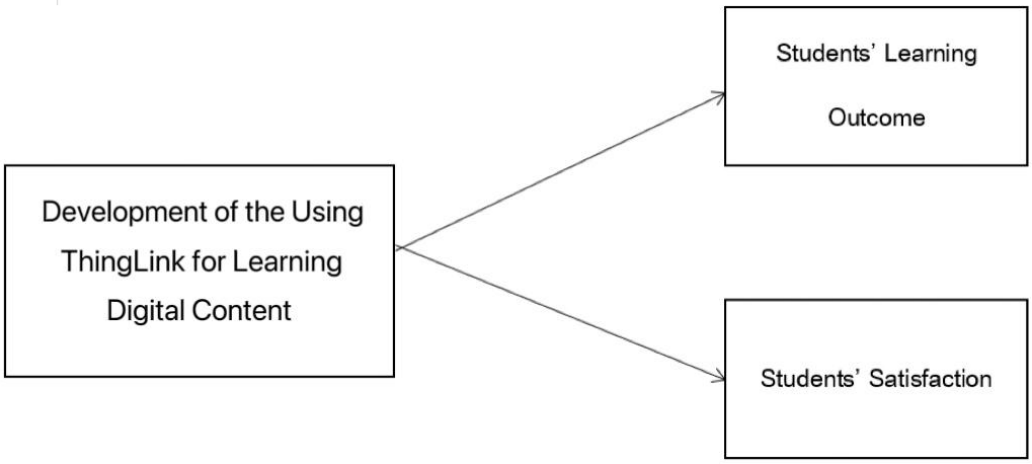

Figure 1 Conceptual Framework

CHAPTER 2
REVIEW OF THE LITERATURE

This chapter introduces the theoretical frameworks that inform this study, covering Thinglink, the Characteristics of Teachers in High Schools, and the Design of the new High School Music Curriculum.

Thinglink

In alignment with the goals of UNESCO's Education 2030 initiative (UNESCO, 2021), ThingLink—a Finnish edtech company—has pioneered a cloud-based platform that enhances educational accessibility through immersive, interactive media. Recognized with the 2018 UNESCO King Hamad Bin Isa Al-Khalifa Prize, ThingLink offers tools for augmenting images, videos, and 360-degree virtual environments with interactive elements such as text annotations, voice recordings, links, and multimedia content.

This technology supports a range of pedagogical objectives, including fostering digital literacy and enriching both school-level and post-secondary curricula. By enabling learners to explore virtual environments, it promotes experiential and culturally responsive education beyond the confines of physical classrooms. ThingLink not only allows teachers to design customized instructional materials suited to diverse learning needs but also empowers students to create personalized digital narratives that document their own educational journeys.

Through a global content-sharing network and a collaborative educator community, ThingLink expands the reach of quality learning resources. The platform's compatibility with various learning management systems and platforms like Microsoft Teams further enhances its accessibility and pedagogical utility. With a user base exceeding 5.5 million across 190 countries, ThingLink supports the creation of multisensory, data-rich learning experiences that are inclusive of marginalized, displaced, or literacy-challenged learners.

ThingLink for teachers and schools

ThingLink is a widely recognized educational technology tool that enables users to enhance visual media—such as images, videos, and virtual tours—by embedding interactive elements like text, links, and other resources. Designed to cater to the needs of educators, students, and school administrators alike, it supports the creation of dynamic learning materials and collaborative projects. Users can edit, share, gather feedback, and refine their work with confidence throughout the learning process.

ThingLink is a versatile educational technology platform recognized for its capacity to transform static visual content—such as images, videos, and 360° virtual environments—into interactive, information-rich learning tools. Tailored to meet the needs of diverse users including teachers, students, and school administrators, ThingLink fosters dynamic collaboration, creative exploration, and iterative learning in both individual and group settings.

For educators, the platform offers an array of possibilities: they can design customized instructional content, organize classroom schedules, or develop immersive learning experiences such as virtual excursions to engage students more deeply. Learners, on the other hand, are encouraged to build and present digital projects—ranging from multimedia presentations to interactive résumés—while sharpening their technological fluency and communication skills.

Beyond the classroom, administrative personnel utilize ThingLink to effectively convey complex procedures, highlight campus features, or publicize institutional events to stakeholders including parents and community members. With millions of users across early education, K–12, higher education, and professional training environments, ThingLink has grown into a robust global learning ecosystem.

The platform's evolution has been significantly shaped by its user community. In response to educational demands, ThingLink now supports integration with LMS and LTI systems, enabling seamless incorporation into existing digital infrastructures. New functionalities such as virtual forms, interactive branching paths, and modular course design tools further expand its capabilities. Whether deployed for

lesson delivery or international collaboration, ThingLink empowers educators and learners to craft compelling and inclusive learning environments—transforming ordinary media into extraordinary educational journeys.

4 Ways to Create Remote Learning Tools with ThingLink

ThingLink can serve as an effective tool for remote teaching, especially in situations where schools are closed, events are suspended, or travel is restricted. It provides educators with the means to create meaningful digital learning experiences that maintain student engagement and continuity.

Interactive videos in remote learning

Interactive video content plays a key role in distance education. It can be used for various teaching purposes, including presentations, topic introductions, concept explanations, recorded lectures, instructional training, and project guidance. Even short videos—such as a quick five-minute update explaining daily learning goals or homework—can help foster a stronger sense of connection between teachers and students, compared to simple text instructions delivered through an LMS.

- Use a mobile phone or screen recording tool to capture your video.
- Upload the recorded content to ThingLink.
- Add interactive tags to include extra resources, guidance, or external links.
- Share the enhanced video through platforms like ThingLink, Microsoft Teams, Google Classroom, or your school's LMS.

Virtual tours as remote learning tools.

Virtual tours have increasingly become a valuable component of digital education. However, many educators still lack curriculum-aligned materials that they can tailor to their own teaching needs. During a recent school closure in the Veneto region of Italy, teachers were instructed to develop online instructional content. Astrid Hulsebosch, a member of ThingLink's Italian educator network, emphasized that in such contexts, producing adaptable materials for teachers takes precedence over ready-made content for students. To support fellow educators, she shared an immersive

Judaism-themed lesson that utilized 360-degree imagery from the historic Venetian Ghetto. The lesson incorporated various supplementary elements—such as extra resources and a student feedback form—allowing teachers to modify the content to suit their own classroom goals.

- Capture 360-degree visuals or videos from educational settings and upload them to ThingLink. Alternatively, you may select media from ThingLink's existing content library.

- Enhance the experience by adding detailed images, explanatory text, voice narration, or embedded videos.

- Distribute the final virtual tour through ThingLink itself or integrated platforms like Microsoft Teams, Google Classroom, or your school's LMS.

Remote learning for TVET, workplace and professional courses.

In professional settings, educators increasingly rely on virtual courses and interactive 360-degree videos to train staff or introduce them to specific physical environments. These materials are commonly used for purposes such as workplace orientation, sales instruction, safety procedures, and technical or product training. A key advantage is that remote participants can access these virtual sessions across various devices—including desktop computers, mobile phones, or virtual reality headsets like ClassVR and Oculus—ensuring flexible, immersive learning experiences regardless of location.

Narrated photos and screenshots for sharing work and assignments.

Working remotely—whether from home or another location—often demands additional communication efforts to keep others informed about one's ideas and progress. One effective method for submitting assignments or documenting project development is through the ThingLink app, available on both desktop and mobile platforms. Users can enhance images or screenshots by recording brief audio explanations, providing valuable context. Whether it's a math problem or a user interface design, these audio annotations help teachers, trainers, or team members better understand the reasoning behind the work.

Examples of ThingLink products

The versatility of the ThingLink platform extends across numerous organizational sectors, including education at various levels, media outlets, commercial enterprises, and government agencies. Its applications range from facilitating classroom instruction in schools and universities to supporting corporate e-learning programs, editorial tasks, marketing campaigns, paid online courses, and digital publishing (ThingLink, 2018a). This section highlights several examples demonstrating how diverse users have utilized ThingLink to enhance their work and learning experiences.

The 'woodwind collage' in Figure 2 shows the viewer a selection of woodwind musical instruments being played.

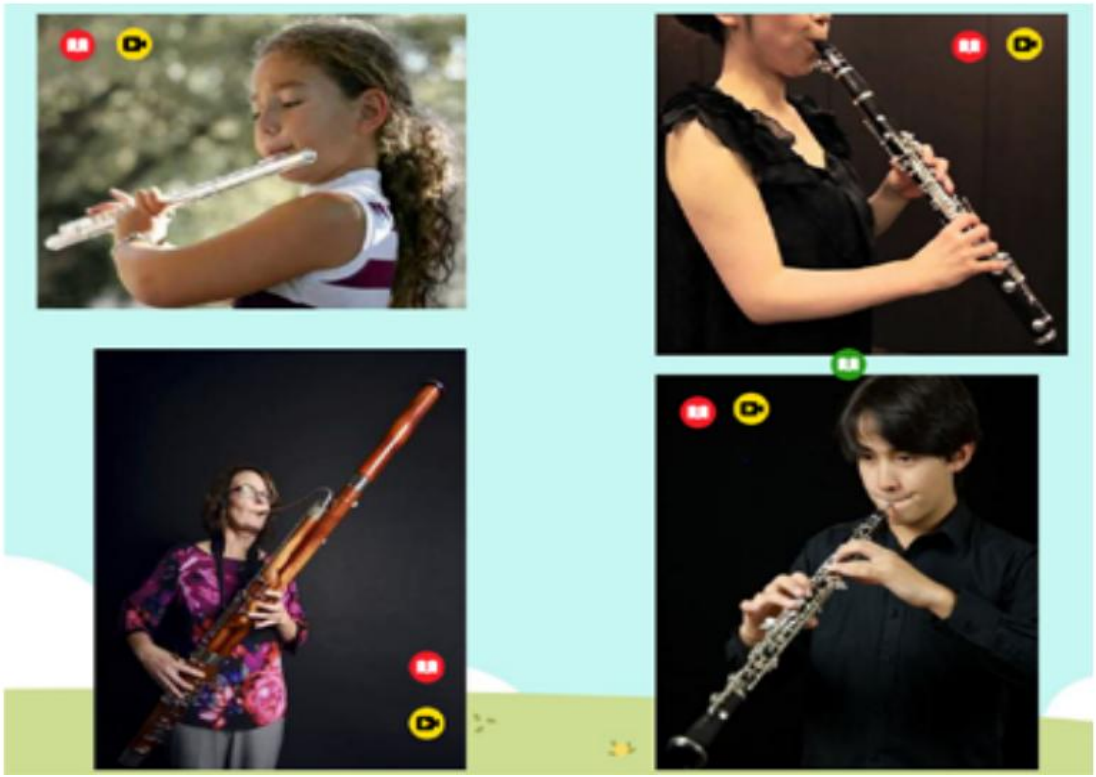

Figure 2 Woodwind collage, a ThingLink project

(The picture comes from the website support.thinglink.com)

Viewers can interact with the image by clicking on various icons to access supplementary content. For example, selecting the red book icon reveals related text, while the yellow camera icon opens a video performance. This integrated design allows users to engage with visual, written, and audio materials all within a single interface.

As shown in Figure 3, a High School student integrated a digital photograph of her hand-drawn poster featuring foreign language vocabulary with embedded microphone links that provide accurate pronunciation for each term. Through this project, she showcased her interdisciplinary abilities by combining traditional drawing techniques, digital proficiency, and language skills—all facilitated by ThingLink.

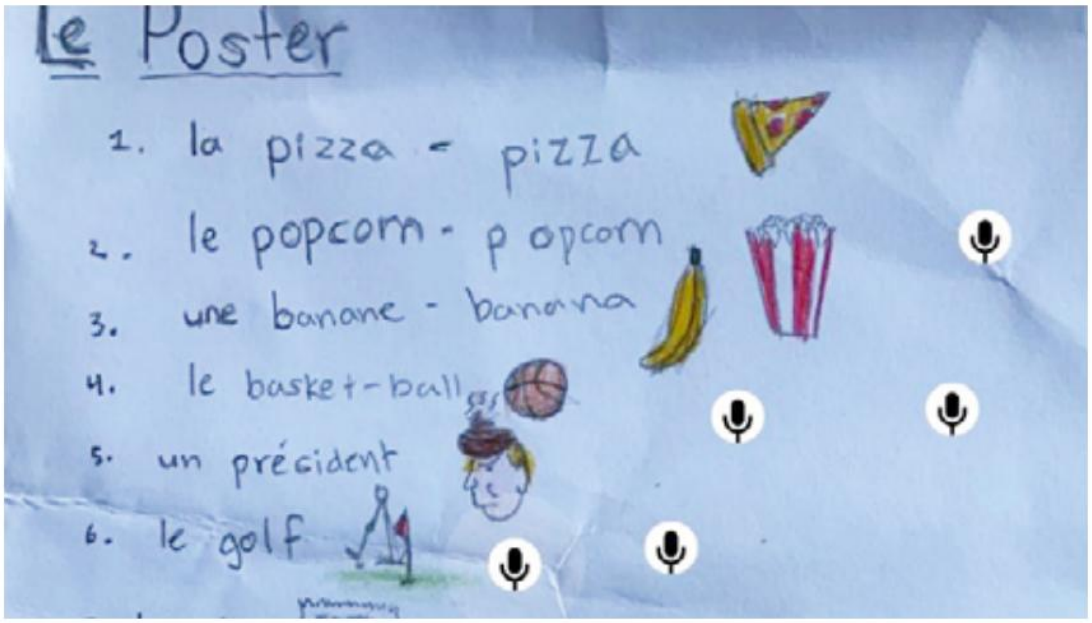

Figure 3 Foreign language practice, a ThingLink project

(The project comes from the website blog.thinglink.com)

Such activities are well-suited for both classroom and home settings and can also be carried out collaboratively by groups working remotely from various locations. For instance, fifth-grade students in Romea Canini's class took turns narrating

the legend of the Republic of San Marino, known as the world's oldest and smallest independent country, using their own voices.

