THE DEVELOPMENT OF AN INSTRUCTIONAL MODEL COMBINING THE FLIPPED CLASSROOM WITH GAMIFIED LEARNING ON DIGITAL PLATFORMS TO IMPROVE THE LEARNING PERFORMANCE OF UNDERGRADUATE MEDIA STUDENTS IN CHINA

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การพัฒนารูปแบบการเรียนการสอนตามแนวคิดเกมมิฟิเคชันร่วมกับห้องเรียนกลับด้านเพื่อส่งเสริมประสิทธิภาพการเรียนรู้ของนักศึกษาระดับปริญญาตรีในประเทศจีน

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THE DEVELOPMENT OF AN INSTRUCTIONAL MODEL COMBINING THE FLIPPED CLASSROOM WITH GAMIFIED LEARNING ON DIGITAL PLATFORMS TO IMPROVE THE LEARNING PERFORMANCE OF UNDERGRADUATE MEDIA STUDENTS IN CHINA

BY

SHANG YUQI

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Title	THE DEVELOPMENT OF AN INSTRUCTIONAL MODEL COMBINING THE FLIPPED CLASSROOM WITH GAMIFIED LEARNING ON DIGITAL PLATFORMS TO IMPROVE THE LEARNING PERFORMANCE OF UNDERGRADUATE MEDIA STUDENTS IN CHINA
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The purposes of this study are as follows: (1) to develop an instructional model with a flipped classroom by using a practice platform with gamification effects to enhance the learning performance of undergraduate media students in China; (2) to study the effectiveness of using instructional model with a flipped classroom by using a practice platform with gamification effects for improving the learning performance and the learning process of Chinese undergraduate media students. This study focused on 39 third-year undergraduate students majoring in media, drama, film and television, who were willing to participate in the study. A simple random sampling method was used to specifically select students who registered for the film and television scores course in the second semester of 2023 academic year. The research instruments were an instructional model with a flipped classroom by using a practice platform with gamification effects, a lesson plan and student learning performance test. The statistics used in this study to collect and analyze data from the questionnaire, including means, SD and a t-test. The research results found four components in the instructional model: (1) platform; (2) learning environment; (3) evaluation; (4) learning resources; and three learning processes: (1) before class; (2) during class; and (3) after class. The effectiveness of using instructional model with a flipped classroom and using a practice platform with gamification effects for improving the learning performance and learning process of Chinese undergraduate media students was higher than before the experiment at a statistically significant level (*$p<0.05$).

Keyword : Gamification effect, Practice platform, Flipped classroom instructional model, Learning performance, Chinese media undergraduate students

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Although my doctoral study courses have been completed and my thesis research has come to an end, I will move forward courageously and never stop on this path of learning. The educational technology knowledge I learned at this stage has had a profound impact on my growth and work. In the future, I will continue to work hard to integrate the knowledge I have learned and apply it to my teaching work to help my students learn more effectively. Thank you all again.

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INTRODUCTION

This section begins with the research background which includes the views of multiple experts, and presents and explains why this study is relevant to the professional courses discussed. In addition, this section presents the research questions, research objectives, study scope, definition of terms, and research framework diagram.

Background

As is known to all, there have been various types and styles of music before the birth of film,however, the emergence and development of film is combined with music (Dou, 2022). With the passage of time, the cognitive and technological level of human beings has undergone tremendous changes, especially in the field of media, film and television. As it has changed, in order to better match and enhance the quality of film and television, a new profession has emerged in the industry - film and television scores. The birth of film and television scores has combined the auditory art of music with the graphic visual artform of film and television and is now integrated into the daily life of the public (Xia, 2019). Film and television scores are very professional, including not only the use of film and television pictures in the media major, but also the creation and production of the music major. Therefore, in order to cater to the rapidly developing film and television industry, major vocational colleges and undergraduate schools around the world have opened special courses of film and television scores (Su, 2021). For example, Berklee College of Music, the University of Southern California, the Royal Conservatory of Music, Communication University of China and so on. In colleges and universities of higher learning, students are familiarised with the history, characteristics and professional knowledge of film and television scoring., Students field of vision is broadened to understand multiple concepts around film and television scores, the aesthetics and cognition thereof, and they are allowed to practise the creation of scores to demonstrate appropriate choice, reasonable use,, and accurate grasp of music

through rhythm, harmony, and the overall effect of the score coupled with the visuals.(Hou,2017)Thus, improving their ability to create professional film and television scores.

However, researching information about film and television scores courses revealed several challenges. Most of the courses and teaching research is aimed at students majoring in recording engineering in music, while few study the teaching methods around film and television score courses offered to students majoring in media. In other words, these majors have certain teaching gaps and leave holes in students' knowledge and abilities. In addition, Feng(2022), points out that in the relationship between the score and visuals students often demonstrate a lack of understanding around using opposition and parallels, and the formation of logic This shows both that students fail to engage in the process of connecting sound and visual operations, and to practise daily training platform., The result is that media professionals graduate from film and television score courses without having developed the skills needed to perform and achieve professionally. Therefore, it is necessary to study and develop a feasible teaching method..

With the advent of the information age, many creative models are widely used in teaching activities. Bergmann and Sms (2007) first proposed the concept of a flipped classroom. This teaching mode leads with the core content and conducts online independent theoretical learning, thereby increasing the time for classroom practice, discussion and communication (Chiang & Wang, 2015). Thus, the flipped classroom, also referred to as the inverted classroom, revolves around pre- and post-class teaching methodologies. Central to the flipped classroom is the enhancement of after-class teaching practices. Prior to class, students engage in independent inquiry learning, while during class, teachers assess students' learning outcomes and provide targeted feedback. After class, students refine their understanding, thereby transcending the confines of traditional classroom constraints in terms of time and space. (Xu, 2022). Through the inversion of roles inside and outside the classroom, the main teaching is

completed outside the classroom, and solutions or deeper or difficult to understand concepts, are completed in classroom time (M.K.Kim et al, 2014).

Regarding a new teaching model, feedback is both positive and questionable. The teaching model of the flipped classroom is a special mixture of teaching and learning methods that improves student performance and increases student engagement and critical thinking (Florence et al., 2021). Under the learning mode of flipped classroom, students can have more time to feedback problems, practice in class, and receive the guidance of the teacher, while the integration of online teaching methods and flipped classroom teaching models can greatly improve students' learning ability and participation (Riel, 2022) .

For courses such as film and television scores that are highly practical and targeted at cultivating students' ability to combine theory with practice, it has become an important goal to deal with practical problems (Liu, 2017). Therefore, it is advantageous to use the flipped classroom teaching method where theoretical problems are dealt with outside and practical skills are focused on inside the classroom with discussion and research guided by teachers.

In terms of analysis, learning performance in the flipped classroom usually has more obvious changes in interdisciplinary students, whereas practical courses have less obvious changes (Strelan et al.,2020). Therefore, in order to deal with the more practical courses discussed, it is necessary to find a tool or method to maximise analysis of the problem and therefore, effectively improve overall learning performance (Strayer, 2012; Song et al., 2019;Sahin et al., 2015)

The effectiveness of the flipped classroom is generally agreed on; however, in practice, there is no single model (Guo, 2019) . Research indicates that different flipped classroom models are used in practical courses with the goal of improving the effectiveness of academic performance, and the results are mixed. Therefore, it is necessary to discuss the advantages and challenges of the flipped classroom (O'Flaherty & Phillips, 2015; Abeysekera & Dawson, 2014; Karabulut-Ilgu et al.,2015).

The concept of "feeding" in class is based on the idea that"the content that individuals can obtain when taking action is also an interactive learning opportunity that students can obtain" (Van , 2013). The concept of feeding includes three links: perception , interpretation and action (Van , 2013). Learners perceive the learning resources and interactive opportunities in the environment, interpret them, and then take actions to transform them into meaningful positive or negative content for professional learning (He and Qin et al., 2022) . For example, in the environment of information technology-assisted film and television score learning, if the student engagesthe learning resources or relevant interactive learning opportunities on the learning platform, interprets them as beneficial content to the learning, and then takes action and actively uses information technology for learning, then the student absorbs new concepts effectively; on the contrary, if any one of the three links is disconnected, this will have a negative impact on their learning. In addition, some studies have shown that there is no significant difference in learning results in the flipped classroom (Marcey et al., 2012; Sahin et al., 2015)which may be due to resistance when students encounter difficulties using unfamiliar technologies (Sahin et al.,2015). In addition, with the gradual increase in independent learning, participants feel alienated and exhausted by the classroom environment due to the increased visibility following distanced interaction with teachers and peers, which also limits learning effectiveness. Therefore, using flipped classrooms may not result in reliable or obvious improvement in academic performance so it is not necessarily popular (Sommer et al., 2018). However, in the flipped classroom, certain teaching technology could be used to solve some of the above problems.

The development of information and digital technology has made the application of the flipped classroom model more flexible. It gives the flipped classroom more information avenues as well as scientific and technological power. Therefore, the development and application of the flipped classroom model has become deeply integrated with the development of digital technology.

Society has evolved from the industrial age to the information age. The first revolution facing human beings at the turning point of the information age has been the

revolution of digital technology, leading to the digital era. Due to the progress and development of digitalization, it has also brought about great change and progress in the field of educational technology. Digitization issimply, the conversion of all information carriers into digital elements for storage, exchange, processing and output. "Digitization" is actually the conversion of analog signals into digital signals in the process of information pulsing, so as to realise digitization (Pan et al., 2022) . The role of digital technology in teaching is mainly reflected in multimedia technology. In its research and discussion, it proves that multimedia technology is not only an embodiment of the modernization of teaching means, but also the breakthrough of the overall reform of teaching (Dai, 2022). From simple slide projection to dynamic digital displays with multimedia graphics and animation, all kinds of teaching strategies are supported,and student engagement and absorption of knowledge is improved. Each of these links in the modes of teaching have played a pivotal role. For example, with the support of technology, educators use digital and multimedia modes to create gamified learning strategies based on film and television scores, and conduct exercises with the help of gamification platforms, which greatly improves the learning interest,concentration and understanding of students.

In teaching practice, we often think that games and learning are opposites. However, when students play games in the process of learning and practice, the efficiency of learning is greatly improved. Gamification teaching changes how students learn and feel about learning. It creates a motivating environment with game-like elements such as tasks and challenges. Integrating teaching content with gamification strategies makes learning more fun and interesting, and achieves teaching goals effectively (Zhu & Chen, 2015). Many researchers have found that gamified teaching strategies and methods can significantly improve students' learning status and academic performance (Chen, 2020). Gamification is the ability to use game elements and game thinking in non-gaming environments to change their behaviour and solve real-world problems, and to attract and motivate people （Deterding et al., 2011). Games are an effective teaching tool, and a good learning environment can be built by

way of games (Hulse et al.,2019). Digital gamification can present graphics in some text, musical, and oral expressions (Tobias et al.,2014) . Students have a deeper understanding of gamification because the virtual environment of digital games has obvious advantages over traditional teaching methods (Tan & Biswas, 2007; Hickey et al.,2009) . However, gamification techniques should combine game design elements with teaching, not change the teaching method to games. Its purpose is to promote learners' engagement (Ratchapol et al.,2021). Ryan and Deci (2000) point out that gamification is simply a strategy to initiate learning by promoting learner engagement. Further, some scholars have also confirmed that gamification strategies are very important in the development of educational technology (An et al.,2020).Research says that integrating game components into an online learning environment makes it easier to achieve defined goals, encourage students and increase their motivation (Jaftha et al, 2020). Most teachers hope to use games to encourage students to learn and make them more engaged and motivated (De-Marcos et al.,2014). In fact, in gamified lessons students' learning centres on them reading text, answering questions, and evaluating content. The integration of game elements improves classroom participation, whether offline or online(Azmi et al., 2015). The idea of incorporating game-like elements is to make people happy and increase student enthusiasm in participating in learning activities. In addition, for teachers, through gamification, students' abilities and technical knowledge can be effectively improved, such as decision-making, mutual integration, and communication (Dicheva et al., 2015). When learning these skills through gamification, it is also effective to carry out interaction and evaluation in an environment guided and monitored by teachers. The relationship between teacher and students is improved in the gamified educational environment, strengthening the effect of innovation and creation (Brifa et al., 2020). As a result, this thoughtful approach to teaching improves the speed of learning and systematic thinking in cross-fertilized disciplines. (Ding et al., 2018). Therefore, gamification is feasible because using it meets most learning needs including services, skills and awareness. This will also lead to improved performance of the institution.

In practice, gamified teaching has transformed several elements of teaching: the role of teachers is more that of student guidance and the organisation of activities; the role of the student has become that of active users of information and accurately reflects the status of students' discovery, inquiry and knowledge construction. The teaching content and process itself has also changed. Content is a certain knowledge point or teaching link, simply it can be understood as a process of "problem solving" (Zhu & Chen, 2015). The gamified teaching strategy uses activities that fully utilise the students' subjective initiative, bring out their internal driving force, and focus their attention. In addition, the research also points out that while introducing advanced digital technology into classroom teaching, attention should be paid to the learning strategies in students' favourite games, so as to improve the effectiveness of teaching and make our classroom teaching more effective. However, gamification still needs to be embedded in a technology to effectively utilise it in teaching.

In his research, Mao (2013) explored the integration of gamification teaching methods and computer technology in teaching computer courses at secondary vocational schools. . He found that this approach yielded positive outcomes in practical application. Mao (2013) highlighted that incorporating gamified teaching designs into the curriculum leverages the benefits of games and students' interests. This integration allows students to explore and solve problems independently in the classroom, thereby enhancing their knowledge and operational skills. Therefore, the teaching strategy combines the following features::

1.) Visualisation of course content

2.) Diversification of teaching methods through gamification

By integrating information technology into the classroom, the use of gamification teaching design in computer courses eliminates the monotony of traditional teaching methods. Teachers can use games to create a guiding and inspiring learning environment, which can stimulate students' interest and guide them to actively participate in the classroom learning process

3.) Game-based teaching can facilitate skill training and layered teaching

The use of game-based teaching allows students to use games to learn and explore under the guidance of teachers, and to complete learning tasks through a combination of individual learning and group collaboration.

In Zhang's (2007) masters thesis "A preliminary investigation of computer gamification teaching mode based on multiple intelligence theory", a specific application case is given. The goal of the game was to develop children's mathematical and logical intelligence (Zhang, 2007). To play the game, children only needed to enter the answer of the equation in the input box and press the enter key, if correct they got ten points and the equations were levelled from simple to difficult. If the game is not done correctly within a certain period of time, it will automatically end. Through the introduction of computer educational games into the classroom, the following was observed: firstly, children changed from studying hard to learning happily, secondly,children became active in their learning. Thus, it can be said that self-study in educational game software with vivid storylines can utilise the child's natural enthusiasm and initiative for learning, which is better than ordinary teaching methods. And thirdly, the introduction of computer educational games into the classroom turns entertainment into learning. This shows that the application of teaching based on digital technology and gamification elements has a strong positive impact on the transformation of students' learning habits, and is a teaching mode worth advocating compared to traditional teaching.

With the support of information and digital technology, educational technology has developed rapidly, and increasing numbers of information network education platforms are being created . For example: the MOOC platform, the CLASSIN education platform, the Tencent Cloud classroom to name a few. Among them, the network education platform also has a number of branches, with various specific functions of the digital education platform, such as mobile learning platform and practice platform. In the network learning platform, (Wu, 2014) a PC terminal, mobile device, and other mobile communication technology and devices (such as handheld

computer, mobile phone, MP3, MP4, tablet computer, ebooks, etc.) can be used to access information, resources and services in education. This information-based learning method can truly provide learners with personalised learning as well as open learning opportunities obtained online anytime and anywhere.Students can also communicate and learn with teachers and other students to achieve their own learning goals. In addition, in the network education platform, the auxiliary practice platform is used alongside the teaching function. can use the practice platform application online through computers, mobile phones, tablets and other tools. In Luo et al's (2021) research, it was proposed that through the practice of the question bank, knowledge and skills were consolidated and improved. Compared with the traditional teaching management, utilising the platform enables teachers to upload question banks and establish classes. This not only reduces the time spent by teachers on correcting homework but also allows teachers to assess the quality of students' problem-solving and responses. By employing big data analysis, teachers can identify common issues among students and gain insights into learning trends and challenges promptly. Consequently, teachers can make necessary adjustments in the classroom to ensure high-quality teaching and enhance students' learning outcomes. Students have the opportunity to review, analyse, and discuss questions at their convenience, unrestricted by time or location. Moreover, the ranking feature contributes to enhancing students' motivation for learning. The objective of this system is to address the challenge of integrating online and offline learning in the digital age through technology.

Specifically, this study proposes the development of an instructional model integrating flipped classroom techniques with gamified learning on digital platforms based on the requirements of modern educational technology. This study aims to integrate game-like activities on practice platforms using the flipped classroom instructional model with the aim of verifying the effectiveness of thereof and thus, improving the learning performance of Chinese undergraduate media students.

Research questions

1. How many components and processes are there in an auxiliary instructional model integrating flipped classroom techniques with gamified learning on digital platforms?

2. Is there a difference in the learning performance of the students who study with this instructional model?

Objectives of the Study

1. To develop an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China.

2. To study the effectiveness of an instructional model combining the flipped classroom with gamified learning on digital platforms in improving the learning performance of Chinese undergraduate media students'.

Scope of the Study

Sample

This study mainly focuses on students majoring in media, drama, film and television directing at Zhujiang College of South China Agricultural University. The specific research participants are students from one of the third-year undergraduate classes in drama, film and television directing, with a total number of 39 students who are willing and ready to participate in the study. A simple random sampling method was used to specifically select and sample five classes registered for the film and television scores course in the second semester of 2023, with a total of 218 students.

Scope of content

This study is mainly about research and development, and the researchers collected quantitative and qualitative data on the study subjects in order to find complete answers for research purposes.

The content of this study is to understand and apply the knowledge of third-year undergraduate students of media, drama, film and television directing in the course

of Film and Television Scores, which mainly includes enabling students to select appropriate music, reasonably use music, accurately grasp the rhythm, create a harmonious relationship between sound and painting, and finally achieve the artistic effect pursued by film and television images and music, so as to enhance students' ability and quality of film and television music composition. Learning content can be divided into 8 units: multiple relationships between film and television and musicians and the aesthetic qualities and aesthetic approach of film and television music, basic music theory knowledge, film and television sound, the role of music and sound in film and television programs, the artistic characteristics of television music classification and composition elements (film and television series as the leading), the artistic conception of film and television music and sound, the concept of soundtrack the concept of film and television music and sound perception, analysis, selection and training.

The study is divided into two parts:

Phase I: The development of an instructional model combining the flipped classroom with gamified learning on digital platforms to improve the learning performance of undergraduate media students in China. The course of film and television scores is taken as the research course.

Phase II: To study the effectiveness of using an instructional model combining the flipped classroom with gamified learning on digital platforms to improve the learning performance of Chinese undergraduate media students' learning process. The course of film and television scores is taken as the research course.

Overall and sample

Phase I

The study subjects are as follows:

Population

The research subjects were third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China. A total of 218 students were divided into 5 classes. A specific random

sampling method was used and students volunteered to participate in the study. Before participating in the trial of this course, students must have taken courses such as audio-visual language, nonlinear editing, directing basics, and film and television aesthetics in the talent training plan formulated by the school in their first and second years of undergraduate study.

Samples

The research subjects were 39 out of 218 third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China, and these 39 students were in one of five classes. A specific random sampling method was used and students volunteered to participate in the study. In addition to the 39 experimental students, 20 students from the try out group were randomly selected. To evaluate part two of the content in the Student Learning Performance Test questionnaire and scoring criteria an expert group was selected.

The expert group is divided into the model expert group and the content expert group. The model expert group specialises in creating film and television score flipped classroom teaching design and production of practice platforms with gamified learning. The experts drafted and approved the development of the digital practice platform with an instructional model combining the flipped classroom with gamified learning to promote improved student learning performance. The information on the five experts are as follows:

1)Two experts of Educational technology

2) Two experts Music

3) One expert of Film and television

The content group is composed of three experts with course-related majors to evaluate part one of the content in the Student Learning Performance Test questionnaire and scoring criteria;

Phase II

The subjects of this phase of the study are as follows:

Population

The research subjects were third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China. A total of 218 students were divided into 5 classes. A specific random sampling method was used and students volunteered to participate in the study. Before participating in the trial of this course, students must have taken courses such as audio-visual language, nonlinear editing, directing basics, and film and television aesthetics in the talent training plan formulated by the school in their first and second years of undergraduate study.

Samples

The research subjects were 39 out of 218 third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China, and these 39 students were in one of five classes. A specific random sampling method was used and students volunteered to participate in the study.

The model expert group confirmed the information content of the instructional model. Their expertise are as follows:

1) Two experts of Educational technology

2) Two experts Music

3) One expert of Film and television

Variable

Independent variable: Instructional model combining the flipped classroom with gamified learning on digital platforms

Dependent variable: Learning performance of undergraduate media students.

Definition of Terms

The flipped classroom (also known as the Inverted Classroom) differs from the traditional classroom in that the course schedule and teaching approach shift from being teacher-centred to student-centred. In this research, the flipped classroom primarily encompasses a learning model process consisting of three stages: before class, during class, and after class. Prior to class, preview materials are distributed online to enhance students' independent inquiry and learning abilities. During class, a combination of online and offline methods is utilised to engage students in classroom teaching and practice, thereby enhancing their participation. After class, students review and consolidate practice materials online to further develop their independent inquiry skills and music perception abilities. Additionally, to enhance the content and format of the flipped classroom, researchers have developed a comprehensive instructional model featuring a gamified practice platform. This model comprises four components, including platform, learning environment, assessment, and learning resources.

Gamification, in this research, refers to the application of game design principles and mechanisms. Its purpose is to use certain elements or mechanisms of the game to stimulate users' enthusiasm for participating in a certain activity. Gamified learning mainly refers to the integration of gamification elements (including badge collection, cartoon graphics, scores, challenges, and clearance) and game mechanisms (including Rewards, Achievement, Status, and Inspiring) into the practice platform developed by researchers. These gamified learning activities are combined with digital platforms and developed into exercises with game attributes to improve students' awareness, stimulate students' interest and participation in learning, enhance their ability to explore independently, and encourage students to work hard to achieve their goals and ultimately reach the learning objectives.

The digital practice platform, in this research, refers to a web platform with the following functions: practice questions, gamification elements, gamification mechanisms, databases, answer score summary, and simple analysis tools. It is a

branch of the educational application platform, based on digital principles and combined with educational concepts and content, and is a manifestation of application in learning. Unlike application platforms of other systems, it not only encompasses most features of the application platform but also includes resources, learning, practice, and education. The practice platform serves as an intelligent tool for learners to consolidate and practise educational content, functioning as a software system supporting teaching content and learning activities. By utilising the digital platform and integrating gamified learning into it, students can receive enhanced support in organising learning knowledge and resources, consolidating exercises, and increasing the platform's usage rate. This enhances students' interest and participation while providing targeted training to improve their musical perception.

Learning performance, in this research, refers to the learner's performance in the learning process, including learning ability, learning behaviour, learning performance, and other learning-related content. The learning ability included in this study mainly refers to independent inquiry learning ability and (music) perception ability; learning behaviour refers to class participation, and learning performance refers to the final exam scores obtained through knowledge and skill tests. At the same time, in the study, after teachers used an innovative flipped classroom instructional model with gamified learnings to teach students knowledge content, students' learning abilities, behavioural changes, and final exam scores improved in the film and television score course. Researchers primarily use the final exam scores as the standard for students' academic performance, but the quality of academic performance is inseparable from changes in students' abilities and behaviours during the learning process. During the learning process, changes in students' abilities and behaviours are directly proportional to the final score.

Independent inquiry ability, in this research, refers to students’ active participation, courage, and willingness to explore problems in the two stages before and after class. It includes the ability to consciously process information, the ability to quickly acquire new knowledge, and the ability to analyse and solve problems. Course content,

training, and review materials are arranged online by teachers, and students learn the course content in advance. In the classroom, teachers only need to spend a small amount of time teaching, as the course content is primarily self-study by students, who actively analyse and think, and finally, demonstrate the ability to summarise the class, ask questions, and make reports.

Classroom participation, in this research, refers to the frequency of interaction between students and teachers and classmates in the classroom, participation in experimental activities, and feedback on questions. Students' active participation can drive cognitive and emotional engagement, and the interaction between them can promote each other. Classroom participation refers to the interaction between students and teachers in the classroom, and it influences the degree of learning tension. Students enhance emotional communication with teachers by exploring their potential for learning motivation, increasing their interests, and exploring new ideas. These aspects contribute to cognitive development and emotional states.

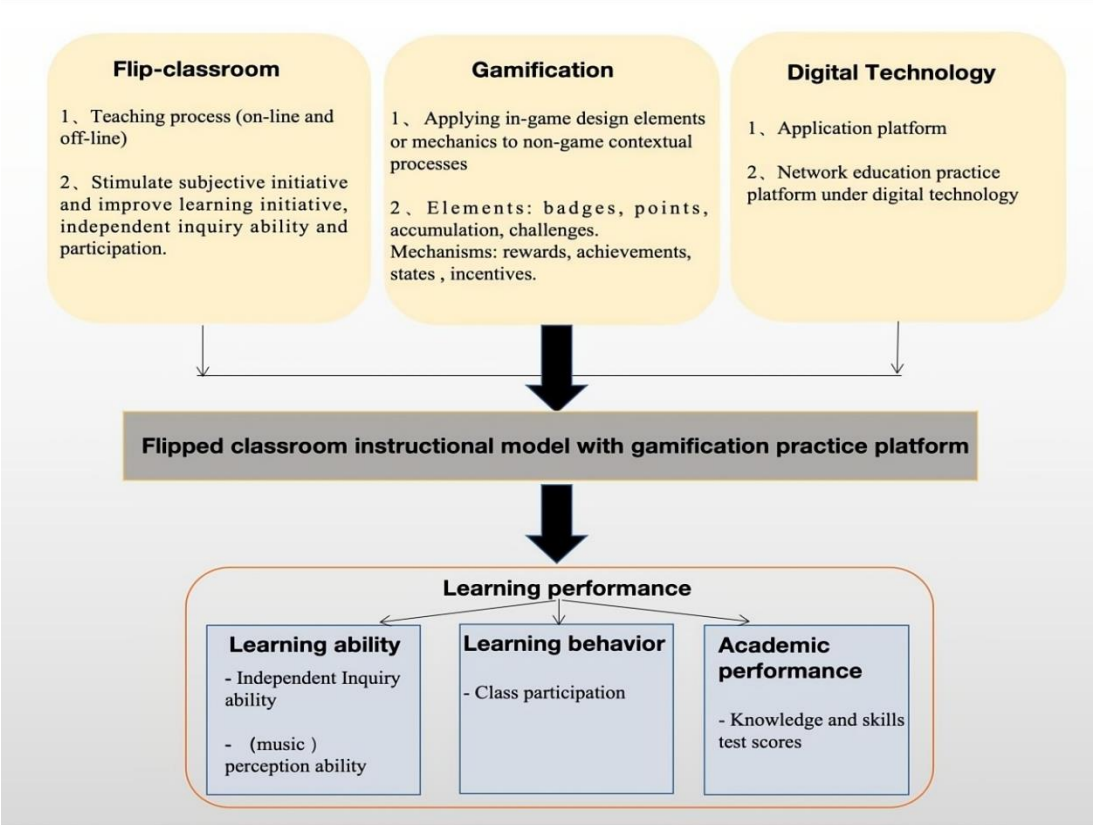
Perception, in this research, refers to the music-dominated perceptual ability. The research subjects in this study are primarily students in the media major system, most of whom have not received music training before entering this major. However, to better integrate music with film and television images, students need exposure, listening, identification, cultivation, and self-feeling training in music. This enhances their response and appreciation of music to meet the needs of music and film integration. To achieve this, they require access to a music resource library and exercises encompassing a variety of styles and types to facilitate rapid self-perception, understanding, and application of music.

Media Students, in this research, refer to students majoring in media-related disciplines, including drama and film and television performance, directing, literature, radio and television directing, broadcasting, hosting art, photography, film and television production, recording art, and other media majors under the art discipline. The research subjects in this study are primarily third-year undergraduate students majoring in drama and film and television directing within the media professional system.

Film and television scores courses, in this research, refer to supplementary courses added to the talent training curriculum plan for media majors in application-oriented universities, based on the media major at Zhujiang College of South China Agricultural University in China. These courses are primarily offered in the third year and typically last about 32 or 48 hours, spanning one semester. Their aim is to quickly cultivate students' multifaceted comprehensive abilities and personal practical skills alongside their major subjects, enabling them to independently create and edit entire works. However, investigations have shown that this major's professional nature is extremely strong, leading many media majors to lack basic music knowledge and skills, hindering their integration with film and television content and impeding their achievement of the school's goals for student development. Therefore, many teachers teaching this course are seeking ways to improve students' learning performance.

An instructional model that combines the flipped classroom with gamified learning on digital platforms is designed to enhance the effectiveness of the traditional flipped classroom. The teacher will integrate practice questions and a resource database on the platform for students to review, consolidate, and practice. Students can even search the resource database for daily information they do not know how to find or would not typically collect. However, the addition of gamified visual effects can not only satisfy students' interests but also improve their participation in learning. Simultaneously, it can stimulate students' curiosity and confidence, encouraging them to actively explore the practice content and engage in self-analysis. As students' learning ability improves on this basis, their final exam scores also increase. The research and development of gamified learning on a digital platform for the auxiliary flipped classroom is highly necessary in today's educational environment. It can provide more effective practice for a larger number of students, enabling us to achieve the desired results.