Additionally, educators utilize ThingLink to develop narrated introductions for various subjects across different grade levels. A notable example is Professor Annamaria Bove from the Instituto Compressive Nocera Inferiors, who transformed a United Nations infographic on the Sustainable Development Goals into an interactive learning tool, providing detailed explanations of each goal and linking to supplementary resources (see Figure 4).

Figure 4 Sustainable Development Goals interactive infographic,

a ThingLink teaching resource

(The picture comes from the introduction of ThingLink's official website)

ThingLink has found applications in orienting employees to their workspaces and conducting safety training. Additionally, in collaboration with the

Finnish National Agency of Education, it was employed to create an immersive virtual exploration of Finland's education system.

Implementation

With a free account, teachers can upload unlimited images, videos, and 360° media but with restricted functionality. Upgrading to a premium classroom plan enables one teacher to oversee more than 60 student accounts, develop educational content, assign lessons, and assess student submissions. Schools and districts can also opt for specialized accounts offering enhanced features such as offline access, unlimited content views, teacher onboarding and professional development support, as well as seamless integration with learning management systems.

Teachers can choose to share their images and sample lessons publicly on ThingLink, making them searchable and accessible to the entire user community. Thanks to contributions from educators worldwide, ThingLink's extensive global image database now hosts millions of interactive visuals and lesson plans. Users have the ability to duplicate shared content into their own accounts and enhance it by adding annotations, audio, music, or other multimedia elements. This collaborative model allows the teaching community to continuously expand and improve available resources, enabling virtual lessons and critical learning components to reach millions of students via internet-connected devices such as tablets, laptops, and smartphones.

To support educators, ThingLink offers free professional development through its "Creating Visual Learning Materials" beginner course hosted on the Microsoft Education Centre. This training addresses practical challenges faced in blended learning settings, encouraging teachers to innovate their instructional strategies, optimize learning materials, and strengthen online engagement with students. Approximately 1,000 educators enroll in this course monthly, and those who fulfill the requirements earn certification and a digital badge recognized by the Microsoft Education Centre.

Enablers and supports

ThingLink's success is largely driven by strong collaborations and support from educators, school leaders, and administrators spanning the full spectrum of

education and workforce training, including lifelong learning initiatives. Engagement from leaders in schools, universities, and districts plays a crucial role in introducing and embedding ThingLink's tools within educational settings. Additionally, consultants involved in employee training and organizational transitions are key partners in leveraging ThingLink to facilitate skill development and adapt to evolving work environments.

The company has also prioritized expanding its connections with municipal, city, and state governments. To support these larger-scale implementations, ThingLink has formed alliances with top platform providers, enhancing its capacity to deliver tailored solutions and features for government-level engagement.

To broaden its advocacy efforts, ThingLink actively cultivates an educator community through social media channels like Facebook and Twitter, alongside content sharing via its dedicated blog and YouTube channel. These platforms serve as hubs for exchanging best practices and innovative ideas for integrating ThingLink across schools, higher education, and workplaces.

Moreover, ThingLink has showcased its capabilities at numerous international events, notably presenting at the 2019 UNESCO-UNEVOC Innovation in Technical and Vocational Education conference in Bonn, Germany, which introduced the platform to policymakers and key stakeholders from over 100 nations.

Monitoring and evaluation

ThingLink tracks teacher participation in its professional development programs and continuously monitors daily metrics such as content engagement, creation, and usage of its tools. The platform's data demonstrates steady growth in its user base. By 2020, ThingLink images received 30 million unique monthly views, with approximately 70% of these views occurring on mobile devices, including smartphones and tablets. The user community now spans 190 countries and includes 7 million registered content creators alongside 30 million learners every month. Each month, users generate around 250,000 new interactive image experiences, which are actively utilized by over 100,000 educators and students for various learning activities.

Beyond seamless integration with Learning Management Systems, ThingLink provides detailed analytics on user interactions such as views, clicks, hovers, and time spent on images. These features enable educators to gather meaningful data on individual student progress and engagement. Furthermore, teachers can complement their ThingLink-created visual materials with assessment tools like Google or Microsoft Forms to conduct pre- and post-tests, facilitating measurement of learning gains throughout courses or specific lessons.

To date, however, a comprehensive formal evaluation assessing ThingLink's effectiveness and its impact on student achievement has yet to be undertaken.

The Concept of the Characteristics of Teachers in High Schools

According to Diamond (2011), an effective teacher is someone who utilizes teaching methods that promote student learning and creates a supportive learning environment. Additionally, teacher characteristics are recognized as having a significant impact on students' learning processes (Murphy & Byrd, 2001).

The Ministry of Education (2004) categorizes the qualities of good teachers under the acronym TOIOWS.

The ideology and spirit of being a teacher.

A. Demonstrate love and faith while upholding the dignity and responsibilities inherent in the teaching profession, with a firm commitment to ethical conduct.

B. Acquire knowledge of relevant laws, teacher regulations, and governmental education development guidelines.

C. Cultivate empathy by dedicating time to support students, addressing their issues, and promoting their academic and behavioral growth.

D. Treat fellow educators with respect and fulfill the responsibility to foster a cooperative and harmonious work environment.

E. Understand and embrace the significance and values of the teaching role, critically reflect on challenges, and contribute to the advancement of students, society, and the nation by proposing effective solutions.

To perform the duties of the teacher fully with the principles and professional teachers.

A. Guide students in developing consistent habits and moral values as outlined in the curriculum.

B. Plan and facilitate activities that empower students to enhance their knowledge, skills, ethical understanding, and psychological well-being.

C. Engage actively in educational programs and student initiatives aimed at addressing challenges and promoting the sustainable use of natural resources and environmental awareness within the community.

D. Adhere to the mission, policies, and regulations of educational institutions while collaborating to support the institution's reputation and advancement in education.

E. Pursue continuous learning and research to improve personal professional practice and contribute to the ongoing development of the wider community.

Continuously develop moral integrity, academic ethics, and professional conduct. Teachers should exemplify good role models both in their professional responsibilities and daily lives, serving as pioneers for society.

A. Possess strong life ideals, commit to personal growth, advance scholarly knowledge, nurture moral values, and faithfully follow religious principles while respecting cultural traditions.

B. Demonstrate public-spiritedness, honesty, and a sense of social responsibility.

C. Maintain positive interpersonal relationships, showing respect, competence, knowledge, and moral character.

D. Uphold faith grounded in democratic monarchy principles, collaborate and coexist democratically, and abide by national laws.

E. Prioritize personal and family health, contributing to overall happiness and well-being.

Serve as a driving force within the community to address challenges and promote social, economic, and educational development.

A. Analyze community issues and needs to support socioeconomic research, providing recommendations for economic and social education that contribute to national progress.

B. Collaborate in advancing education by developing curricula and teaching processes aligned with current social and economic conditions.

C. Take a leadership role in community activities, particularly those related to the sufficiency economy model.

D. Actively participate in national, religious, cultural, and monarchic events to uphold and celebrate shared values.

E. Vigilantly identify potential threats to the community and take appropriate measures to safeguard national security.

Akkarabowon (2001) concluded the concept of the characteristics of teachers as tollows.

1. Being Knowledge:

Develop expertise across various academic fields, demonstrating accuracy especially in their teaching subjects as well as in related disciplines.

2. Being Humorous:

Cultivate a joyful and positive attitude in teaching. The teacher's humor should be constructive and promote good values, avoiding any negative impact.

3. Being Flexible:

Maintain a relaxed demeanor and adapt the atmosphere to fit the needs of the lesson.

4. Being Upbeat:

Be a dedicated and responsible teacher who embraces the teaching mission with enthusiasm—not viewing it merely as a duty but finding joy in fully committing time and effort to educating children.

5. Being Honest:

Maintain honesty with yourself, your students, and others.

6. Being Clear and Concise:

Possess the ability to foster clarity, ensuring learners fully comprehend the material. Teachers should demonstrate strong communication skills in both spoken and written language. Furthermore, all professional responsibilities must be carried out with transparency, precision, and adherence to good governance principles.

7. Being Open:

Be an open and approachable person. Teachers should willingly share their knowledge with others and be receptive to feedback and different perspectives.

8. Being Patient:

Being patient means being diligent, hardworking, and tolerant toward students' behaviors.

9. Being a Role Model:

Teachers should serve as positive role models for both their students and society, exemplifying good behavior in both instruction and daily life.

10. Being Able to Be Related Theory to Practice:

Apply educational theories and knowledge in practice to achieve effective outcomes.

11. Being self-confident:

Self-confidence is the capacity to select the most effective solution to problems or the best approach to accomplish tasks.

12. Being Diversified:

Capable of working across various specialties, including skills such as using compilers.

13. Being well groomed and Having Personal Hygiene:

Maintain appropriate attire and good personal hygiene. Teachers should always present themselves politely and neatly, often wearing the school uniform.

According to the Office of the Basic Education Commission (2010), effective teachers should adhere to ten key principles, outlined as follows.

1. Teachers must demonstrate academic commitment by actively seeking knowledge to effectively educate their students.

A. They should stay updated on subject developments by consulting books, journals, media, and attending conferences to gain new insights.

B. Even with strong subject knowledge, teachers must continually refine and enhance their teaching methods.

C. As professionals responsible for shaping the nation's future, teachers have the duty to nurture individuals academically, professionally, and in self-confidence to meet societal expectations.

2. Teachers should have strong professional dedication, embracing the continuous development of teaching methods, effective communication skills, and fostering joyful, easy understanding among students.

3. Compassion and care are essential; teachers must be problem-solvers who respect student differences without belittling or insulting them.

4. Positive thinking toward the profession, students, institutions, and colleagues is crucial. Teachers should value their career highly and strive for effectiveness.

5. Moral and ethical standards are fundamental, including fairness in teaching and assessment, tolerance, selflessness, sacrifice, and respect for religious and cultural traditions.

6. Teachers should serve as role models within their communities, promoting environmental awareness, waste reduction, energy conservation, and improving quality of life.

7. Encouraging good behavior, moral education, and mental cultivation among students is a key responsibility of teachers.

8. Teachers must pursue ongoing personal and professional growth, contributing to academic knowledge that benefits individuals, society, and the nation.

9. Effective communication is vital; teachers need to cultivate persuasive speaking skills that motivate and inspire positive behavioral change in students.

10. Education is central to human development and national strength. Teachers play a role in preserving Thai identity and culture amid advancing technology and globalization, fostering pride and love for the nation among children.

According to the Office of the Basic Education Commission (2010), the behavior of effective teachers is crucial. Teachers should design content and activities that align with students' interests, abilities, and individual differences. The roles in the learning process include:

1. Designing content and activities tailored to learners' interests and aptitudes while acknowledging individual differences.

2. Encouraging critical thinking, problem-solving, and the application of knowledge to anticipate and address challenges.

3. Facilitating experiential learning activities that promote reflective thinking and continuous development.

4. Integrating cognitive learning with the cultivation of virtues, values, and positive traits across all subjects.

5. Creating a conducive learning environment by organizing appropriate materials, media, and facilities, and incorporating research and academic resources into instruction.

6. Working collaboratively with parents and community members to foster learners' overall potential.

Chantavanich, Chantavanich, and Fry (1990) identified key characteristics of effective teachers as follows:

1. Show genuine love and care for students, treating them with attentiveness and affection as if they were their own children. When students exhibit inappropriate behavior, teachers should guide, counsel, or discipline them with kindness, ultimately earning students' respect and affection as a rewarding outcome.

2. Commit to continuous learning, staying current with rapid advancements in science and incorporating new knowledge and media into teaching practices.

3. Exhibit good conduct and strong moral values, fulfilling teaching responsibilities with honesty and integrity. As role models, teachers influence learners by their behavior and meet society's expectations to exemplify positive values.

4. Prepare and plan lessons thoroughly, continually exploring innovative teaching methods. Teachers should be dedicated and hardworking, inspiring students to pursue knowledge enthusiastically and develop a positive attitude toward learning.

In conclusion, effective High School teachers focus not only on instructional quality but also on shaping students' behavior. They serve as role models and commit to self-improvement to keep pace with evolving media and technology. Moreover, they nurture students' desired qualities and foster a lifelong love of learning.

Design of new High School music curriculum.

Music courses in High Schools mostly start with comprehensive courses and permeate ideological, moral, and aesthetic ability in the teaching process. Use multimedia applications for teaching in the classroom, strengthen education and scientific research, accelerate the modernization of education, and promote educational reform. Let students gradually achieve all-round development in the teaching process. To enhance students' enthusiasm for learning and cultivate students' innovation ability, students with poor music foundation should be given help and encouragement. Pay attention to the training of basic music, further consolidate, and improve teaching, and lay a solid foundation for students' music disciplines (Yi Yudan, 2019).

Through the cultivation of students' sitting posture, singing posture and reasonable breathing, it lays a solid foundation for students to learn music. Cultivate students' interest in learning through the teaching of comprehensive classes, singing classes, appreciation classes, musical instruments classes and singing performance classes (Li Qionghuan,2022).

Pay attention to the training of music knowledge and skills, pay attention to the spiritual development of students, strengthen the learning of weak links, and improve students' artistic accomplishment and music quality (Feng Lu,2020).