Research Framework



Figures 1 Instructional model combining the flipped classroom with gamified learning on digital platforms research framework

CHAPTER 2
REVIEW OF THE LITERATURE

In this study, the researchers reviewed relevant literature and research to form the research background. Topics include:

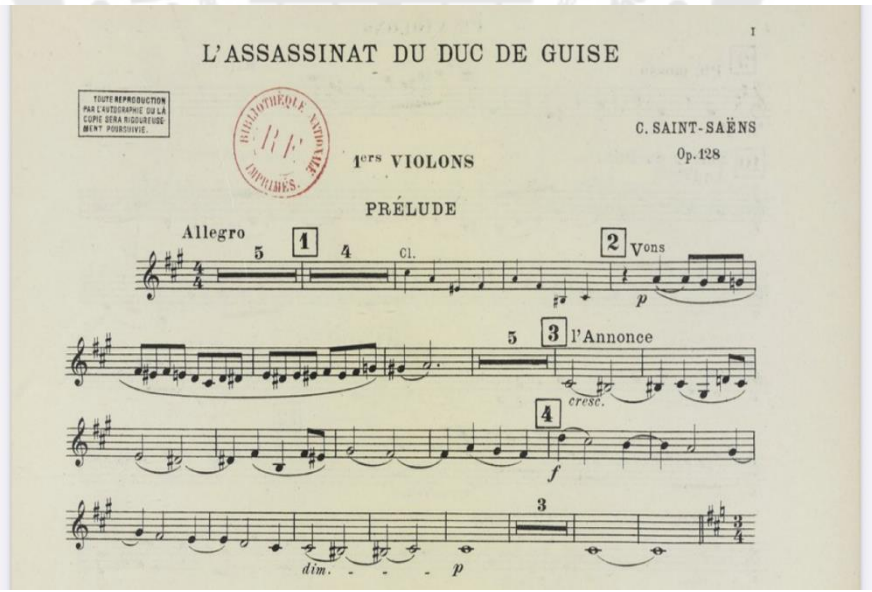
1. The rise and development of film and television scores course

1.1 The rise of film and television scores

In this research, the birth of film and television scores is expounded on. As an integral part of film and television art, film and television scores occupy a very important position. They serve not only to render an environmental atmosphere and depict characters but also to convey emotion, deepen the film's theme, and serve as an effective carrier of national music.(Bai &Fang, 2020) . Film and television art has a history of hundreds of years, among which film is the source of art and TV series are the derivative of art. As a kind of composite art, film presents artistic content in constantly unfolding pictures, which has both the mobility of time and the expressive force of space. It has become the most popular art style in modern society and has a large number of fans. Music is an important part of film and television art. Since the birth of audio, the importance of music in film and television is constantly reaffirmed , and it is a unique genre of its own. Music in film and television called “the score”, has different definitions. In a broad sense, the film and television scores include the theme song, episode, background music and many other styles, while in the narrow sense, the film and television scores refers to the background music.

On December 28, 1985, in the big cafe, 14 Capsing Road, Paris, France, the Lumiere brothers first released some of their early short films, according to the time, music accompanied the film at the premiere. This is widely regarded as the prototype of film music, but some film historians believe that the claim that music accompanied the film at the premiere was a rumour, and there is no more evidence to prove whether there was the piano and violin accompaniment mentioned at the time. Regardless,music eventually became one of the most important elements of film, even if the music just as a

simple background for film accompaniment and no more performance and dramatic, but to some extent let the picture present more complete stereo, make the audience experience more vivid, but also reduce the movie is just plane projection feeling. Due to the limitation of technology and production, early film music and in the form of live accompaniment, a piano or a small band hidden in the curtain in the command under the guidance of the film accompaniment, songs are mostly existing classic works, such as liszt, Tchaikovsky, Wagner composer's works with the audience, of course there will be some popular songs and folk songs in film accompaniment. With the continuous maturity of the film industry, the gradual entry into the entertainment life of the public and the in-depth understanding of film music by film producers, music has become a new link of film creation. In film scores completely guide art and commercial music mentioned in the book saint-sang (Camille Saint-Saens) of the prince stabbed (L ́Assassinat du Duc de Guise), this is currently recognized as the first original film music, composer saint-sang includes the prelude and multiple scenes of five pieces of music, each music to match picture mood (Wang, 2017), as shown in figure 2:



Figures 2 Richard Davies. The Complete Guide to Film Scores - The Art and Business of Film Scores

The scores achieved unprecedented success after the performance, but the idea of creating music specifically for films has not developed because of the huge cost of hiring composers, preparing music, and inviting musicians.

Then there are a lot of composers who, according to different film moods, adapt to the music fragments, to provide the movie with reference to music script. This adds more scene atmosphere and mood, with some music giving priority to the acting in a scene. The music style leans on piano, organ and orchestra.

In the earliest stage of film scoring, pictures and music were relatively independent. From the physical perspective, film pictures and music are still two separate artistic behaviours, and they have not found a public career. Initially, most music was only to avoid monotonous accompaniment to the narrative of some auxiliary pictures.

The 1927 Warner Bros. film The King of Jazz opens a new era of film scores. It is the first film with sound in human history.It had only a few simple lines due to the inexperience of film production, but it was a milestone. During this period, the fanatical pursuit of science and technology reached a new climax, and recording technology experienced unprecedented development. Around 1931 "records" finally made it into the music scene.Musicians moved from live performances into the studio recording sound alone, making the early work of the crew and music group much simpler. Later, filmmakers were able to put this recorded music in any movie. In the following years, with the continuous development of the film industry, music, sound effects, dialogue and environmental sound gradually became indispensable basic elements in film.

Through the aforementioned literature narrative, the four stages of film and television score technology are summarised from the early 20th century to the present. Early film score production relied entirely on composers using paper and pen. Musically, there were limited timbre options beyond orchestral music and some popular music instruments. Additionally, there were challenges in combining music and picture, which were gradually resolved with the progress of science and technology. Now, film musicians can accomplish most of the soundtrack work on digital platforms, eliminating

the need for paper and pen. They can even score a movie without any musical players. More musical styles and elements have been added to films, resulting in qualitative differences in both production methods and musical content compared to the early stages of film and television scores. Film technology continues to evolve, and film and television scores are constantly expanding their performance content and functionality.

The four stages are outlined as follows:

1. The first stage: Early 20th-century live scoring of music scripts, dominated by classical music.

2. The second stage: The development of the "re-recording" process in the mid-20th century, incorporating dialogue sound into films.

3. The third stage: The emergence of various music styles in the mid to late 20th century.

4. The fourth stage: The integration of various music styles with digital tools in the 21st century.

1.2 Functional attributes of film and television scores

Film and television scores play a vital role in the development of film and television today, and its functional attributes are often thoroughly studied and summarised by many researchers.

Environment rendering and rhythm structure function

Elaborated on the functionality of film and television scores in more detail. He believes that film and television scores can render the atmosphere of the environment(Bai & Fang, 2020) . The rendering of ambient atmosphere is the most basic artistic function of film and television scores. Excellent directors are good at presenting the ambient atmosphere of the story in a way of synchronising audio and video through background music, so as to bring the audience into the fictional world of film and television works and enhance the viewing experience of the audience. Take "Kung Fu" :Xingchi Zhou's film "Kung Fu", 2004 as an example. In the classic chase scene at the beginning of the film, Stephen Chow used the allegro part of the violin solo "Song of the Wanderer" to exaggerate the tension of the charter woman chasing the protagonist. At

the same time, the combination of European classical music with a distinct gypsy style and the old Shanghai scene in the 20th century fits well with Stephen Chow's usual funny style. Excellent creators are good at using the scores to render the atmosphere, so that the audience can quickly integrate into the scene through the change of sound(Wang, 2022) . Especially in some suspense and horror film and television works, the rendering of music is very important and can even play a decisive role. In addition, (Wang, 2017) further explained the rendering function of the environment atmosphere of film and television scores. He added an explanation of the rhythm function, that is, while the film and television scores can effectively render the environment, it can also be used for the image and sound. Rhythm and structure have a greater impact. In the movie "Wolf Totem" composed by James Horner (James Horner), the hero is spying on the wolves hunting. The first half of the whole film and television scores highlights the atmosphere and renders the overall mood of the picture. The changes in the structure and rhythm of the second half make the picture plot more ups and downs. The energy burst out after the combination of sound and picture gives the audience a strong sense of audio-visual impact. .

Transfer and deepen the emotional function

It is said that music is an art based on emotion. Although film and television scores do not serve the needs of film and television art in the form of independent music, they also have strong emotional attributes and are the main carrier of emotion and emotion in film and television art(Bai et al.， 2020 ; Wang, 2022) .Whenever the story enters a turning point, a climax or a character expresses a specific emotion, the corresponding film and television scores will always sound to complement each other. Take Schindler's List as an example. As a work that reflects the atrocities committed by the German army during World War II, the film is generally in a depressive atmosphere. With the help of the violin sound that touches the heartstrings, the director shows the audience the cruelty of war and the inhuman condition of Jews in concentration camps. The sound of the violin in the film is like a sharp sword, hitting the audience's heart directly, achieving the purpose of conveying emotions well.

It is difficult to make the audience fully appreciate the emotion and value that the film wants to express through simple narrative (Wang, 2022). Therefore, creators often use film and television scores in important plots of movies to achieve the finishing touch. For example, the early movie "Red Sorghum" was very particular about music, using a lot of background music to set off and render the scene. At the end of the film, after the song sung by the little boy ended, the background music of suona began to sound. Emotion and thinking generate great stimulation.In the specific film analysis for examples: to let the audience fully realise the emotion and value of the film, it is difficult to realise only through simple narration(Wang, 2022) . Therefore, the creators will often use the soundtrack in the important plot of the film to achieve the finishing effect. For example, the early film Red Sorghum was very particular about the score, using a lot of background music to foil and render the scene. At the end of the film, after the ballad sung by the little boy ends, the background music of the suona begins to play. For the audience immersed in this tragic story, the sudden appearance of the children's ballads and the loud and sad suona music will produce great stimulation to their emotions and thinking.

Deepen the theme function of film and television

Gave an example of how to deepen the theme of film and television scores in a specific film(Bai et al.2020;Wang, 2022) . They said: The film Braveheart is a rare masterpiece in the history of Hollywood movies, showing the Scottish people’s love for England. oppressive resistance. The score of the film shows the simple and kindness of the Scottish people with the help of the soft timbre in the middle and low range of the flute, which forms a strong contrast with the cruelty and tyranny of the British rulers. It shows people's desire for freedom and equality, and deepens the theme of the work.

Excellent film and television scores are an indispensable means of expression in film and television works(Chen, 2012) . It can accurately express the emotions of the characters in the play and deepen the emotional experience of the aesthetic subject. It has unique advantages in deepening the theme of and sublimating the emotions , and plays an irreplaceable role. It has a unique advantage in deepening

the theme of film and television works and sublimating the emotion of film and television works, and plays an irreplaceable role.

Description and narrative function

(Wang, 2017) The description functions of film and television scores can be roughly divided into three categories: character description, environmental atmosphere description, and theme description (Wang, 2017) . Among them, the description of the environment and the theme will be more used in the creation of digital tools in contemporary movies. Examples of specific soundtrack works: "Gravity" is a science fiction film filmed by the famous American director Alfonso Cuarón in 2011, and the soundtrack is performed by Steven Price , at the beginning of the movie, the astronauts are working in the dark of space, the EQ processed vocal dialogue and the Hank Williams JR song "Angels Are Hard to Find" and some mechanical sounds are the only few scenes in the movie Sound material, the purpose of this sound arrangement is to describe the silent environmental characteristics of the vacuum state of space, making the film more realistic as a whole and giving the audience more sense of presence. At the beginning of the film, Price Silence is better than sound.

Shape the character image function

It has the following discussion on the characterization function of film and television scores(Chen, 2012) . He points out that film and television scores are often used to effectively supplement the characterization of the characters in the play, just like labelling a character with music. In CCTV version of the martial arts series "tian long ba bu" (Zhao Jiping composition), played by l fairy sister Wang Yuyan appearance always accompanied by bamboo flute in the pitch area bright gently slightly sad melody, this is a typical example, the meaning of music expression here very clear —— — this is a beautiful kind, sentimental, not cannibalism fireworks fairy type. This kind of music label type film and television scores is particularly important in Tian Long Ba Bu, because there are many beautiful roles in the drama, and good and evil are mixed. The film and television scores here effectively clarify the character characteristics of the characters in the drama and suggest the direction of the plot.

The side points out that the emotional performance of the characters in the film and TV series can achieve the best effect through the background music, so that the audience can realise the understanding of the characters in the play with the cooperation of the picture and music(Wang, 2022) . The story setting of movies and TV dramas makes the fate of the characters have great ups and downs in a short period of time. If there is no music and other artistic effects, it is difficult for the audience to effectively understand the plot.

From the perspective of specific film and television examples, it expounds the function of film and television scores in shaping the character image(Bai et al.,2020) . The European princess in Roman Holiday, Scarlett in Gone with the Wind, Wallace in Braveheart, Chen Jiaju in Police Story, etc. The film and television scores are a very important means of character image building. The film and television scores that fit the character's appearance or personality can make the character image more three-dimensional. The most typical is the Huang Feihong series directed by Tsui Hark. Huang Feihong, played by Jet Li, would play the male self-improvement music adapted from the classical music General Order every time he was fighting. The generous and heroic music highlighted Huang Feihong's chivalrous image.

1.3 The Current Development Situation of the Film and Television Scores Course

At present, the film and television scores course type is given priority to with the present several, for music college electronic music composition direction of music engineering, media institute, film and television related professional, ordinary institutions of higher learning literacy courses, among them, in the face of different teaching object, according to their professional depth, film and television scores course technical difficulty and focus on the direction is slightly different.

Xinyang normal college points out that the opening of the film and television scores course, through the history and characteristics of it, excellent music and classic appreciation teaching, the purpose is to expand the students 'vision, understand multiple concept of music, improve it aesthetic, cognitive, use ability, let the student can

select the right music, reasonable use of music, accurate grasp the rhythm, create a harmonious relationship between sound and painting, finally achieve the pursuit of artistic effect, improve students' ability of film and television creation and accomplishment(Hou, 2017).

The teacher explained the opening and focus of the course of film and television scores in recent years from the perspective of professional music colleges (Feng, 2022) . In his research paper, he pointed out in detail that professional music colleges are more inclined to teaching music performance and music theory in major and curriculum. Composition, recording art and other creative direction of the main subject,the design of professional common courses is also mainly aimed at pure music creation, and there are few targeted courses for music creation combined with pictures. However, film and television music, as a popular music category in the market, is an important part in music creation. In the setting of course content, Wuhan Conservatory of Music offers the theoretical part of the course. In this part of the teaching, the main purpose is to enhance students 'enthusiasm for learning, enhance students' interest in film music and their ability to analyse film music systematically. In the design of the course, each knowledge point will be presented in the form of course topics, mainly including Classical Music in Film Music, Electronic Music in Film Music, Chinese Elements in Film Music, The Golden Age of American Film, JohnWilliams Film Music, HansZimmer Film Music and so on.

Hebei Institute of Communication described the current development status of the film and television scores course in private colleges, and also raised some practical difficulties(Xie, 2020) . He pointed out that the teaching content of film and television scores needs to be restructured under the development of the new media era. The compilation and improvement of traditional course books have gradually become out of touch with technology in modern society. At this time, strengthening and improving the teaching content of film and television music production is to pay attention to students' acceptance of new knowledge and the cultivation of professional quality in the learning process . The course content design of film and television music production

needs to strengthen the cultivation of professional applied talents. The international application of film and television scores course has also been studied by scholars from Wuhan Conservatory of Music. In their article that in the United States, where the film industry is the most developed, Film Scoring has long been distinguished from other creative majors in a single subject setting(Feng, 2022). Many internationally renowned comprehensive universities and conservatories, including New York University, University of Southern California, Berkeley Conservatory of Music and Eastman Conservatory of Music, have set up major courses from undergraduate to doctoral students for this major many years ago. Its graduates radiate the film industry from the United States to the whole world, and play a pivotal role and position in it. Compared with the more mature and supporting film and television scores education in the United States, although major music colleges in China do not have independent disciplines for film and television scores, they are in the initial stage of gradual promotion, experimentation and exploration in recent years: including the Central Conservatory of Music, Shanghai Many professional music colleges and comprehensive universities in China, including the Conservatory of Music and the Sichuan Conservatory of Music, are actively developing the possibility of using film and television music analysis and production or similar courses as elective courses, and the scale has initially formed at this stage .

1.4 Conclusion

In the century-old development of film and television scores, from the initial simple separation of audio and video, live soundtrack accompaniment, to live accompaniment behind the scenes, to the electronic music soundtrack technology supported and derived from the digital development of movies, and finally to the current digital platform. Soundtrack technology and the technical application of film and television scores have achieved a worthy leap. In addition, in terms of materials, in addition to classic classical music soundtracks, the style changes in various historical periods, the vigorous development of electronic music, and finally the flourishing of it styles, the emergence of distinctive film and television scores works from various

countries and nations, It all confirms that the music style and soundtrack materials of film and television scores are rapidly developing towards diversification. In addition, in terms of the construction and development of the film and television scores course, whether it is domestic or international, the development of this course is rapid. The film and television scores course is not only a professional course with professional skills, but also an emotional link for students. An auxiliary course for quality improvement training. At the same time, we must also note that there are still considerable differences in the development of this course, for example, the lack of hardware equipment in private universities, and the mismatch between the formulation of curriculum standards and the current talent needs. Experts and scholars are required to carry out continuous and in-depth research and practice.

2. Flipped classroom

2.1 Development and Definition of the flipped classroom

In the spring of 2007, two American teachers (Aaron Sams) and (Jonathan Bergmann) used various information methods to record the courses and share them on the web platform, so that students who failed to attend the class could download the study online and play back the teacher's recorded video. Subsequently, the two teachers boldly carried out an innovative reform of the existing teaching form, so that students could understand the knowledge by watching the recorded video resources after class, while in class, they organised relevant discussions according to the analysis results of the feedback platform. Subsequently, they also held many Open days of teaching mode observation, which promoted the communication and development of flipped classrooms.

In 2012, Bergman and Samms (Flip Your Classroom: Talk to Every Student in Every Class Every Day) became an important milestone in the theoretical process of flipped classroom learning. In the first half of 2014, by American professors (Jared, Grace Onchwari) and (James N.Oigara) .The three co-authored a book (Promoting Active Learning Through The Flipped Classroom Model), which discusses the internal relationship between the flipped classroom and students' active learning in 15 chapters,

setting a clearer tone for the study of this new teaching model. The emergence and communication development of learning mode.

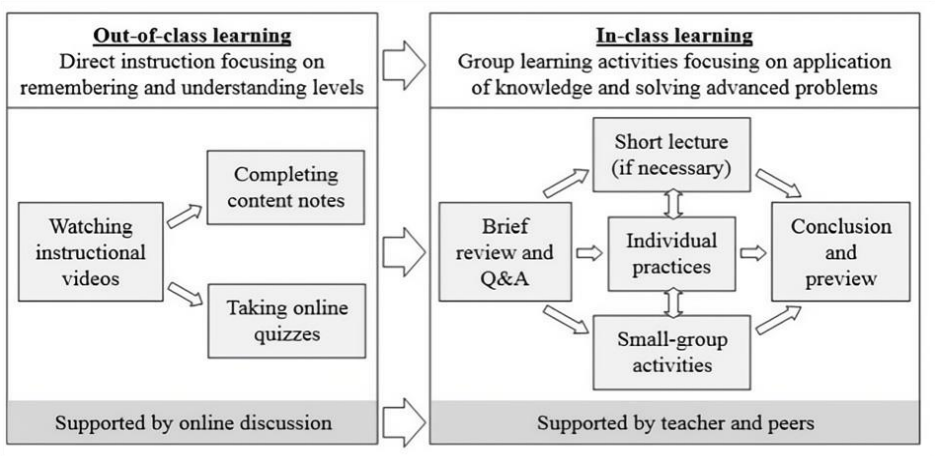
Flipped classroom is a method of creativity. Students interact in class and learn content and do homework independently outside class. With this approach, students can learn outside the classroom at their own pace through teaching videos or other resources, and complete assignments and interactive activities in the classroom Bergmann and Sams (2012). In addition, Bishop and Verleger (2013) defined the flipped classroom as "a new teaching approach that uses video lectures and practice questions as homework, and conducts problem-solving activities in small groups."They excluded the implementation methods of not using video outside the classroom. According to the flipped classroom paradigm, and the revised cognitive domain education goal classification (Krathwohl, 2002), we will flip classroom teaching strategy for students before class through teaching video and auxiliary materials, and then participate in interactive and collaborative learning activities, promote their understanding, application, analysis, evaluation and creation in class.

From the definition of flipped classroom by domestic and foreign scholars, it is mainly conducted from two perspectives, one is macro abstraction the perspective is the change of the process of knowledge transmission and knowledge internalisation, the second is the micro specific perspective, namely, the description of the flipped class the general process of the hall. However, it can be seen that their understanding of flipped classroom has internal unity, which is mainly manifested in three aspects: First, in terms of its use conditions, technology has given it sufficient support; second, in terms of its use process, the time and space for teaching knowledge have made a crucial leap; thirdly, in terms of teaching elements, the relationship between teachers and students as well as the relationship and connection between learning content are all changed through technology. Based on the analysis above and existing research, this study affirms that the flipped classroom model involves students engaging in autonomous learning before classroom sessions by accessing instructional videos and materials. During class time, guided by teachers, students collaborate to explore and learn

together, clarifying any doubts they may have. The theoretical perspective suggests that the flipped classroom disrupts traditional classroom dynamics, altering the interactions among teachers, students, and instructional content. By reversing the role of information technology and redefining the space for knowledge dissemination and assimilation, the flipped classroom model transforms teaching practices.

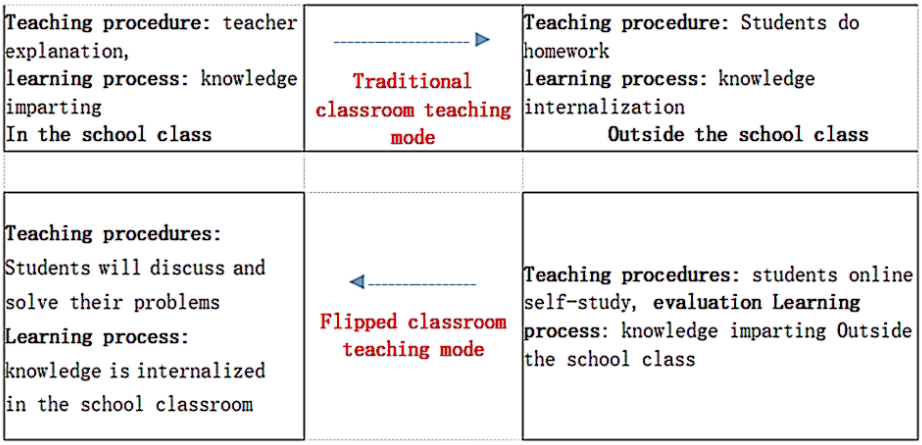
2.2 Mode and application of flipped classroom

The flipped classroom model is a role transformation between inside and outside the classroom. Lectures, discussions and activities organised in the role of teachers are conducted outside the classroom, while time in the classroom is used to create a new environment to share and display the content learned and acquired outside the classroom, so as to actively learn and transmit information. During the class time, the group cooperative learning and discussion are used to solve the problems (M.K.Kim et al., 2014). The following figure is the flipped Classroom Challenge in K12 Education: Possible Solutions and Suggestions for Future Research (Lo,Hew & Chen, 2017), International Journal of Management Education, showing the flipped classroom model in figure 3:



Figures 3 Lo, C.K., Hew, K.F. 2017. Toward a set of design principles for mathematics flipped classrooms.

In the traditional classroom, the teachers use most of the time in the classroom to explain the knowledge in detail, and then promote the students to complete the internalisation of knowledge through the homework assignment and other means after class(Fan, 2015) . In the flipped classroom teaching mode, students use the online video learning and self-testing provided by the resource platform to achieve the effect of knowledge preview, while in the offline classroom, through cooperative learning, action discussion, application combined with teachers' targeted explanation, so as to achieve the effect of knowledge internalisation. From the level of knowledge, understanding and teaching process, it is enough to see that this teaching mode is a subversion and turnover of the traditional teaching mode, so it is called the flipped classroom teaching mode. From figure 4, we can clearly understand this flipping process:



Figures 4 Fan,X.Y. 2015.Research on American Flip Classroom Teaching Model

In addition, it is called a hybrid learning strategy (Lewis et al.2018; Yilmaz 2017), which transfers the content in the classroom outside the classroom and makes it student-centred. There is no longer a teacher to teach the course content. This is the backbone of the flipped classroom (Pierce and Fox, 2012). Teachers reduce the time to explain basic content in class, send specific knowledge content to students in advance, and enable them to complete it independently. In this way, classroom practice and interaction are strengthened (Lewis et al., 2017). The documents and materials

prepared by teachers before class are mainly based on videos and other texts to facilitate students' understanding of basic concepts (Cilli-Turner, 2015).

Jukui middle school is the first implementation of flipped classroom school, through the implementation of flipped classroom Jukui school found micro video to promote students learning effect is better than single guide case, therefore, put forward the concept of "using technology to promote efficient classroom", at the same time, Jukui school found flipped classroom can integrate passive accept learning and independent construction learning advantages, then put forward "tailored personalised learning scheme, make learning anytime, anywhere, on demand" concept. Nowadays, Jukui Middle School has formed a complete flipped classroom system with objectives and planning, physical environment, micro-class and production, operation mode, and teacher-student training. Studies of gather the middle school questionnaire survey, from the student attitude to flipped classroom, students before class learning, classroom learning situation and students to micro video attitude on flipped classroom implementation, the results show that 67% of students to flipped classroom is positive attitude, 69% of students think flipped classroom learning a big help, 84% of students think flipped classroom can improve their autonomous learning ability, only 48% of students think he is the centre of teaching, 45% of students think they got individual tutoring.

2.3 Advantages and disadvantages of the flipped classroom

As a new type of classroom teaching strategy and teaching mode, flipped classroom has a positive side and its defects. Some researchers have found that if there is no guidance and hints for the discussion, some students with low grades and poor ability may not keep up with the discussion in class and feel anxious or self-abandoned (Sun et al., 2017).At the same time, it is mainly divided and discussed through groups. However, there are many literatures that have done some research on cooperative learning, indicating that students encountered many challenges and problems during this process. (Le et al., 2018). For example, there are problems with the speed of

knowledge creation and discussion due to the lack of strong abilities of their students (Popov et al., 2012; Ross, 2008).

Therefore, although flipped classrooms play a positive role in students' learning, students must adopt appropriate prompts and guidance strategies, as well as students should have some participation in learning and explore independently.

Believes that this mode promotes language learning, while the other one believes that there is no significant difference between the effect of feeding and transformation under the traditional teaching mode （Balzotti et al., 2015; He et al.,2022) . The former believes that the ecological supply transformed by learners in the flipped classroom teaching environment is directly helpful to students' learning.

The latter believes that there is no significant difference between the teaching effect of them (Marcey et al.,2012;Sahin et al.,2015).First of all, the reasons for this result may be affected by various objective reasons, indicating that flipped classroom may not be able to be routinely used (Sommer et al.,2018).Another reason is limited by teachers or students' own reasons (He et al.,2022; Lax et al.,2017). If students have a certain understanding of technology (Kim, M. et al., 2014) in the process of independent learning, they can absorb the curriculum content in the traditional classroom and can self-digest according to their personal situation(Marcey et al.,2012).Of course, if we think about the direction, we find that if they are used to the traditional classroom form, then they will have a bad view of the new method they will accept, thus finding it difficult and affecting the quality of teaching or learning(Sahin et al., 2015).At the same time, due to the forced increase of independent learning time, many students due to the classroom atmosphere and spatial distance and emotional changes, resulting in the learning effect of restrictions.

2.4 Conclusion

After examining the literature on the flipped classroom, it is evident that this teaching approach, relatively new in recent years, has exerted a widespread influence on education. Many educators and scholars have conducted extensive research on the flipped classroom model, which embodies the principles of student-centred education.

It addresses several shortcomings of traditional teaching methods, such as limited classroom interactivity, student engagement, collaboration, and autonomy in learning. However, it also has its drawbacks, including challenges in adapting to new modes and technical limitations. Nevertheless, the flipped classroom demonstrates remarkable flexibility and adaptability. It aligns well with the advancements in information technology, actively integrating with network technologies to continuously improve and innovate, thereby contributing to the advancement of educational technology.

3. Gamification

3.1 Definition of gamification

Gamification is the application of game design elements and gameplay principles in non-game environments. It is a set of activities and processes that solve a problem by applying a game process. When such a functional form attracts the audience, it can be integrated into learning through game activities, solving problems discovered in the process and mastering new skills. Gartner, Inc. predicts that by 2020, gamification will be widely used and its mechanisms will be implemented in learning processes around the world. Among them, organisation and competition are mainly carried out through rankings, badges, rewards, etc. Through its different focuses, such as motivation, participation plays a vital role and effect in higher education and beyond technology in the environment (An et al., 2020). Gamification refers to the process of using game elements and thinking in a non-game environment to attract and motivate people, change behaviour, and solve problems in the real world (Kapp, 2012). Over the past decade, games have been used in many fields, including education, health care, software development, business, marketing, and entertainment (Koivisto and Hamari ,2019).

3.2 Gamification elements

In the case of (Prensky ,2003), six key structural elements of the game have been proposed, namely "rules", "goals and goals", "results and feedback", "fiction" fiction / competition / challenge / against "," interaction "and" representative or story".

Pasakorn Nai Lasakul (2014) said that the core of the game is two components:

1) Game mechanics are the rules and interactions in the game that make the game more interesting. There are many forms of game mechanism, such as challenges and levels in the achievement achievement mechanism; points, virtual items, badges, rankings, etc. in the incentive mechanism ; rewards in the reward mechanism, etc.

2)Game dynamics are game-driven, based on human behaviour. This refers to the basic needs, such as reward needs, recognition needs, competitive needs, etc. It can be said that these two elements are interrelated, such as points, challenges, and virtual products, to make the game more interesting and enable the game to drive, because it meets the basic human needs: Woravit Penyayang (2013) explains the game mechanics as a conceptual element of the game as follows:

2.1) Points are points earned by participating in an event. It is a tool to measure success.

2.2) A badge is a special symbol that is only acquired at a specific event and can also be acquired as an additional task.

2.3) The level is a challenge level. Through the conquest of the increasing difficulty, gain satisfaction and pride, and then establish new challenge goals, and continuous progress.

2.4) The ranking board (Leaderboard) shows the points that participants get over a certain period of time. The function of the points can be used to motivate participants to challenge the next cycle, or to get partial virtual or real comfort through the points

2.5) A challenge is a task that you need to help with (Sarah Bright, 2014), the elements of motivation include points, level table, opportunities to improve knowledge and level, badges, adding multiple challenges, and instant response. They discussed the elements of the motivation, including rating scales (scores, badges, people, etc.), story telling, game control, immediate feedback, and participation opportunities (Randall et al., 2013) . Address learning problems by increasing

challenges, improving knowledge levels, and social connections. The elements of motivation in games include points, leaderboards, and levels (Mekler et al., 2013).

3.3 The role of gamification in teaching and learning

In a conceptual definition, gamification refers to the process of using game elements and thinking in a non-gaming environment to attract and motivate people, change behaviour, and solve problems in the real world. He has a very deep use in many fields. Some researchers have also given new explanations to the theoretical application of gamification in teaching and learning.