Teaching objectives of music subject under the new curriculum reform

1. Ideological education Love the motherland, love the people, love labor, love life

2. Music knowledge and skills training

A. Teach students proper posture and breathing techniques for singing.

B. Guide students to develop correct vocal practice methods.

C. Encourage music listening and appreciation to foster students' interest and enthusiasm for learning music.

D. Improve students' sense of music and rhythm by patting objects, distinguishing sound areas, listening and thinking.

E. Improve the comprehensive quality of students through song performance and group dance performance teaching.

The process and method of teaching

A. Guide students to understand the mood of songs and be able to sing different songs with different emotions.

B. The singing class gives students 10 minutes of voice training, and the teacher guides them to correct them.

C. Arrange music appreciation classes to cultivate students' hobbies for music, broaden students' horizons, and understand the common sense of music.

D. Body rhythm training to cultivate students' physical coordination ability and sense of music.

E. Use multimedia and other electronic software to carry out teaching activities, so that the curriculum is no longer single, exercise students' ears, eyes and senses, and enrich music classes.

F. Improve music quality education, implement it in teaching practice, and give full play to the greatest impact of music on people.

Take music aesthetics as the core, improve students' interest in learning, guide students to actively participate in music practice, respect individual differences, develop

students' creative thinking and logical ability, and form a good musical aesthetic ability (Yan Zan,2023).

The music course not only sings, but also combines the appreciation of music works, understands the preliminary knowledge of melody, and adds emotional experience ability to deepen the feeling of music image and enters a more in-depth appreciation situation. Pay attention to the reasonable arrangement of students' boring music theory knowledge learning (Wang QingQing,2018).

Emphasize the relationship between music and people, music and life, music and nature, music, and animals. The content is rich and colorful, listening to the characteristics of music customs around the world, and putting music in a large cultural background. Sublimate thoughts and feelings and let student’s practice (Tang Jia,2013).

Increase students' creation, performance, and hands-on activities. Create a colorful environment for students to learn music. Personalize the classroom in the form of interesting riddles, stories, games, activities, etc. Turn boring into vivid, abstract into popular, and give the classroom to students (Shi Guohua,2020).

To sum up, music is a discipline that improves aesthetic ability and purifies the soul. It is not only a knowledge, but also a washing of the soul.

CHAPTER 3
RESEARCH METHODOLOGY

This chapter provides a comprehensive overview of the methodology used in the study, covering the research design, participants, instruments and materials, procedures, data collection, and data analysis.

Research Design

Drawing from the experimental design framework of Praseto (2008:160), this study employs a pre-experimental design, specifically a one-group pretest-posttest design. Unlike true or quasi-experimental designs, pre-experimental designs do not include a control group, but they are useful for observing changes in a single group over time.

Experimental research is unique in that it involves the manipulation of variables and the measurement of their effects on dependent variables. In this study, a single group of Grade 10 students (N = 40) participated in both a pre-test and a post-test. The pre-test was administered prior to the instructional intervention to evaluate students' baseline knowledge in Western Music History and music concepts. The post-test was conducted after the intervention to assess learning gains.

The intervention involved the use of ThingLink interactive music courses to enhance students' understanding and engagement in the subject. The difference in performance between the pre-test and post-test was analyzed to determine whether the interactive instructional method had a statistically significant impact on students' music knowledge and aesthetic appreciation.

Research population and sample

The object of this study is:

1. The total number of students and teachers in the Airport School of the First Middle School in Kunming City, Yunnan Province, is 2,740, and the total number of teachers is 150. There are 500 students and 30 teachers in the primary school

department. There are 1,550 students and 120 teachers in the middle school department. There are two grades in the first and second grades in the primary school department. There are three grades in the middle school department: seventh grade, eighth grade and ninth grade. There are three grades in the tenth grade, eleventh grade and twelfth grade in the High School department. The total number of music teachers in the school is 4, 2 in the primary school department, 1 in the middle school department, and 1 in the High School department. The average number of people in each class is 40-45.

2. There are 2 principals, 10 management leaders, and 8 grade directors of the Airport School of the First Middle School in Kunming City, Yunnan Province.

Considered choosing the sample by size of the school. Criteria for consideration the size of the school is: Kunming First Middle School Airport School

- Middle School
  - 400 students in the first grade (7)
  - 400 students in the second grade (8)
  - 400 students in the third grade (9)
- High School
  - 360 students in the first grade (10)
  - 360 students in the second grade (11)
  - 320 students in the third grade (12)
- Primary School
  - 300 students in the first grade (1)
  - 200 students in the second grade (2)

Guandu District, Kunming City, Yunnan Province, is one of the four major urban areas of Kunming City. It is located in the southeast of the urban area of Kunming City and has a wide range. There are a total of 60 primary and secondary schools in Guandu District, including 25 general secondary schools, 30 general primary schools and 5 super-large educational group schools.

This research sample will select a representative super-large educational group school from 60 schools. The teaching methods of super-large education group schools cover school groups of different sizes, which is an important representative.

This research sample will select a class with equivalent music scores from the tenth graders of Kunming No. 1 Middle School Airport Branch. There are a total of 40 people in the sample group, of which Group A records the music scores of 40 people before using ThingLink interactive music for classroom learning, and Group B records the music performance of 40 people after using ThingLink interactive music courses for classroom learning. Finally, the two groups of data analysis are compared to see whether the students' grades have improved significantly after using the ThingLink interactive music course, whether the students' satisfaction with the course is recognized, and whether the students' enthusiasm continues to increase. The number of music teachers is 1. In the test evaluation, the number of principals is 1, the number of academic directors is 1, the number of grade team leaders is 1, and the number of music subject team leaders is 1.

All the sample students participating in this study are from the same school, the same grade, the same learning progress and knowledge mastery progress, and the same teacher.

Research instruments

This study employed a pre-experimental research method, specifically a one-group pretest-posttest design, to investigate the effectiveness of the ThingLink interactive music course in enhancing students' knowledge of Western Music History and digital music content.

The instruments used in this research include the following:

1. ThingLink for Learning Digital Content

The main instructional tool for this study was the ThingLink interactive platform, which allowed the creation of multimedia-based music learning modules. These modules were designed to deliver digital content related to Western Music History, incorporating images, audio, videos, and interactive hotspots. The ThingLink

platform enabled students to explore content actively and participate in self-directed learning both online and offline.

2. Pre-test and Post-test Assessments

A set of parallel-form tests was developed to evaluate students' understanding of Western Music History and basic music concepts before and after the instructional intervention. The tests were validated by expert music educators and piloted prior to implementation.

3. Questionnaire on Student Satisfaction

A structured questionnaire was designed to measure students' levels of satisfaction, engagement, and perceptions of the ThingLink learning experience. The questionnaire was adapted based on relevant literature and the contextual characteristics of music education in secondary schools.

4. Semi-structured Interviews

Semi-structured interviews were conducted with experienced music teachers to collect qualitative feedback regarding the usability, effectiveness, and pedagogical value of the ThingLink platform. The interviews were customized to align with the educational context and national curriculum standards.

5. Data Analysis Tools

Quantitative data from pre-tests, post-tests, and questionnaires were analyzed using SPSS to determine statistical significance. Qualitative data from interviews were examined through thematic analysis, supported by tools such as ECCLES for coding and interpretation.

The process of developing the research instrument consisted of the following steps:

1. ThingLink for Learning Digital Content

The development of the instructional tool **ThingLink for Learning Digital Content** was conducted through the following systematic steps:

1. **Curriculum and Content Analysis**: The researcher analyzed the content of the high school music curriculum, with a focus on **Western Music History**, which served as the core subject matter for developing the digital learning modules.

2. **Designing the Digital Learning Modules**: The content was structured into concise, clear, and level-appropriate **digital modules**, divided into sub-units based on chronological periods in Western music history.

3. **Multimedia Content Development Using ThingLink**: The learning materials were developed in a multimedia format, consisting of:

- **Images**, such as portraits of composers, musical works, and visual diagrams
- **Audio clips**, including samples of classical music
- **Videos**, such as short documentaries related to historical music periods
- **Interactive hotspots**, which allowed students to click and explore extended content independently

4. **Implementation on the ThingLink Platform**: The designed content was uploaded and structured using the **ThingLink** platform, which supports the creation of interactive infographics and visual maps. This allowed students to explore content and manage their learning pace both **online and offline**.

5. **Content Validation by Experts**: Three experts—specialists in music and educational technology—were invited to evaluate the content accuracy, media appropriateness, and alignment with the learners' level. A quality and suitability assessment form developed by the researcher was used. The evaluation yielded an overall mean score of **4.40**, which falls within the "Good" level.

6. **Pilot Testing with a Small Sample Group**: - A **pilot study** was conducted with a group of 10 students to observe user interaction, gather feedback, and refine the tool prior to full implementation.

7. **Final Revision and Completion of the Tool**: Based on the pilot results and expert feedback, the content, format, and presentation were revised to

ensure appropriateness. The final version of **ThingLink for Learning Digital Content** was then prepared for use in the actual experimental study.

2. Pre-test and Post-test Assessments

The development of the **Pre-test and Post-test Assessments** followed a structured process to ensure validity, reliability, and alignment with the research objectives, as outlined below:

1. **Defining Learning Objectives and Content Scope**: The researcher first identified key learning objectives based on the high school music curriculum, focusing on **Western Music History** and fundamental **music theory concepts**. These objectives guided the selection of test content to ensure alignment with the learning modules delivered through ThingLink.

2. **Designing Parallel-form Test Items:** A pair of **parallel-form tests** (pre-test and post-test) was constructed. Each test contained equivalent numbers of questions, types of items, and cognitive levels to ensure comparability. The questions included:

- Multiple-choice items
- Matching items (e.g., composer-to-era)
- Short-answer questions assessing key concepts

3. **Content Validation by Experts:** The initial drafts of the test instruments were submitted to a panel of **three expert music educators** for review. They evaluated each item based on:

- Content accuracy
- Clarity of language
- Appropriateness for Grade 10 learners
- Alignment with learning objectives

The Index of Item-Objective Congruence (IOC) was used to determine item validity. Items scoring below 0.5 were revised or removed.

4. **Pilot Testing**: The validated test instruments were piloted with a small group of students (n = 10) who shared similar characteristics with the target sample. The pilot aimed to:

- Assess item difficulty and discrimination
- Identify ambiguous or confusing items
- Estimate average test duration

5. **Revision and Finalization**: Based on the pilot data and expert feedback, necessary revisions were made to improve clarity, item balance, and reliability. The final version of the pre-test and post-test was confirmed as suitable for implementation in the main study.

6. **Scoring and Interpretation Guidelines**: A standardized answer key and scoring rubric were developed to ensure consistent assessment. Each correct response was awarded one point, and total scores were calculated for comparison between pre- and post-instruction performance.

Questionnaires on Student Satisfaction

A customized questionnaire was employed in this study to gather data.

The questionnaire assessing effective teaching was originally developed by Faranda and Clarke III (2004) and later adapted by Barnes and Lock (2010). Both versions focused on five key attributes: rapport, delivery, fairness, knowledge and credibility, as well as organization and preparation. For this study, the questionnaire was further modified to suit the specific context of evaluating effective music teachers in middle schools. It aimed to gather perceptions from High School students, High School music teachers, and middle school administrators regarding the qualities of effective music educators. The adapted questionnaire comprised 10 items, each rated on a five-point Likert scale.

10 = agree

5 = somehow agree

0 = disagree

The first requirement of the questionnaire determines that the identity of the respondents is: students, teachers and principals. Gender: male, female.

The second part of the questionnaire requires these 10 classroom learning problems related to the use of ThingLink interactive music and the effectiveness and characteristics of music teachers' teaching, based on the following five categories:a) rapport, b) delivery, c) fairness d) knowledge and credibility and e) organization and preparation.

Table 2 Questionnaire survey from

Thinglink Interactive Music Course Questionnaire Evaluation Form
For concise test content vocabulary, please judge the consistency of the problem and the learning purpose according to the test indicators.
Measure the following academic performance by marking √ in a box that matches your opinion. The following are divided into 3 levels:
+1 means to ensure that the test content is in line with the purpose of learning.
0 indicates that it is uncertain whether the test content is in line with the purpose of learning.
-1 indicates that the test content does not measure knowledge and is consistent with the purpose of learning.

Table 2 (Continued)

Thinglink Interactive Music Course Questionnaire Evaluation Form					
Questions to be investigated	Degree of satisfaction with the course	Satisfaction score	Evaluation level		
			(+1)	0	(-1)
1. Do you like to use Thinglink interactive courses to learn the knowledge content of music?	A. Like B. Same C. Don't like	A. Option 10 points B. Option 5 points C. Option 0 points			
2. What is your overall evaluation of using Thinglink interactive courses?	A.Like B.Same C.Don't like	A. Option 10 points B. Option 5 points C. Option 0 points			
3. Have your grades improved after using Thinglink's interactive course?	A.Progress B.Same C.No progress	A. Option 10 points B. Option 5 points C. Option 0 points			
4. Do you think Thinglink interaction is a rich and interesting music course?	A.Yes B.Same C.No	A. Option 10 points B. Option 5 points C. Option 0 points			
5. Do you think Thinglink interactive music courses can motivate you to learn?	A.Can B.Same C.Can't	A. Option 10 points B. Option 5 points C. Option 0 points			
6. What is your evaluation of the teacher's proficiency in using Thinglink interactive music courses?	A.Proficient B.Same C.Unskilled	A. Option 10 points B. Option 5 points C. Option 0 points			
7. What is your evaluation of the Thinglink application?	A.Great B.Same C.Very bad	A. Option 10 points B. Option 5 points C. Option 0 points			
8. Do you think using Thinglink interactive music courses is helpful for you to learn difficult Western Music History knowledge points?	A.Yes B.Same C.No	A. Option 10 points B. Option 5 points C. Option 0 points			

Table 2 (Continued)

Thinglink Interactive Music Course Questionnaire Evaluation Form					
Questions to be investigated	Degree of satisfaction with the course	Satisfaction score	Evaluation level		
			(+1)	0	(-1)
9. Will you take the initiative to use the Thinglink interactive music course to discuss the content knowledge points in the classroom with your classmates when you get home?	A.Yes B.Same C.No	A. Option 10 points B. Option 5 points C. Option 0 points			
10. When you encounter some non-academic music knowledge in your life, will you immediately use the Thinglink interactive music course to share with your classmates or teachers for discussion and research?	A.Yes B.Same C.No	A. Option 10 points B. Option 5 points C. Option 0 points			
Please make some comments and suggestions on the future use of Thinglink interactive music courses:					
Supplement: There are a total of 10 questions in the questionnaire survey, with a full score of 100. The full score of each question is 10, and the satisfaction options are divided into 3 (A. Agree 10 points B. Average 5 points C. Disagree 0 points). Please rate according to your real feelings after using it, and finally put forward some comments and ideas on the new teaching mode of using Thinglink interactive music courses.					

Table 3 Course experiment plan form

Experimental (Control Group)	Experimental data A Before the experiment (class of 4)	Experimental data B After the experiment (class of 4)
Delivery method	ThingLink Interactive Music Class	ThingLink Interactive Music Class
Teach cycle	3 - week (One music class every week)	3 - week (One music class every week)
Fixed number of people	40	40
The situation of leave of absence	Not have	Not have
Course duration	40 minutes / class	40 minutes / class
Environmental factors	The same natural and stable class environment and state	The same natural and stable class environment and state
Content	Music Course Content: Unit 4 (Western Music History) 1. Baroque classicism period: Historical time, famous musicians in the Baroque period, Western musical instruments in the Baroque period, musical genres. 2. Classical period: historical time, famous musicians in the classical period, Western musical instruments in the classical period, musical genre.	Music Course Content: Unit 4 (Western Music History) 1. Baroque classicism period: Historical time, famous musicians in the Baroque period, Western musical instruments in the Baroque period, musical genres. 2. Classical period: historical time, famous musicians in the classical period, Western musical instruments in the classical period, musical genre.

Table 3 (Continued)

Experimental (Control Group)	Experimental data A Before the experiment (class of 4)	Experimental data B After the experiment (class of 4)
	3. Modern Romanticism Period: Historical Time, Famous Musicians in the Modern Romantic Period, Western Musical Instruments in the Modern Romantic Period, Music Genre.	3. Modern Romanticism Period: Historical Time, Famous Musicians in the Modern Romantic Period, Western Musical Instruments in the Modern Romantic Period, Music Genre.
Homework	Music testbooks	ThingLink
Interest in learn	From the beginning, the seriousness gradually lost patience and interest, and the enthusiasm showed a downward trend, and there were students who were distracted.	Enthusiastic and lively, proactive serious in class
Feedback results in the class	Learning completion and knowledge mastery are average or poor.	Good learning completion knowledge mastery

*All external factors are the same and there is no difference.

Questionnaire Modification

1. Reviewed the questionnaires developed by Faranda and Clarke III (2004) and Barnes and Lock (2010) to serve as the primary reference for designing the research questionnaire.

2. Established the conceptual framework for this study by examining related research, theories, and concepts concerning the characteristics of effective High School music teachers. These characteristics were categorized into five main groups.

(1) Rapport

(2) Delivery

(3) Fairness

(4) Knowledge and Credibility

(5) Organization and Preparation

3. Defined and adapted key terms locally, then developed questionnaire items for each category based on the definitions and indicators from Faranda and Clarke III (2004). Initially, 40 items were created, with 20 selected for actual use.

4. Submitted the questionnaire to the advisor and three Western Music History, experts for content validity assessment using the Item Objective Congruence (IOC) method; only items with IOC values of 0.50 or higher were retained.

5. Revised the questionnaire according to expert feedback.

6. Conducted a pilot test with 10 selected High School students who were not part of the main study sample. The pilot results were used to evaluate the questionnaire's quality.

7. The quality of the questionnaire was divided into the following categories:

Statistical analysis was conducted using the Pearson Product Moment Correlation Coefficient, with questionnaire items demonstrating a discriminative power of 0.20 or higher considered acceptable.

8. The reliability of the 10 selected questions was evaluated using Cronbach's Alpha coefficient, with a threshold of 0.70 or above deemed satisfactory.
The finalized questionnaire was then printed and administered to the sample group.

Interview

Semi-structured interviews were conducted with High School students, middle school music teachers, and High School administrators. The interview protocols were designed using insights gathered from the questionnaire findings. Both written

transcripts and audio recordings of the interviews were collected to facilitate thorough data analysis.

The process is as follows:

1. Studied and analyzed data that got from the questionnaire.

2. Developed open-ended interview questions for middle school students, High School music teachers, and High School administrators, based on data obtained from the questionnaire.

3. Submitted the interview questions to the advisor and three experts in Western Music History, for content validity assessment using the Item Objective Congruence (IOC) method; only questions with IOC scores of 0.50 or higher were accepted.

4. Revised the interview questions according to expert recommendations.

5. Conducted a trial interview with three individuals outside the study sample, with the researcher and a research assistant carrying out and recording the sessions.

6. Refined the interview guide and resubmitted it to the advisor for accuracy verification.

7. Printed the finalized questionnaire for use with the study's sample group.

Data collection Procedures

This study adopted a pre-experimental research design, specifically a one-group pretest-posttest design, to examine the impact of ThingLink for Learning Digital Content on students' learning outcomes and satisfaction. The data collection was carried out with a sample of 40 Grade 10 students from a senior high school.

The study consisted of the following components:

1. **Research Setting and Participants**: The participants were 40 students from a single Grade 10 class, with approximately the same academic performance as other Grade 10 classes in the school. These students served as the sole experimental

group. The same group was tested before and after the intervention, ensuring consistent comparison within one group.

2. **Data Collection Tools**

- Pre-test and Post-test: Standardized test papers were used to assess students' knowledge of Western Music History and core music concepts before and after the 3-week instructional period.

- Questionnaire: A student satisfaction questionnaire was used to evaluate students' engagement and attitudes toward ThingLink for Learning Digital Content.

- Classroom Observation: Naturalistic observation was conducted without interfering with the learning process. The researcher observed students in their regular classroom environment to record learning behaviors and classroom interactions.

3. Experimental Procedure

This study employed a pre-experimental research design, specifically a one-group pretest-posttest design, with the following procedures:

3.1 Pre-test Phase: Prior to the intervention, a pre-test was administered to 40 Grade 10 students to assess their baseline knowledge and understanding of Western Music History and basic music concepts. This initial test helped establish a point of comparison for evaluating learning gains after the treatment.

3.2 Treatment Phase: During the three-week intervention period, the same group of students participated in music lessons delivered through ThingLink for Learning Digital Content. These lessons were conducted during their regularly scheduled music classes on Wednesdays. The traditional lecture-based music instruction was replaced with interactive multimedia modules, which included clickable images, embedded audio, video explanations, and other engaging features within the ThingLink platform. The instructional design emphasized student-centered learning, interactivity, and multimodal engagement to support the development of both conceptual understanding and aesthetic appreciation.

3.3 Post-test Phase: At the end of the three-week instructional cycle (after three Wednesday sessions), a post-test was administered using a parallel version of the pre-test. The purpose of this test was to evaluate any significant improvement in students' knowledge and understanding of Western Music History and music concepts following the use of ThingLink. The results of the post-test were compared with the pre-test scores to determine the effectiveness of the digital learning intervention.

These phases allowed for a controlled observation of student progress within a single group and provided evidence of learning outcomes achieved through the integration of ThingLink for Learning Digital Content in the music classroom.

4 . **Research Objectives Covered Through Data Collection**: The data collection aimed to explore the following areas:

- The general profile of the students (e.g., grade, age, prior music knowledge, current curriculum structure, and class schedule).

- The level of student mastery in Western Music History prior to and after the intervention.

- The effectiveness and impact of ThingLink for Learning Digital Content, including students' satisfaction with the new learning model.

All quantitative data from tests and questionnaires were analyzed using SPSS, while classroom observations were used to provide contextual support and insights into learning behavior under natural classroom conditions.

Data analysis

The data analysis in this study was divided into two categories: quantitative analysis and qualitative analysis, using appropriate statistical methods as follows:

1. Quantitative Data Analysis

Used for analyzing data obtained from pre-test and post-test assessments, as well as student satisfaction questionnaires.

(1) Descriptive Statistics

- Percentage

- Mean

- Standard Deviation

(2) Inferential Statistics

- Paired Sample t-test was used to compare pre-test and post-test scores of the same group in order to examine whether there was a statistically significant difference after the intervention.

- The significance level was set at α=0.05\alpha = 0.05α=0.05.

(3) Software Used

- SPSS was used for analyzing quantitative data from test scores and questionnaires.

- Microsoft Excel was used for data recording, organization, and basic visualization.

2. Qualitative Data Analysis

Used for analyzing classroom observation data and students' open-ended feedback.

- Analyzed using Content Analysis and Thematic Analysis techniques.

- Qualitative data helped support the interpretation of students' learning outcomes in the context of real classroom environments.

CHAPTER 4
RESULTS

This chapter presents the results of the research, which aimed to examine the impact of using **ThingLink for Learning Digital Content** on high school students' mastery of basic knowledge in music, particularly in the area of **Western Music History**.

The objectives of the analysis were as follows:

1. To compare students' learning outcomes before and after using ThingLink for Learning Digital Content.

2. To examine students' satisfaction with the ThingLink for Learning Digital Content in the context of Western Music History among junior high school students in China.

The data were collected and analyzed using both **quantitative** and **qualitative methods** in accordance with the pre-experimental research design. The procedures and results are summarized as follows:

- **Quantitative Data Analysis** consisted of two main components:

- Calculation of **mean scores and standard deviations** from pre-test and post-test results to assess students' academic improvement.

- A **paired sample t-test** was conducted to compare the differences in students' test scores before and after the intervention, to determine whether the observed changes were statistically significant.

- **Qualitative Data Analysis** was based on students' feedback and reflections collected through **open-ended questionnaires** and **semi-structured interviews**. This data provided insights into students' satisfaction, engagement, and opinions regarding the use of interactive learning through ThingLink.

All data were systematically analyzed using appropriate statistical tools (e.g., SPSS) and thematic coding methods to ensure the accuracy and reliability of the findings.

Results of High School Students' Basic Music Knowledge Test on Western Music History: Pre-test and Post-test Comparison

This section presents the comparison of pre-test and post-test scores of High School students on the Western Music History segment of the basic music knowledge test. Additionally, it examines the score changes of middle school students in the same segment after using ThingLink interactive music courses. The goal of this chapter is to address the study's first research question. Descriptive statistics including mean scores and standard deviations were calculated and analyzed.

Table 4 Basic knowledge of music subject Western Music History part test comparison of pre-examination and post-examination results of middle school students

Test	N	Mean	S.D.	T	Df	P
Pre-test	192	9.44	4.7	7.56	47	0.00**
Post-est	192	14.27	5.41			

The conceptual value level is 0.05

N = Total number of students

Mean = Average score

S.D. = Measure of score variability (standard deviation)

T = Value from the t-test distribution

** = Significance at the 0.05 probability level

As shown in Table 4, the pre-test mean score was 9.44, with a standard deviation of 4.7. The average score after the test is 14.27 and the standard deviation is 5.41.

It can be considered that there is a difference between the pre-test and post-test scores of the sample of the basic knowledge of music subject Western Music History, which shows that students' scores after the test are higher than those before the test, and the statistical T distribution value is 7.56.

The experimental results show that after students learn about the history of Western music based on the use of ThingLink interactive music courses, their test scores are significantly higher than those before using ThingLink interactive music courses, which shows that ThingLink interactive music courses really help students learn about music subject knowledge, and the post-test score data is significantly higher than the test money score data.

Table 5 The average and standard deviation before and after the Thinglink interactive music course sample test

Test	M	S.D.
Pre-test	9.44	4.7
Post-test	14.27	5.41

According to Table 5, the average predicted score of the samples based on the ThingLink interactive music coursused for learning and participation in learning activities—was 9.44 before the intervention. By the end of the experiment, the average post-test scorehad increased to 14.27. The survey resultsindicate that the post-test score was significantly higher thanthe pre-test score. The statistical analysis revealed a significant difference at the 0.05 level ($t = 6.34$, $p < 0.01$), as illustrated in theaccompanying figure for better understanding.

Table 6 High School students learn the basic knowledge of music subjects through the Thinglink interactive music course and compare their achievements before and after the history of Western music.

Student Number	Pre-test	Post-test
01	7	6
02	4	19
03	9	13
04	8	9
05	18	27
06	5	9
.....	.....	.....
40	9	18
Mean	**9.44**	**14.27**
	Score 30	

(Please refer to the original form in the appendix for the complete picture data.)

As shown in Table 6, the score after the test shows that there is a difference in the score before and after the sample test. The analysis found that the sample's score improved after training in the interactive music course using Thinglink.

In a word, through the teaching research of the Western Music History part of the basic knowledge of the music subject of the Thinglink interactive music course project, and the quantitative data obtained from the research sample, the results show that this new teaching method can effectively improve the Western Music History part of High School students to learn the basic knowledge of music. The ability to master. Compared with the results before the test, the sample scores higher after the test.

In addition, qualitative data are also collected to explore the views, opinions and results of High School students on the investment of Thinglink interactive music courses in the teaching of music subjects, and to support the effectiveness of teaching

the Western Music History part of the basic knowledge of middle school music subjects based on the use of Thinglink interactive music courses.