Games in teaching applications can be divided into two categories: (a) games based on external rewards and (b) meaningful games (Tan & Hew, 2016). Game mechanics based on external rewards mainly involve the use of game elements. For example, if you want to emphasise external dynamics, you can use badges, leaderboards. Secondly, the interesting environmental experience is achieved through both internal and external levels of motivation and reward. When it comes to playing against each other, many people divide it into deep and shallow. Meaningful game situations use both intrinsic motivational elements and extrinsic reward elements to provide a meaningful experience. Similarly, some researchers distinguish between shallow and deep games (Liberos, 2015). Shallow games involve the use of game elements in the context of core teaching processes, while deep games use game elements and game design skills to change the core process of the activity. Understanding the differences between games based on external rewards and meaningful games, and shallow and deep games can solve the negative effects of teachers on external rewards and misunderstandings of playing methods.

In addition, for the embodiment of gamification in learning, we can refer to several propositions of (Landes, 2014), which explains the role of gamification in the learning process:

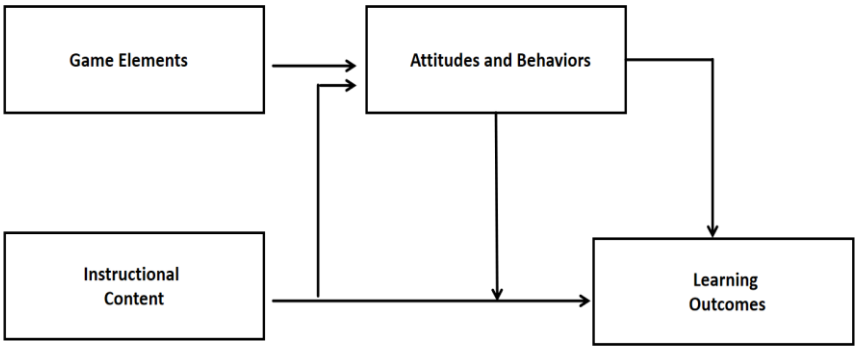
1) The quality of learning results is directly caused by the teaching content and the corresponding teaching methods. A prerequisite for the success of any successful game is effective teaching content(Landers ,2014). Games are meant to

enhance teaching, not replace it. This is important for researchers and practitioners when learning, designing, or implementing games in educational settings.

2) Attitude and behaviour are two variables that can inculcate students' learning results. Although there are some structures in the teaching content (e.g. Intrinsic motivation), it may vary depending on the specific situation. Previous research has shown students' behavioural motivation and cognitive performance, that is, learning attitude (Hattie, 2008). For example, to enhance their performance of outcomes, a behavioural structure could be used (Brown, 2001).

3) This proposition establishes the relationship between various game elements and student behaviour in a gamified learning environment. Student behaviours and attitudes (e.g., satisfaction). We need to be careful that the overall change of students cannot be maintained in a good state all the time. A number of studies have shown that in some cases, over-reliance on gamification can also lead to negative learning outcomes(Hanus & Fox, 2015).

4) Game elements influence attitudes and behaviours that mediate learning outcomes: Moderating effects occur when one structure depends on another. The students' attitude and behaviour towards the course content will have an impact on their learning results. The creation of more refined game elements may, in turn, have an impact on the students' positive status, so as to change and improve the relationship between the course content and results. , as shown in Figure 5:



Figures 5 Landers ,2014. Theory of Gamification Learning

5) The relationship between game elements and learning outcomes is mediated through attitudes and behaviours: Moderation when a construct is causally related to only one intermediary variable has consequences that would otherwise be the case. He explained and elaborated that gamification cannot bring effects to learning itself, but these elements with game effects can have an impact on results, mainly determined by their familiarity and behaviour.

In China, some scholars also have precise explanations for the term of gamification teaching.Gamification teaching, also known as teaching gamification, is a gamified teaching in the classroom. Interest is the best teacher in human beings(Wang, 2021) . With a positive interest in learning, there will be a good learning motivation, which will induce a good learning behaviour, and then produce a good learning effect. Thus it can be seen that gamified teaching methods can stimulate students' autonomy, so as to achieve the ideal state.

In addition, as one of the important means to stimulate people's learning motivation, applying games to teaching requires not only the cognitive characteristics of students, but also the characteristics of the subject. Gamification learning is the gamification of learning. Teachers use games to simplify the complex knowledge points, make life interesting. According to the psychological characteristics of learners' love for games, teachers take games as a platform to impart knowledge, which makes the process of information transmission more interesting. The interactive factors in games are introduced in the communication link, so that students do not feel oppressed, nervous and passive in learning.

3.4 Strategies of gamification in teaching

Gamification teaching strategy refers to the classroom teaching, teachers combining the actual situation of students development characteristics, considering the differences between students, combined with the teaching content and teaching objectives, follow the principle of gamification teaching strategy and the characteristics of different course link, combined with modern information technology design appropriate teaching strategy, in the form of the game to develop teaching.

Multimedia gamification teaching strategies can be divided into three categories: category game strategy, creation game strategy, and restructuring game strategy(Wang, 2021) .

1. Category of game strategy

Category game strategy refers to the use of existing online learning games in the classroom. Its advantage lies in the sharing teachers design the burden of games, with a high game fun, more likely to arouse students' interest in learning.example For example, "Jinshan typing game" has been successfully applied in primary school English teaching, mainly to exercise students' word memory with spelling ability. The disadvantages of the category game strategy are also obvious, that is, the lack of the category games the method covers all knowledge use cases, and the game content is updated slowly, resulting in a disconnect from the new textbook. Into the category the use of game strategy is divided into the following steps: First, teachers should make clear the teaching objectives, and students should accurately grasp the learning ； Secondly, the teacher chooses the game material and the students adapt to the game environment; Again, the teacher teaches the students Game materials, supplement the knowledge points not covered by the game, the students complete the knowledge points in the game and the teacher's teaching learning; Finally, the students review the learning experience during the game, the teacher observe the teaching effect and the student feedback and guide the problem and correct the mistakes in the first time.

2. Create similar game strategies

Creation game strategy refers to the teacher design teaching games, with a strong teacher personal style.Because the creation of games are designed by teachers according to the actual teaching content and the real situation of students, so the games are targeted very strongly, the teacher can control the pace of the classroom independently.

3. Restructuring game strategy

Category games are lacking for some knowledge points to a certain extent, and creation games are right, the requirements of the teachers themselves are very high, so the most feasible is the reorganisation game. Recombination is the words,image, animation, video and audio are selected according to the needs to stimulate students' learning interest. So the key here is to choose which forms to mix, and how to combine the pace of the class phase mixing to achieve optimal learning results.

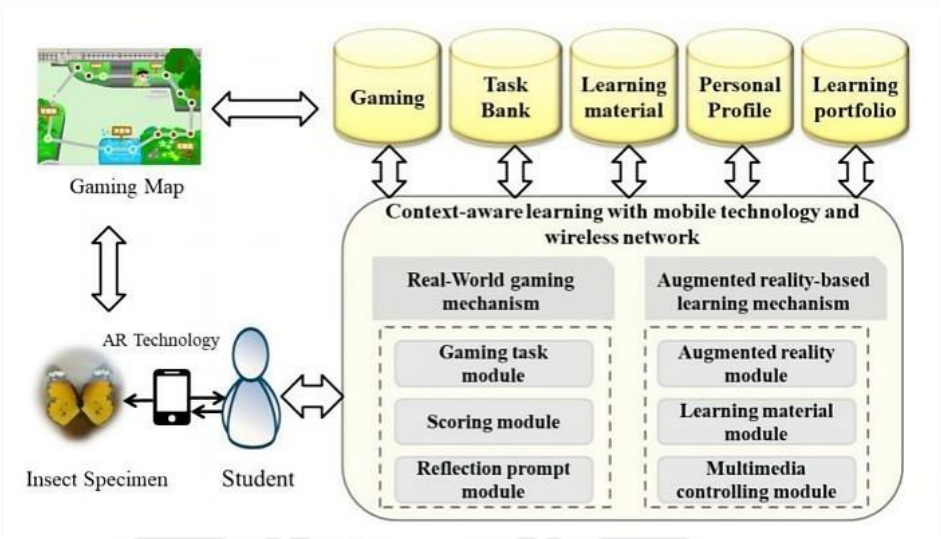
3.5 Application of gamification in teaching

Gamification has been repeatedly verified by many experts and scholars, proving that it can be effectively integrated with teaching in the process of application, so as to improve students' ability in some aspects of the learning process.

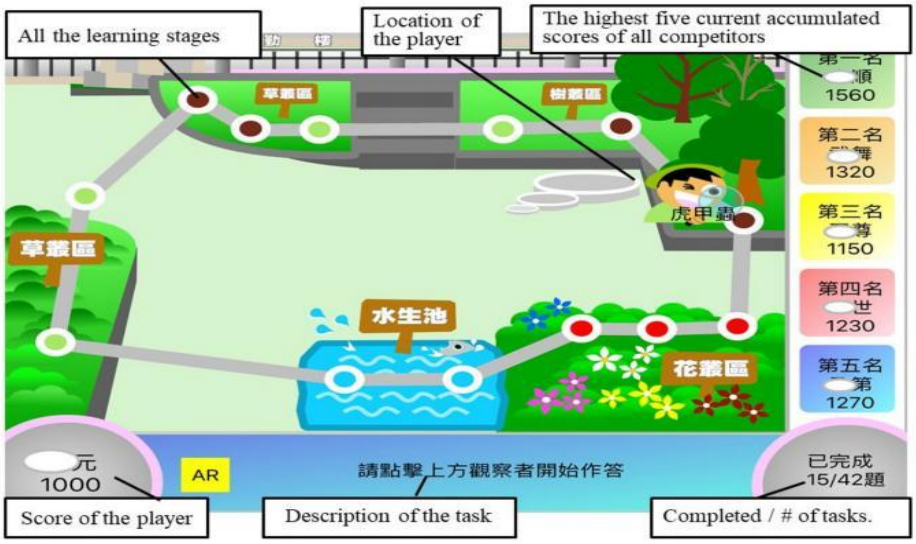
Digital game-based learning (DGBL) is considered active learning that uses educational games to a study context (Chang & Hwang, 2019). Recent years, it has been used to look for the learning ability that students want to get, such as cognition, effectiveness, high level thinking ability, etc.For example,A number of scientific articles have been published on game learning, demonstrating that in order to improve correct and effective learning, digital games have the potential to create the environments they demand, blending virtual and real learning environments and Spaces(Li & Tsai, 2013) . Song and Sparks (2019) designed an evaluation based on game-enhanced scenarios to explore debating skills, and announced the significant advantages of learning activities over students' argumentation skills. In addition, the DGBL provides a positive and effective learning environment for teachers to promote students' self-directed learning(Chen et al.,2014;Yang & Chang, 2013).Some of the more positive studies suggest that students can better understand the concept of learning when they actively process information (Kühl et al.,2018).Promoting student engagement is crucial for their efficient learning, as well as high student engagement.

In some teaching modes, teachers actively use modern information technology, such as AR technology, and integrate gamified strategies with AR technology, and apply them in teaching, to form a gamified teaching mode based on AR technology:

The researchers designed a learning model based on multimedia learning and AR games to carry out learning activities with situational perception and association to improve students' cognition of insects. Based on this, a learning system based on AR games was developed using Vuforia, Unity 3D and Xcode, with each insect appearing in the park scene. In addition, the implemented learning system is installed in the students' mobile tablets. Figure 1 describes the structure of AR game-based learning systems, including an information-aware real learning environment and two mechanisms, namely the realistic game mechanism and AR-based learning mechanism; moreover, multiple databases are created to support learning mechanisms, such as game database and learning combination database. Figure 2 shows the interface for AR games, including a map depicting the real background, as well as some game or learning modules. On the map, several game stages represent individual insect specimens observed in the Learning Park. Each student had an initial game score and could randomly touch a stage on the map to begin the learning task. Figure 6、 7 learning process based on AR games.



Figures 6 Chen, C.H. 2020, Impacts of augmented reality and a digital game on students science learning with reflection prompts in multimedia learning.



Figures 7 Chen, C.H. 2020, Impacts of augmented reality and a digital game on students science learning with reflection prompts in multimedia learning.

3.6 Gamified reality development and the establishment of game types

With the development of computers and Internet technologies, the traditional ways of learning are slowly changing. Online learning is favoured by more and more educators because of its high mobility and convenience. However, online learning still has some limitations, such as lack of interest, interactivity and so on, which cannot essentially improve the enthusiasm and efficiency of learners. Game-Based Learning (GBL), as a new choice, combines the advantages of computer games and online learning, which not only meets the needs of people to learn anytime and anywhere, but also increases the interest of learning activities. Therefore, from the perspective of software and computer digital development, integrating the needs of education, many technical personnel started the construction and research of relevant aspects, and designed and developed the efficient and fun gamification-based learning (CT-GBL) system based on computational thinking.

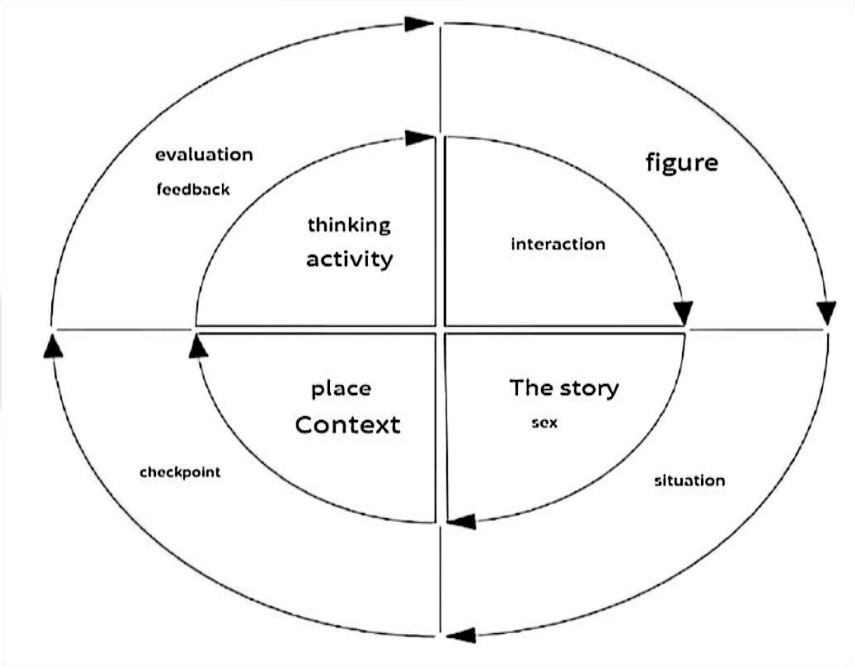
FunBrain: This is one of the recently created educational Internet websites with gamified learnings for students at different stages, including maths arcade, reading, fun arcade, playground, special activities, teacher area and other sections. Their focus is to provide learners with a variety of interactive games, including many subject categories, with the purpose of cultivating learners' reading, writing and mathematics abilities.

MUVES: the gamification learning project conducted by Harvard University Dede et al. allows learners to enter a nineteenth-century virtual city and solve various problems facing the city through observation, experiments and conversations with characters(Dede， Ketelhut & Ruess , 2002).

SAGE: Simulations and Advanced Gaming Environments (SAGE) is a gamification learning project conducted by Simon Fraser University in Canada, together with several universities and companies, to achieve the purpose of learning through advanced simulation game technology(Sauvé et al., 2022) .The core spirit of the game is the expression of behaviour, which includes four elements, which are the behaviour

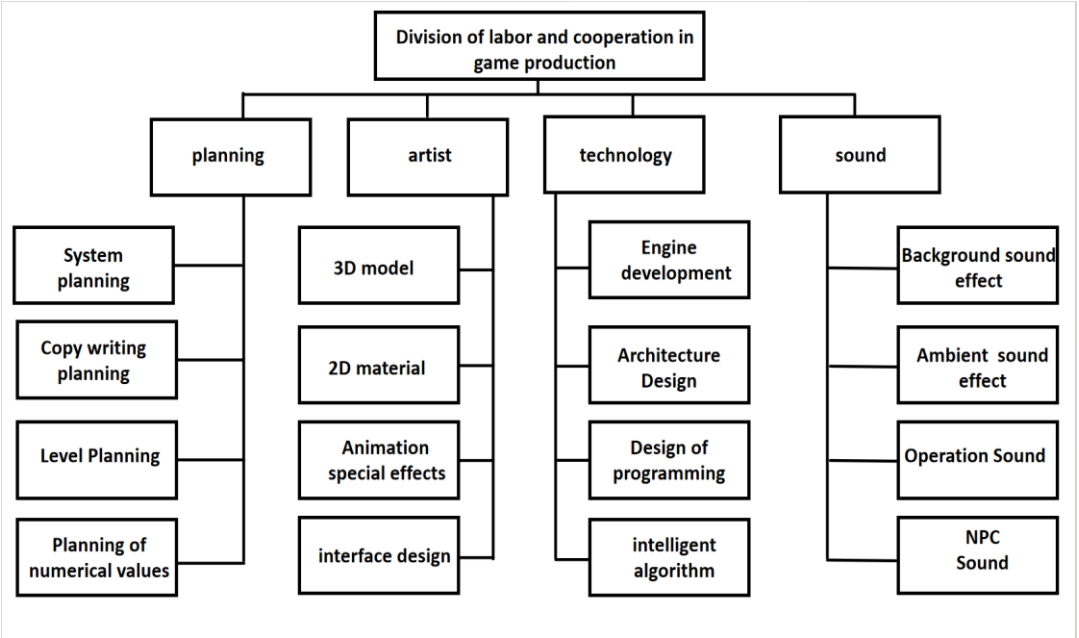
mode, the conditional rules, entertaining the body and mind, and winning or losing. Game interaction design master Chris Crawford defines and analyses the composition of the game from four aspects: representation, interaction, conflict, and security (Crawford & Crawford, 1984).

In view of the special purpose of gamified learning software based on computational thinking, researchers proposed a design framework for simulated gamified learning according to the characters, situations, content and objectives of the game(Wang, 2015). As shown in figure 8:



Figures 8 Gamification learning framework Simulation experience of gamified learning framework From Wang,Y.H. 2015, Research and Development of Gameplay

The gamification modules embedded in the platform will have slightly different development processes due to their different characteristics and different platforms. In the meantime, the division of labour and cooperation of various departments is shown in figure 9:



Figures 9 Wang,Y.H. 2015, Research and Development of Gameplay Learning System Based on Computational Thinking

From the above research, we can know that in the online education platform, the development and construction of gamification design has a certain degree of complexity, which requires a relatively clear module division and classification construction. Users need to choose the type of gamification that needs to be matched according to the gamification module created by themselves, so as to better achieve the use purpose of educators.

3.7 Conclusion

Gamification is not a very new topic. With the rapid development of the game industry, its theoretical and practical value are increasing. By summarising gaming experiences, individuals analyse the structure, elements, and mechanics of games. They then construct application platforms with gamification features, studying their functions and significance, and implementing them across diverse domains to fulfil envisioned objectives. In the field of education, gamification is integrated into teaching,

and a set of effective teaching strategies can effectively improve the efficiency of classroom teaching, enhance students 'active participation, and meet students' needs for innovation in learning methods. In addition, gamification teaching transfers students 'love for games into classroom teaching through interesting and ambiguous activities, which is conducive to cultivating students' good emotion, attitude and values, improving students' ability of independent exploration and the awareness of actively participating in classroom teaching. Finally, with the rapid development of information technology, digital technology and gamification research can create new teaching modes and teaching methods, which can broaden the "options" of educators. For example, the integration of visual enhancement technology and artificial intelligence technology and gamification greatly improves the efficiency of the teaching field; integrating gamification teaching into online education platforms can also improve the limitations and shortcomings of online learning. There is reason to believe that gamification will be more widely disseminated and applied in teaching strategies, or even in other professional fields.

4.Digital technology

4.1 Definition of digital technology

Explains the concept of digital technology as follows: Digital technology, the corresponding English concept is "Digital Technology", which is a technology that promotes, influences and develops computer technology(Wu, 2018) . In this technology, all kinds of information are coded through certain coding means, turned into binary numbers "0" and "1", and then through the computer to achieve storage, calculation, transmission and other functions."digital technology" or "computer technology", because it is called "digital technology" or "computer technology".

In the process of development, the digital technologies included the following categories: digital information input and output technology, digital information storage technology, digital information processing technology, digital transmission technology, digital information management technology and digital information security technology. As Negroponte (1997) expressed digital technology has become one of the

most important technologies in today's society, and profoundly changed the lifestyle of all

Digital technology, also known as "digitalization," is a branch of science and technology closely associated with computers. It involves converting various forms of information, such as pictures, text, sound, and images, into binary code with the assistance of specific equipment. This binary data is then processed, stored, transmitted, and manipulated by computers. (Cai, 2021).

The rise of information and communication technology (ICT) and urbanisation are the two most important global trends in the world today(Zhou, 2020). The historical scope and scale of both is an unprecedented change in the way of production and life of human society. Human society has entered an era of amazing progress in digital technology (including mobile Internet, Internet of Things, big data, cloud computing, artificial intelligence and many other information and communication technologies) and so on. In particular, the popularity of intelligent terminals enables people to connect to the internet anytime and anywhere, personal life, national prosperity and security and stability are increasingly affected by digital technology , and they refers to the use of certain equipment to transform all kinds of information into the electronic computer can identify the binary number after computing, processing, storage, transmission, transmission, reduction technology, it can generally refer to many technologies, including mobile internet, internet of things, big data, cloud computing and artificial intelligence (Raisinghan & Nugent, 2004) . The conceptual analysis of digital technology should focus on the profound impact it brings, including the integration and development with other technologies, the social change brought about by the popularisation and application of digital technology, the microeconomic operation and the change of macroeconomic level and the impact of application ability.

4.2 Definition and type of network platform under digital technology

With the support of digital technology, derived the Internet network based service platform, from the basic definition of network platform, network platform refers to the network delivery, network service type is divided into network services and system

services, by the application server, Web server, information transmission server, communication server delivery function.From the definition of the operation function of the network platform, the network platform is a network platform-based operation mode in the network industry, that is, professional platform developers or operators build a platform architecture based on the Internet and network technology to provide one-stop information services for network users(Duan,Zhao & Chen,2009).The researchers also believe that the network platform is a multi-level architecture that delivers functions and provides information services through database, algorithm and protocol, and other information technologies (Zhou, 2016).

In the structure of the network platform, the communication system in which users upload and share resources and data is defined by the type of their network structure, which links PC computers, servers, and other devices(Zhou, 2016). In addition, information technology companies have also developed their own dedicated network architectures, such as IBM's famous system Network System structure (SNA) and DEC's digital network architecture (DNA). In addition, open source open architecture also exists for a long time. For example, the International Organization for Standardization (ISO) launched the system open interconnection (OISO) model. Due to the openness of this standard, it is possible to evolve product collaboration technologies among major data vendors.

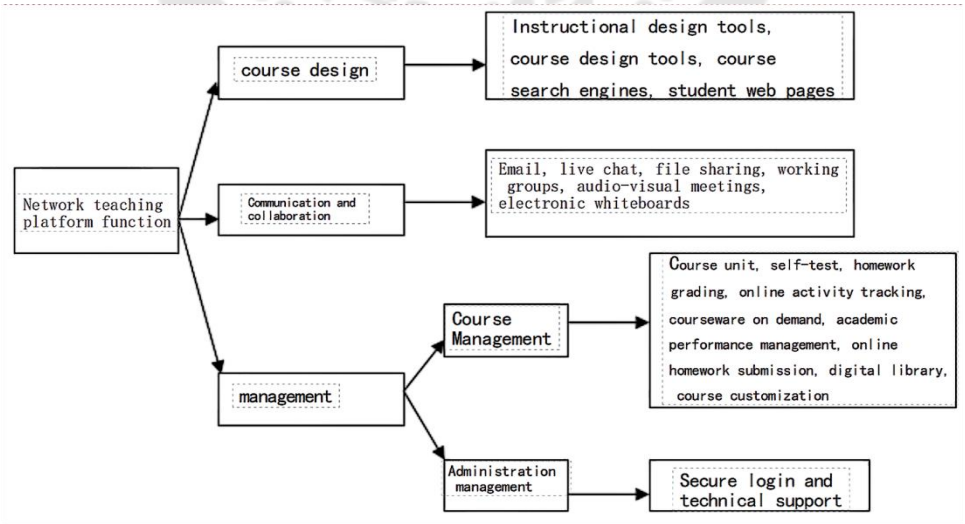
In addition, through the research of various network platforms at home and abroad, we can also know that the current network platforms are divided into general platforms and special platforms. The special meaning includes the network platform specially developed for a certain institution and suitable for certain disciplines, industries and other purposes, and the general platform is divided into commercial platform and open source platform. The network education platform studied in our project refers to the professional-oriented, commercial or open-source platform specially applied in the field of education.

4.3 online education platform under digital technology

With the rapid development of digital technology, the development of educational technology has been on the fast track. Among them, the online education platform that jumped out of the traditional offline classroom was born. Online education platform is a platform for the integration of new educational technology and network technology, highly relying on the development of digital technology and mobile technology.

A large-scale scientific research project "Information Campus Program" (The Campus Computing Project) was initiated and hosted by Professor Kenneth Green from the University of Claremont in 1990, which was the earliest emergence of the concept of 5 parks in digital schools(Chu, 2012) . According to statistics, online teaching platforms have been established in more than 3,000 public and private universities in the United States, basically covering all professional disciplines in colleges and universities, and basically completing the transformation from traditional teaching to teaching based on digital platforms.

Professor Zhang WeiYuan Summary summarises the functional classification of network teaching platforms, with 22 items in 3 categories. The specific functions are shown in figure 10:

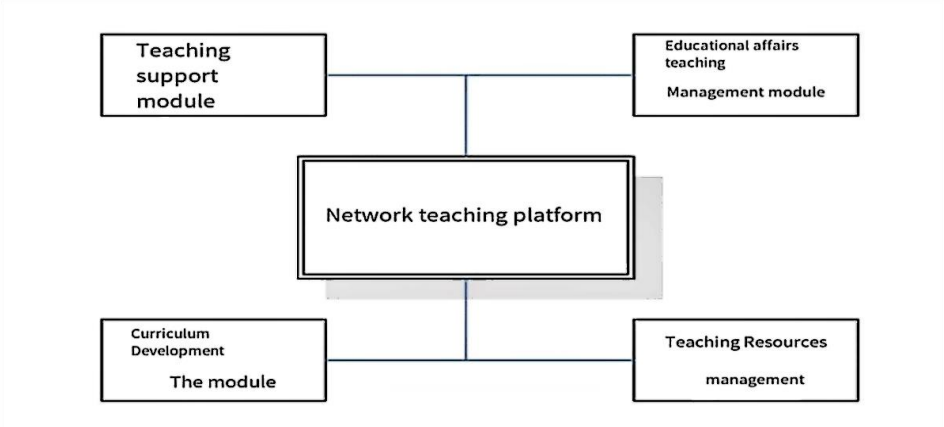


Figures 10 Chu,G.P. 2013,Research on the Influencing factors and promotion strategies of Network teaching Platform Application: A case study of universities in Guangzhou.

From the figure drawn above, we can conclude that the online education platform is a platform with integrated functions, and also an online education platform for the comprehensive application of educational technology.

Researchers said that the online teaching platform is a set of distance teaching service system software that takes online teaching resources as the core and, with the support of the teaching management system, makes reasonable use of teaching resources and provides a full range of services. Modern distance teaching organically combines online teaching resources with school distance teaching services (Luo, 2014).

The online teaching platform is generally composed of a teaching support module, educational administration and teaching management module, curriculum development module and teaching resource management module(Luo, 2014). From another perspective, it can also be composed of registration management module, online course module, online homework module, online tutoring module, online test module and online exercise module, as shown in figure 11:



Figures 11 Luo,H. 2014, Current situation and countermeasures of college students' independent learning based on network teaching platform.

Pan HongYan, Zhu XiaoJu, Zhang WeiYuan and other scholars have the following expressions on the definition of network based platform in their respective academic papers, which are called distance teaching platform, network teaching platform, network teaching support platform, etc., among which the network teaching platform ".

In western countries, such as Britain, Germany, the United States and other countries with developed information technology, some scholars call it a course management system, some scholars call it a learning management system, some scholars call it learning activity management system, etc. Although domestic and foreign scholars are not the same name, its connotation is basically the same.

Therefore, based on the research of many scholars, the network teaching platform is a network software system that supports teachers to conduct teaching evaluation and interactive teaching in the classroom based on the network teaching environment.

4.4 Definition and application of network education practice platform under digital technology

With the development and application of computer electronic technology and related communication technology, the transmission of knowledge becomes more and more rapid. Teachers and students can acquire and use knowledge through more ways and means. The modernization of educational thought, educational content, educational means and educational technology is an important symbol of educational modernization. Among many modern educational methods and educational technologies, the teaching media with computer and communication technology as the means is one of the most cutting-edge and developing teaching methods. In the above literature research, we discussed the birth and derivative of online education platform, among which, as the auxiliary "sub-function", undertook the functions of practice consolidation, self-practice evaluation and promotion of knowledge internalisation. Such a concept is also called the CAI technology concept.

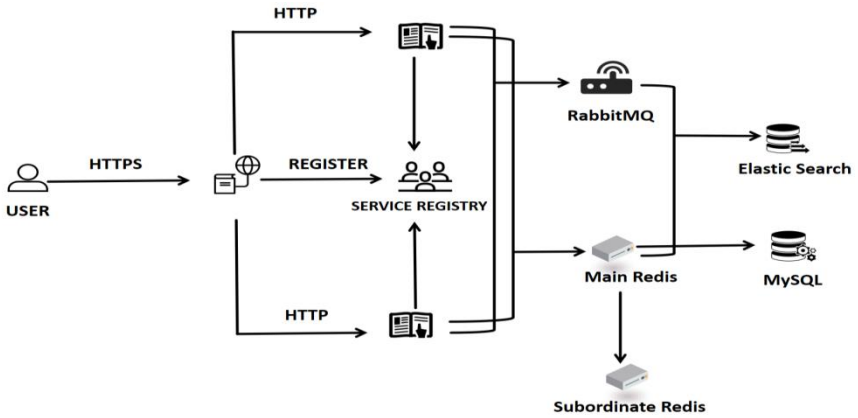
The concept of computer-aided teaching (CAI) is the use of teaching software and computers, through users and metres teaching methods to achieve certain teaching objectives (Wang, 2010).

Besides, Study on the effectiveness of networked practice for learning, Universities around the world also have in-depth research, For example, at the Chinese University of Hong Kong, Proposed the concept of user validity (Consumer Validity) in computerised examinations; in England (Wolverhamton University), Developed a "computer-based evaluation project"; in the United States (University of Charleston), online exercises were studied among college students and graduate students, and made a comparison between the two ; in (University of Victoria) and in Malaspina University-College, Canada, a comparative study of network exercises and traditional exercises, all the above experimental results show that doing exercises on the internet is effective (Li, 2007).