Qualitative results

High School students' views on using Thinglink interactive music courses to learn.

In order to effectively explore and collect students' opinions on learning using Thinglink interactive music courses, the sample needs to use focus group technology, and a semi-structured interview questionnaire is conducted after adopting a learning method based on the use of Thinglink interactive music courses. The results of the semi-structured interview are divided into two parts. First of all, analyze the collected data samples to determine their views on the relevance of academic knowledge in the teaching content. The second point is to analyze and study the collected data to determine the supplement of the additional knowledge points obtained by students from the teaching of the new curriculum. The third point is to summarize students' opinions on Thinglink interactive music courses. In addition, the evaluation information of the learning activities in the project display and the quality of the final project are also introduced to confirm the results of qualitative data, so as to better understand and analyze.

The sample needs to be divided into one groups (one class for each group) with 40 participants in each group. Among them, Group 1 uses Thinglink interactive music courses for music discipline guidance and research(Use ThingLink interactive music courses to teach knowledge of Western Music History in music disciplines .) ; Group 2 uses traditional music courses for music discipline guidance and research (There is no use of ThingLink interactive music courses to teach Western Music History knowledge in music disciplines.) Therefore, the sample needs to be semi-structured interviews and questionnaire feedback according to each group. Use interview and questionnaire content analysis to study the results of qualitative data.

Before the experiment, the hypothetical conclusion was that the ThingLink interactive music course was of great help and breakthrough for students to learn the

knowledge of music subjects. Combined with the post-experimental test data, the conclusion was consistent with the hypothetical conclusion. Students have achieved excellent results in learning the history of Western music using the ThingLink interactive music course, which is far from the previous results without using it.

Therefore, the experimental results can be obtained as follows: the data results after the test are consistent with the hypothetical results, and the experimental hypothesis conclusion is valid.

Academic knowledge

The sample data is used to record students' views and opinions on the course teaching mode before and after using ThingLink interactive courses to learn about Western Music History. For example, the first group of students (learning using Thinglink interactive music courses) said that learning based on Thinglink interactive music courses greatly improved their music knowledge and helped them better understand music courses.

Table 7 Sample table of interview results (interview summary data)

ThingLink Interactive Course Satisfaction survey data
Mean Scores Interpretation of the score
4.50-5.00 points Very high
3.50-4.49 points High
2.50-3.49 points Moderate
1.50-2.49 points Low
1.00-1.49 points Very low

Table 7 (Continued)

Satisfaction	Number of people	Percentage %
Very high	18	45%
High	16	40%
Moderate	5	12.5%
Low	1	2.5%
Very Low	0	0
Total	**40**	

According to Table 7, the following conclusions can be drawn. The score of students' satisfaction is divided into 5 levels:

4.50-5.00 points Very high

3.50-4.49 points High

2.50-3.49 points Moderate

1.50-2.49 points Low

1.00-1.49 points Very low

The total number of people in the experimental class is 40. In the experimental cycle, 40 people completed the course experiment and participated in the test performance evaluation before and after the experiment.

According to the interview survey data, it can be concluded that 18 out of 40 students in the class gave a very high score, accounting for 45% of the total number of students in the class. 16 out of 40 people in the class gave a high score, accounting for 40% of the total number of students in the class. 5 out of 40 people in the class gave a medium score, accounting for 12.5% of the total number of students in the class. Only one out of 40 students in the class gave a low score, accounting for 2.5% of the total number of students in the class. None of the 40 people in the class gave the lowest score.

Of the 40 people in the class, a total of 34 people achieved high and very high scores, accounting for 85% of the percentage of the class.

Everyone in the class can only have one chance to choose to score, and no selection or multiple selection are allowed.

According to the interview data, it can be concluded that:

1. 85% of students expressed their satisfaction with this new model after using the ThingLink interactive music course to learn about Western Music History, and are willing to continue to use ThingLink interactive music course to learn music subject knowledge in the future.

2. 12.5% of students think that the teaching mode of using ThingLink interactive music courses to learn Western Music History is relatively medium. The reason why it is not high is that individual classmates will express some views in the background of ThingLink, which affects other students' learning music knowledge.

3. The only student who gave low scores explained that he was not good at using new intelligent apps, so using ThingLink interactive music courses to learn about Western Music History made him feel embarrassed. He needed a certain amount of time to adapt to how to use the ThingLink application, which would make It's harder for him to study than his classmates, so he gave a low score. However, after class, he expressed his willingness to continue to try using ThingLink interactive music courses to learn, and was willing to break through his weaknesses and try his best to keep up with the progress of other students.

On the other hand, students from other classes in the tenth grade also shared similar ideas.

Students who have visited and studied with Thinglink interactive music courses said:

"I'm not very good at learning the basics of music subjects, especially the Western Music History part, but after learning by visiting the teaching experience of using Thinglink interactive music courses, I feel that music knowledge is very simple and interesting for the first time."

"I used to think that the basic knowledge of music subjects was difficult to learn and required a certain amount of talent, but after watching other classes using Thinglink interactive music courses, I found that most people could actually learn the content of music knowledge."

"By visiting other classes using Thinglink interactive music courses, I feel that it has broken the limitations of time and space. As long as I encounter relevant music knowledge or things, I can share them with my classmates or teachers. After they receive my sharing, they can give me feedback in time, which makes me feel good!"

The answers of the above students show that most of them have a positive attitude towards the Western Music History section based on using the Thinglink interactive music course to learn the basics of music. They believe that this new teaching model can effectively help them understand and master the content of the course, such as historical periods, famous musicians and the background of the times, and can fully describe the musical style, musical works and representative instruments of the period. They expressed their desire to continue to use Thinglink interactive music courses in music subjects in the future, even if their basic knowledge of music is not perfect and proficient enough. In this three-week three-period project study, 95% of students think that the interactive course learning method is very interesting. The remaining 5% of the students thought that some knowledge points could be simplified and gave their suggestions and ideas. For example: Unit 3 "The World of Musical Instruments". The first group of students shared their favorite instruments and the types of instruments they were good at playing, and explained why they liked the instrument and the joy and meaning it brought them. The first period of the "Baroque period" can allow students to understand the most representative and turbulent period in the history of Western music. Musical creativity and imagination reached their peak during this period. The second period, the "classical period", can allow students to understand the milestone in the history of Western music, and the musical genre and creative style have changed from single to diversified. In the third period, the "Romantic Period" can let students know the most personalized and developed change period in the history of

Western music. The music creation styles of various genres are rich and diverse, and hundreds of flowers compete with their own characteristics.

Non-academic knowledge

The sample data recorded the views and opinions of one class of students on the teaching mode of the course used through interviews and questionnaires. In addition to the necessary academic knowledge of music subjects acquired by students through the study of Thinglink interactive music courses, non-compulsory academic knowledge (extended comprehensive knowledge) also left a deep impression on students and had a long-term impact. Therefore, the students in the first group said:

"I want to continue to learn through this new teaching method, because I like the rich content and divergent thinking of the course, which allows me to learn more colorful knowledge. I can listen to other people's views and ideas in the course, and share my own insights and experiences. In addition, the Internet can also be used in the course. In group discussion and exploration activities, everyone can help each other to complete the learning content together."

Ten students who gave high scores thought that:

When using the Thinglink interactive music course, they feel that the learning method and atmosphere are different from the previous courses, which enhances their interest in learning the basic theoretical knowledge of music.

In addition, when students have different opinions in the group discussion, they can draw conclusions through online voting, which effectively avoids the problem of unnecessary links affecting the progress of the course. They can also use different color pens in the Thinglink program to co-edit the learning content materials provided by teachers, or use drawing tools to mark their ideas and views on a problem, so that everyone can participate in learning and discussion.

Thirteen students with very high scores believe that by using Thinglink interactive music courses to learn, they have the opportunity to cooperate with their friends to complete learning tasks. When you encounter differences in learning, you can write down your personal opinions and submit them to the teacher through the picture editing function of the Thinglink program. After receiving the teacher's reply, they can continue to discuss the problem.

Five of the 18 students with very high scores said that by studying the Thinglink interactive music course, their mastery of music subjects has improved significantly. As they expected, their confidence in learning the basic knowledge of music subjects has also been encouraged.

"I have the confidence and ability to learn the knowledge of music well, actively participate in group discussion activities, use musical skills to sing, share my ideas and opinions with my classmates, and actively participate in discussions."

However, five students with a medium score gave feedback on some of the problems and ideas they encountered in the learning process.

When we learn new knowledge points and contents, we encounter some difficulties. We have to face the whole class. Some students need to listen to books and practice recordings repeatedly because of their slow learning mastery. At the end of each class, the whole person is very tired, and sometimes even bored, unable to grasp more of the knowledge learned in the classroom. Knowledge and content are often remembered and forgotten, and the learning time is relatively long.

"When we need to complete a task together, if our team members have some minor omissions and impacts in the process of participating that day for various reasons, it will prevent us from completing the homework within the time specified by the teacher, which will affect the performance of the whole group and even the whole class."

From the perspective of the required academic knowledge and non-required non-academic knowledge shared by students, they have gained this knowledge from the study of Thinglink interactive music courses. It can be concluded that students have the opportunity to learn music through consultation and cooperation with friends and classmates. Learning based on the use of Thinglink interactive music courses allows students to freely carry out divergent thinking learning within a controllable range, so as to explore and pursue the subjects they are interested in. The content, plan and outline of the study remain unchanged. Adopt different teaching methods for teaching, thinking and exploration. In the event of a difference of opinion, make a decision and draw a conclusion by voting. Students' confidence in music knowledge has been significantly

improved. According to the average score of the project display evaluation, the results from the Baroque period of the first period to the Romantic period of the third period have improved slightly: the average score of the first period is 9.5 points, the average score of the second period is 9.4 points, and the average score of the third period is 9.6 points (out of 10 points). Because students have the opportunity to expand their knowledge and interact with their classmates in the learning process through Thinglink. After each class, there is a music knowledge consolidation review competition game. These new teaching contents and teaching activities enable students to quickly understand and remember the knowledge points, consolidate the content of the previous lesson, and greatly enhance students' self-confidence and enthusiasm for learning.

The students' opinions on the open-ended questions in the questionnaire are as follows:

1. The advantages of learning in Thinglink interactive music courses

According to the results of the questionnaire survey, students who use the interactive course of Thinglink in the class have said that learning the basic knowledge of music subjects through this new teaching method not only makes it easier for them to understand and remember the knowledge points, but also gives them a sense of fun and accomplishment in the learning process. At the same time, they believe that through the function of the Thinglink program, it provides a platform for teachers and students to interact and discuss in a timely manner. Everyone can intuitively understand other students' views on knowledge points, which is conducive to students' progress and development.

2. Limitations of Thinglink interactive music courses

However, very few students hold different views. They believe that some students who are not serious enough will use the function of Thinglink to carry out activities other than learning, which will affect the learning progress of other students in the course. The other three students suggested that they prefer a quiet and single teaching mode, so that they can devote themselves to learning.

3. The limitations of Thinglink program in Chinese education and teaching

The Thinking program has not been fully popularized in China. At the same time, the program does not have an automatic language switching function. For most middle school students in China, the all-English operation method requires certain adaptation time and skills. Compared with ordinary middle school students, the Thinking program at this stage may be more suitable for students in the international class. Therefore, at this stage, it has been found that there are certain limitations and timeliness to widely promote and use in domestic middle schools in China.

In short, the new teaching model of Thinglink interactive music courses allows students to easily and happily acquire the necessary academic knowledge and expand non-academic knowledge. Regarding the views of students learning the basics of music subjects by using Thinglink interactive music courses, the results show that they have a positive attitude towards learning from Thinglink interactive music courses. Through the new teaching model, students can understand and master the knowledge they have learned more easily and efficiently. Rong said that he used the knowledge learned in the course to complete simple music choreography, rhythmic choreography, singing and dancing, etc., thus providing remarkable learning results. To a certain extent, the songs learned are composed of musical instruments, vocals, chords, etc. The students also said that they were very happy in the process of learning the Thinglink interactive music course. They used the functions of the Thinglink program to share their learning experience, learning methods and way of thinking with their classmates, and explained their views in detail in the demonstration. Although they are still in the research and exploration stage, the students are still very willing to continue to participate. Learn about music through this new teaching model.

Table 8 ThingLink Interactive Music Course Questionnaire feedback statistics

	Thinglink Interactive Music Course Feedback Questionnaire				
	Thinglink Interactive music course satisfaction questionnaire:				
	·4.50-5.00 points for very satisfied				
	·3.50-4.49 points for general satisfaction				
	·2.50-2.49 points for general				
	·1.50-2.49 points for dissatisfaction				
	·1.00-1.49 points for very dissatisfied				
	* (Number √ under the selected score.)				
	Satisfaction scoring				
Student number	4.50-5.00	3.50-4.49	2.50-3.49	1.50-2.49	1.00-1.49
01	√				
02		√			
03	√				
04	√				
05	√				
06		√			
07	√				
08	√				
09	√				
10	√				
11	√				
12	√				
13	√				
14	√				
15	√				
16		√			
17	√				
18	√				
19			√		
20	√				
21	√				
22	√				
23	√				

Table 8 (Continued)

	Satisfaction scoring				
Student number	4.50-5.00	3.50-4.49	2.50-3.49	1.50-2.49	1.00-1.49
24	√				
25	√				
26	√				
27	√				
28	√				
29	√				
30	√				
31	√				
32			√		
33	√				
34	√				
35	√				
36			√		
37	√				
38	√				
39	√				
40	√				
Total	40				
Data analysis	4.50-5.00 points: 34 (85%) 3.50-4.49 points: 3 (7.5%) 2.50-3.49 points: 3 (7.5%) 1.50-2.49 points: 0 1.00-1.49 points: 0 Very satisfied people account for 82% of the total number of people. Generally satisfied people account for12% of the total number of people. The average number of people accounts for 6% of the total number of people.				

Table 9 Students attitude to learn about the Western Music History based on using ThingLink interactive music courses

Level of Interpretation				
Mean Scores Interpretation of the score				
4.50-5.00 points Very high				
3.50-4.49 points High				
2.50-2.49 points Moderate				
1.50-2.49 points Low				
1.00-1.49 points Very low				
Items	**Mean**	**S.D.**	**Rank**	**Level of satisfaction**
1.It is very interesting to learn about the history of Western music through the interactive music course of Thinglink.	4.37	.530	2	High
2.Learning Western Music History through Thinglink interactive music courses can create a good atmosphere in the classroom.	4.35	.601	3	High
3.Through Thinglink interactive music courses, you can be provided with many opportunities to participate in learning.	4.28	.645	5	High
4.Through Thinglink interactive music courses, you can memorize music knowledge more easily.	4.35	.601	4	High
5.Through the Thinglink interactive music course, you are provided with an opportunity to practice the music knowledge you have learned.	4.41	.678	1	High
6.Through the interactive music course of Thinglink, you are more enthusiastic and motivated to learn music.	4.22	.721	10	High
Total	**4.26**	**.111**		**High**

According to Figure c, the figure shows students' attitude towards learning Western Music History knowledge through ThingLink interactive music courses, from which the four contents with the highest consensus can be obtained in order: Item 5 Through the Thinglink interactive music course, you are provided with an opportunity to practice the music knowledge (average score = 4.41), Item 1 It is very interesting to learn about the history of Western music through the interactive music course of Thinglink (average score = 4.37), Item 2 Learning Western Music History through Thinglink interactive music courses can create a good atmosphere in the classroom (flat Average score = 4.35), and item 4 Through Thinglink interactive music courses, you can memorize music knowledge more easily (average score = 4.35). The first four items are considered to be high-level explanations.

Conversely, the two items rated with the lowest level of consistency are: item 3 Through Thinglink interactive music courses, you can be provided with many opportunities to participate in learning (average score = 4.28) and item 6 Through the interactive music course of Thinglink, you are more enthusiastic and motivated to learn music (average score = 4.22). Then all the projects have reached a high level of interpretation.

Students' attitude towards learning Western Music History through the learning method of ThingLink interactive music courses has an overall average score of 4.26, which is at a high level.

Table 10 Teaching Schedule

Week	Date Range	Topic	Learning Content (details of two type of courses were shown in appendix)
1	Nov 4 – Nov 8, 2024	**Baroque Era**	Historical background, key composers, musical characteristics, representative works.
2	Nov 11 – Nov 15, 2024	**Classical Era**	Historical background, key composers, musical forms, stylistic features.
3	Nov 18 – Nov 22, 2024	**Romantic Era**	Historical background, key composers, emotional expression, nationalism in music.
4	ThingLink interactive course post-learning test		

Table 11 ThingLink interactive music course expert scoring evaluation results

ThingLink interactive music course expert scoring evaluation results						
For concise test content vocabulary, please judge the consistency of the problem and the learning purpose according to the test indicators. Measure the following academic performance by marking √ in a box that matches your opinion. The following are divided into 3 levels: +1 The evaluation satisfaction reached all 3 questions. 0 The evaluation satisfaction reaches 2 questions satisfaction. -1 There is only one satisfactory question in the evaluation of satisfaction.						
Expert	Q1. ThingLink interactive music courses are very effective in helping students learn music subjects.	Q2. The students who teach ThingLink interactive music courses are very satisfied.	Q3. Students who use ThingLink interactive music courses to learn music subjects are more motivated than before.	Satisfaction score		
				+1	0	-1
Headmaster	√	√	√	+1		
Academic Director	√	√	√	+1		
Grade team leader	√	√	√	+1		
Music team leader	√	√	√	+1		
Total	All passed	All passed	All passed			
Remarks	The four teachers, principal, academic affairs director, grade team leader and music team leader, follow the teacher to listen to lectures and provide learning feedback in each course within three experimental cycles.					

Expert evaluation suggestions

1. Principal's feedback: This is a very innovative course. Unlike the previous traditional courses, the ThingLink interactive music course integrates new technology and teaching concepts. The course is very interesting, convenient and fast. You can learn and give feedback anytime and anywhere, which solves the problem of limited

space and time. It is a very novel and unique new teaching method, which is worth vigorously promoting in school.

Suggestion: The music curriculum can be made more perfect according to the requirements of the new course standards in 2022, and a plan can be written for the observation and guidance of teachers in all disciplines in the whole school.

2. Feedback from the director of academic affairs: The ThingLink interactive music course is very interesting. Students' enthusiasm is high, and the feedback on after-class homework is very good. The results after the experiment have been greatly improved compared with the results before the experiment. It is a very novel new teaching method.

Suggestion: I hope to integrate a whole set of knowledge of this learning music discipline into a complete ThingLink interactive music course and put it into teaching work.

3. Feedback from the grade team leader: A very outstanding course uses the means of scientific and technological innovation to increase the fun and flexibility of the subject course. Corresponding teaching plans can be formulated for students of different levels, so that each student can master the subject knowledge smoothly and easily.

Suggestion: Share how to use the ThingLink program and put it into the teaching work of other disciplines or sections.

4. Feedback from the music team leader: Breaking the traditional music curriculum model, it is a new curriculum model worth exploring and researching, providing a broad development space for music subject teaching.

Suggestion: Make a more complete course teaching plan and put it into other grades to use it, and teach ThingLink interactive music courses for other members of the music group to use.

CHAPTER 5
DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

This study aims to explore the impact of learning interactive music courses based on Thinglink on the ability of middle school students to master the basic knowledge of music subjects and the history of Western music. This chapter outlines the research results, summarizes and discusses the research results and teaching significance, and puts forward further in-depth research suggestions.

Research summary

The purpose of this study is to explore the effectiveness of using Thinglink interactive music courses in teaching the basic knowledge of music disciplines in the history of Western music. This new teaching method introduces digital applications into the teaching of music subjects and is used in Kunming No. 1 Middle School Airport School, a public K12 school in Guandu District, Kunming City, Yunnan Province, China. Ordinary eighth-grade students learn the basic knowledge of music subject Western Music History part through this new teaching method, and record students' attitude and feedback on the basic knowledge of music subject Western Music History part after learning. The learning model based on the digital application of Thinglink has attracted the interest of most in-service music teachers. Music teachers in most countries, including China, are conducting a large number of research experiments on such teaching methods, and have achieved good teaching results and advantages. However, there is very little research data on students from primary and secondary schools, especially public schools, who use Thinglink interactive music courses to teach in Yunnan, China. At the same time, there are relatively few studies on the attitude and feedback of eighth-grade students on the basic knowledge of music subjects in the history of Western music. Surveys based on Thinglink interactive music courses are also rarely mentioned. Therefore, the previous research of this project aims to make up for the gap in the study and research of the basic knowledge of music subjects for ordinary students in the eighth grade of Guandu District Middle School in Kunming City, Yunnan

Province, China. The focus is on the level of students' mastery of the basic knowledge of music subjects after learning through the Thinglink interactive music course, as well as their attitude and ideas for learning the basic knowledge of music subjects in this way.

The objectives, research problems, participants, research tools, procedures and data analysis of this study are summarized as follows:

This study uses both quantitative and qualitative data collection and data analysis.

Objectives of the study

This research uses Thinglink interactive music courses to teach, aiming to cultivate the influence of students' basic knowledge of music subjects and musical aesthetic ability;

Explore and study students' views, attitudes and opinions on the new teaching model of Thinglink interactive music courses in the teaching of basic knowledge of music subjects.

Participants in the study

The participants of this study were selected from 400 ordinary students in the eighth grade of the airport school of Kunming No.1 Middle School, a public K12 school in Guandu District, Kunming City, Yunnan Province, China. The sample selection adopts the hierarchical random sampling method, and 40 students are selected from one classes with similar music scores and divided into two groups:

Experimental Group (Group A): 40 students use ThingLink to teach interactive e-learning courses.

(Record and compare the results of students before and after using ThingLink interactive music courses.)

All students are taught by the same music teacher to ensure the fairness of the experiment. The selection of Kunming No.1 High School Airport Campus is based on its representativeness. As a large-scale educational institution covering a variety of schools, it has become a valuable reference for this study.

Problems of research

In this study, researchers mainly answered the following two research questions:

1. How effective is the Using ThingLink for Learning Digital Content in junior High School Western Music History,?

2. Does the Using ThingLink for Learning Digital Content improve students' learning outcomes compared with traditional teaching methods?

3. To what extent are students satisfied with learning through Using ThingLink for Learning Digitai Content?

Research tools

This study uses two research tools: the first tool is before and after the test of basic knowledge of music subjects. They share the comparison of students' learning scores and use the SPSS program for experimental data analysis. The second tool is WPS, which is used to sort out statistical data and record research result reports, as well as compile questionnaires for structured interviews and basic knowledge test papers of music disciplines.

1. Before and after the test, it aims to measure students' understanding of Western Music History before and after the intervention.

2. The student questionnaire aims to assess students' satisfaction with Using ThingLink for Learning Digitai Content.

3. Interviews were conducted with school students, middle school music teachers and middle school administrators to gain an in-depth understanding of the different views on the effectiveness of using ThingLink for interactive e-learning courses in Western Music History,.

Research Procedure

In order to carry out this study smoothly, the participants were assigned to conduct a pre-test of the Western Music History part of the basic knowledge of music to explore the mastery of the music knowledge they are about to learn. Next, Group A will use the Thinglink interactive music course to study the basic knowledge of Western Music History for 3 weeks. Three weeks later (3 hours), 40 students from one classes

were assigned to take the music basic knowledge test to observe the changes in the Western Music History part of their mastering the basic knowledge of music. In addition, they will also accept semi-structured interview questionnaires to express their attitudes and ideas about this new and traditional learning methods.

Data analysis

I will use a similar comparative data analysis: control implementation analysis method. A class with the same grades in the tenth grade compared the results before and after using the ThingLink interactive music course to learn about the history of Western music. Data A records the music results before using ThingLink interactive music courses to learn about the history of Western music. Data B records the music results after using ThingLink interactive music courses to learn about the history of Western music. After the end of the experimental cycle, conduct a classroom test again to analyze and compare the two sets of data before and after. The test results show that the test results after using the ThingLink interactive music course to learn about Western Music History are significantly higher than those before using the ThingLink interactive music course.

A: Using ThinLlink interactive music classroom teach mode, the learning efficiency has improved significantly compared with the previous one. Most students maintain a very high interest in learning, and the content mastery is better than before.

B: The use of traditional teaching methods does not affect the effectiveness of learning. Some students are still less effective than before.

Summary of the survey results

Character data of participants

The survey results showed that male participants accounted for 67.2% and female participants accounted for 32.8%. The majority of participants (77.5%) were 14 years old, a few participants (15.3%) were 13 years old, and a very small number of participants (7.2%) were 15 years old. Regarding the learning situation, 30.22% of the participants had excellent grades in all subjects, 20.72% of the participants had excellent Chinese scores, 24.45% of the participants had excellent grades in

mathematics, 18.81% of the participants had excellent English scores, and 13.1% of the participants had excellent grades in mathematics and English. The performance is relatively excellent, with 2.08% of the participants performing well in music, sports and art. In addition, 86.66% of the participants have never participated in music training outside the school, and have only received regular music courses in kindergarten or primary school.

The effectiveness of using Thinglink interactive music courses in the teaching of basic knowledge of music subjects

Test students' mastery of the basic knowledge of music subjects through 20 questions to examine the differences between students' use of Thinglink interactive music courses before and after learning. According to the survey results, the average score of the participants before the test was 9.44 points, with a standard deviation of 4.7 points; after the test, the average score increased to 14.27, accompanied by a standard deviation of 5.41. This indicates an improvement compared to the pre-test scores, with a t-value of 7.56 confirming statistical significance. Consequently, the use of ThingLink interactive music courses has markedly enhanced participants' basic knowledge of music subjects and Western Music History.

Students' attitude towards learning the basic knowledge of music subjects through Thinglink interactive music courses

Through 5 closed-ended questions and 5 open-ended questions in the questionnaire, students' attitudes towards learning the basic knowledge of music subjects through Thinglink interactive music courses are explored. The questionnaire project and the participants' attitudes and ideas towards learning the basics of music disciplines through the Thinglink interactive music course.

The survey results showed that in the questionnaire, the top 5 items were closed questions and were selected by the participants as the highest recognition. The first question is "Learning through Thinglink music courses helps you understand notes", the third question is "Learning through Thinglink music courses is very interesting", and the second question is "Learning through Thinglink interactive music courses is great. For the open-ended questions in the questionnaire, most participants believe that

learning the basics of music through the Thinglink interactive music course not only helps them recognize and remember all the notes, but also makes them have fun in the learning process. However, some participants also believe that some students are not really learning, and few participants prefer traditional music courses to learn.

Discussion

This section presents the research findings and examines their connections with prior related studies. The effectiveness of interactive music courses using ThingLink has been widely supported by scholars in the field of Western Music History,. Therefore, it is valuable to discuss these results by comparing the similarities and differences between the current study and previous research.