At present, the application of CAI in China has been able to make good use of text, sound, graphics, video images and animation to display and reproduce knowledge in various aspects, angles and forms, so that the means of teaching content expression are diverse, and improve the diversity, flexibility and realism of teaching content. Many existing CAI systems have been recognized by the domestic market. For example, China Xinghai Conservatory of Music has developed an examination and practice platform app for the music social art level examination. In addition, the development of the network practice platform has tended to be mobile, small, portable and intelligent. In the process of use, users can no longer only rely on the PC terminal to complete the practice, but can use more mobile devices for practice and learning.

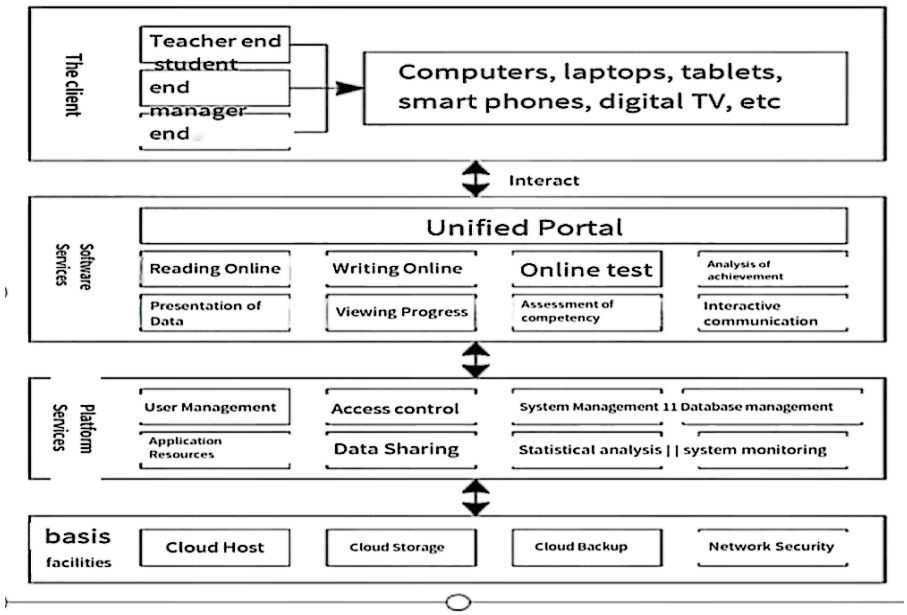
For example: the article describes the online exercise system based on WeChat small program- "topic guest"(Luo et al., 2021). Different from traditional learning methods, this platform combines data mining technology and wechat small program application, which can better meet students 'needs for flexible problem solving problems and facilitate teachers to timely control students' learning situation. The platform adopts a modular micro-service mode, and the specific architecture is shown in

Fig. Students will take the WeChat small program as the entrance, and the teacher terminal can log in to the background of the exercise platform through the WEB browser, as shown in figure 12:

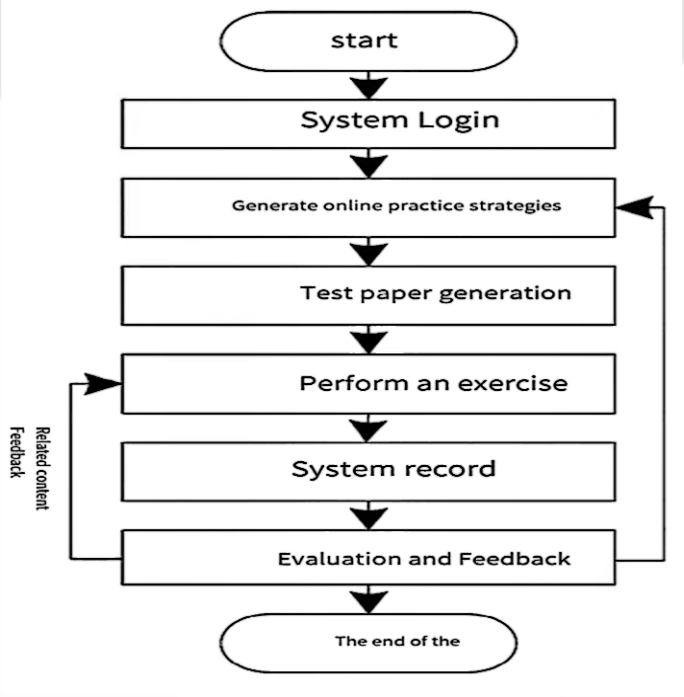


Figures 12 Luo,H.B.,Chen,M.,Chen,G.J.,Qiu,G.J., & Song,J.H. 2021, online practice system based on WeChat applet

The practice platform is divided into the following parts in the module design(Wang & Zhao , 2022). The system client layer, as a tool for users to interact with the system, can be divided into several contents: teacher side, student side and management side. Teachers can provide courseware upload, homework and exam review, student ability evaluation and other functions for teachers; Students can use students to complete online reading, writing, testing and other online practice functions, and interact with other users through skills sharing, resource recommendation, Q&A and other ways; Administrators can implement system management functions through the management terminal. At the same time, users of each system can access the system at any time through computers, laptops, smartphones and other tools when the network is connected. The specific module service and expected service flow are shown in Figure 13 and 14:



Figures 13 Wang, J., & Zhao, C. 2022, English online practice system based on cloud computing platform.Information Technology.



Figures 14 Wang, J., & Zhao, C. 2022.English online practice system based on cloud computing platform.Information Technology.

4.5 Conclusion

Under the rapid development of digital technology, many new products have been derived, among which the emergence of network platforms has changed all aspects of human life. Due to the support of digital technology, life began to become integrated and convenient. Among them, the network teaching platform supported by digital technology has been developed and applied in the teaching field, and has been the attention of many experts and scholars. The progress of digital technology has built a powerful digital system with technical support for network teaching. With its convenient educational communication function, the network education platform has been applied to educational institutions at all levels, which complements the traditional classroom and improves the current talent training mode of schools. In addition, due to the powerful functional attributes of the online education platform, many emerging teaching tools and models are derived in the teaching ecological chain. For example, the information practice platform that can assist the internalisation and absorption of knowledge and the subsequent practice platform that integrates gamification elements, which largely make up for the various stages of pre-learning, cognition, learning and consolidation in the learning process. With the rapid development of Internet technology and information technology and the upgrading of network equipment, the transmission speed of information is accelerating, and the communication channels will be increasing. With the enhancement of people's awareness of information, the network teaching platform will be able to maintain high quality and rapid development.

5. Learning performance

5.1 Definition of learning performance

According to Wang Dong, learning performance refers to the learning caused by learners because of their learning behaviour in the learning process.The ability and quality of learners have changed, which should be measured from the three dimensions of behaviour, time and quality (Du, 2018).

Yue Yanbing believes that learning performance refers to the completion of learning by learners in a specific period of timeThe academic results, he believes that

the forms of learning performance are various, mainly in the quality and efficiency of learning.Number of three aspects, learning performance can be a more comprehensive measure of learners in the learning reflected All qualities (Yue & Fan, 2006).

Hao Jianchun believes that learning performance refers to the good communication and interaction between learners and teachers, and the provision of learning a good learning situation enables learners to improve their academic achievements and thus achieve a high sense of learning achievement (Hao, 2006).

Webster & Hackleyl and other scholars use the literature review method and experimental research method to influence learners. The main factors of learning performance include the high quality of teaching media, the teaching characteristics of teachers, and the learners' attitudes, and the characteristics of the study course (Webster & Hackley, 1997)。

5.2 Momentum factors affecting learning performance

The momentum factors affecting learning performance are diverse and complex, covering individual student abilities, the learning environment, and various factors in the learning process. These factors interact with each other and have a significant impact on students' learning outcomes. Among the many momentum factors, independent inquiry ability, perceptual ability, learning motivation, and classroom participation are considered to be the main momentum factors that influence students' learning performance.

Independent inquiry skills: Independent inquiry skills refer to their ability to actively seek knowledge and solve problems. This ability enables students to plan and organise their learning tasks independently and develop the ability to think independently and explore new knowledge. Cooperation and collaboration skills, on the other hand, emphasise students' ability to work with others in groups or teams to complete learning tasks. By working with peers, students can work together to solve problems, exchange ideas, and share knowledge, thereby promoting mutual learning and understanding.

D. Litfie (1991) defines self-directed learning as "the ability to think critically, make decisions, and perform independent actions. According to Little wood (1996), self-directed learning is primarily "the desire and ability of the learner to make independent choices". Desire refers to the learner's motivation and confidence to take responsibility for his or her own learning; competence refers to having both the knowledge to make choices for one's own learning and the skills to be able to carry out one's own choices. It can be seen that Little wood defines self-directed learning in terms of both competence and psychology. In his study on autonomous learning ability and English test scores in college students' English learning came to the following conclusion: an empirical study was done on the correlation between college English grade 4 scores and various aspects of autonomous learning, and the study showed that the will to learn autonomously was not significantly correlated with English scores, but was significantly and positively correlated with autonomous learning ability(Wang, 2013) .

Perceptual ability: Perceptual ability is a student's ability to perceive and understand learning materials, learning environment and teaching contents. Through effective perceptual skills, students are able to better understand and assimilate the learning content, thus improving their learning performance. In addition, classroom participation is an important factor in learning performance. Active participation in classroom activities stimulates students' enthusiasm for learning and increases their opportunities to interact with teachers and peers, resulting in more learning opportunities and feedback.

Perceptual education is part of perceptual education, which aims to conserve, nurture and develop students' perceptions. "Perceptual education, which develops one's perceptual literacy, consists of three main areas: perceptual education, emotional education and imagination. Perceptual education develops one's ability to perceive, receive and experience perceptual information." Perceptiveness is the ability to grasp and judge things as a whole based on feelings and perceptions of things. Thus, perceptual education is an education that is based on students' experiences and develops their perceptual awareness and abilities through a series of inquiry and

practical activities in a purposeful and planned manner. The curriculum is both the primary vehicle for student learning and the core resource of the school. The key to the success of perceptual education lies in the development and organisation of its curriculum. In his article, Dewey pointed out that "most knowledge does not influence behaviour in life for two reasons: First, it does not cause a person's will or desire; Second, even if it does, he does not know how to do it because he does not have enough knowledge(Shan & Wang, 2007) .

Classroom Engagement: the level of active participation and engagement of students in the classroom is critical to learning performance. Active participation can include behaviours such as asking questions, answering questions, participating in discussions, and interacting with the instructor. Students with high levels of classroom engagement are more likely to receive more learning opportunities and feedback, thus contributing to improved learning outcomes. Astin's theory of student engagement incorporates student behaviour and psychological activity into the concept of classroom engagement, thus enriching the connotation of classroom engagement and opening the way for the study of classroom engagement. Subsequently, the scholar George Kuh. Kuh proposed the concept of student engagement on the basis of student engagement theory, which contains two meanings. Firstly, student engagement is the amount of time and effort students put into educational activities. Second, the concept also includes the degree to which universities attract students to participate in teaching and learning activities.

In his experimental study, Delprato showed that the level of student engagement increased when students self-observed their behaviour and recorded their goals during classroom learning. In 2013, Kimberly D. Tanner, a biology education researcher at San Fransisco State University, proposed five dimensions of 21 instructional strategies in her article. Focusing on how to teach, the author summarises a "system of equitable teaching" that emphasises providing equal opportunities for every student in the classroom to participate and for teachers to focus on the development of each student. Student engagement in different classroom interaction models, Sun Jie

suggested that students' engagement should be effectively enhanced by making full use of the moderating effect of affective experiences on classroom participation, driven by tasks, so as to create stronger motivation for students to participate(Sun & Hsieh, 2018) . In 2013, in his study, Wang Ming used an analytical model with a micro-sociological perspective to propose strategies related to improving students' classroom engagement, i.e., improving the effectiveness of teachers' classroom decision making, establishing democratic teacher-student relationships, and maintaining continuous attention to poor students. Bai conducted a study to analyse the mathematics classroom for elementary school students and proposed strategies to improve elementary school students' engagement in mathematics from both individual and group loci(Bai, 2016) .

Learning motivation: learning motivation is the intrinsic driving force for students to perform learning activities. Students' motivation for learning can be divided into intrinsic and extrinsic motivation. Intrinsic motivation includes interest in learning content, a sense of accomplishment, and a desire for self-development, while extrinsic motivation includes rewards and recognition from outside sources. Positive motivation for learning helps to improve student performance and outcomes.

The concept of achievement motivation was introduced in the 1930s by H. A. Murray, who defined achievement motivation as the desire to overcome obstacles, solve problems, and complete tasks. C. McClelland and Atkinson (J. W. Atkinson) proposed a theory of achievement motivation. The theory believes that the pursuit of achievement motivates people to produce the internal drive to achieve, and this internal drive makes individuals produce achievement motivation, and then implement achievement behaviour to achieve success. This motivation has social significance and is unique to humans and is acquired later in life.

Self-determination theory (SDT) is a relatively new theory of motivation for learning that is closely linked to the self-directed learning perspective. It emphasises that motivation stems from the intrinsic needs of human beings, and it believes that motivation creates energy problems. The theory was first proposed by the famous American psychologists Deci and Ryan, who stated that to explain student motivation

one needs to first understand three basic inner needs of students: the need to be competent, the need to belong and love, and the need for autonomy (Deci & Ryan, 1985). The degree of satisfaction of an individual's psychological needs will determine the energy and nature of motivation to learn. Competence refers to the behavioural individual's feeling of task competence in interacting with society to accomplish a task. Belonging refers to the sense of belonging that an individual feels in a collective group. This sense of belonging mainly comes from the care and love of others and from the pleasant communicative atmosphere established between oneself and the people around in the social environment. In the process of implementing game-based teaching, the students' desire to win through the "challenge" directly reflects the description of this theory. When students have a strong motivation to learn, their drive is often enhanced.

5.3 Association between academic performance and academic achievement

Many studies have shown that in the presentation of learning performance, the different competencies presented by students in the acquisition due to active or passive can have different magnitudes of impact on learning performance. Competence is the quality demonstrated by the accomplishment of an objective (task). Learning is a way of acquiring knowledge and skills through a series of activities. Therefore, the competency theory in learning performance shows a greater correlation with learning achievement. In addition, the self-efficacy of students in the acquisition process is also an important correlate of learning performance.

The association between competency theory and academic performance

Ability theory refers to an individual's perception of the essential properties of ability-whether it can be changed or whether it can be controlled(Xia, 2013). One view is that human ability is a fixed object that cannot be changed and cannot be developed, i.e., the ability fixation view; the other view is that human ability can be developed through learning, i.e., the ability development view.

The research on ability theory and academic achievement has shown that ability theory has significant predictive effects on students' academic achievement, mainly in the form of negative prediction of academic achievement by the ability fixation

view and positive prediction of academic achievement by the ability development view. They also conducted a study of students entering junior high school and found that students with a developmental view of ability had a greater advantage in academic achievement than students with a fixed view of ability, after controlling for entrance grades(Dweck, 1999). A grouping experiment with college students was conducted with one group taught the ability development perspective, one group taught the multiple intelligences perspective (an education unrelated to ability theory), and the other group was a control group; after controlling for SAT scores, the ability development group had the best academic performance of the three groups(Aronson, Fried & Good, 2002) . Competency theory predicts not only students' academic performance within one year, but also long-term academic performance.

Rethinking the association between academic ability and academic achievement

In He (2019), the impact of students' reflective learning ability and academic achievement was illustrated with the example of English learning in junior high school . Among them, reflective learning is based on the learner's perspective, which is guided by metacognitive and constructivist theories, and it is the learner's reflection on the process of his or her learning activities and the resulting learning outcomes. Rather than just a general review of one's own learning activities, reflective learning leads students to learn to learn on their own and turn their learning activities into an inquisitive, research-based activity (Zheng, 2002). Reflective learning is a way of learning in which learners continuously learn by reflecting on their own learning process and learning results (Lu, 2007). Reflective learning is a learning activity in which learners adjust and optimise their learning through certain reflective methods and reflective strategies with certain reflective motives, so as to improve the efficiency and effectiveness of learning (Cai, Shi & Fu, 2009). Reflective learning is a metacognitive process in which learners self-awareness, adjustment and evaluation in the learning process (Liu, 2011). Reflective learning is the learner's feedback on early learning processes and learning outcomes and influences the learner's later learning (Lowndes & Berry, 2002). Reflective learning

skills are an essential competency in students' learning process, which not only contribute to the development of students' critical and creative consciousness, but also contribute to students' independent learning and significant improvement in academic performance.

The Association between Critical Thinking Skills and Academic Achievement

At the beginning of the 20th century, Dewey as a representative of the malefactor began to systematically study critical thinking and proposed reflection thinking, which represents critical thinking. Dewey (1909) analysed thinking in terms of experience and its consequences, elaborated on the different processes that individuals go through when thinking reflectively, and emphasised the necessity of thinking training.

Critical thinking is a purposeful, self-regulated judgmental thinking process that includes critical thinking dispositions and critical thinking skills, and is composed of open-mindedness, intellectual curiosity, cognitive maturity, systematisation, truth-seeking, analytical, and critical thinking skills.

The seven components of critical thinking are open-mindedness, intellectual curiosity, cognitive maturity, systematisation, truth-seeking, analytical ability, and self-confidence in critical thinking (Pa , 1990).

More scholars agree that the correlation between critical thinking skills and students' academic ability is constant (Ricketts et al., 2005; Fero et al., 2010; Huang et al., 2016). A meta-analysis by (Fong et al.,2017) investigating the relationship between students' critical thinking skills and their academic performance showed that there is a constant relationship between the level of critical thinking and academic performance of college students and it is not affected by factors such as major and age, and the study also revealed the importance of the educational system to foster critical thinking in community college students, which facilitates their in-depth exploration of future fields of study. Explored the effect of critical thinking on the academic performance of MBA students through multivariate analysis of variance, and the results of the study showed that critical thinking has a positive effect on the average academic

performance of MBA students (D'Alessio et al.,2019) . A descriptive correlation study of 120 nursing students' critical thinking tendencies and their relationship with academic performance, and the results also showed that significant critical thinking ability tendencies were more helpful in enhancing nursing students' high quality nursing competencies (Mousazadeh et al., 2016).

Association between self-regulatory skills and academic performance

We turned to this new research direction in the late 1980s as educational psychologists turned their attention to self-regulated learning. Researchers conceptualised social cognitive theory to form self-regulation, in which students are "active participants" in tasks in terms of cognition, motivation, and behaviour (Zimmerman et al., 1986). Research believes that through self-regulated learning, a process of active construction, we try to set goals for students, as well as manage, control and regulate their behaviour, cognition and motivation (Zeidner et al., 2000). Students with good academic performance use such customised strategies more frequently and skillfully, and they can show that standardised learning is associated with better academic performance (Zimmerman et al., 1986, 2002).

The association between self-efficacy and academic performance

The concept of self-efficacy was first introduced by a leading American social learning psychologist (Bandura) in 1977. In his book "Social Learning Psychology", Bandura pointed out that people do not only reflect the external factors, but also make choices and comprehensive processing of the stimuli they face, i.e., self-regulation in response and regulation.

This refers specifically to learning self-efficacy, which is derived from Bandura's self-efficacy theory. Such a theory mainly refers to learners' self-understanding and judgement of their professional abilities, that is, whether they can control themselves to complete tasks through self-awareness. Of course, their judgement is affected by three circumstances, including the accumulation and expression of emotions, their own abilities, and teachers' expectations of them (Shen, 2016).

Based on Bandura's definition, defines English learning self-efficacy as learners' judgments of their own abilities in learning English or completing English tasks(Liu,2009) .

Argues that foreign language learning self-efficacy is the learner's judgement of his or her ability to complete a foreign language learning task, as well as, the learner's confidence and belief in achieving a certain goal(Liu, 2006).

Although the definitions of self-efficacy vary slightly, they are generally consistent in that they indicate that self-efficacy is an evaluation of the individual's self, a category of personal consciousness, and a subjective judgement of oneself in the learning process and learning situation. At the same time, the research ultimately points to a positive relationship between self-efficacy for learning and student acquisition and student achievement. When students' self-efficacy is high, they tend to have a higher level of confidence and motivation, which also directly leads to a jump in academic performance.

An empirical study by Bandura (1982) et al. found that students' self-efficacy levels predicted students' academic achievement levels. Through empirical research, it is found that if students are affected by insufficient self-efficacy, they will have difficulty completing their studies and their academic performance will also be affected. On the other hand, if students have higher levels of self-efficacy, they can solve problems in less time and eliminate incorrect answers(Collins,1982) . Empirical studies have shown that students' self-efficacy levels are closely related to their academic performance(McCarthy et al., 1985) .

5.4 Conclusion

It can be concluded from a study of the literature that learning performance is the academic outcomes that learners achieve by completing learning considered over a specific period of time, that learning performance takes diverse forms, and that the momentum factors affecting learning performance are multidimensional and diverse. In the research and application of educational technology, the interaction of these factors needs to be considered in an integrated manner in order to promote students' learning

outcomes and comprehensive development. In addition, in studies related to the correlation between learning performance and learning achievement, learning achievement, as the language of evaluation that reflects the quality of learning in learning performance, remains of great reference value to educators. Some of the studies mentioned above have also provided detailed data on the correlation between learning performance, including self-efficacy, reflection and critique, and academic achievement.

6. Related studies

6.1 Research on the combination of flipped classroom and gamification

With the rapid development of the information age, the traditional teaching methods have been difficult to meet the requirements of teachers and students. The emergence of flipped classroom for how to use computer technology to improve students 'learning efficiency, how to according to the characteristics of each student the maximum to meet the personalised needs of students provides the answer, flipped classroom by flipped knowledge teaching, knowledge internalisation of traditional teaching mode, supplemented by short "micro" video can significantly improve students' learning efficiency, and gamification teaching can stimulate students 'interest, cultivate students' ability of solidarity characteristics just make up for the insufficiency of flipped classroom teaching.

Hunt and Anderson et al. combined the students' preferences for games and their curiosity about fresh food to apply gamification learning concepts to the flipped classroom practice. Professor Karim and Zaid Ali Alsagoff applied the concept of gamified learning in two workshops on learning, "Open Education Resources (OER)," in July and August 2012. Practice has proved that the introduction of gamified learning into flipped classrooms plays an important role in improving students' learning interest and autonomous learning ability.

In the study of the gamification flipped classroom mode has the following definition: "gamified flipped classroom" teaching mode is in flipped classroom teaching mode on the basis of the advantages of gamification teaching mode to form a new

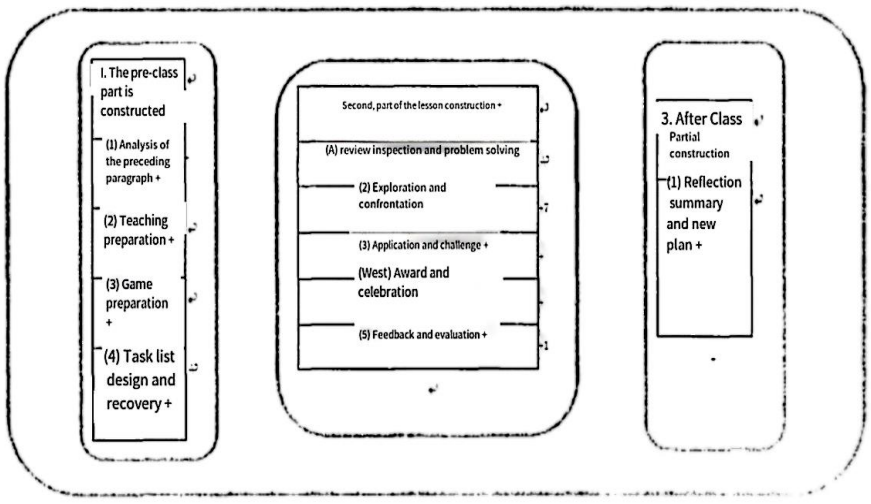
teaching mode, the teaching mode through the overall teaching process and single classroom teaching gamification, game each knowledge into a scene to arouse students' interest in learning motivation, and then with the flipped classroom teaching mode organisation teaching, students in the game in the construction of new knowledge and internalisation(Li, 2018).

After fully considering the basic process of the flipped classroom, the standards of each link and the main components of the game, combined with the characteristics and similarities of the two, reasonable add, delete and modify. We can get the drama of the flipped classroom.

Design the strategy, as shown in the below table 1 and figure 15 :

Table 1The Gamification Design Strategy Table From Li,H. 2018, The feasibility study of the "Gamified Flipped Classroom" teaching model in teaching Chinese as a Foreign language.

翻转课堂需求设计 Flipped Classroom Requirements Design	游戏化设计策略 Gamification Design Strategy	案例 example of case
微课，知识碎片化视频 Micro-class, knowledge fragmentation video	目标分析和分层策略 Game level setting strategy	关口设置和升级~ Pass setting and upgrade
知识碎片化和学习动机 Knowledge fragmentation and learning motivation	游戏关卡设置策略 Game level setting strategy	通关 clearance
参与度和学习动机 Engagement and learning motivation	奖惩策略 Reward and punishment strategy	装备，经验，声望，金钱 Gear equipment, experience, prestige, money
学习支持 Learning support	互动反馈策略 Interactive feedback strategy	论坛，师徒系统，帮派系统 Forum,Mententice System, Gangs interconnected system
个入与团队发展 Individual Entry and team development	竞争合作策略 Competition and cooperation strategy	个人挑战赛以及团队比赛 Individual Challenge and team ratio match
反思和总结+ Reflections and Summary	反思策略 Reflection strategy	游戏心得分享，游戏攻略 Game experience sharing, game strategy
评价和扬弃 Evaluation and sublation	评价策略 Evaluation strategy	讲评和颁奖 Comments and awards



Figures 15 Gaming, flipped classroom model diagram From Li,H. 2018, The Feasibility study of "Gamified Flipped Classroom" teaching model in teaching Chinese as a Foreign language.

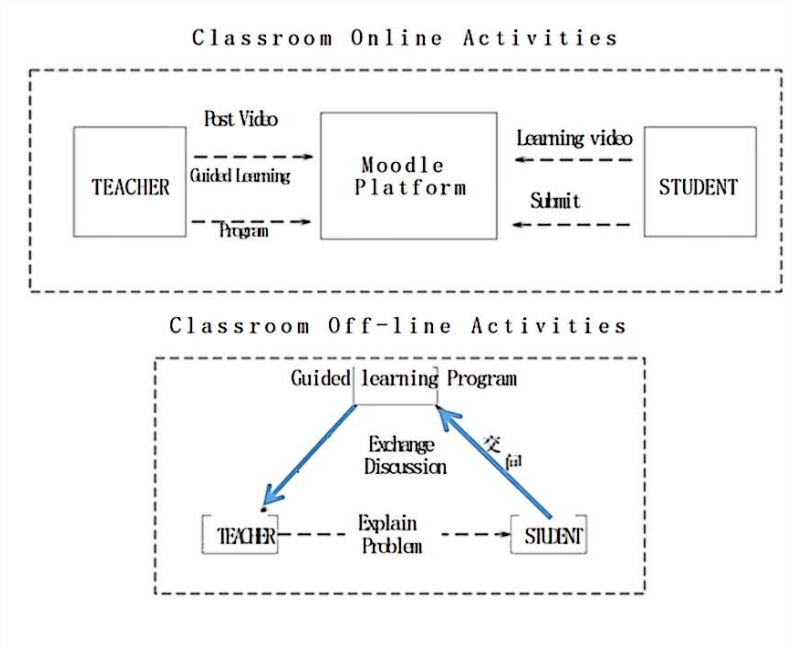
6.2 Research on the combination of flipped classroom and online teaching platform

Many advantages of the teaching mode of flipped classrooms have been explored by many experts and scholars. With the advent of the information age, more and more teaching modes are constantly exploring and innovating, such as the online flipped classroom mode, which is the product of this mode and the online education platform. At this point, relevant research scholars also began to set foot in the theory and teaching practice in this field, forming a series of academic research results and teaching cases for reference.

Tsinghua University has established the core course of "Yao Class" and introduced "SPOC and flipped classroom" to conduct teaching practice research(Wang, 2019). The teacher requires students to complete online learning before class, and integrate the difficult problems encountered in pre-class learning into the class for communication and discussion, and finally complete the homework in group cooperation. The final practice results show that this model has achieved good results and has been recognized by the students. Pei Guangshan and Xu Yuanyuan chose English School-based Curriculum Development and Practice and other courses to conduct research based on the teaching mode of "MOOC and SPOC and flipped classroom", and found that this mode cultivated students' ability of cooperative learning and deep learning. In 2018, the computer teaching team of Xi'an University of Posts and Telecommunications used "MOOC and SPOC and flipped classroom" to pilot teaching reform, and achieved very satisfactory results. In 2012, Stanford University opened the first materials science course, Materials Science, based on the "MOOC and flipped classroom" teaching model. San Jose State University in the United States also began to try to use the "MOOC and flipped classroom" teaching mode. Before class, students can use MOOC to learn basic knowledge, and ask students to communicate and discuss and solve problems in class.

With the development of network information technology, the teaching mode of "MOOC and SPOC and flipped classroom" has been promoted. In the world, this teaching mode has begun to conduct practical research, in order to improve the quality of teaching and promote the development of education(Wang, 2019).

Combined with the teaching objectives, learners' characteristics, teaching environment, teaching resources and other factors of Python Language Programming Design, a new mode of "role flipping" is put forward on the basis of flipped classroom(Wang,2019). The specific operation procedures, such as the following figure16:



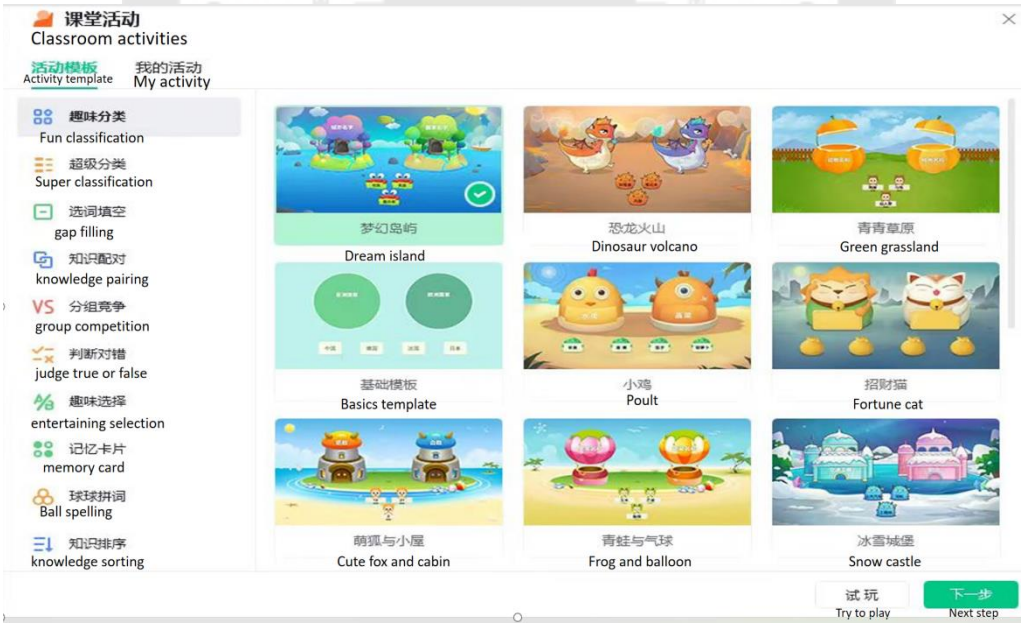
Figures 16 "MOOC and Flipped Classroom" Teaching model From Wang,R. 2019, MOOC and SPOC and Flipped classroom "teaching model Practice research

From the above research, we can know that scholars and colleges and universities from all over the world are actively discussing the educational practice of online-based flipped classrooms, and actively summarising models and teaching experience. In the period of highly mature information conditions, the implementation of online flipped classrooms can better develop and improve students' learning efficiency.