The first research question

Based on the first research question, this study explores the changes in the test scores of eighth-grade students of Kunming First Middle School Airport School in a public K12 school in Guandu District, Kunming City, Yunnan Province, before and after using Thinglink interactive music courses to teach basic knowledge of music subjects. The analysis results show that their post-test scores are higher than their pre-test scores. Although the researchers have calculated the scores of the basic knowledge of music subjects in the traditional teaching mode and the new teaching mode respectively, the results still show that students who learn the basic knowledge of music subjects through the Thinglink interactive music course have significantly improved their scores after the test, while those who study music science through traditional music courses The scores of students with basic knowledge have almost no change after the test. Therefore, the researchers believe that after learning through the Thinglink interactive music course, students' basic knowledge of music subjects has been significantly improved.

The above findings and Liu Huan. Analysis of the implementation of music curriculum standards and teaching status in compulsory education [D]. The research of Guizhou Normal University (2018) is consistent, which aims to check whether the new music curriculum has an impact on students' memory. The results of this study may be caused by one of the interesting features of the new music curriculum. When students

are interested in what they are doing, they may learn more relaxedly and be able to remember knowledge points and content better and faster. (LiuHui&Xielin, 2018; quoted from Guizhou Music Discipline Education, 2019)

In addition, the research results also support Wang Yifan. Song analysis in primary school music textbooks and the characteristics of song piano accompaniment [D]. The study of the Central Conservatory of Music (2019) aims to investigate the impact of using ThingLink music courses to improve the knowledge of music subjects for sixth-grade primary school students. In these studies, students test the reason for the increase in the basic knowledge of music after learning through applications as a hypothesis, because one of the characteristics of the course usually requires competitors. Therefore, it causes competition among students. In this way, students are often encouraged by competitive emotions. The higher the students' motivation for learning, the higher the learning energy and mood, so the results are shown with their scores.

At the same time, the results collected from this study are related to Wang Yue. On the development of personalized music cultivation in primary school Western Music History, in China [D]. The research results of the Central Conservatory of Music (2019) are very similar. This study explores the achievements of sixth-grade students after studying electronic courses. Another reason why students in these two studies perform better in the test after studying the electronic music course may be affected by one of the characteristics of the electronic course, that is, the ability to attract students' attention. So students may focus more on this learning activity, because their attention is attracted by e-courses. When students focus on what they are doing, they are often better able to stick to this behavior.

The second research question

What is the attitude of students to learn the basic knowledge of music subjects through Thinglink interactive music courses?

Regarding the second research question, this question explores the attitude of tenth-graders to learn the basic knowledge of music subjects through the Thinglink

interactive music course, and analyzes the answers in the questionnaire. The survey results showed that most participants thought it was a very interesting class that could create a good learning atmosphere. In addition, they also said that learning the basic subjects of music subjects in this way can not only help them memorize knowledge points, but also improve their music knowledge.

Not only that, the students also said that after mastering the basics of music through this new learning method, they feel very happy and their enthusiasm for learning is even higher. This study aims to explore the academic performance of eighth-graders of Kunming No. 1 Middle School Airport School in one month before and after learning the basic knowledge of music subjects through e-courses. Research results show that students are more enthusiastic and active than traditional teaching methods in the process of learning through Thinking interactive courses.

In addition, students admit that after learning through the Thinglink interactive music course, their memory of the basic knowledge of music subjects has improved. The research results show that after learning through the Thinking interactive course, students' ability to master knowledge has been significantly improved.

Conclusion

The current purpose of this study is to explore the effectiveness of tenth-grade students of Kunming No. 1 High School Airport School, a public K12 school in Guandu District, Kunming City, Yunnan Province, to learn the basic knowledge of music subjects through Thinglink interactive music courses, and students' attitudes towards this way of learning. Regarding the effectiveness of using the Thinglink interactive music course to learn the basic knowledge of music subjects, it can be concluded that the test scores of students who learn the basic knowledge of music subjects through the Thinglink interactive music course are significantly higher than the pre-test scores. This result shows that students' knowledge of music subjects has been significantly developed after completing this study.

Regarding students' attitude towards the teaching of Thinglink interactive music courses, the results of the questionnaire show that most students think that the new

teaching method is very interesting and helps to create a good learning atmosphere in the classroom. In addition, they also agreed to improve musical emotions through new teaching methods and help them remember more basic knowledge of music subjects. Finally, it can be explained that students have a positive attitude towards learning the basic knowledge of music subjects through new teaching methods, because it helps them better understand the basic knowledge of music.

Suggestions

Suggestions for effectively implementing Thinglink interactive music course teaching

According to the results of this study, the teachers made some suggestions.

A. Teaching time should be well managed. Since some participants in this study mentioned that it may take too much time to learn in this way, it is the responsibility of teachers to deal with the problem of course time management, in order not to let students feel bored in the teaching process or other problems that affect the teaching content.

B. Training sessions and teaching seminars should be organized for educators to enhance their knowledge and boost confidence in using the ThingLink application in the classroom. Providing teachers with more opportunities to attend seminars or training focused on this teaching approach will ensure they acquire the necessary skills and knowledge to apply it effectively and proficiently during lessons.

For the control of the classroom, teachers have the obligation to arrange students' learning activities to avoid a small number of students from doing things that have nothing to do with learning in the course, thus affecting most positive students.

Further research suggestions

According to the results and conclusions of the research, the following suggestions are put forward for the future research direction.

For future studies, additional qualitative approaches such as interviews, classroom observations, and teacher team reflections can be employed to gather more

comprehensive data. Furthermore, to enhance the research's credibility, expanding the participant pool and conducting deeper discussions are recommended.

Since the participants of this study are ordinary students in the eighth grade of a public school in China, further research can be conducted with other students with similar education levels to determine all the similarities and differences in the results.

Since the teaching theme of this study is the basic knowledge of music, future research could focus on other teaching topics, such as editing and creation, to explore potential similarities and differences compared to the findings of this study.

Secondly, this study only investigates the basic musical ability of middle school students, which is limited to the understanding of the historical part of Western music, the identification of representative musical instruments, the understanding of musicians, the understanding of creative background, the understanding of musical style, the understanding of musical genre, historical background and the analysis of musical emotions. Further research should be carried out to understand the effectiveness of project-based learning in improving students' basic knowledge of music subjects.

Finally, further research and investigation should be carried out to observe the effectiveness of Ben Xiang's research in the teaching of music subjects for students at other levels.

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APPENDICES

APPENDIX A

Quality Evaluation Form of Western Music History Learning Performance Test for Third-year Middle School Students

For concise test content vocabulary, please judge the consistency of the problem and the learning purpose according to the test indicators.

Measure the following academic performance by marking √ in a box that matches your opinion. The following are divided into 3 levels:

+1 means to ensure that the test content is in line with the purpose of learning.

0 indicates that it is uncertain whether the test content is in line with the purpose of learning.

-1 indicates that the test content does not measure knowledge and is consistent with the purpose of learning.

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
1.Describe and distinguish musicians in the history of Western music	1. There are many musicians in the history of world music. Which of the following musicians does not belong to the history of Western music? A. Debussy B.Bach B. Beethoven D.Xian xinghai★			
	2. Which of the following musicians is the work of the piano suite "Four Seasons"? A. Mozart B. Vilvati C. Tchaikovsky★ D. Haydn			

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
	3. Which composer wrote the symphonic poem "Ode to Finland"? A. Sibelius★ B. Grig C. Gerlinka D. Puccini			
	4. From the picture on the right, which musician is he in the history of Western music?  A. Bach★ B. Mozart C. Handel D. Brahms			
	5. Who is the musician known as the "father of music" in the history of Western music? A. Beethoven B. Chopin C. Lister D. Bach★			

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
2.Understand and explain the characteristics of musical instruments in the history of Western music, and how to use or play them.	6. Which of the following instruments is known as the "King of Musical Instruments" in modern times? A. Saxophone B. Cello C. Clarinet D. Piano★			
	7. Which of the following instruments is not a Western instrument? A. Gu Zheng★ B. Feather harpsicord C. Harp D. Ukulele			
	8. Which of the following instruments does not belong to the wind instrument category? A. Clarinet B. Oboe C. Saxophone D. Double bass★			
	9. Which of the following instruments was used to play Beethoven's Moonlight Sonata? A. Cello B. Dulcimer C. Large size D. Piano★			

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
	10. Which of the following instruments was used to play Liszt's famous Paganini Etude? A. Piano B. Organ C. Violin★ D. Pipa			
	11. Terpander, a poet in the 7th century BC. Use the sakira to accompany the poem and increase the number of strings from 4 to how many? A. 12 roots B. 21 roots C. 8 roots D. 7 roots★			
	12. In the six quartets of OP.20 composed by Haydn in 1772, which instrument was used as an independent stringed instrument, and there was no trace of the bass at all. A. Cello★ B. The first violin C. Viola D. The second violin			
	13. Which of the following Western instruments is a plucked string instrument? A. Trumpet B. Plucked piano C. Harp★ D. Violin			

The purpose	Test content	Evaluation level		
	14. Which of the following Western musical instruments have the same principle of use? A. Tuba and Cello B. Trumpet and Violin C. Piano and Dulcimer D. Clarinet and Oboe★			
	15. Which of the following Western instruments can be played by pulling strings or plucking strings? A. Dulcimer B. Organ C. Violin★ D. Classical guitar			
	16. What kind of stringed instrument is played only with a high-pitched scale on the stave? A. Double bass B. Cello C. Allitone violin D. Violin★			
3.Understand the importance of music courses and the history of Western music	17.In the history of Western music, which period was the period when symphonic music developed rapidly? A. The Baroque period B. The period of ancient Rome C. The period of modern romanticism D. Classical period★			

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
	18.The importance of Western Music History includes? A. Promote the development of modern music and art. B. Help human beings clearly view and record the development of the world in a diversified way. C. It is the cornerstone of modern music. D. All of the above are right.★			
	19. Liszt, a musician in the modern Romantic period, pioneered a new field of title music. What genre did he first create? A. Opera Overture B. Symphonic sound and painting C. Symphony D. Symphonic poem★			
	20. The earliest attempt to write plamonic music in the history of Western music was to take the Glegoli song as a "fixed tone" and add a parallel five-degree or parallel four-degree voice below it. Why? A. Klaurasu B. Scripture song C. Olganon★ D. Gregory's Holy sing			

Date:

Evaluation expert:

APPENDIX B

Quality Evaluation Form of Western Music History Learning Performance Test for Third-year Middle School Students

For concise test content vocabulary, please judge the consistency of the problem and the learning purpose according to the test indicators.

Measure the following academic performance by marking √ in a box that matches your opinion. The following are divided into 3 levels:

+1 means to ensure that the test content is in line with the purpose of learning.

0 indicates that it is uncertain whether the test content is in line with the purpose of learning.

-1 indicates that the test content does not measure knowledge and is consistent with the purpose of learning.

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
1.Describe and distinguish musicians in the history of Western music	1. There are many famous musicians in the history of world music. Which of the following is a musician in the history of Western music? A. Debussy★ B.Ryuichi Sakamoto C. Nie Er D.Xian Xinghai			
	2. Which of the following musicians is the work of the piano sonata "Sadness"? A. Mozart B. Vivalti C. Beethoven★ D. Haydn			

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
	3. Which musician is the work of Symphony of Destiny No. 9? A. Beethoven★ B. Grig C. Mozart D. Johann Strauss			
	4. From the picture on the right, which musician is he in the history of Western music?  A. Bach★ B. Mozart C. Handel D. Brahms			
	5. Who is the musician known as the "mother of music" in the history of Western music? A. Beethoven B. Chopin C. Handel★ D. Bach			

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
2.Understand and explain the characteristics of musical instruments in the history of Western music, and how to use or play them.	6.Which of the following Western instruments is known as the "Queen of Musical Instruments"? A. Saxophone B. Violin★ C. Clarinet D. Pian			
	7.Which of the following instruments belongs to Western instruments? A. Gu Zheng B. Clarinet feather harpsicord★ C. Shakuhachi D. Bamboo flute			
	8. Which of the following instruments belongs to the brass instrument category? A. Dulcimer B. Traps C. Saxophone★ D. Double bass			
	9. Which of the following instruments is in the picture on the right?  A. Cello B. Dulcimer C. Tuba D. Violin★			

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
	10. Which of the following instruments is used to play Bach's famous "Chakong"? A. Piano B. Organ C. Violin★ D. Pipa			
	11. Terpander, a poet in the 7th century BC. Use the sakira to accompany the poem and increase the number of strings from 4 to how many? A. 12 roots B. 7 roots★ C. 21 roots D. 8 roots			
	12. In the six quartets of OP.20 composed by Haydn in 1772, which instrument was used as an independent stringed instrument, and there was no trace of the bass at all. A. Cello★ B. The first violin C. Viola D. The second violin			
	13. Which of the following Western instruments does not belong to plucked instruments? A. Trumpet★ B. Plucked piano C. Clarinet D. Classical guitar			

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
	14. Which of the following Western musical instruments have the same principle of use? A. Tuba and Cello B. Trumpet and Saxophone★ C. Piano and Dulcimer D. Clarinet and piano			
	15. Which of the following Western instruments can be played by pulling strings or plucking strings? A. Dulcimer B. Organ★ C. Violin D. Classical guitar			
	16. Which kind of stringed instrument is played only with bass scales and sub-bass scales on the pentagram? A. Classical guitar B. cello★ C. Allitone violin D. Violin			
3.Understand the importance of music courses and the history of Western music.	17.Debussy's first impressionist music poem "The Pastor's Afternoon" was written based on whose poem of the same name? A. Goethe B. Malame★ C. Schiller D. Metlinck			

The purpose of test	Test content	Evaluation level		
		(+1)	(0)	(-1)
	18.Which important period of innovation in the history of Western music is the poem known as the "pearl of strange shape"? A. The period of modern romanticism B. The period of ancient Rome C. The Baroque period★ D. Renaissance period			
	21. Liszt, a musician in the modern Romantic period, pioneered a new field of title music. What genre did he first create? A. Opera Overture B. Symphonic poem★ C. Symphonic sound and painting D. Symphony			
	22. What technology has been highly developed in the hands of Flanderss composers? A. Remodulation Technology★ B. Main tuning Technology C. Harmony Technology D. Melody Technology			

Date:

Evaluation expert:

Thinglink Interactive Music Course Questionnaire Evaluation Form

For concise test content vocabulary, please judge the consistency of the problem and the learning purpose according to the test indicators.

Measure the following academic performance by marking √ in a box that matches your opinion. The following are divided into 3 levels:

+1 means to ensure that the test content is in line with the purpose of learning.

0 indicates that it is uncertain whether the test content is in line with the purpose of learning.

-1 indicates that the test content does not measure knowledge and is consistent with the purpose of learning.

Questions to be investigated	Degree of satisfaction with the course	Satisfaction score	Evaluation level		
			+1	0	-1
1. Do you like to use Thinglink interactive courses to learn the knowledge content of music?	A. Like B. Same C. Don't like	A. Option 10 points B. Option 5 points C. Option 0 points			
2. What is your overall evaluation of using Thinglink interactive courses?	A.Like B.Same C.Don't like	A. Option 10 points B. Option 5 points C. Option 0 points			
3. Have your grades improved after using Thinglink's interactive course?	A.Progress B.Same C.No progress	A. Option 10 points B. Option 5 points C. Option 0 points			
4. Do you think Thinglink interaction is a rich and interesting music course?	A.Yes B.Same C.No	A. Option 10 points B. Option 5 points C. Option 0 points			
5. Do you think Thinglink interactive music courses can motivate you to learn?	A.Can B.Same C.Can't	A. Option 10 points B. Option 5 points C. Option 0 points			

Questions to be investigated	Degree of satisfaction with the course	Satisfaction score	Evaluation level		
			+1	0	-1
6. What is your evaluation of the teacher's proficiency in using Thinglink interactive music courses?	A.Proficient B.Same C.Unskilled	A. Option 10 points B. Option 5 points C. Option 0 points			
7. What is your evaluation of the Thinglink application?	A.Great B.Same C.Very bad	A. Option 10 points B. Option 5 points C. Option 0 points			
8. Do you think using Thinglink interactive music courses is helpful for you to learn difficult Western Music History knowledge points?	A.Yes B.Same C.No	A. Option 10 points B. Option 5 points C. Option 0 points			
9. Will you take the initiative to use the Thinglink interactive music course to discuss the content knowledge points in the classroom with your classmates when you get home?	A.Yes B.Same C.No	A. Option 10 points B. Option 5 points C. Option 0 points			
10. When you encounter some non-academic music knowledge in your life, will you immediately use the Thinglink interactive music course to share with your classmates or teachers for discussion and research?	A.Yes B.Same C.No	A. Option 10 points B. Option 5 points C. Option 0 points			
Please make some comments and suggestions on the future use of Thinglink interactive music courses:					

Questions to be investigated	Degree of satisfaction with the course	Satisfaction score	Evaluation level		
			+1	0	-1
Supplement: There are a total of 10 questions in the questionnaire survey, with a full score of 100. The full score of each question is 10, and the satisfaction options are divided into 3 (A. Agree 10 points B. Average 5 points C. Disagree 0 points). Please rate according to your real feelings after using it, and finally put forward some comments and ideas on the new teaching mode of using Thinglink interactive music courses.					

Barroco Music lesson plan

I. Teaching background

This unit is a middle school music theory course, and the teaching content is Baroque music, one of the three most important periods in the history of Western music. Baroque music is an important period in the history of Western music, with a unique artistic style and aesthetic value. In order to make students better understand and learn Baroque music, the following teaching activities are designed to improve students' musical literacy and aesthetic ability.

II. Teaching Objectives

1. Understand the historical background and style characteristics of Baroque music.

2. Get to know the representative musicians and popular Western instruments of the Baroque period.

Get to know the representative music of the Baroque period by listening to it.

III. Difficulties in teaching

Key points:

1. Understand the historical and cultural background of the Baroque period

2. Enjoy the music works of the Baroque period

Difficult points:

1. Analyze the musical characteristics of the Baroque period

2. Learn about the representative musicians and musical instruments of the Baroque period

IV. Teaching resources

1. Multimedia courseware, ThingLink.

2. Pictures, audio and video materials (such as introductions and classic works by Bach and Handel).

V. Teaching methods

Teaching method, appreciation method, ThingLink auxiliary teaching

VI. Teaching process

1. Import

• Play a piece of Baroque music (such as Bach's Aria on the G String) to guide students into the classroom atmosphere.

• Ask students how they feel about this piece of music and introduce the theme of Baroque music.

2. Teaching of new courses

• Historical background:

• Introduce the social background and cultural characteristics of the Baroque period (1600-1750).

• Explain the origin of the word "baroque" and the characteristics of its artistic style.

• Music style characteristics:

• Explain the characteristics of Baroque music, such as the splendor of the melody, the complex decorative notes, and the combination of photony and the main tone.

• By playing music clips, let students feel the rhythm, strength and emotional expression of Baroque music.

• Music genre and representative composers:

• Introduce the musical genres of the Baroque period, such as sonata, concerto, cantata, etc.

• Explain the important composers of the Baroque period, such as Bach, Vivaldi, Handel, etc.

• Play Bach's "Tokata and Fugue in D minor" and Vivaldi's "Four Seasons" clips to guide students to analyze the characteristics of the works.

3. Classroom activities

• Group discussion: Divide students into groups to discuss the characteristics of Baroque music and its similarities and differences with other musical periods.

• Sharing and communication: Each group selects a representative to share the results of the discussion, and the teachers make comments and summaries.

VII. Class summary

• Summarize the main characteristics of Baroque music and representative composers.

• Emphasize the important position of Baroque music in Western music culture.

VIII. Assign homework

• Complete the 5 multiple-choice questions about Baroque music assigned by the teacher.

Teaching reflection

Through the study of this lesson, students have a preliminary understanding of Baroque music. In the teaching process, students' interest in learning has been well stimulated through ThingLink interactive APP auxiliary teaching and rich music appreciation activities. However, in the classroom discussion, a small number of students' in-depth analysis of music style is not deep enough, and they need to strengthen guidance and training in follow-up teaching.

Classical-Era Music lesson plan

I. Teaching background

This unit is a music theory course in middle school, and the teaching content is classical music, one of the three most important periods in the history of Western music. Classical music is a turning point in the history of European music, with a unique artistic style and aesthetic value. In order to make students better understand and learn classical music, the following teaching activities are designed to improve students' musical literacy and aesthetic ability.

II. Teaching Objectives

1. Understand the historical background and style characteristics of classical music.

2. Get to know the representative musicians and popular Western instruments of the classical period.

3. Get to know the representative musical works of the classical period through listening.

III. Difficulties in teaching

Key points:

1. Understand the historical and cultural background of the classical period

2. Enjoy the musical works of the classical period

Difficult points:

1. Analyze the musical characteristics of the classical period

2. Learn about representative musicians and musical instruments in the classical period

IV. Teaching resources

1. Multimedia courseware, ThingLink.

2. Pictures, audio and video materials (such as introductions and classic works by Beethoven, Mozart and Haydn).

V. Teaching methods

Teaching method, appreciation method, ThingLink auxiliary teaching

VI. Teaching process

(1) Import

1. Play micro-video: introduce the background of classical music and the "Three Great Viennese Classical Music" (Haydn, Mozart, Beethoven).

2. Question: Students share their initial impressions of classical music.

(2) New course teaching

1. The historical background of music in the classical period:

- Time range: 1750-1820.
- Social and cultural characteristics: Influenced by the Enlightenment, pursue rationality and nature.

2. Characteristics of music style:

- The main music is woven, with a simple melody and clear harmony.
- Structural specifications of the music style, such as sonata style and round music style.

3. Representative genre:

- Symphony, Sonata, Concerto, Chamber Music.

4. Representative composers and works:

- Haydn: Symphony No. 94 in G major.
- Mozart: String Serenade and Turkish March.
- Beethoven: Symphony No. 5 "Destiny".

(3) Music appreciation

1. Appreciation of Mozart's String Serenade:

- Introduction works and composer Mozart.
- Listen to music and analyze the melodic characteristics of the main theme and the insert.
- Discuss the structural characteristics of the cyclone.
- Analyze the rhythm, melody and harmony characteristics of the main theme.

(4) Representative musical instruments

1. Keyboard instruments:
   - Piano
   - The harphesis
2. Stringed instrument
   - Violin
   - Cello
3. Wind instrument
   - Clarinet
   - Oboe
4. Percussion instruments
   - Big drum

(5) Classroom activities

1. Classical music promotion meeting:
   - Students introduce the lives and representative works of Haydn, Mozart and Beethoven in groups.
   - Each group recommends one work and explains the reason for the recommendation.

VII. Class summary

- Summarize the main characteristics and representative composers of classical music.
- Emphasize the important position of classical music in the history of Western music.

VIII. Classwork

- Complete the 5 multiple-choice questions about music in the classical period assigned by the teacher.

Teaching reflection

Through the study of this lesson, students have a certain understanding of classical music. In the teaching process, students' interest in learning has been well stimulated through ThingLink-assisted teaching and rich music appreciation activities. However, in the classroom discussion, a small number of students' in-depth analysis of music style is not deep enough, and they need to strengthen guidance and training in follow-up teaching.

Romantic-Era Music lesson plan

I. Teaching background

This unit is a middle school music theory course, and the teaching content is modern romantic music, one of the three most important periods in the history of Western music. Modern romantic music is a driving period in the history of Western music, with a unique artistic style and aesthetic value. In order to make students better understand and learn modern romantic music, the following teaching activities are hereby designed to improve students' musical literacy and aesthetic ability.

II. Teaching Objectives

1. Learn about the historical background and style characteristics of music in the modern romantic period.

2. Get to know the representative musicians and popular Western instruments of the modern Romantic period.

3. Get to know the representative music of the modern romantic period by listening to it.

III. Difficulties in teaching

Key points:

1. Understand the historical and cultural background of the modern romantic period

2. Enjoy the music works of the modern romantic period

Difficult points:

1. Analyze the musical characteristics of the modern romantic period

2. Learn about the representative musicians and musical instruments of the modern romantic period

IV. Teaching resources

1. Multimedia courseware, ThingLink.

2. Pictures, audio and video materials (such as introductions and classic works by Liszt, Chopin and Schubert).

V. Teaching methods

Teaching method, appreciation method, ThingLink auxiliary teaching

VI. Teaching process

(1) Import

1. Play music clips: Choose a representative modern romantic music work (such as Schubert's Trout or Chopin's Sea Etude).

2. Question: Guide students to share their feelings about music and lead to the characteristics of music in the modern romantic period.

(2) New course teaching

1. The background of music in the modern romantic period:

- Time range: 1820-1910.
- Social and cultural characteristics: Influenced by the Enlightenment and the French Revolution, it emphasizes emotional expression and individual liberation.

2. Characteristics of music style:

- Nationality: integrate ethnic folk music elements and emphasize ethnic identity.
- People's nature: pay attention to the emotions and lives of ordinary people.
- Lyricism: pay attention to personal emotional expression, beautiful melody and lyricism.
- Fantasy: Often take materials from myths, legends and natural landscapes.

3. Representative genre:

- Art songs, symphonic poems, piano sketches, etc.

4. Representative composers and works:

- Schubert: "Trout" "Winter Journey".
- Chopin: "Sea Etude" "Fantasy Improvisation".
- List: "Clock" and "Nightingale".
- Tchaikovsky: "1812 Overture" "Swan Lake".

(3) Music appreciation

1. Appreciation of "Trout":

- Brief introduction of works and composer Schubert.
- Listen to music, analyze melody, harmony, accompaniment and emotional expression.
- Discuss the characteristics of artistic songs.

2. Appreciation of "Clock":

- Brief introduction works and composer Liszt.
- Analyze the characteristics of instrumental solo music and the fantasy in music.

(4) Classroom activities

1. Music composition and performance:

- Group discussion, choose a music work from the modern romantic period, and try to describe its emotions and pictures in words.

VII. Class summary

- Review the style characteristics of music in the Romantic period and representative composers.
- Emphasize the important position of music in Western music culture in the modern romantic period.

VIII. Assign homework

- Complete the 5 multiple-choice questions on modern romantic music assigned by the teacher.

Teaching reflection

Through the study of this lesson, students have a preliminary understanding of music in the modern romantic period. In the teaching process, students' interest in learning has been well stimulated through ThingLink interactive APP auxiliary teaching and rich music appreciation activities. However, in the classroom discussion, a small number of students' in-depth analysis of music style is not deep enough, and they need to strengthen guidance and training in follow-up teaching.

Students compare the scores before and after learning the basic knowledge of music subjects through the Thinglink music course.

Student Number	Pre-test	Post-test
01	7	6
02	4	19
03	9	13
04	8	9
05	18	27
06	5	9
07	10	12
08	13	14
09	10	18
10	4	9
11	13	14
12	9	13
13	9	16
14	12	21
15	8	9
16	10	16
17	8	10
18	6	7
19	9	14
20	8	10
21	9	16
22	14	22
23	10	16
24	7	9
25	4	13

Student Number	Pre-test	Post-test
26	10	23
27	5	7
28	16	18
29	17	22
30	13	16
31	19	24
32	1	6
33	7	13
34	15	18
35	10	16
36	10	11
37	8	7
38	14	18
39	4	9
40	9	18
Mean	**9.44**	**14.27**
	Score 30	

VITA