6.3 Research on the combination of gamification and online teaching platform

The development of the network teaching platform has greatly expanded the boundary of teaching and improved the efficiency of teaching. In addition, the integration of gamification and online education platforms greatly improves the interactivity and fun of the classroom. Especially in the field of basic education, classrooms that integrate the gamified learning on online teaching platforms focus students 'attention, improve students' interest, and promote the internalisation and absorption of knowledge in the process of gamification.

Shivo Whiteboard is an interactive electronic whiteboard software developed by China Vision Rui Technology in 2009, can be applied to the computer side, the latest version, named "Sevo (Seewo)". It takes the slogan "Born for interactive teaching" as the slogan, emphasising generative teaching, unique teaching effect, compatibility of various teaching equipment, sharing and receiving courseware anytime and anywhere, aiming to create a practical and efficient interactive teaching platform for front-line teachers. The six activity templates of by white board 5 system, Powerpoint and WPS have no game activities(Zhang, 2022). Teachers need to make interesting classroom interaction and practice activities to mobilise students' participation in the classroom and activate the classroom atmosphere. The "classroom activity" in Shivo White board 5 provides six types of classroom games (as shown in figure 17 and 18), including fun classification, word selection and fill in the blanks, group competition, right and wrong judgement, etc.



Figures 17 Figure of the "Classification" game interface From Zhang, J. 2022, Interactive whiteboard in English vocabulary teaching in primary school A case study of SEEWO Whiteboard 5.

Figures 18 Zhang , J. 2022, Interactive whiteboard in English vocabulary teaching in primary school A case study of SEEWO Whiteboard 5

Through the research and display of the above platform, we can see that through game activities to promote teaching, mobilise students' sense of competition, alleviate the monotonous teaching atmosphere, promote the actual effect of classroom teaching, and realise the unity of teaching and learning. In addition, the online teaching platform with such gamification functions has been gradually improved and developed successively.

The advent of the gamified online education platform has brought infinite possibilities for classroom teaching in a real sense. Because most of the students have not experienced the teaching method, will keep some curiosity about new things, teachers can conduct innovative research and teaching on the teaching model based on this feature to use students' curiosity to teach knowledge and stimulate interest, thereby breaking through teaching difficulties. (Wang,2022).

The new teaching platform integrating Internet + technology and teaching assistant applied to the teaching work can not only achieve the effect of the application of traditional platforms in teaching, but also achieve the teaching effect that the traditional teaching platform cannot achieve (Du, 2022).

6.4 Conclusion

In the above literature research, we have respectively conducted literature research on flipped classroom and gamification, the integration of flipped classroom and online teaching platform, and the integration of gamified online teaching platform. In the rapid development period of educational technology, it is not difficult for us to see that the derivative or reform of a new teaching mode must be accompanied by a high degree of compatibility. With the support of digital technology, a new product integrating the online teaching platforms, the gamified teaching concept and a new hybrid teaching mode has been born. In the process of studying its internal elements, pattern construction and functional attributes, we find that there is a considerable degree of integration among them, that is, there is no separation of specificity between individuals, and the mutual combination between them can promote the rapid development of educational technology and make up for some defects and limitations in today's educational technology. To a certain extent, the arbitrary combination of online teaching platforms, flipped classroom and gamified teaching elements can change teachers' teaching habits and students' learning habits, and play a large role in promoting teaching methods and educational technology.

To sum up, for Chinese undergraduate students majoring in media, in the film and television scores course, due to restrictions on professional attributes and examination requirements, most students have not received systematic training in basic music knowledge before enrolling as undergraduates. During the undergraduate studies, students were not provided with a step-by-step and systematic music curriculum. However, this situation makes most students only have a superficial understanding of music by listening and singing casually. They have not received systematic and professional guidance, and they do not know the principles of music construction. Even though media majors have learned all aspects of film and television knowledge since entering college, they still fail to develop strong and accurate perceptions and professionalism when matching music to films and television. Even so,

this course has not received much attention from the popularisation of media majors. In the teaching work of teachers, due to the influence of various previous factors mentioned by researchers, some teachers have not been able to effectively and reasonably use the teaching methods. Classes are taught with targeted teaching methods. Many students failed to effectively and reasonably arrange their study time and master the specific learning content during the study of this course, which ultimately led to the student's learning performance failing to meet the final assessment requirements of the course or professional abilities students should have after studying the course. The researcher deeply felt the problem in their own teaching.

The focus of this study is to continue on the basis of gamification teaching strategies, add virtual practice data, and develop an instructional model combining the flipped classroom with gamified learning on digital platforms, so as to improve students' learning performance. The development of this platform is based on appropriate gamified learning activities and digital technology, and it is integrated into the specific flipped classroom instructional model

CHAPTER 3
METHODOLOGY

Research Design

Research on "The development of an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China.". The objectives of this study are :

1) To develop an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China.

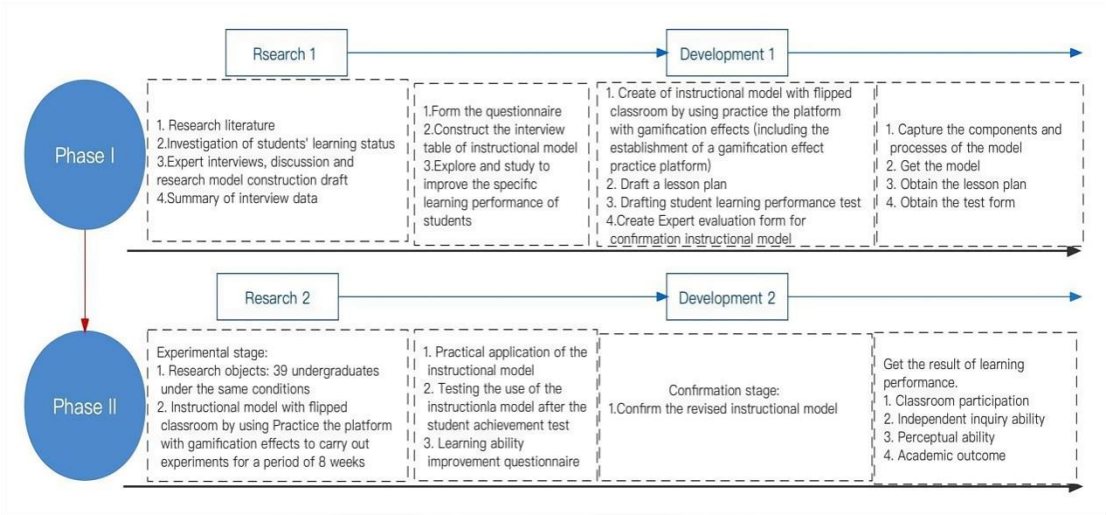
2) To study the effectiveness of using an instructional model combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students' learning process.

In addition to the experimental study of quantitative analysis methods, 39 students were used for pretest and posttest. The study was divided into two phases:

Phase I : To develop an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China.

Phase II : To study the effectiveness of using an instructional model combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students' learning process.

The specific process is as follows(as shown in figure 19):



Figures 19 The process of design

1.Phase I (R1)

Research of an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the conditions and requirements for the learning performance of undergraduate media students in China.

1.1 Participants of the study

1.1.1 Population

The research subjects were third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China. A total of 218 students were divided into 5 classes. A specific random sampling method was used and students volunteered to participate in the study. Before participating in the trial of this course, students must have taken courses such as audio-visual language, nonlinear editing, directing basics, and film and television aesthetics in the talent training plan formulated by the school in their first and second years of undergraduate study.

1.1.2 Sample

The research subjects were 39 out of 218 third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China, and these 39 students were in one of five

classes. A specific random sampling method was used and students volunteered to participate in the study,and students registered for the film and television scores course in the second semester of 2023.

The expert sample group was composed of 5 model experts ; 2 education technology experts, 2 music education experts, 1 film and television education expert. They are mainly responsible for providing reliable data for the creation of an instructional model combining the flipped classroom with gamified learning on digital platforms. The specific selection requirements are provided as follows:

1) No less than 5 years of working experience in the professional field.

2) Have certain academic achievements or professional achievements.

1.2 Research instruments

Tool 1 The questionnaire about the current situation and existing problems of the students in the film and television scores course.(Appendix1)

Tool 2 Expert Interview Form.(Appendix2)

1.2.1 Tool 1 The questionnaire about the current situation and existing problems of the students in the film and television scores course

The construction and approval of the instrument quality.

1) Research、analyse and synthesise relevant literature and research results, draft the questionnaire Learning Status and Existing problems of students in film and television scores course, and investigate the learning status and existing problems of students in Film and television scores course.

2) The questionnaire of Students' learning status and existing problems in film and television scores course(Appendix1).Use a five-level system to measure and divide the results in the student questionnaire, 5 means Always, 4 means Often, 3 means Sometimes, 2 means Seldom, and 1 means Never .

By adopting the evaluation criteria of Likert scale (5-point) questions， the evaluation criteria are as follows:

4.20-5.00 means Always(During the learning process, you are always in a learning state) ;

3.40-4.19 means Often (In the process of learning, most of the time is in a learning state) ;

2.60-3.39 means Sometimes(During the learning process, approximately half of the time remains in a learning state) ;

1.80-2.59 means Seldom(In the process of learning, there is only a little time to maintain a learning state) ;

1.00-1.79 means Never(In the process of learning, you can never maintain a learning state).

3) Propose the draft questionnaires to the advisor for approval.

4) Bring the proposed questionnaires to IOC experts (3 experts) to ensure the consistency of the data.The inspection level was divided as follows:

+ 1 means to ensure that the evaluation project meets its purpose;

0 means not sure whether the evaluation project meets the purpose;

-1 means the item is inconsistent with the purpose.

5) Modify questionnaires according the experts comments evaluated using Item Objective Congruency Index (IOC), the result value was 0.67—1.00.Therefore, all of the assessment items were valid.Experts suggest that the questionnaire should express clear meanings to questions about whether students want teachers to change teaching methods based on their current learning status and whether students like challenging activities in the classroom.

6) Get the complete questionnaires for using the next step.

1.2.2 Tool 2 Expert Interview Form

Collect the collected data and interview experts (5 experts), organise an expert group to discuss how to develop a support system (flipped classroom instructional model with gamified effect practice platform), track the results, evaluate and establish basic tools for quality assurance.

1) Research data, documentation and research including support systems, tracking, evaluation and educational quality certification. Collect, consult and analyse information about the following contents: flipped classroom, online education practice platform, gamification, learning performance, film and television scores, evaluation methods, quality testing, etc

2) Create an open-ended interview form for experts on support system development details, learn about support system development, monitoring, evaluation and certification.(Appendix 2)

3) Propose to the advisor for approval and modification.

4) Bring the proposed questionnaires to IOC experts (3 experts) to ensure the consistency of the data. The inspection level was divided as follows:

+ 1 means to ensure that the evaluation project meets its purpose;

0 means not sure whether the evaluation project meets the purpose;

-1 means the item is inconsistent with the purpose.

5) Modify questionnaires according the experts comments evaluated using Item Objective Congruence Index (IOC), the result value was 0.67—1.00.Therefore, all of the assessment items were valid.Experts suggest that the contents of the interview form could be classified and listed.

1.3 Data collection

1.3.1 Use "Questionnaire Star" to collect questionnaire data on 39 students' learning status.

1.3.2 The 5 model experts answered and determined the questions in the expert interview form through conference interviews, and developed an instructional model combining the flipped classroom with gamified learning on digital platforms through the data information obtained from it.

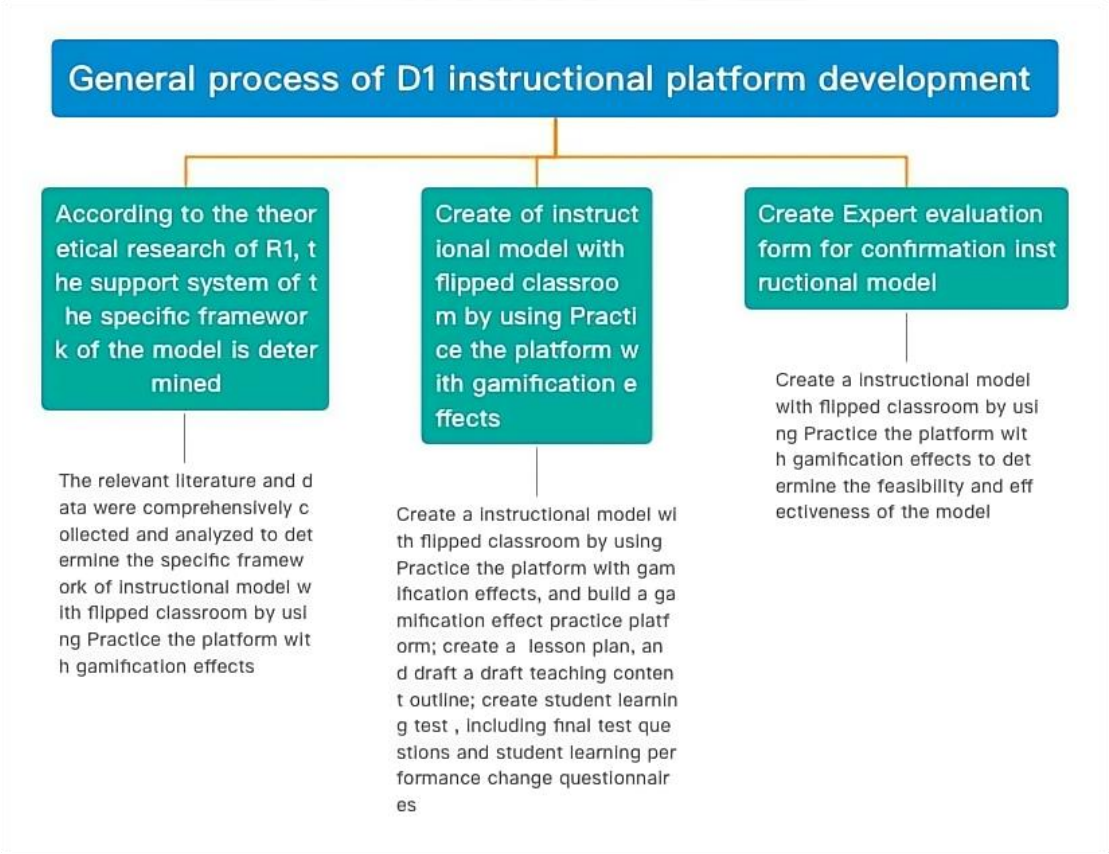
1.4 Data analysis

1.4.1 Analyse the questionnaire with mean, S.D.

1.4.2 Using a quantitative approach to the analysis and synthesis of expert interview data, the researcher exploited the coherence of key questions collected and compiled a summary based on the interview questions.

2.Phase I (D1)

To develop an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China. and track, evaluate, and verify measurements through interviews and group discussions.



Figures 20 Development process diagram

To develop an instructional model combining the flipped classroom with gamified learning on digital platforms and support the tracking, evaluation, and

certification of educational quality. Data were obtained from phase 1 to determine the details of the system and to develop the system. The effectiveness of the basic education quality assessment and certification support system (draft) was assessed through expert panel discussions and expert panel evaluation. Including a total of 5 model experts. Modifications were then made according to expert advice before testing.

2.1 Participants of the study

2.1.1 Sample

A sample group of experts who created the instructional model combining the flipped classroom with gamified learning on digital platforms:

2.1.1.1 The 5 model experts include 2 educational technology experts, 2 music education experts, 1 film and television education expert. They were mainly responsible for providing reliable data for creating a flipped classroom instructional model with gamified learning on a digital platform.

2.1.1.2 The 3 content experts include 2 music education experts and 1 film and television education expert.

The specific selection requirements are as follows:

1) At least 5 years of working experience in the professional field.

2) Have certain academic achievements or professional achievements.

2.1.1.3 The 3 experts who evaluate the validity of the draft model and the validity of the educational quality certification, evaluate the Lesson plan.

2.1.1.4 The 20 students in the experimental group were randomly selected from the 218 third-year undergraduate students majoring in drama, film and television directing at Zhujiang College of South China Agricultural University, except for 39 students in the experimental group.

2.2 Research instruments

Tool 3 The instructional model combining the flipped classroom with gamified learning on digital platforms (Appendix 3 and Appendix 4)

Tool 4 Lesson plan (Appendix 5 and Appendix 6)

Tool 5 Student Learning Performance Test (Appendix 7 and Appendix 8)

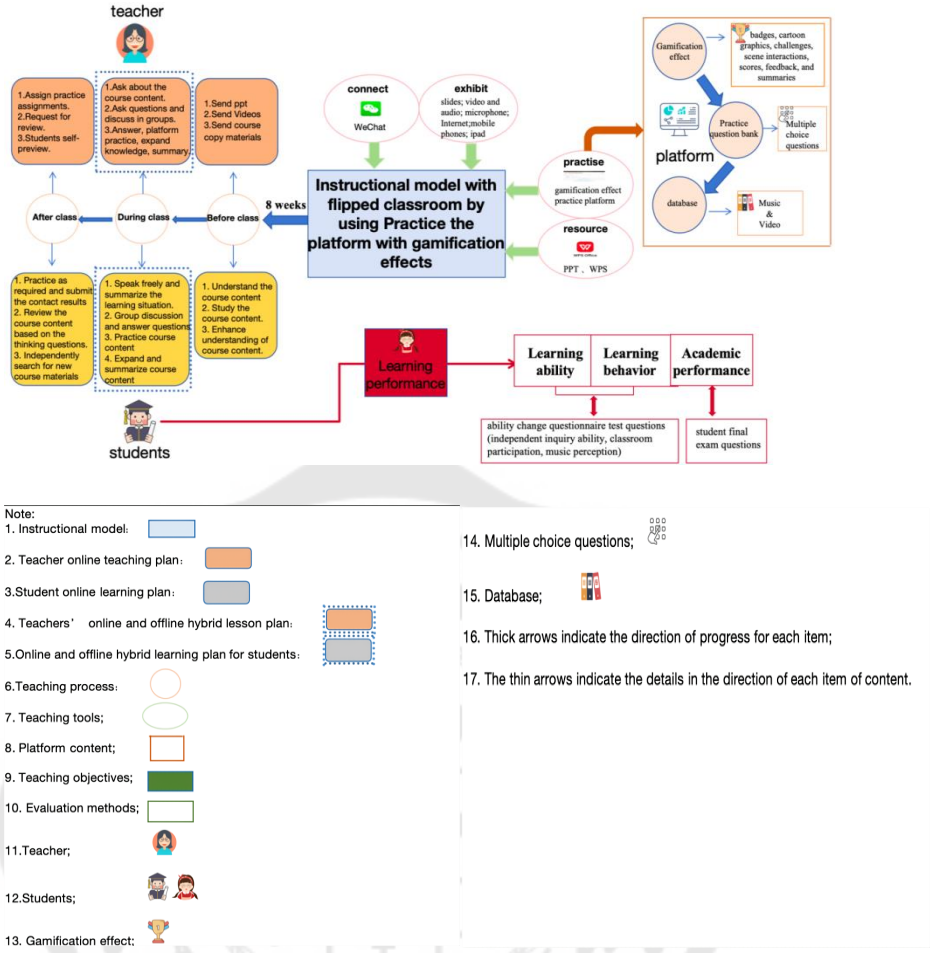
2.2.1 Tool 3 The instructional model combining the flipped classroom with gamified learning on digital platforms

The construction and approval of the instrument quality.

Through discussion with the expert group, on the basis of feedback, the instructional model combining the flipped classroom with gamified learning on digital platforms was improved, and through group discussions, the effectiveness and effectiveness of the flipped classroom instructional model with gamified learning on a digital platform were evaluated for feasibility.

1) Research, analyse, and synthesise relevant literature and research results, and combine the student questionnaire data and expert interview data results of the R1 stage to draft all the components for creating the instructional model combining the flipped classroom with gamified learning on digital platforms.There were two sections.

Section 1: Creating an instructional model combining the flipped classroom with gamified learning on digital platforms part 1. This part creates the instructional model combining the flipped classroom with gamified learning on digital platforms framework (Appendix 3) to determine the overall construction of the flipped classroom and highlight the student-centred teaching concept(Figure 22).



Figures 21 Instructional model combining the flipped classroom with gamified learning on digital platforms

Section 2: Creating an instructional model combining the flipped classroom with gamified learning on digital platforms part 2. This part creates a evaluation form for the composition of an instructional model combining the flipped classroom with gamified learning on digital platforms (Appendix 4).Use a five-level system to measure and classify the results of the evaluation form, 5 means Most appropriate, 4 means Appropriate, 3 means General, 2 means Inappropriate, and 1 means Most inappropriate .

By adopting the evaluation criteria of Likert scale (5-point) questions , the evaluation criteria are as follows:

4.20-5.00 means Most appropriate(The instructional model construction content and learning process fully meet the needs of teaching model development, and the content is very comprehensive) ;

3.40-4.19 means Appropriate(The instructional model construction content and learning process meet the needs of an instructional model development, and the content is comprehensive) ;

2.60-3.39 means General(The instructional model construction content and learning process do not fully meet the needs of instructional model development, and the content is not comprehensive) ;

1.80-2.59 means Inappropriate (The construction of the instructional model and the learning process do not meet the needs of instructional model development, and the content is unclear) ;

1.00-1.79 means Most inappropriate(The construction of the instructional model and the learning process are very inconsistent with the needs of instructional model development, and the content is completely wrong).

2) Before send to expert , should be send to advisor approve.Submit to the IOC expert group for discussion, evaluation, and certification measurement to determine its validity and feasibility, and make revisions according to expert suggestions.Ensure data consistency, and divide the inspection levels as follows:

+ 1 means to ensure that the evaluation project meets its purpose;

0 means not sure whether the evaluation project meets the purpose;

-1 means the item is inconsistent with the purpose.

3) Modify questionnaires according to the experts' comments evaluated using Item Objective Congruency Index (IOC), the result value is 0.67 -- 1.00. Therefore, all of the assessment items were valid. The expert's suggestion in the part of components should be to display the sub components such as the platform functions.

4) Modify and send it to 5 model experts to approve the model.

2.2.3 Tool 4 Lesson Plan

The construction and approval of the instrument quality.

Through discussion with the expert group, the draft lesson plan was improved on the basis of feedback, and the effectiveness and feasibility of the draft lesson plan of an instructional model combining the flipped classroom with gamified learning on digital platforms were evaluated through group discussions.

1) Summarise, research, and analyse relevant materials, and combine the number and types of class hours determined by Zhujiang College of South China Agricultural University in the talent training plan for this discipline, creating the lesson plan process framework. There are two sections.

2) Section 1: Create Lesson Plan Part 1(Appendix 5).The duration of the teaching plan is 8 weeks, with 4 lessons per week, and each lesson was 45 minutes long; the teaching content includes 8 chapters, all types of music in the music database, and 16 sets of practice questions.

Section 2: Create Lesson Plan Part 2. This section determines the types and usage of practice platform questions in the lesson plan.(Appendix 6);

All sections certify and evaluate information against standards and evaluate the effectiveness of supporting systems. Use the five-level method to measure and classify the results of the lesson plan part 2, 5 means Most appropriate, 4 means Appropriate, 3 means General, 2 means Inappropriate, and 1 means Most inappropriate .

By adopting the evaluation criteria of Likert scale (5-point) questions , the evaluation criteria are as follows:

4.20-5.00 means Most appropriate （The content in the lesson plan is complete, the process is clear, and it meets the research objectives）；

3.40-4.19 means Appropriate(The content in the lesson plan is relatively complete, the process is relatively clear, and it is more in line with the research objectives)；

2.60-3.39 means General(The content in the lesson plan is not complete enough, the process is not clear enough, and it does not fully meet the research objectives)；

1.80-2.59 means Inappropriate （The content in the lesson plan is incomplete, the process is unclear, and it does not meet the research objectives）；

1.00-1.79 means Most inappropriate （The content, process, and research objectives in the lesson plan completely do not meet the requirements and cannot be used).

3)Before send to expert , should be send to advisor approve.Submit it to the IOC expert group for discussion, evaluation, and certification measurement to determine its effectiveness and feasibility, and make revisions according to expert suggestions.Ensure data consistency, and divide the inspection levels as follows:

+ 1 means to ensure that the evaluation project meets its purpose;

0 means not sure whether the evaluation project meets the purpose;

-1 means the item is inconsistent with the purpose.

4) Modify questionnaires according to the experts' comments evaluated using Item Objective Congruence Index (IOC), the result value was 0.67 -- 1.00. Therefore, all of the assessment items were valid.Expert advice could illustrate where to use a gamified effectiveness practice platform.

5) Modify following IOC experts suggested and through expert testing and evaluation, an 8-week lesson plan was obtained. The lesson plan includes 8 chapters of teaching content, one chapter per week. It includes three stages of teaching activities, divided into before class, during class and after class. Send the before-class preview materials online to strengthen the students' independent inquiry and learning ability; enter the classroom teaching and practice link, improve the students' classroom participation ability through a combination of online and offline methods during class ; conduct online review after class and consolidate the practice link to improve students' independent inquiry learning and music perception ability. As well as teaching tools, including Preview materials; WeChat; PPT; Video; Audio and Class hour arrangement, including (pre-class stage: A 20-minute online video before class, with a total teaching time of no less than 30 minutes; mid-class stage: offline during class Teaching 2 credit hours, online practice 2 credit hours, 45 minutes per class; and after-school stage:

online and practice after class for no less than 30 minutes a day). After the study is completed, the final exam (including knowledge and skills test and student learning performance questionnaire) will be conducted. Finally sent to collect data with 5 model experts.

2.2.4 Tool 5 Student Learning Performance Test

The construction and approval of the instrument quality.

1) Research, analyse, and synthesise relevant literature and research results, and summarise research materials (including textbooks, papers, monographs, and other subject materials, as well as student questionnaire data and expert opinion table data in the R1 stage) to control the degree of difficulty acceptable to students level, drafting and creating of student learning performance test .There were two sections.

2)Section 1: Drafting student learning performance test part 1 (Appendix 7) for students' learning performance. Three content experts will evaluate the feasibility and effectiveness of the test questions and scoring standards, which will be used to detect changes in students' scores on knowledge and skill test questions after learning.Certify and evaluate information against standards and evaluate the effectiveness of supporting systems. Use a five-level approach to measure and classify the results of student learning performance test question part 1,5 means Most appropriate, 4 means Appropriate, 3 means General, 2 means Inappropriate, and 1 means Most inappropriate .

By adopting the evaluation criteria of Likert scale (5-point) questions , the evaluation criteria are as follows:

4.20-5.00 means Most appropriate(The content of the test questions is very accurate and the assessment method is very clear) ;

3.40-4.19 means Appropriate(The test questions are accurate and the assessment method is clear) ;

2.60-3.39 means General(The content of the test questions is relatively accurate and the evaluation method is basically clear) ;

1.80-2.59 means Inappropriate(The content of the test questions is inaccurate and the evaluation method is unclear) ;

1.00-1.79 means Most inappropriate(The content of the test questions is completely wrong, and the assessment method is completely inconsistent with the situation of the students and the course).

Section 2: Drafting student learning performance test part 2(Appendix 8), the test questions were questionnaires, students answer according to the five-level standard to test their classroom participation, independent inquiry ability and (music)perception in learning performance after learning the change.Certify and evaluate information against standards and evaluate the effectiveness of supporting systems. Use the five-level method to measure and classify the results of student learning performance test question part 2 , 5 means Always, 4 means Often, 3 means Sometimes, 2 means Seldom, and 1 means Never .

By adopting the evaluation criteria of Likert scale (5-point) questions , the evaluation criteria are as follows:

4.20-5.00 means Always(Students' independent inquiry ability, classroom participation, and music perception can all be maintained in good condition in their learning performance) ;

3.40-4.19 means Often(Most of the students' independent inquiry ability, classroom participation, and music perception can be maintained in good condition in their learning performance) ;

2.60-3.39 means Sometimes(The independent inquiry ability, classroom participation, and music perception in students' learning performance can only be maintained in good condition part of the time) ;

1.80-2.59 means Seldom(Students' independent inquiry ability, classroom participation, and music perception can occasionally be in good condition in their learning performance) ;

1.00-1.79 means Never(Students' independent inquiry ability, classroom participation, and music perception are not in good condition in their learning performance).

3) Before sending it to experts, it should be sent to the advisor to approve. Submit to the IOC expert group for discussion, evaluation, and certification measurement to determine its validity and feasibility, and make revisions according to expert suggestions.Ensure data consistency, and divide the inspection levels as follows:

+ 1 means to ensure that the evaluation project meets its purpose;

0 means not sure whether the evaluation project meets the purpose;

-1 means the item is inconsistent with the purpose.

4) Modify questionnaires according to the experts' comments evaluated using Item Objective Congruency Index (IOC), the result value was 0.67 -- 1.00. Therefore, all of the assessment items were valid.Experts recommend that the test questions and questionnaires used to test students' learning performance should be specifically classified.

5) Modifications were made according to the suggestions of IOC experts, and part 1 of the student learning performance test question (student knowledge and ability test questions) was sent to 3 content experts for testing. Part 1 of the student learning performance test question was most appropriate, and its pre-test data results were ($\overline{x}$=4.70, S.D.=0.20). Part 2 of the student learning performance test question (Student Ability and Behavior Test Questionnaire) was sent to a randomly selected sample test group of 20 students for testing(Try out group). Part 2 of the student learning performance test question was most appropriate, and its pre-test data result was($\overline{x}$=4.37, S.D.=0.15).

2.3 Data collection

2.3.1 Using the draft instructional model combining the flipped classroom with gamified learning on digital platforms in Tool 3 and the lesson plan in Tool 4, collect data from the results of discussions, interviews and evaluations of five model experts.

2.3.2 Using Tool 5, the student learning performance test section 1 for three content experts and the student learning performance test section 2 send to 20 students of try out group to determine the validity of test section 1 and 2 and collect data.

2.4 Data analysis

2.4.1 Qualitative analysis and quantitative analysis

Qualitative methods are combined with papers, textbooks and other materials to summarise the content. Using a quantitative approach to analyse and synthesise interview data from model experts and content experts, the researcher exploits the agreement of key questions collected and compiled a summary based on the interview questions. Evaluation criteria include performance evaluation of evaluation support systems, tracking evaluation results, and ensuring the quality of education through evaluation.

2.4.2 Analyse the questionnaire with mean, S.D.

2.4.3 Using Reliability to Analyze Student Learning Performance Test: Part 2 Test

3.Phase II (R2)

To study the effectiveness of using instructional models combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students' learning process.

At this stage, test, support, improve the system, track, evaluate and quality test certification. This stage was to apply the gamified learning on a digital platform of assisted flipped classrooms to teachers and students as an experiment. The subject of the trial teacher was the researcher himself, and the subject of the trial student was a simple random sample of third-year undergraduate students majoring in media, drama,

film and television directing at Zhujiang College of South China Agricultural University in China, divided into five classes， a total of 39 students.

3.1 Participants of the study

3.3.1 Population

The research subjects were third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China. A total of 218 students were divided into 5 classes. A specific random sampling method was used and students volunteered to participate in the study. Before participating in the trial of this course, students must have taken courses such as audio-visual language, nonlinear editing, directing basics, and film and television aesthetics in the talent training plan formulated by the school in their first and second years of undergraduate study.

3.1.2 Sample

The research subjects were 39 out of 218 third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China, and these 39 students were in one of five classes. A specific random sampling method was used and students volunteered to participate in the study,and students registered for the film and television scores course in the second semester of 2023.

3.2 Research instruments

Tool 3 The instructional model combining the flipped classroom with gamified learning on digital platforms

Tool 4 Lesson plan

Tool 5 Student Learning Performance Test

3.3 Data collection

Improving the learning performance of Chinese undergraduates majoring in media in the process of using an instructional model combining the flipped classroom with gamified learning on digital platforms. Teaching arrangements are made for 39 students and combined with the tools obtained in the development 1 stage, so as to collect experimental data in each stage. The researcher used a lesson plan for this

Experiment.This stage was divided into four steps: before class online preparatory learning stage; during class offline teaching interaction stage; after class online and offline mixed learning stage; student assessment after completing course learning. The specific process of collecting data to test the learning outcomes of students using the model was as follows:

3.3.1 The first stage of before class preparation work: online before class preparation learning stage, including

1) Classify and explain the use of technical tools to students before the first class. Instruct students to learn and clarify the learning steps and operation methods of the flipped classroom instructional model experiment with gamified learning on a digital platform. The technical tools include: WeChat, PPT, video, audio, and gamified learning on a digital platform.

2) Check the university's hardware, software and technology infrastructure to ensure the smooth running of the trial.

3) Reconfirm the research sample, the third-year undergraduate students majoring in media, drama, film and television directing of Zhujiang College of South China Agricultural University in China, and adopt a simple random sampling method to select 39 students in a class with the same educational background, major, grade and age.

4) Confirm the detection by the expert assessment team

5) Organise online resources according to the lesson plan, and send the course content PPT prepared by the teacher; course video; text materials to students through WeChat before class, and require students to conduct online independent inquiry learning. The video content was about 20 minutes of course content explanation video, which needs to be watched and studied in conjunction with ppt, and the text materials were auxiliary explanations of the teaching content. Students were required to complete online independent learning for at least 30 minutes.

3.3.2 The second stage was the interactive stage between offline and online teaching: the class was a combination of offline and online, with classroom teaching and classroom practice sessions, including

1) The course time is determined to be 45 minutes per class, with a total of 4 classes per week. An 8 week trial. The 4 classes are divided into theoretical classes and practical classes. The teaching content consists of 8 chapters, as well as all music types in the music database, and 16 sets of practice questions.

2) It was determined that the classroom teaching link includes teachers asking and asking questions; group discussions, speeches, answers, and knowledge content expansion; the classroom practice link includes classroom training on the gamified learning on a digital platform, student feedback exercise results, and teachers summarising and expanding knowledge. In order to improve the participation of students in the classroom and the training of perception of music.

3.3.3 The third stage of after class online review stage: After class, there will be online practice and review sessions, including

1) The teacher assigns practice homework and at the same time puts forward requirements for review; the practice time at this stage should not be less than 30 minutes a day.

2) Students carry out precise training according to the after class practice content arranged by the teacher(Includes gamified learning exercise platform and other types of assignments), and feedback the practice results to the teacher through online wechat, and the teacher makes a summary of evaluation.

3) Students independently organise information and search and accumulate knowledge after class. And prepare learning questions to be sent to teachers through WeChat for knowledge expansion reporting. These contents are completed online to once again enhance students' independent inquiry learning ability and train their music perception ability.

3.3.4 The fourth stage was to complete the test and evaluation of students after completing the course study: complete the test of student learning performance test section 1 and student learning performance test section 2, including

Test students' learning outcomes using the model: Combining with the tools obtained in the first stage of Development, the student learning performance test part 1 was used for the performance test of students after learning and the student learning performance test part 2 was used for the detection and evaluation of learning behaviour changes and ability changes, and data collection .

3.4 Data analysis

Analyse the mean value and standard deviation of Part 1 and Part 2 of the student learning performance test questions respectively. Data analysis was performed using SPSS software. The mean (M) and standard deviation were used to analyse the test scores and student learning performance changes questionnaire before and after the experiment with film and television soundtrack production skills assessment, and the independent sample t-test was used to test the significant difference in scores.

4.Phase II （D2）

Confirmation and study the effectiveness of using an instructional model combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students' learning process.

In this stage, the results of R2 are monitored, evaluated, and certified to ensure the effectiveness and integrity of the system and to confirm the final instructional model.

4.1Participants of the study

4.1.1 Sample

The sample group includes 5 model experts, and determines the final instructional model combining the flipped classroom with gamified learning on digital platforms. The specific selection requirements were as follows:

1) At least 5 years of working experience in the professional field.

2) Have certain academic achievements or professional achievements.

4.2 Research instruments

4.2.1 Tool 6 Expert evaluation form for confirmation instructional model

The construction and approval of the instrument quality.

1) Combining R2's expert model trial evaluation questionnaire data to modify an instructional model combining the flipped classroom with gamified learning on digital platforms, confirm the expert evaluation form of an instructional model combining the flipped classroom with gamified learning on digital platforms. (Appendix 9).A five-level method was used to measure and classify the results of the expert evaluation form of the instructional model, 5 means Most appropriate, 4 means Appropriate, 3 means General, 2 means Inappropriate, and 1 means Most inappropriate .

By adopting the evaluation criteria of Likert scale (5-point) questions, the evaluation criteria are as follows:

4.20-5.00 means Most appropriate (The Instructional model is very complete, the learning process is very clear, and the impact of the instructional model on students and teachers is very clear) ;

3.40-4.19 means Appropriate (The instructional model is relatively complete, the learning process is clear, and the impact of the instructional model on students and teachers is clear) ;

2.60-3.39 means General (The construction of the instructional model is somewhat inaccurate, the learning process is somewhat unclear, and the impact of the instructional model on students and teachers is somewhat unclear) ;

1.80-2.59 means Inappropriate (The construction of the instructional model is incomplete, the learning process is unclear, and the impact of the instructional model on students and teachers is unclear) ;

1.00-1.79 means Most inappropriate(The establishment of the instructional model does not meet actual needs, the learning process does not meet actual needs, and the impact of the instructional model on students and teachers does not meet actual needs).

2)Before sending it to the experts, it should be sent to Advisor Approval.

3) Submit the IOC expert group for discussion, evaluation, and certification measures to determine the effectiveness and feasibility of the model.The inspection level is divided as follows:

+ 1 means to ensure that the evaluation project meets its purpose;

0 means not sure whether the evaluation project meets the purpose;

-1 means the item is inconsistent with the purpose.

4) Modify questionnaires according to the experts' comments evaluated using Item Objective Congruency Index (IOC), the result value is 0.67 -- 1.00. Therefore, all of the assessment items were valid.

5) Modify and send it to 5 model experts to confirm the final design of the instructional model combining the flipped classroom with gamified learning on digital platforms .

4.3 Data collection

4.3.1 Use the expert evaluation form to confirm the instructional model to conduct a questionnaire survey and evaluation of 5 model experts to determine the effectiveness of the instructional model combining the flipped classroom with gamified learning on digital platforms and collecting data.

4.4 Data analysis

4.4.1 Analyse the mean and S.D. of the expert evaluation form.

CHAPTER 4
RESEARCH RESULTS

The title of : “The development of an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China”have two objectives :1) To develop of an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China.2) To study the effectiveness of using instructional model combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students’ learning process. The researcher conducts and collects research data for analysis based on a research plan. The research divide into two phases, the research results are presented in two phase as follows:

The results of phase I: To develop an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China.

The results of the phase II: To study the effectiveness of using an instructional model combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students' learning process.

The details of the analysis results were as follows:

1. Phase I

The result of the development of an instructional model combining the flipped classroom with gamified learning on digital platforms .

Table 2 The results of the questionnaire on the learning status of students in film and television scores course (n=39).

Film and television scores course questionnaire information	$\bar{x}$	S.D.	Meaning
Current situation of students' learning			
1.Are there sufficient learning resources?	2.38	0.59	Seldom
2.Do you conduct before class preview independently?	2.31	1.28	Seldom
3.Do you actively participate in classroom learning activities?	2.85	1.11	Sometimes

4.Can you quickly understand the content of the class?	2.82	1.23	Sometimes
5.Is there enough time for study and practice?	2.69	1.10	Sometimes
6.Are you able to complete your homework effectively?	2.67	0.90	Sometimes
7.Do you receive effective feedback from teachers on your assignments?	3.54	1.32	Often
8.Do you know your current ranking and grade in the class?	3.59	1.46	Often
9.Do you like the traditional teaching methods?	2.56	1.12	Seldom
10. Do you think teachers' teaching methods need to be changed and innovated?	3.59	1.29	Often
11. Do you like the challenging activities that teachers arrange in class sessions?	3.49	1.25	Often
Overall average value	**2.95**	**1.15**	**Sometimes**

From the Table 2, it was founded the overall average value of the learning status of students in film and television scores course was sometimes level ($\bar{x}$=2.95, S.D.=1.15). The three ranking of the problems from the lowest of students showed the result that, the most was "Do you conduct before class preview independently?" was seldom level($\bar{x}$=2.31, S.D.=1.28); the second was "Are there sufficient learning resources?" was seldom level($\bar{x}$=2.38, S.D.=0.59); And the last was "Do you like the current traditional teaching method?" was seldom level ($\bar{x}$=2.56, S.D.=1.12).

Table 3 The results of the questionnaire on students' learning problems in film and television scores course (n=39).

Students have problems learning	$\bar{x}$	S.D.	**Meaning**

1.Can I accurately find the course preview materials?	2.77	1.22	Sometimes
2.Have you learned the basics of music and film before starting this course?	3.49	0.82	Often
3.Can I effectively integrate and understand the music I feel with the film and television?	2.38	1.07	Seldom
4.Is the content of each class fully understood?	2.92	1.18	Sometimes
5.Are you unable to actively participate in the group after the classroom activities begin?	3.44	1.19	Often

Table 3 (Continue)

Students have problems learning	$\bar{X}$	S.D.	Meaning
6.Is there a gap between the current academic performance and expectations?	3.59	1.04	Often
7.Can you finish your homework accurately and quickly?	2.74	1.23	Sometimes
8.Are you willing to do enough exercises?	2.87	1.13	

			Sometimes
9. Do you have strong expectations and interest in learning film and television scores course?	3.97	1.27	Often
10.Is it impossible to better arouse one's own learning interest and independent inquiry ability in the traditional teaching mode?	3.82	0.94	Often
Overall average value	**3.19**	**1.10**	**Sometimes**

From the Table 3 , it was founded the overall average value of students' learning problems in film and television scores course was level sometimes ($\bar{x}$=3.19, S.D.=1.10). The most three ranking of the problems from the maximum to minimum of students showed the result that, the most was “Do you have strong expectations and interest in learning film and television scores course?” was often level ($\bar{x}$=3.97, S.D.=1.27); The second was"Is it impossible to better arouse one's own learning interest and independent inquiry ability in the traditional teaching mode?" was often level ($\bar{x}$ =3.82, S.D.=0.94); And the last was "Is there a gap between the current academic performance and expectations?”was often level($\bar{x}$=3.59, S.D.=1.04).

Table 4 The result from the model's experts interview about the instructional model combining the flipped classroom with gamified learning on digital platforms interview form (n=5) . The interview content evaluation results were as follows:

1) Platform

gamified learning on a digital platform (should be an online platform).

1.1 Gamification mechanisms in the platform include: such as Rewards, Achievement, Status or respert, and Inspiring;

1.2 Elements in the platform include: for example, Gamification elements (badges, cartoon graphics, challenges, scene interactions, scores, feedback, summaries)、 Practice question banks (multiple-choice questions: listen to music and choose appropriate videos, or watch videos and choose appropriate music)、 Databases (Music data summarised according to different music types and styles)、 Device (smartphone, mobile iPad, computer, mobile network or Wi-Fi, open the link and enter the account and password to enter the platform cover)、 Multiple choice questions (listen to music and choose appropriate videos, or watch videos and choose appropriate music)、 Answer score summary and simple analysis (score summary and score analysis).

2) Learning environment

Flipped classroom framework, teaching activities, and teaching time.

2.1The flipped classroom framework includes: such as before class, during class and after class;

2.2Teaching activities include: such as independent viewing of learning videos, interactive classroom questioning, group discussions, classroom exercise training, expanding course content, and students independently searching for classified course materials;

2.3Teaching time includes: for example, the length of teaching content should be maintained for no less than 6 weeks and no more than 10 weeks.

3) Evaluation

Types of instructional tests and methods of testing student learning performance.

3.1Tests include: student final exam questions(Have film and television scores production knowledge skills assessment);

3.2Methods for students' learning performance include: ability change questionnaire test questions (Independent inquiry ability, classroom participation, music perception).

4) Learning resources

Lesson plan, Syllabus, Teaching tools.

4.1The lesson plan includes: before class, students can independently explore and learn online through videos, text materials, PPT, and gamified learning activities on digital platforms. During class, students can conduct independent group discussions, ask questions, answer questions, and complete gamified learning activities on digital platforms to train and expand their special abilities offline. Data collection, active participation in classroom activities and training of music perception. After class, students review independent course content, complete platform exercises as required, and submit results. Teachers collect information and give feedback to improve independent inquiry, learning ability and music perception. Strength; four classes per week, including theoretical and practical classes, each class was 45 minutes long; a total of 8 weeks;

4.2The syllabus includes: 8 chapters of film and television scores course contents, which was: Multiple relationships between film and musicians and the aesthetic characteristics and aesthetic way of film and television music;Basic theoretical knowledge of film and television music; Film and Television Sound;The role of music and sound in film and television;The Classification of TV Music and the artistic Characteristics of the constituent elements (dominated by movies and TV series);The Art conception of Film and television Music and Sound;The concept of the soundtrack;Perception, analysis, selection and training of film and television music and sound.

4.3Teaching tools include: WeChat; WPS; Slides; Video and audio; Microphone; Internet; gamified learning on a digital platform; Mobile phones; Ipad.

Table 5 The result from the model's experts questionnaire about the instructional model combining the flipped classroom with gamified learning on digital platforms part 2 (n=5).

Instructional Model Combining the Flipped Classroom with Gamified Learning on Digital Platforms Part 2 Questionnaire information	$\bar{X}$	S.D.	Meaning
1. The Components of Model			
1.1 Platform			
1)Gamification mechanisms in the platform include: such as Rewards, Achievement, Status or respert, and Inspiring. These gamification mechanisms can satisfy students' learning interests and help students achieve learning goals.	4.80	0.45	Most appropriate
2)Elements in the platform include practice test elements, gamification elements, equipment, database content, answer score summaries and simple analysis. For example, the exercises include multiple-choice questions (listen to music and choose the appropriate video, or watch the video and choose the appropriate music); gamification elements include badge collection, cartoon graphics, scores, challenges, and clearance; devices include smartphones, mobile iPads, and computers. Mobile network or Wi-Fi, open the link and enter your account and password to enter the platform cover; the database content includes a music database summarised according to different music types and styles; answer score summary and simple analysis include score summary and score analysis. The content classification of the music database is clear, the database is clearly marked and students can use it conveniently, the difficulty level of the exercises in the exercise database is within the acceptable range of students, and the classification of the exercise database can clearly distinguish the types of questions and make it convenient for students. Use exercises from the	4.80	0.45	

exercise question database to meet the students' learning goals.			
			Most appropriate
1.2 Learning environment			
1)The flipped classroom framework includes: such as before class, during class and after class.	5.00	0.00	Most appropriate
2)Teaching activities include: such as independent viewing of learning videos, classroom interactive questions, group discussions, classroom exercise training, expanding course content, and students independently searching for classified course materials.	5.00	0.00	Most appropriate
3)Teaching time includes: for example, maintaining the duration of teaching content for no less than 6 weeks and no more than 10 weeks.	4.80	0.45	Most appropriate
1.3 Evaluation			
1)Testing includes: student final exam questions.	4.80	0.45	Most appropriate
2)Methods for students' learning performance include: ability change questionnaire test questions (independent inquiry ability, classroom participation, music perception).	5.00	0.00	Most appropriate
1.4 Learning resources			
1)The lesson plan includes: online learning for students before class, offline and online hybrid learning for students during class, and online homework training and independent review of course content for students after	5.00	0.00	Most appropriate

class.			
2)The syllabus includes: 8 chapters of film and television scores course contents, which are: Multiple relationships between film and musicians and the aesthetic characteristics and aesthetic way of film and television music;Basic theoretical knowledge of film and television music; Film and Television Sound;The role of music and sound in film and television;The Classification of TV Music and the artistic Characteristics of the constituent elements (dominated by movies and TV series);The Art conception of Film and television Music and Sound;The concept of the soundtrack;Perception, analysis, selection and training of film and television music and sound.	4.80	0.45	Most appropriate
3)Teaching tools include: WeChat; WPS; Slides; Video and audio; Microphone; Internet; gamified learning on a digital platform; Mobile phones; Ipad.	4.80	0.45	Most appropriate
2.The process of Learning Model			
1)Before class: Teachers send videos, text materials, and PPT, and students learn independently online according to requirements.	5.00	0.00	Most appropriate
2)During class: Students engage in offline and online blended learning. The teacher arranges group discussions, asks questions, answers questions, special topic ability training on the gamified learning on a digital platform (The gamified learning will evaluate and motivate students in an interactive way. Students can challenge the practice questions again and complete them again to obtain higher points. After completing the exercises, you will get corresponding game badges based on your points) , and expand the collection of	4.80	0.45	

materials and other teaching activities to enable students to actively participate in classroom activities and practice music. Perception. There are 4 classes per week, including two theoretical and two practical classes, each class is 45 minutes long; a total of 8 weeks.			Most appropriate
3)After class: The teacher arranges the number of homework exercises based on the classroom content. The students complete the platform exercises online according to the requirements and submit the results. The teacher collects information and provides feedback, and the students review the course content independently. Improve independent inquiry learning ability and music perception.	5.00	0.00	Most appropriate
Overall average value	4.80	0.45	Most appropriate

From the Table 5, it could be seen that the overall average value of the effect of an instructional model combining the flipped classroom with gamified learning on digital platforms part 2 questionnaire was most appropriate ($\bar{x}$=4.80, S.D.=0.45).

Among the components of the model:

For the component model part of the platform, it founded all items was most appropriate ($\bar{x}$=4.80, S.D.=0.45). Among them, "Gamification mechanisms in the platform include: such as Rewards, Achievement, Status or Respert, and Inspiring.These gamification mechanisms can satisfy students' learning interests and help students achieve learning goals." the result was most appropriate ($\bar{x}$=4.80, S.D. =0.45); Secondly, "Elements in the platform include practice test elements, gamification elements, equipment, database content, answer score summaries and simple analysis.For example, the exercises include multiple-choice questions (listen to music and choose the appropriate video, or watch the video and choose the appropriate

music); gamification elements include badge collection, cartoon graphics, scores, challenges, and clearance; devices include smartphones, mobile iPads, and computers. Mobile network or Wi-Fi, open the link and enter your account and password to enter the platform cover; the database content includes a music database summarised according to different music types and styles; answer score summary and simple analysis include score summary and score analysis.The content classification of the music database was clear, the database was clearly marked and students could use it conveniently, the difficulty level of the exercises in the exercise database is within the acceptable range of students, and the classification of the exercise database can clearly distinguish the types of questions and make it convenient for students. Use exercises from the exercise question database to meet the students' learning goals." The result was also most appropriate ($\bar{x}$=4.80, S.D.=0.45).

For the results of the learning environment part, it was found that although the project values are slightly different, it found all items were most appropriate. According to the values from large to small, the largest one was "The flipped classroom framework includes: such as before class, during class and after class." the result was most appropriate ($\bar{x}$=5.00, S.D.=0.00); Followed by "Teaching activities include: such as independent viewing of learning videos, classroom interactive questions, group discussions, classroom exercise training, expanding course content, and students independently searching for classified course materials." the result was most appropriate level($\bar{x}$=5.00, S.D.=0.00); The smallest was "Teaching time includes: for example, maintaining the duration of teaching content for no less than 6 weeks and no more than 10 weeks." the result was most appropriate ($\bar{x}$=4.80, S.D.=0.45).

For the results of the evaluation part, it was found that although the values of the items were slightly different, it found all items were most appropriate. Sorted according to the values from large to small, the largest one was "Methods for students' learning performance include: ability change questionnaire test questions (independent inquiry ability, classroom participation, music perception)." the result was most

appropriate ($\bar{x}$=5.00, S.D.=0.00); Followed by "Testing includes: student final exam questions." the result was most appropriate ($\bar{x}$=4.80, S.D. =0.45).

For the results of the learning resources part, it was found that although the project values are slightly different, it found all items were most appropriate. According to the values from large to small, the largest one was "The lesson plan includes: online learning for students before class, offline and online hybrid learning for students during class, and online homework training and independent review of course content for students after class." the result was most appropriate ($\bar{x}$=5.00, S.D.=0.00); Followed by "The syllabus includes: 8 chapters of film and television scores course contents, which were: Multiple relationships between film and musicians and the aesthetic characteristics and aesthetic way of film and television music;Basic theoretical knowledge of film and television music; Film and Television Sound;The role of music and sound in film and television;The Classification of TV Music and the artistic Characteristics of the constituent elements (dominated by movies and TV series);The Art conception of Film and television Music and Sound;The concept of the soundtrack;Perception, analysis, selection and training of film and television music and sound." the result was most appropriate ($\bar{x}$=4.80, S.D.=0.45) and another was "Teaching tools include: WeChat; WPS; slides; video and audio; microphone; Internet; gamified learning on a digital platform; mobile phones; ipad." the result was most appropriate($\bar{x}$=4.80, S.D.=0.45).

In the process of learning the model:

For the process part of the learning model, it was found that although the project values are slightly different,it found all items were most appropriate. They were sorted from large to small according to the values. The largest one was "Before class: Teachers send videos, text materials, and ppts, and students learn independently online according to requirements." the result was most appropriate ($\bar{x}$=5.00, S.D.=0.00); Followed by "After class: The teacher arranges the number of homework exercises based on the classroom content. The students complete the platform exercises online according to the requirements and submit the results. The teacher collects information

and provides feedback, and the students review the course content independently. Improve independent inquiry, learning ability and music perception." the result was most appropriate ($\bar{x}$=5.00, S.D.=0.00);The smallest was “During class: Students engage in offline and online blended learning. The teacher arranges group discussions, asks questions, answers questions, special topic ability training on the gamified learning on a digital platform (The gamified learning will evaluate and motivate students in an interactive way. Students could challenge the practice questions again and complete them again to obtain higher points. After completing the exercises, you will get corresponding game badges based on your points) , and expand the collection of materials and other teaching activities to enable students to actively participate in classroom activities and practice music. Perception. There are 4 classes per week, including 2 theoretical and 2 practical classes, each class is 45 minutes long; a total of 8 weeks." the result was most appropriate($\bar{x}$=4.80, S.D.=0.45).Overall, experts believe that the design content of this instructional model was relatively comprehensive and could be experimented to improve students' learning performance.

Table 6 The result from the model's experts questionnaire about the lesson plan 1 (n=5).

lesson plan 1					$\bar{X}$	S.D.	Meaning
Time	Content of courses	Teaching activities	Teaching Tools	Class hour arrangement			
1 week	1. The multiple relationships between film and television and musicians, and the aesthetic characteristics and aesthetic ways of film and television music	**Before class:** (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes			
					4.80	0.45	Most appropriate
		During class:	Video ;	offline during		0.45	

(online and offline) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	Audio; PPT; gamified learning on digital platforms	class Teaching 2 credit hours , online practice 2 credit hours , 45 minutes per class	4.80		
					Most appropriate
After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning	gamified learning on digital platforms; WeChat	online and practice after class for no less than 30 minutes a day	4.80	0.45	

		and music perception ability —Arranging practice homework (platform and other homework, reporting and summarising the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarise knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.					Most appropriate
2 week	2. Basic theoretical knowledge of film and television music	**Before class:** (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes	4.80	0.45	

	—Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials				Most appropriate
	During class: (online and offline) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up	Video ; Audio; PPT; gamified learning on digital platforms	offline during class Teaching 3 credit hours ,online practice 1 credit hour , 45 minutes per lesson	4.80	0.45

		the platform practice content)			
					Most appropriate
		After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarising the practice results) —Make a request for review —Require students to independently explore and	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day	4.80 0.45

		learn to expand knowledge, and summarise knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.					
							Most appropriate
3 week	3.Film and television sound	**Before class:** (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes	4.80	0.45	

—Additional course copywriting materials						
					Most appropriate	
During class: (online and offline) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)		Video ; Audio; PPT; gamified learning on digital platforms		offline during class Teaching 3 credit hours ,online practice 1 credit hour, 45 minutes per lesson		
					4.80	0.45

					Most appropriate
After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarising the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarise knowledge, send it to teachers, and at the same time, the teacher	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a dayStrongly agree			
				4.80	0.45

		makes a summary of the evaluation.				
						Most appropriate
4 week	4. The role of music and sound in film and television	**Before class: (offline)** Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes		
					4.80	0.45	Most appropriate
		During class: (online and offline) Enter the	Video ; Audio; PPT; gamified	offline during class Teaching 2 credit hours	4.80	0.45	

classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	learning on digital platforms	,online practice 2 credit hour, 45 minutes per lesson			
					Most appropriate
After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day	4.80	0.45	

		and music perception ability —Arranging practice homework (platform and other homework, reporting and summarising the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarise knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.					Most appropriate
5 week	5. The classification of TV music and the artistic characteristics of its constituent elements	**Before class**: (online) Send the before-class preview materials to strengthen the students' independent	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes	4.80	0.45	

(dominated by movies and TV series	inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials					Most appropriate
	During class: (online and offline) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up	Video ; Audio; PPT; gamified learning on digital platforms	offline during class Teaching 2 credit hours ,online practice 2 credit hour, 45 minutes per lesson	4.80	0.45	

	the platform practice content)				
					Most appropriate
	After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarising the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day	4.80	0.45

		summarise knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.					
							Most appropriate
6 week	6. Artistic conception of film and television music and sound	**Before class: (online)** Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes	4.80	0.45	

					Most appropriate
During class: (online and offline) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	Video ; Audio; PPT; gamified learning on digital platforms	offline during class Teaching 3 credit hours ,online practice 1 credit hour, 45 minutes per lesson			
			4.80	0.45	Most appropriate
After class: (online)	gamified learning on	online practice after	4.80	0.45	

Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarising the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarise knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.	digital platforms; WeChat	class for no less than 30 minutes a day

						Most appropriate
7 week	7. The concept of the soundtrack	**Before class:** (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes		
					4.80	0.45	Most appropriate
		During class: (online and offline) Enter the	Video ; Audio; PPT; gamified	Off-fline during class Teaching 1 credit hours	4.80	0.45	

	classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	learning on digital platforms	,online practice 3 credit hour, 45 minutes per lesson		
					Most appropriate
	After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day	4.80	0.45

		perception ability —Arranging practice homework (platform and other homework, reporting and summarising the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarise knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.					Most appropriate
8 week	8.Film and television music and sound perception, analysis, selection and training	**Before class:** (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes	4.80	0.45	

prepared curriculum content framework ppt —Course content video —Additional course copywriting materials					
					Most appropriate
During class: (online and offline) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link	Video ; Audio; PPT; gamified learning on digital platforms	offline and online during class Practice 4 credit hour, 45 minutes per lesson	4.80	0.45	

	includes (set up the platform practice content)					
						Most appropriate
	After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarising the practice results) —Make a request for	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day	4.80	0.45	Most appropriate

	review —Require students to independently explore and learn to expand knowledge, and summarise knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.				
Final exam	Final Arrange the final questions to reflect the final scores after study。 Evaluation criteria for the final examination: Final grade of 100%	South China Agricultural University Pearl River College strong intelligence system			
			4.80	0.45	Most appropriate
	Student Learning	Questionnaire Star	4.80	0.45	

	Performance Questionnaire	Questions and Answers			Most appropriate
Overall average value					**Most appropriate**
			4.80	**0.45**	

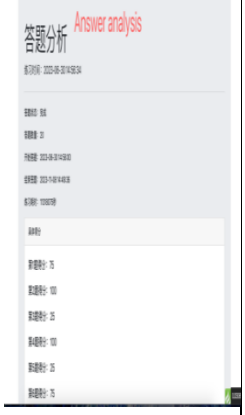
From the Table 6, it could be seen that the overall average value of Lesson Plan 1 was most appropriate ($\bar{x}$=4.80, S.D.=0.45). Experts agreed that Lesson Plan 1 was consistent with the objectives and most appropriate. The lesson plan was divided into 8 weeks in total, and each week was divided into 3 teaching activities. The values from the first week to the eighth week were most appropriate. ($\bar{x}$=4.80, S.D.=0.45); The final exam arrangements was also most appropriate ($\bar{x}$ =4.80,S.D.=0.45)。

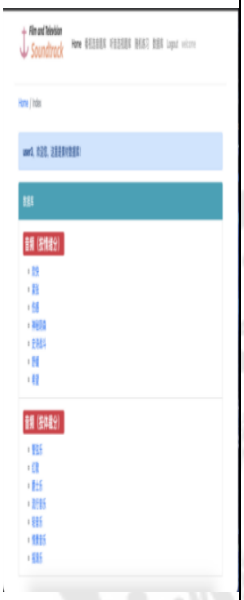
Table 7 The result from the model's experts questionnaire about the description of question types and usage of the practice platform with gamified learning in the lesson plan part 2 (n=5).

Steps for usage	Drawings and instructions		$\bar{x}$	S.D.	Result
1		**Platform cover:** 1) First click on the link http://study.xbox.yongit.com/ to enter the practice platform; 2) After entering the page, click Register, apply for an account and set a password. 3) Enter your account number and password and click Login	4.80	0.45	Most appropriate
2		**Platform homepage:** 1) Click on the logo on the first line of the page, including watching videos and selecting audio exercises, listening to music and selecting video exercises, random exercises for questions, and database 2) Home means returning to the homepage. 3)The medal image on the homepage shows the badge reward points obtained.	4.80	0.45	

					Most appropriate
3		**Platform practice page:** 1) Enter the practice page, you can choose the number of question sets at will, click Start Practice in the blue box and practice. There are 20 questions in each set. 2） The practice time and status will be recorded under each set of practice questions. If it is not completed, you can click on the blue font to continue practising when you log in next time.	4.80	0.45	Most appropriate
4		**Enter practice state:** 1) Listen to music and select videos: Click the triangle button in front of the music progress bar to enter the music listening mode. 2) After listening to the music, click the triangle button on the video among the four options of ABCD to watch the video, and click the circle in front of the video option to choose the answer. 3) The method of using the music to practise by watching	4.80	0.45	

		the video is the same as above. **Summary:** The exercises in the above two directions are mainly used in the after-school stage. This exercise combines music and video training to improve students' quick and accurate perception of music. At the same time, the practice platform has a certain gamified learning while doing exercises, thereby improving students' ability to independently explore the exercises.			Most appropriate
5		**Page after completing each question:** 1) Obtain different types of badges based on different scores, and the number of badges will accumulate. 2) If you are not satisfied with the practice results, you can select the try again button in the grey box and click the blue box to enter the next question.	4.80	0.45	

					Most appropriate
6	 	**Page after completing each set of questions:** 1) Different types of badges will be awarded based on the total score obtained for each set of questions, and the number of badges will be accumulated. 2)If you are not satisfied with the exercise results, you can select the try again button in the grey box, or click the blue box to complete this set of exercises and enter the answer analysis.	4.80	0.45	Most appropriate

7		**Enter the database page:** 1) The database page is classified according to music type and style. 2) You can click on the blue words to enter learning according to different needs. **Summary:** The above exercises are mainly used in the class stage. This database exercise uses the database to classify and integrate the styles of music and film and television, thereby improving students' quick and accurate perception of music. At the same time, the exercises of the platform database are used in a targeted manner in classroom practice sessions, thereby improving students' classroom participation.	4.80	0.45	Most appropriate
Overall average value			4.80	0.45	Most appropriate

From the Table 7, it could be seen that the overall average value of the question types and instructions for using the practice platform in lesson plan 2 was most appropriate ($\overline{X}$=4.80, S.D.=0.45). Among them, there were 7 steps in total: "Platform cover", "Platform homepage", "Platform practice page", "Enter practice state", "Page after completing each question", "Page after completing each set of questions" and "Enter

database page" The partial description means were respectively most appropriate ($\bar{x}$ =4.80, S.D.=0.45).

2.Phase II

The result of studying the effectiveness of using an instructional model combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students' learning process.

Table 8 The result of student's learning performance test question part 1(Have film and television scores production Knowledge skills assessment) (n=39).

Experiment time	Student number	$\bar{x}$ (100)	S.D.	t-test
Before experiment	39	77.46	9.147	-10.571*
After experiment	39	88.30	6.542	

*Statistical significance : * p<0.05

From the Table 8,it was founded that the test results of 39 students samples before and after the experiment showed that the average value after the experiment ($\bar{x}$ =88.30, S.D. =6.54) was higher than the before experiment mean ($\bar{x}$=77.46, S.D. =9.14), which was highly significant (* p<0.05).

Table 9 The result of the student's learning performance test question part 2 (Tests on the improvement of learning ability and behaviour in students' learning performance) (n=39).

Experiment time	Student number	$\bar{x}$	S.D	t-test
Before experiment	39	2.61	0.18	-25.997 *
After experiment	39	4.18	0.32	

*Statistical significance : * p<0.05

From the Table 9,it was founded that the test results of 39 students samples before and after the experiment showed that the average value after the experiment ($\bar{x}$ = 4.18, S.D. = 0.32) was higher than the before experiment mean ($\bar{x}$ = 2.61, S.D. = 0.18), which was highly significant (* p<0.05).

Before experiment and after experiment specific project results for Part 2 of the student learning performance test question.

Table 10 The result of a student's learning performance in independent inquiry ability (n=39).

Student Learning Performance Test Part 2 Student Questionnaire Questions	Before experiment			After experiment		
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning
1.I would like to try to find information related to the content of the class by myself.	2.66	0.66	Sometimes	4.18	0.64	Often
2.I began to organise the course content in an organised and logical way.	2.59	0.67	Seldom	4.23	0.70	Always
3.I began to be able to more accurately grasp the focus of the classroom content and learning purpose.	2.66	0.57	Sometimes	4.15	0.67	Often
4.I would like to start trying to learn the content and problems that are more difficult than the course content.	2.59	0.49	Seldom	4.00	0.60	Often

Student Learning Performance Test Part 2 Student Questionnaire Questions	Before experiment			After experiment		
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning
5.I can set regular learning goals according to my own learning needs.	2.56	0.59	Seldom	4.18	0.60	Often
6.I am willing to use the gamified practice platform to train and do the exercises repeatedly, and to reflect on the reasons for the wrong questions.	2.61	0.59	Sometimes	4.12	0.69	Often
Independent inquiry ability overall average value	**2.61**	**0.59**	**Sometimes**	**4.14**	**0.65**	**Often**

From the Table 10, It was founded that in part 2 of the student learning performance test question independent inquiry ability, the scores after the experiment ($\bar{x}$=4.14, S.D.=0.65) were higher than before the experiment ($\bar{x}$=2.61, S.D.=0.59). Among them, from the ranking of students' performance in order from maximum to minimum found, the first was "I began to organise the course content in an organised and logical way." the level was always level($\bar{x}$=4.23, S.D.=0.70); The second was "I would like to try to find information related to the content of the class by myself." was often level ($\bar{x}$=4.18, S.D.=0.64); The third was "I can set regular learning goals according to my own learning needs." was often level ($\bar{x}$= 4.18, S.D.=0.64).

Table 11 The result of the student's learning performance in class participation Assessment (n=39).

Student Learning Performance Test Part 2 Student Questionnaire Questions	Before experiment			After experiment		
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning
1.I can actively answer the questions raised by the teacher in class.	2.59	0.63	Seldom	4.20	0.69	Always
2.I can keep up with the class schedule.	2.51	0.64	Seldom	4.20	0.69	Always
3.I can take the initiative to have face-to-face group discussion and research with my classmates, and clearly express my views and opinions.	2.56	0.55	Seldom	4.12	0.65	Often
4.I can take the initiative to communicate feedback with teachers on problems I do not understand.	2.59	0.59	Seldom	4.10	0.71	Always
5.I can keep a happy, more relaxed mood to participate in the classroom learning environment.	2.48	0.55	Seldom	4.02	0.58	Often

Student Learning Performance Test Part 2 Student Questionnaire Questions	Before experiment			After experiment		
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning
6.I can participate in every part of the classroom learning.	2.53	0.60	Seldom	4.35	0.58	Always
Class Participation Assessment overall average value	**2.54**	**0.59**	**Seldom**	**4.16**	**0.65**	**Often**

From the Table 11,It was founded that in part 2 of the student learning performance test question class participation assessment , the scores after the experiment ($\bar{x}$=4.16, S.D.=0.65) were higher than before the experiment ($\bar{x}$=2.54, S.D.=0.59). Among them, from the ranking of students' performance in order from maximum to minimum found, the first was "I can participate in every part of the classroom learning." the level was always ($\bar{x}$=4.23, S.D.=0.70); The second was "I can actively answer the questions raised by the teacher in class." and "I can keep up with the class schedule." the level was always ($\bar{x}$=4.20, S.D.=0.69); The third was "I can take the initiative to have face-to-face group discussion and research with my classmates, and clearly express my views and opinions." the level was often ($\bar{x}$=4.12, S.D.=0.65).

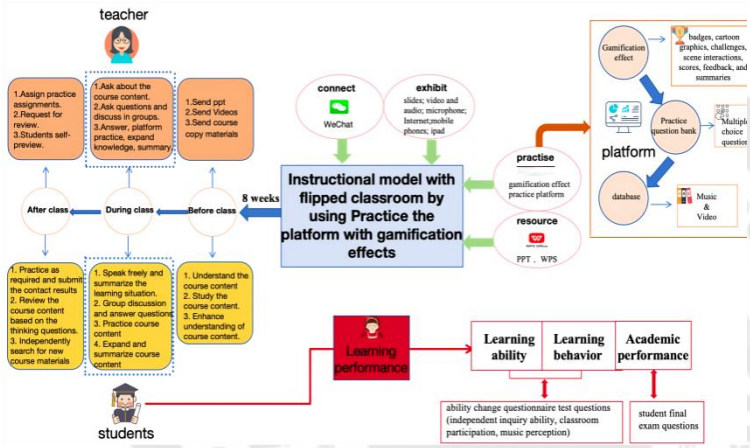
Table 12 The result of a student's learning performance in perceptual ability assessment (n=39).

Student Learning Performance Test Part 2 Student Questionnaire Questions	Before experiment			After experiment		
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning
1.I can master the basic knowledge of music.	2.69	0.73	Sometimes	4.25	0.67	Always
2.I can master more basic knowledge of film and television.	2.94	0.75	Seldom	4.18	0.55	Often
3.I could gradually tell the style and type of each music I heard.	2.64	0.66	Sometimes	4.12	0.61	Often
4.I can gradually feel the musical emotions of different types and styles.	2.53	0.50	Seldom	4.23	0.70	Always
5.I can more accurately perceive and analyse each basic content in the music.	2.69	0.61	Sometimes	4.15	0.63	Often
6.Gradually, I can more accurately combine the feelings and emotions expressed by the music that I hear with the film content and emotions that I see.	2.69	0.61	Sometimes	4.33	0.66	Always

Student Learning Performance Test Part 2 Student Questionnaire Questions	Before experiment			After experiment		
	$\bar{x}$	S.D.	Meaning	$\bar{x}$	S.D.	Meaning
7.I can start to complete the music classification and film and television classification independently.	2.61	0.63	Sometimes	4.20	0.65	Always
8.I accelerated my perception of music and television.	2.51	0.50	Seldom	4.20	0.61	Always
Perceptual ability assessment overall average value	**2.66**	**0.62**	**Sometimes**	**4.20**	**0.63**	**Always**

From the Table 12, It was founded that in part 2 of the student learning performance test question perceptual ability assessment, the scores after the experiment ($\bar{x}$=4.20, S.D.=0.63) were higher than before the experiment ($\bar{x}$=2.66, S.D. =0.62). Among them, from the ranking of students' performance in order from maximum to minimum found, the first was "Gradually, I can more accurately combine the feelings and emotions expressed by the music that I hear with the film content and emotions that I see." the level was always ($\bar{x}$=4.33, S.D.=0.66); The second was"I can master the basic knowledge of music." the level was always ($\bar{x}$=4.25, S.D.=0.67); The third was "I can gradually feel the musical emotions of different types and styles." the level was always ($\bar{x}$=4.23, S.D.=0.70).

Table 13 The result from the model's experts' questionnaire about the expert evaluation form for confirmation of the instructional model (n=5).

Expert evaluation content	$\bar{x}$	S.D.	Meaning
Graphic model (see details)			
	4.80	0.40	

			Most appropriate
Components of an instructional model combining the flipped classroom with gamified learning on digital platforms.			
1.The components in the model are clear.	4.80	0.40	Most appropriate
2.The design of the teaching link in the model matches the teaching content.	4.80	0.40	Most appropriate
3.The instructional design process is complete in the model.	4.80	0.40	Most appropriate
4.The lesson plan in the model is appropriate (including teaching time, teaching content, teaching weeks, teaching tools, teaching course types).	4.80	0.40	Most appropriate
5.Models with gamified learning on a digital platform are effective.	4.80	0.40	Most appropriate
6.Educational technology tools used in the model correspond to teaching activities.	4.80	0.40	Most appropriate
7.The assessment tests in the model are consistent with the teaching content.	4.80	0.40	Most appropriate
8.The assessment tests in the model are consistent with the teaching content.	4.80	0.40	Most appropriate
9.The teaching objectives in the model match the teaching process.	5.00	0.00	Most appropriate
The impact of an instructional model combining the flipped classroom with gamified learning on digital platforms on students and teachers.			
1.The teaching link in the model can improve students' independent inquiry ability and participation in the classroom.	4.80	0.40	Most appropriate
2.The gamified learning on a digital platform in the model can			Most

improve students' perception of music.	5.00	0.00	appropriate
3.The instructional medium used in the model is acceptable to the students.	5.00	0.00	Most appropriate
4.The difficulty level of the teaching content in the model can be accepted by the students.	4.60	0.80	Most appropriate
5.The test section in the model can clearly detect the students' learning performance.	4.80	0.40	Most appropriate
6.Using the instructional model, the teaching effect of teachers is more vivid and interesting.	4.80	0.40	Most appropriate
7.Lessons prepared by teachers using instructional models are enriched.	4.80	0.40	Most appropriate
Process of an instructional model combining the flipped classroom with gamified learning on digital platforms.			
1.Before class online teaching activities in the instructional model ——PPT before class ——Before class video ——Before class text materials	5.00	0.00	Most appropriate
2.During class offline and online teaching activities in the instructional model ——Teacher question in class ——Teachers ask questions in the classroom, students discuss face-to-face in groups, make speeches, teachers answer and expand knowledge ——Using the gamified learning on a digital platform for practical practice in the classroom ——Students report the results of the exercises in the classroom, and the teacher summarises and expands knowledge	5.00	0.00	Most appropriate
3.After class online teaching activities in the instructional model ——online practice platform homework training and review of			

classroom content after class ——After class, the practice results will be reported online, and the teacher will summarise and evaluate ——After class, students organise their own materials, search and accumulate knowledge after class, prepare learning questions and send them to teachers through wechat, and Teachers evaluate content submitted by students	4.80	0.40	Most appropriate
4.Student learning performance detection part in the instructional model ——Student learning performance test question part 1, test question to test student performance ——Student learning performance test question part 2, questionnaire detects students' behavioural changes and ability changes after learning	4.80	0.40	Most appropriate
Overall model			
1.Components of an instructional model combining the flipped classroom with gamified learning on digital platforms.	4.80	0.40	Most appropriate
2.Learning process of an instructional model combining the flipped classroom with gamified learning on digital platforms.	4.80	0.40	Most appropriate
Overall average value	4.84	0.09	Most appropriate

From the Table 13, it could be seen that the overall average evaluation value of an instructional model combining the flipped classroom with gamified learning on digital platforms was most appropriate ($\bar{x}$=4.84, S.D.=0.09).

Graphic model （see details） ：

For the part of an instructional model combining the flipped classroom with gamified learning on digital platforms, was most appropriate ($\bar{x}$=4.84, S.D.=0.09).

Among the Components of an instructional model combining the flipped classroom with gamified learning on digital platforms.

For the results of the specific instructional model components part, it was found that although the project values were slightly different, it found all items were most appropriate. According to the values from large to small, the largest one was " The teaching objectives in the model match the teaching process."the result was most appropriate ($\bar{x}$=5.00, S.D.=0.00); The values of all other items were ($\bar{x}$=4.80, S.D.=0.40).

The impact of an instructional model combining the flipped classroom with gamified learning on digital platforms on students and teachers part:

For the impact of the instructional model on students and teachers, it was found that although the project values were slightly different, it found all items were most appropriate. According to the values from large to small, the largest one was " The gamified learning on a digital platform in the model can improve students' perception of music." the result was most appropriate ($\bar{x}$=5.00, S.D.=0.00); The second was "The instructional medium used in the model was acceptable to the students."the result was most appropriate ($\bar{x}$=5.00, S.D.=0.00);The third was “The teaching link in the model can improve students' independent inquiry ability and participation in the classroom." the result was most appropriate ($\bar{x}$=4.80, S.D.=0.40).

Process of an instructional model combining the flipped classroom with gamified learning on digital platforms part ：

For the results of the process part of the instructional model, it was found that although the project values were slightly different, it found all items were most appropriate. According to the values from large to small, the largest one was " Before

class online teaching activities in the instructional model" the result was most appropriate ($\bar{x}$=5.00, S.D.=0.00); The second was" During class online and offline teaching activities in the instructional model". the result was most appropriate ($\bar{x}$ =5.00, S.D.=0.00); The third was " After class online teaching activities in the instructional model" and "Student learning performance detection part in the instructional model"the result were all most appropriate ($\bar{x}$=4.80, S.D.=0.40).

Overall model part:

For the results of the overall part of the instructional model,it founded all items was most appropriate ($\bar{x}$=4.80, S.D.=0.40). Among them, "Components of an instructional model combining the flipped classroom with gamified learning on digital platforms." the result was most appropriate ($\bar{x}$=4.80, S.D.=0.40); secondly, "Learning process of an instructional model combining the flipped classroom with gamified learning on digital platforms." the result was most appropriate ($\bar{x}$=4.80, S.D.=0.40).

CHAPTER 5
CONCLUSIONS AND DISCUSSION

This study researched and developed an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China. The summary of the research results are as as follows:

5.1 A Brief Summary of the Study.

5.1.1 Objectives of the Study

1) To develop an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China.

2) To study the effectiveness of using an instructional model combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students' learning process.

5.1.2 Population and sample

Phase I

The study subjects are as follows:

Population

The research subjects were third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China. A total of 218 students were divided into 5 classes. A specific random sampling method was used and students volunteered to participate in the study. Before participating in the trial of this course, students must have taken courses such as audio-visual language, nonlinear editing, directing basics, and film and television aesthetics in the talent training plan formulated by the school in their first and second years of undergraduate study.

Samples

The research subjects were 39 out of 218 third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China, and these 39 students were in one of five classes. A specific random sampling method was used and students volunteered to participate in the study. In addition to the 39 experimental students, 20 students from the try out group were randomly selected. To evaluate the content of the questionnaire questions in part 2 of the course examination content in the instructional model

The expert group is divided into model expert groups and content expert groups. The model expert group is an expert who specialises in creating film and television score flipped classroom teaching design and production of practice platforms with gamified learning.The experts drafted and approved the development of a gamified effects practice platform with a of an instructional model combining the flipped classroom with gamified learning on digital platforms to promote improved student learning performance. The information on the five experts are as follows:

1) Two experts of Educational technology

2) Two experts Music

3) One expert of Film and television

The content expert group is composed of 3 content experts with course-related majors selected from 5 model experts to evaluate the Student Learning Performance Test part 1 of the student test question content and scoring criteria in the instructional model;

Phase II

The subjects of this phase of the study are as follows:

Population

The research subjects were third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China. A total of 218 students were divided into 5 classes. A specific random sampling method was used and students volunteered to participate in

the study. Before participating in the trial of this course, students must have taken courses such as audio-visual language, nonlinear editing, directing basics, and film and television aesthetics in the talent training plan formulated by the school in their first and second years of undergraduate study.

Samples

The research subjects were 39 out of 218 third-year undergraduate students majoring in media, drama, film and television directing at Zhujiang College, South China Agricultural University, China, and these 39 students were in one of five classes. A specific random sampling method was used and students volunteered to participate in the study.

The model expert group is an expert who specialises in confirming the information content of the instructional model. The information of the five experts are as follows:

1) Two experts of Educational technology

2) Two experts Music

3) One expert of Film and television

5.1.3 Research Tools

1) The "Questionnaire on the Learning Current Situation and Problems of Students in Film and Television Scores Course" was used to test the students' situation before developing the instructional model to determine students' before the experiment problems.

2) The "Expert Interview Form" was used to interview experts before developing the instructional model to determine the model components included in the model framework.

3) "Instructional model combining the flipped classroom with gamified learning on digital platforms model framework" was used to determine the overall framework of the model.

4) "Evaluation Form for instructional model combining the flipped classroom with gamified learning on digital platforms" was used to determine the content

of each component in the instructional model to improve students' learning performance.

5) The "Lesson Plan" was used to confirm the teaching arrangements during the teaching process, including teaching time, teaching content, teaching activities, teaching tools, teaching arrangements, etc., to ensure the teaching progress and teaching effect, thereby improving students' learning performance.

6) "Explanation of question types and usage of the practice platform in the lesson plan" was used for experts and students to understand the use of the platform.

7) "Student Learning Performance Test Questions(Student knowledge ability test questions)" were used to test students after they finish their studies.

8) "Student Learning Performance Test Questionnaire(Student Ability and Behavior Questionnaire) " was a questionnaire used to test students' learning performance after the study.

9) "Expert Evaluation Form for instructional model combining the flipped classroom with gamified learning on digital platforms" was used to confirm the usability and effectiveness of the instructional model.

5.1.4 Research methodology

Research steps：

Phase I: To develop an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China. The course of Film and television scores was taken as the research course.

Step 1: Analysis Phase

Research, analyse, and synthesise relevant literature and research results. Including (gamified learning, online practice platforms, course design, assessment methods, learners current learning status and problems, etc.).

Step 2: Design Phase

Design instructional model, including gamified learning on a digital platform, lesson plan (environment and resources) and student learning performance test questions. Experts reviewed the draft format respectively through group discussions, questionnaires, etc., and created tools based on expert suggestions.

Step 3: Development Phase

Submit the evaluation form and all tools to the model and content experts, as well as to students piloting the tools. Before presenting and evaluating the tools to the experts, IOC measurement experts are provided with evaluation models and tools and find the IOC consistency index to determine the accuracy and applicability of the tools. Afterwards, experiments were conducted using different tools to obtain the reliability value of the tool.

Phase II: To study the effectiveness of using instructional models combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students' learning process. The course of film and television scores was taken as the research course.

Step 4: Implementation Phase

39 students in the experimental class conducted an organised flipped classroom teaching experiment with a gamified practice platform. The course time is 45 minutes per class, with a total of 4 classes per week. An 8 week mixed online and offline flipped teaching experiment. and tested before and after the experiment. Before the experiment, students were asked to answer a questionnaire about their current learning status and learning problems, allowing students to express themselves; after the experiment, through the final test questions and final questionnaire, teachers and students evaluated their learning performance respectively, thus showing the experimental results.

Step 5:Evaluation Phase

Analyse student performance before and after the experiment, as well as the learning performance effect index. Analysing content learners

performance improvement scores on questionnaire measures. Experts use the expert evaluation form to confirm the instructional model, collect data and expert opinions, and confirm the final instructional model.

5.2 Conclusion

The research conclusion shows:

5.2.1 Phase I

Summarises the development of an instructional model combining the flipped classroom with gamified learning on digital platforms to enhance the learning performance of undergraduate media students in China. To development results was as follows:

5.2.1.1 Through a questionnaire survey on the learning status of 39 students before the instructional model was developed, the overall average level of problems in the learning status of students in the film and television scores course were sometimes. The ranking results of students' three lowest questions show that the lowest was that they were rarely able to independently preview before class; the second was that they rarely have sufficient learning resources; and the last was that they rarely like the current traditional teaching methods. These results show that students' current learning status was not very proactive and independent, and their independent inquiry ability and classroom participation in learning need to be improved.

5.2.1.2 Through a questionnaire survey on 39 students learning problems before the instructional model was developed, the overall average level of students learning problems in the film and television scores course were sometimes. The most three ranking of the problems from the maximum to minimum of students showed the result that they often feel that they have strong expectations and interests in learning film and television scores courses; the second was that they often couldn’t better motivate themselves under the traditional instructional model. their learning interest and independent inquiry ability; finally, they often feel that there was a gap between their current academic performance and their expectations. These results show that students currently have many problems in learning, and they were very much

looking forward to the learning process. Teachers need to innovate teaching methods and change instructional models as soon as possible to help students maintain their interest in learning and improve their academic performance faster , learning ability and learning behaviour.

5.2.1.3 Based on the preliminary survey results of 39 students, the researcher drafted an expert interview form. Through communication, discussion, and research with experts, compiled and summarised experts opinions and summarised the creation of an instructional model combining the flipped classroom with gamified learning on digital platforms. Model construction content. Data analysis shows that experts recommend that in order to improve students' learning performance, our teaching model should include four parts: 1) platform 2) learning environment 3) assessment 4) learning resources. The creation of a gamified learning on a digital platform should clearly include both gamification mechanisms and gamification elements, and clarify the gamified learning. The learning environment should include the flipped classroom teaching framework, teaching activities, and teaching time. During the evaluation, the types of teaching tests and the methods for testing student learning performance should be clarified, which include final examination questions on student learning performance with teachers as the main body of assessment and student learning performance test questionnaires based on student self-evaluation. Learning resources should include specific lesson plans, syllabus, and teaching tools.

5.2.1.4 Based on the data collected from the expert interview form, the researcher created a questionnaire to investigate the specific components and learning model of an instructional model combining the flipped classroom with gamified learning on digital platforms for 5 model experts. The data shows , it can be seen that the overall average value of an instructional model combining the flipped classroom with gamified learning on digital platforms part 2 questionnaire was the most appropriate .The questionnaire was divided into two parts: 1) the components of the model; 2) the process of learning the model.

1) The components of the model

Data analysis in the components of the model shows that the average rating of each of the four components in the instructional model regarding, platform, learning environment, evaluation, and learning resources were the most appropriate.

Platform: The platform includes gamification mechanisms and elements, and 5 model experts evaluate the specific content of the platform. The data shows that all components was the most appropriate.Such as Rewards, Achievement, Status or respert, and Inspiring.These gamification mechanisms could satisfy students' learning interests and help students achieve learning goals; Elements in the platform include practice test elements, gamification elements, equipment, database content, answer score summaries and simple analysis.For example, the exercises included multiple-choice questions (listen to music and choose the appropriate video, or watch the video and choose the appropriate music; gamification elements include badge collection, cartoon graphics, scores, challenges, and clearance; devices include smartphones, mobile iPads, and computers. Mobile network or Wi-Fi, open the link and enter your account and password to enter the platform cover; the database content includes a music database summarised according to different music types and styles; answer score summary and simple analysis include score summary and score analysis.

The content classification of the music database was clear, the database was clearly marked and students could use it conveniently, the difficulty level of the exercises in the exercise database was within the acceptable range of students, and the classification of the exercise database could clearly distinguish the types of questions and make it convenient for students.Use exercises from the exercise question database to meet the students learning goals.

At the same time, in order to facilitate students and teachers to further understand the use of the platform,for the smooth use of the platform in the teaching experiment, the researcher produced instructions for using the gamified learning on a digital platform and collected data from 5 experts through a questionnaire

survey. The results show that the experts' instructions for using the gamified learning on a digital platform were the most appropriate.

Learning environment:The learning environment was mainly reflected in the flipped classroom framework, teaching activities and teaching time arrangements. Five model experts evaluated the specific content of the learning environment, and the data showed that all components were the most appropriate. According to the concept of flipped classroom, the flipped classroom framework includes three processes before class, during class and after class. Combining the above three processes, the design of teaching activities includes independent viewing of learning videos, classroom interactive questions, group discussions, classroom exercise training, expansion of course content, and students' independent search and classification of course materials. The teaching time was no less than 6 weeks and no more than 10 weeks. The duration of the teaching content was finally determined to be 8 weeks, with 4 classes per week, each class was 45 minutes. The arrangement of this learning environment enables students to study in a stable environment, and reasonably plans course time, teaching activities and teaching processes, ensuring that students could display the results after using the instructional model, and promoting students to achieve the expected experimental goals.

Evaluation:Five model experts evaluated the specific contents of the evaluation form, and the data showed that all components were the most appropriate. Methods for student learning performance included student final exam questions (tests of student knowledge and skills). Ability Change Questionnaire test questions (including independent inquiry ability, classroom participation, and music perception). This assessment method could more comprehensively test the changes in students' learning performance after using the instructional model. It not only tests and evaluates knowledge and skills from the perspective of teachers, but also allows students to test their own behaviours and abilities in learning performance through questionnaire changes to confirm whether the expected learning objectives were achieved.

Learning resources: Learning resources included lesson plan learning format framework, syllabus and teaching tools as course arrangements for teachers and students. Five model experts evaluated the specific content of the learning resources, and the data showed that all the components were the most appropriate.

Online learning for students before class, offline and online hybrid learning for students during class, and online homework training and independent review of course content for students after class;

The teaching content syllabus had eight chapters , there were Multiple relationships between film and musicians and the aesthetic characteristics and aesthetic way of film and television music;Basic theoretical knowledge of film and television music; Film and Television Sound;The role of music and sound in film and television;The Classification of TV Music and the artistic Characteristics of the constituent elements (dominated by movies and TV series);The Art conception of Film and television Music and Sound;The concept of the soundtrack;Perception, analysis, selection and training of film and television music and sound.

Teaching tools that needed to be used,WeChat; WPS;Slides; Video and Audio; microphone; Internet; gamified learning on a digital platform; Mobile phones; Ipad.The arrangement of these learning resources assists the learning environment and could effectively improve the effectiveness and impact of the instructional model.

2) The process of learning the model

There were four specific components in the model, the process of learning the model was summarised and arranged in detail. Data analysis shows that experts also expressed that the specific process arrangements for the three processes;before class, during class, and after class were the most appropriate.

The teaching activities and learning processes before class were sent to teachers with videos, text materials, and PPT, and students could study independently online according to requirements.

The teaching activities and learning process during class provide students with offline and online blended learning. The teacher arranges group discussions, asks questions, answers questions, and exercises the gamified learning on the platform's special ability training (the gamified learning will be evaluated interactively) To motivate students, students could challenge the practice questions again and complete them again to obtain higher points. After completing the exercises, they received corresponding game badges based on the points, expansion information collection and other teaching activities, so that students could actively participate in classroom activities and train music perception. There were four classes per week, including two theoretical classes and two practical classes, each class was 45 minutes long; a total of 8 weeks.

The teaching activities and learning process after class are for the teacher to arrange the number of homework exercises based on the classroom content. The students complete the platform exercise training online according to the requirements and summarise the results and submit them. The teacher collects information and gives feedback, and the students review the course content independently. Improve independent inquiry learning ability and music perception.

Overall , 5 model experts believe that the design content of this instructional model was relatively comprehensive and could be experimented to improve students' learning performance. The instructional model obtained four components and three processes according to the results.Here, in order to facilitate everyone’s use in future research, the researcher calls the instructional model GaF-PELL model.

5.2.2 Phase II

Summarises to study the effectiveness of using instructional models combining the flipped classroom with gamified learning on digital platforms for improving the learning performance of Chinese undergraduate media students’ learning process. The results of the experimental process was as follows:

5.2.2.1 The learning performance of 39 students experienced significant changes after GaF-PELL model， the average value after the experiment was higher

than the before experiment , which was highly significant.This show that the students' final grades in learning performance after passing the experiment have significantly improved in popularity, and most of them could achieve relatively good results. We achieved our expected goals and verified that the instructional model was effective and appropriate.

5.2.2.2 For a student learning performance test questionnaire survey on 39 students after learning GaF-PELL model, and conducted independent evaluation to study their satisfaction. According to data statistics, students' independent inquiry ability, classroom participation, and perceptual abilities had also changed significantly in their learning performance. After the experiment was higher than the previous experiment, which was highly significant.The students said that they had obvious changes in their learning performance before and after the experiment, and that they had improved their abilities and behaviours and met their expectations. Among them, the student learning performance:

3) Learning ability part (including independent inquiry ability and perception ability)

After the experiment on independent inquiry ability, found scores were higher than those before the experiment. The first was that they were able to sort out the course content in an organised and logical manner; The second was that they were often willing to try to find information related to the class content on their own ;The third was that they could often set regular learning goals based on their own learning needs.

After the experiment on perceptual ability was found the scores were higher than those before the experiment. The first was that they could gradually and more accurately combine the feelings and emotions expressed in the music they heard with the film and television content and emotions they saw; The second was that they could always master basic music knowledge; The third was that they could always feel the emotions of music in different types of styles.

After the experiment, most students believed that their independent inquiry abilities and perceptual abilities had been significantly improved, they were willing and able to independently complete tasks such as previewing and searching for information, and they were able to begin to master more knowledge about music and film and television. Basic content, and gradually they could distinguish the style and type of each piece of music they heard, and gradually they felt the emotions of different types of music. Gradually, they could more accurately combine the feelings and emotions expressed by the music they heard with the content and emotions of the movies they saw, and they could complete the classification of music and movies independently, and accelerated the improvemented of their perception of music and movies.

5) Learning behaviour part (referring to class participation)

After the experiment, it was found that scores were higher than those before the experiment. They always participated in every aspect of classroom learning;They always actively answered the questions raised by the teacher in class and followed them in class; They often took the initiative to conduct face-to-face group discussions and research with classmates, and clearly express their views and opinions.

Most students believed that their classroom participation was relatively poor before the experiment, for example, they were unable to actively participate in classroom learning activities. After the experiment, most students believed that their classroom participation behaviour had been significantly improved. For example:they actively answered questions raised by the teacher in class;They could keep up with the progress of the class, they participated in every aspect of class learning;They could take the initiative to conduct face-to-face group discussions and research with their classmates, and Clearly express their views and opinions and other classroom behaviours.

5.2.2.3 After implementing the instructional model, researcher brought the finally developed GaF-PELL model, the researcher created a confirmation model evaluation form for five model experts. The results showed that,it could be seen that the overall average evaluation value of GaF-PELL model was most appropriate.

1) Graphic model (see details)

For the part of GaF-PELL model, the components and process were most appropriate.

2) Among the Components of GaF-PELL model ：

For the results of the specific GaF-PELL model components part, it was found that although the project values were slightly different, it found all components were most appropriate. Especially the teaching objectives in the model match the teaching process with the high value of all others.

3)The impact of GaF-PELL model on students and teachers part:

For the impact of the GaF-PELL model on students and teachers, it was found that although the project values were slightly different, it found all components were most appropriate. According to the values from three ranking, the first was the gamified learning on a digital platform in the model could improve students' perception of music;The second was the instructional medium used in the model was acceptable to the students;The third was the teaching link in the model could improved students' independent inquiry ability and participation in the classroom.

4) Process of GaF-PELL model part ：

For the results of the process part of the GaF-PELL model, it was found that although the project values were slightly different, it was found all items were most appropriate. According to the values from three ranking, the first was before class online teaching activities in the instructional model the result was most appropriate ; The second was during class online and offline teaching activities in the GaF-PELL model; The third was after class online teaching activities in the GaF-PELL modell and student learning performance detection part in the GaF-PELL model.And all content the GaF-

PELL model was effective and appropriate. This shows that the model was developed successfully and was able to achieve the research objectives.

5.3 Discussion of research results

The established model results have four components and three processes. All model experts' evaluation results of the GaF-PELL model were the most appropriate. The results after students use the GaF-PELL model also have significant changes compared with the results before the experiment. The researchers present the key points of the established components and processes as well as the changes in students before and after using the GaF-PELL model as follows:

5.3.1 Platform

5.3.1.1 Platform creation effect in GaF-PELL model

In order to assist the flipped classroom instructional model to improve teaching and learning effects, digital technology was used to create a practice platform with targeted training of knowledge, and gamification learning strategies were integrated into the platform, and gamification mechanisms and gamification elements were integrated into the practice platform to form a practice platform with gamified learning was developed to satisfy and stimulate students' learning interests and help students achieve their learning goals. This was consistent with whose research set up an exercise training question bank in a platform-building manner and conducted independent online exercises to consolidate knowledge content(Liu et al, 2021) ; a gamification learning strategy , create a learning environment that was driven by incentives, scenarios and tasks, as well as game elements such as levels, challenges, badges, etc.(Zhu & Chen, 2015) ,, to integrate and unify learning content and game methods, thereby developing a game-like training, inner feelings and games to apply game strategies to education, thereby integrating modern educational technology Integrated with traditional teaching methods to create a relatively novel and rich student-centred learning environment(Giannakos, 2013); The proposed digital gamification could present graphics through digital technology, with some text, music it

was consistent with the conclusion obtained through oral and other expression methods(Tobias et al., 2014) .

5.3.1.2 The impact of the practice question bank in the platform on students after the experiment

By using the gamified learning on a digital platform for training on course-related content, the exercise question bank in the platform was a specially designed exercise training content by teachers based on relevant course content and students' actual abilities, which satisfies students' knowledge after learning the course content. The consolidation and proficiency of key points improves the accuracy of student training and strengthens students' practicality. This was in line with what was proposed, using a question bank to conduct independent online exercises to consolidate and improve knowledge and skills(Luo et al, 2021). Teachers used a digital practice platform to upload exercises of a question bank nature in the platform, reducing the need for teachers to correct students. At the same time, big data could also be used to summarise students' questions and understand the status and quality of students' answers in real time, analyse students' mastery of course content, and enable teachers to understand students' learning trends and make corresponding adjustments in course content. , in order to achieve high quality of teaching, and at the same time enable students to have targeted course content training to improve learning quality and performance. At the same time, because it was a digital practice platform, students could repeatedly train and analyse anytime and anywhere to achieve the same conclusion of mastering the content and consolidating knowledge points; At the same time, the integration of digital gamification strategies in the practice platform and reflection, allowing students to actively participate in the training process, improving students' learning efficiency and interest. This was consistent with the gamification teaching strategies and methods pointed out by (Chen, 2020) that could significantly improve students' learning status and this conclusion remains consistent with academic performance.

5.3.1.3 The impact of gamified learning in the platform on students after the experiment

The use of the gamified learning on a digital platform in the practice sessions during class and after class review training has played a great role in improving students' (music) perception. Traditional exercises, writing homework, completing classroom assignments, etc. mostly involve teachers assigning tasks and students completing them boringly. Many students even have to complete very difficult exercises because they have not yet learned the class content. From a teacher's perspective, with traditional teaching methods, teachers cannot effectively pay attention to students' state, emotions and other factors during the completion of homework, making it impossible for teachers to control and understand students' actual mastery of the course, and at the same time, they cannot effectively It could effectively guide students' status in completing homework at any time, not to mention making students interested in homework training and improving practice efficiency. From a student's perspective, traditional learning methods, boring homework content, and boring homework formats make students feel that they cannot complete the task in terms of ability, and are emotionally stressed and frustrated, making them increasingly unwilling to practise, practice, and practice. To train and consolidate the key points of course knowledge, students' perception of learning content becomes worse and worse. However, through the gamified learning on a digital platform created by the researcher, students' enthusiasm and interest in learning are mobilised through gamification elements and mechanisms, and at the same time, targeted exercise training with appropriate course content was added to satisfy students' interest in doing exercises. and the need to consolidate course content knowledge, thereby improving students' understanding and perception of the key points of course knowledge. This research result solves the problem pointed out by (Feng, 2022) that in the relationship between sound and picture in film and television music, because students were often unable to understand the opposition between sound and picture or the parallelism between sound and picture, they lack both the intuitive operation process for the formation of works and the lack of self-esteem. A practical training platform that focuses on music in film and

television scores to train oneself to mature could be used for daily practice. This has also become an important reason why undergraduate students majoring in media fail to effectively improve their academic performance and perceptual abilities in the film and television scores courses , and at the same time, as pointed out by (Li, 2002), a comparative study of online exercise practice and traditional exercise practice was conducted at the University of Victoria and Canada (Malaspina University-College). The experimental research results show that it was better to conduct exercises on the Internet. Exercises were effective and targeted, thereby improving students' rapid perception of knowledge content; gamification can become a way to acquire knowledge and improve basic abilities, such as decision-making, perceptuality, cognitive abilities(Dicheva et al., 2015) ; the use of gamification teaching design in courses could give full play to the advantages of games and the characteristics of students' interests, so that students could have an impacted in the classroom through the integration of information technology and games, realise self-exploration, be able to discover and solve problems on their own, and at the same time master relevant knowledge and improve the skills of perceiving professional knowledge in the learning process(Mao, 2013) . The results were consistent.

5.3.1.4 The impact of gamification strategies in the platform on students after the experiment

Such a gamification strategy also increases students' interest in the learning process, stimulates students' motivation and willingness to participate in learning training, and thereby improves students' classroom participation. For example, the badge elements in the gamified learning of the platform, the challenge and points mechanism in the gamified learning, and the interaction in the language all enhance and stimulate students to repeat learning, participate in learning, and independently explore learning in the practice platform. The important reason was that its existence also reduces the boring and boring training and learning, and stimulates students' mentality when doing exercises. This conclusion was consistent with those who pointed out that incorporating game elements into the implementation process of re-education improves classroom participation, whether it was an offline class in a flipped classroom or an

online class (Azmi et al., 2015) . The concept of integrating games was to make people happy while increasing students' intrinsic enthusiasm for participating in learning activities; gamification that could used game elements and game thinking in non-game environments to change people Behaviours and solving real-world problems could also attract and motivate people (Hulse et al., 2019) ; The gamification technology pointed out by (Kladchuen et al., 2021) was to combine game design elements with teaching and was not intended to change the teaching methods of games. It was designed to coincide with concepts and conclusions that could drive learner engagement.

5.3.2 Learning environment

5.3.2.1 Learning environment creation effect in GaF-PELL model

To establish the learning environment in the construction part of the instructional model, first of all, the researchers mainly used the concepts based on the flipped classroom, because in the process of analysis, research, and discussion, the researchers used the concepts of flipped classroom first proposed by (Van, 2013). The concept of "feeding" refers to "the content that an individual could obtain when taking action, and it was also an interactive learning opportunity that students could obtain. Feeding transformation includes three links: perception, interpretation and action. The researchers also constructed the basic framework of the flipped classroom through before class, during class and after class methods in the process of learning environment and learning model. At the same time, they made specific arrangements for students to watch learning videos and texts independently before class. The setting of teaching activities was dominated by material content, interactive questions in class, group discussions, after class exercise training, etc., and the specific arrangement of 8 weeks of classroom teaching content creates a relatively complete learning environment and learning process. Such learning The process setting of the environment and learning model allows for more communication between teachers and students during class time. It also enhances students' awareness and ability of independent inquiry and learning, so that students could actively integrate into the classroom and no longer feel confused. The classroom was boring, and it also allowed students to break the inner tension, urgency and fear caused by not understanding the knowledge content in the

classroom. This result was consistent with what (Ching-Yi chang et al., 2019) said through flipping Classroom teaching models and concepts introduce the core teaching content in the classroom, and at the same time, allow students to conduct theoretical online independent learning, thereby increasing the time for classroom practice, discussion, interaction, collaboration and communication; through the expanded core construction of before class and after class teaching practices in the flipped classroom, students were allowed to conduct independent inquiry learning before class, and teachers arrange and set up a variety of activities during class to test students' before class learning effects , and at the same time put forward targeted opinions on student feedback, and students could "revise" and "train" after class, thereby breaking the limitations of classroom teaching time and space in traditional teaching(Xu, 2022) . And the concept proposed by (Pierce and Fox, 2012) Change traditional teaching methods and shift the focus of the classroom from teachers to students to maintain consistency with the "student-centred" teaching philosophy.

5.3.2.2 The effect of the creation of learning environment on students after the experiment

In the flipped classroom instructional model, teachers incorporate more questions, group discussions, Q&A, and practical training using a gamified practice platform into the classroom to mobilise students' enthusiasm and encourage students to interact with each other, real-time communication and exchange between teachers and students, stimulating students' curiosity in the classroom. At the same time, teachers no longer blindly instil course content in the traditional way, but let students complete basic learning independently before class. The knowledge content in the classroom will become more relaxed and pleasant. This kind of environment also enables students to put down their guard in the classroom, relax, experience the classroom with questions, and immerse themselves in every teaching activity in the classroom, which also improves students' classroom participation. Moreover, when students no longer absorb the course content unilaterally, but instead come to class with questions they do not understand and practise with questions, students' independent inquiry abilities are also improved before and during class. Students are willing to use

their brains to think, reflect, and strengthen logical summaries. This conclusion was consistent with (Zhang, 2015) who pointed out that teachers and students need to complete joint Q&A, expansion, interaction, discussion, collaboration and other activities during class. Such flipped classroom activity design allows students to spend more time and space in class. practical activities to improve classroom participation. This was also consistent with (Herid & Schiller, 2013) pointing out that students could even develop deeper course knowledge by completing practical exercises in class and discussing the questions raised and pre-class practice assignments. This will improve classroom efficiency and allow teachers to quickly identify problems in students' learning processes that are consistent with the results of participating in class interactions.

5.3.3 Evaluation

5.3.3.1 Evaluation effect in GaF-PELL model

The purpose of innovation and construction of instructional models was to have a positive impact on students' learning performance. Therefore, the construction of the instructional model includes the evaluation and testing of students after using the instructional model to verify the effectiveness of the instructional model. In the evaluation, it was necessary to create a questionnaire that not only ensures that teachers evaluate changes in students' knowledge and skills, but also openly and clearly detects changes in students' learning performance after using the instructional model through student self-evaluation. This was consistent with the conclusion proposed by (Florence et al., 2021) that the hybrid teaching method of flipped classroom with special characteristics was used, and performance assessment was used to detect changes in student performance and other performance. Under the flipped classroom learning model, students could have more time to feedback questions, practice, and receive guidance from teachers in class, and the integration of online teaching methods and flipped classroom instructional models was used , greatly improving students' learning ability and participation(Riel, 2021) .

5.3.3.2 Impact of evaluation on students after the experiment

Through the research and development of the GaF-PELL model, and according to the opinions of experts, the GaF-PELL model was mainly divided into four

model components. This study measured the learning performance of 39 experimental students before and after the experiment. The research results show that there was a significant difference in students' learning performance before and after using the GaF-PELL model. Statistically, students' learning performance after learning was significantly higher than before learning. Demonstrate that the instructional model meets all standards and is most appropriate, feasible, and effective.

5.3.4 Learning resources

5.3.4.1 Learning resource creation effect in GaF-PELL model

In order to meet the richness of the learning environment, the researchers carefully arranged and prepared the learning resources needed in the learning environment, mainly including the arrangement of lesson plans, the design of teaching syllabus, and the specific teaching tools to be used. For example: the lesson plan includes online learning for students before class, hybrid offline and online learning for students during class and online homework training and independent review of course content for students after class; The teaching syllabus includes 8 chapters of film and television scores course content; Teaching tools include: Tools based on WeChat; Slides; Video and Audio; gamified learning on a digital platform; Mobile phones, etc. This was consistent with the flipped classroom learning model, in order to ensure that students could have more time to communicate, train, collaborate, discuss, etc. with the teacher in the classroom, and could also receive information from the teacher(Riel, 2021). Guidance, the use of more interesting and rich learning resources, and the integration of online teaching methods and flipped classroom instructional models were consistent with this result to improve the effects of classroom teaching and learning. The teaching concept of flipped classroom and the design of teaching activities, students learn through the online and offline mixed strategies of flipped classroom, so that students can preliminarily preview and master the course content through rich learning resources before class. At the same time, students entered the classroom with questions, consolidated and expanded their knowledge content through classroom activities designed by teachers, and conducted real-time interactions and platform knowledge training with teachers and classmates, which improved the practicality of the

classroom, students conduct independent review according to the teacher's requirements.This was consistent with the conclusion that by using group cooperative learning, discussion and other flipped classroom teaching activities during class time to solve problems, students' performance was improved consistent (M.K. Kim et al., 2014)

5.3.4.2 The effect of learning resource creation on students after the experiment

By using such learning resources, it not only saves teaching time in the classroom, but also promotes students to master the key points of the course content through self-study, discover and explore problems in their own learning before class, summarise, and discuss with the teacher in class Interaction and questions. However, after class, through online training, knowledge review and new content expansion teaching activities and learning environment design, students once again conducted independent learning training and inquiry, improving their independent inquiry ability. This result was consistent with what (Xu, 2022) proposed. The expansion of before class and after class teaching practices was the core of the flipped classroom. Students independently explore and learn before class, and teachers test students' learning effects during class and then put forward targeted opinions. Students "Modification" after class breaks the limitations of classroom teaching time and space in traditional teaching, thereby improving students' independent inquiry ability with consistent results. Students are taught in traditional classrooms by teachers, which requires students to study strictly according to the content taught by the teacher. This kind of teaching method makes students learn in a state of being suppressed, brainless, uninterested, and indoctrinated for a long time. As a result, students have lost their ability to explore independently, their learning ability was getting worse, and their interest in learning was also getting lower and lower. Therefore, when teachers try to adopt a "student-centred" instructional model combining the flipped classroom with gamified learning on digital platforms, it gradually stimulates students' initiative and enhances their interest in learning. Students also accept and are willing to try their own changes to improve students' independent inquiry abilities.

5.4 Research recommendations

From this study, several recommendations can be made. These include:

Chinese undergraduate media majors can use these research results as a reference, employing the concept of gamification to create a targeted course content practice platform. They can integrate the flipped classroom teaching concept and develop a flipped classroom instructional model suitable for media major courses, aligned with the learners' level and content requirements, aiming to enhance student learning performance.

5.4.1 Suggestions for teachers:

Professional teachers should pay attention to the mechanism of gamification, the design of gamification elements and the design of practice questions when on digital platforms. The design should be based on the age, gender, grade, nature of professional courses, etc. of the student group. The overall design must be attractive. The main purpose is to arouse students' interest, ambition and challenge, so that they are willing to participate in the training process autonomously, actively, happily and easily, so as to carry out the course. Special exercise training to consolidate course content knowledge and improve the perception of professional skills. At the same time, although the design of gamified learning and exercise content needs to be interesting and attractive, it is still necessary to pay attention to that the gamified learning should not be too complicated, which will cause students to pay too much attention and distract them, resulting in them not doing the exercises attentively. At the same time, the content of the exercises should not be too complex or too difficult, so that students lose confidence, become frustrated, and become more unwilling to engage in independent learning, which reduces students' ability to explore independently and cannot strengthen and improve their music through effective practice perceptual abilities.

When designing the entire flipped classroom instructional model, attention should be paid to strengthening the design of student-centred teaching activities, controlling effective learning time, selecting appropriate teaching tools, confirming effective course content materials, and guiding and encouraging students to actively participate. to the classroom session to enhance student participation in the

classroom. It should be noted that the selection of teaching tools should not be too complicated, but should be refined, easy to operate, and consistent with students' usage habits to increase student participation. The design of teaching activities should not be too compact, which will deprive students of a relaxed and pleasant classroom experience and cause students to become exhausted and lose interest in actively participating in class and actively communicating with teachers and classmates.

5.4.2 Suggestions for schools:

To ensure the smooth progress of teaching and research, schools should fully prepare teaching tools for teachers and students in advance. First, check the university's hardware, software and technical infrastructure; Secondly, arrange for dedicated personnel to check the readiness of the platforms and equipment that learners need to use, such as computer systems, networks, multimedia equipment, etc. to support the use of the platforms; Finally, it should be done by the school uniformly teaches students how to open platform links, registration information and instructions for using each link within the platform to improve teaching efficiency and ensure the orderly implementation of teaching and research.

5.4.3 Recommendations for research sample selection:

In this study, the sample selection mainly focused on students majoring in drama, film and television directing in Chinese undergraduate media major departments, and the sample size was 39 students, which is not a large sample size. This also led to the researcher's interpretation of the research results. Certain restrictions. The limitations of this study are mainly reflected in the following aspects:

5.4.3.1 The Chinese media undergraduate system also includes many other specific majors, such as: Radio and Television Directing, Drama, Film and Television Literature, Drama, Film and Television Performance, Broadcasting and Hosting, Photography, Film and Television Production, etc. These majors All belong to the media disciplines. Therefore, there were many differences in course types and nature of courses in various professional disciplines, resulting in insufficient research data. In future research, more professional courses can be accommodated and tried as

research and experimental subjects, thereby making the resulting data more accurate and comprehensive.

5.4.3.2 Regarding the selection of students, this study mainly uses third-year undergraduate students majoring in drama, film and television directing as the research sample. The sample size is small, resulting in incomplete data. In China, there are a large number of universities, and the grades and rankings of different schools are different. There are still many uncertain factors in terms of abilities and preliminary foundation of students of different generations. Therefore, in future research, more university students of different types and levels will be added as research samples to enrich the breadth of the entire study, and the results will be more convincing.

5.4.4 Suggestions on research methods:

This study mainly uses questionnaire survey method, interview method and final test question scoring supplemented by survey form. Generally speaking, the questionnaire survey itself has certain limitations. Uncontrollable factors such as the mood, attitude, subjective consciousness, and emotions of the respondents when filling out the questionnaire will affect the credibility of the survey results to a certain extent and authenticity, which will affect the research results and conclusions. However, the subjective consciousness of experts and teachers who use the interview method and students' final test questions will be relatively strong, and to a certain extent, there will be uncontrollable factors in the perception, understanding and evaluation of the information content, thus affecting the construction of the instructional model. It will have an impact on students' final exam scores.

Overall, the results of this study can be used as a more effective guideline to develop new instructional models. The GaF-PELL model to enhance the learning performance of undergraduate media students in China. Gamified learning on a digital platform is used as a learning medium in the flipped classroom instructional model to strengthen and improve students' learning performance. Of course, it is not just a practice platform, it uses gamification elements to enhance the effect of the online platform, and uses new methods to improve students' learning status and improve

students' learning performance. It can also be made into app software, innovating with new media technology and making it more convenient to use. It is recommended to conduct research on students' classroom process evaluation and more learning performance. Understand and obtain more new dimensions of research results through interviews, observations, qualitative research, and surveys.

5.5 Research Reflection

Based on the research process and results of this study, the researcher reflected on the research on the GaF-PELL model. The reflection content is as follows:

5.5.1 To support the flipped classroom instructional model

In the development process of the GaF-PELL model, this study focuses on the digitalization of the teaching process in the arrangement of basic, traditional, and conventional online and offline mixed teaching activities in the flipped classroom. The development and use of technology, but ignores the innovation in the design of flipped classroom teaching activities. Researchers can strengthen and try changes in this content in the future research process. For example: in the classroom interaction part of the class, the organisation form of interactive activities can also be changed based on different course content needs and the specific performance and situation of students' learning. Enable students to participate more effectively in class.

5.5.2 Innovative development to support digital technology

Although this study has researched and developed a subject-specific practice platform, the module development of this platform is mainly created to improve students' perception and participation in the music in the course content and their independent inquiry ability. There are two major modules: practice question bank and database. Although such a module seems to provide targeted training for professional content in both the exercise content and the database, the construction of the platform module is relatively basic and simple. With the rapid development of digital technology in the 21st century, future researchers can continue to develop and create other practice platforms based on subject attributes and content in addition to ensuring the

use of the two modules with subject-specific practice question banks and databases. modules to ensure the practicality, richness and durability of the practice platform.

5.5.3 For supporting gamification elements and mechanisms in the practice platform

In order to improve students' ability to independently explore the course content, as well as their participation and perception of music, this study incorporated gamification elements and mechanisms into the practice platform to improve students' training status and learning performance. However, because this is the first time that the researcher has tried to integrate gamification strategies into the practice platform created, and is worried that students will rely too much on the effects of gamification during the learning process, which will lead to a reduction in our experimental expectations for students, therefore, the research After discussions and consultations with various model experts, the author decided to use only common gamification elements and mechanisms to display in the learning process of the practice platform. However, at the same time, there is not much research and innovation in the patterns and colours of gamification elements to change the visual impact of gamification in the training platform. In the future, researchers can innovate and change here to enrich the visual effects and activity settings in the practice platform, so that students can more like and consciously train course content and assignments, and improve students' learning performance.

5.5.4 Research on supporting dependent variables

This study is mainly based on four aspects of improving students' learning performance: final exam scores and students' independent inquiry ability, classroom participation, and perception. However, there are many other manifestations in learning performance. In the future, researchers can also innovate and modify the instructional model combining the flipped classroom with gamified learning on digital platforms to study dependent variables such as metacognition in students' learning performance

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APPENDIX

Appendix A

Check the list of research tool experts

The experts of the research team are as follows:

List of 3 IOC experts:

1. Name:Kajohnsak Sanguansat

School:Suringra Rajabhat University

Position / Title:Assoc.Prof.

1. Name:Suppawan Satjapiboon

School:Srinaknarinwirot University

Position / Title:Asst. prof.

2. Name:Tavika Tangprapa

School:Srinaknarinwirot University

Position / Title:Asst. prof.

List of 5 model experts:

1. Name:Anchana Suksomjit

School:Faculty of Education.Suan Sunandha Rajabhat University

Position / Title:Asst. prof.

2. Name:Preeya Sompuet

School:Faculty of Management Science.Phranakorn Rajabhat University

Position / Title:Asst. prof.

3. Name:Di SUN

School:Institute of Music Education, Guangdong Technical Normal University

Position / Title:Associate prof.

4. Name:Yi ZHONG

School:Xinghai Conservatory of Music

Position / Title:Associate prof.

5. Name:Xiaoer GAN

School:Institute of Fine Arts, South China Normal University

Position / Title:Full prof.

List of 3 content experts:

1.Name:Di SUN

School:Institute of Music Education, Guangdong Technical Normal University

Position / Title:Associate prof.

2.Name:Yi ZHONG

School:Xinghai Conservatory of Music

Position / Title:Associate prof.

3.Name:Xiaoer GAN

School:Institute of Fine Arts, South China Normal University

Position / Title:Full prof.

Appendix B

Tool Evaluation Results and Research Outcome

Tool evaluation results and research findings studies:

1.IOC index value to evaluate the consistency of questionnaires on the learning status and existing problems of students in film and television scores course.(Table 14)

2. IOC index value to evaluate the consistency of experts interview form.(Table 15)

3. IOC index value to evaluate the instructional model combining the flipped classroom with gamified learning on digital platforms .(Table 16)

4.IOC index value to evaluation form for the composition of an instructional model combining the flipped classroom with gamified learning on digital platforms. (Table 17)

5.IOC index value to evaluation Lesson plan.(Table 18)

6.IOC index value to evaluation question types and practice platform usage instructions in the evaluation lesson plan.(Table 19)

7.IOC index value to evaluation student learning performance teststudent knowledge ability test questions.(Table 20)

8.IOC index value to evaluation students' learning performance test(student Ability and Behaviour Questionnaire).(Table 21)

9.IOC index value to expert evaluation form for confirmation instructional model.(Table 22)

Table 14 IOC index value to evaluate the consistency of questionnaires on the learning status and existing problems of students in film and television scores course

Item	Experts	IOC	Result	Suggestions
	1 2 3			
Current situation of students' learning				
1.	+1 +1 +1	1.00	Agree	
2.	+1 0 +1	0.67	Agree	
3.	+1 +1 +1	1.00	Agree	
4.	+1 +1 +1	1.00	Agree	
5.	+1 +1 +1	1.00	Agree	
6.	+1 +1 +1	1.00	Agree	
7.	+1 +1 +1	1.00	Agree	
8.	+1 +1 +1	1.00	Agree	
9.	+1 +1 0	0.67	Agree	
10.	+1 0 0	0.33	Disagree	The question is not clear, 10 and 11 are very similar
11.	+1 0 0	0.33	Disagree	The direction of the specific content to be assessed should be clear
Students have problems learning				

1.	+1 +1 0	0.67	Agree	
2.	0 +1 0	0.33	Disagree	The meaning is not expressed clearly enough
3.	+1 +1 0	0.67	Agree	
4.	+1 +1 0	0.67	Agree	
5.	+1 0 +1	0.67	Agree	
6.	+1 +1 +1	1.00	Agree	
7.	+1 +1 0	0.67	Agree	
8.	+1 +1 0	0.67	Agree	
9.	0 +1 0	0.33	Disagree	There is a conflict between question 9 and question 10.
10.	+1 +1 +1	1.00	Agree	

Table 15 IOC index value to evaluate the consistency of expert interview form

Item	Experts	IOC	Result	Suggestions
	1 2 3			
1.	+1 +1 +1	1.00	Agree	
2.	+1 0 +1	0.67	Agree	
3.	+1 0 +1	0.67	Agree	
4.	+1 +1 +1	1.00	Agree	
5.	+1 0 +1	0.67	Agree	
6.	+1 +1 +1	1.00	Agree	
7.	+1 +1 +1	1.00	Agree	
8.	+1 +1 +1	1.00	Agree	
9.	+1 0 +1	0.67	Agree	

Table 16 IOC index value to evaluation the instructional model combining the flipped classroom with gamified learning on digital platforms

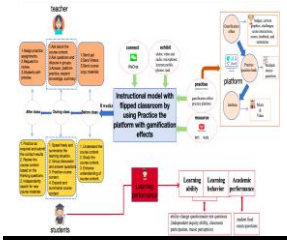
Module	Experts	IOC	Result	Suggestions
	1 2 3			
	+1 +1 +1	1.00	Agree	

Table 17 IOC index to evaluate the composition of an instructional model combining the flipped classroom with gamified learning on digital platforms

Item	Experts	IOC	Result	Suggestions
	1 2 3			
1.The Components of Model				
1.1Platform				
1)	+1 +1 +1	1.00	Agree	
2)	+1 0 +1	0.67	Agree	
1.2Learning environment				
1)	+1 +1 +1	1.00	Agree	
2)	+1 +1 +1	1.00	Agree	
3)	+1 +1 +1	1.00	Agree	
1.3Evaluation				
1)	+1 +1 +1	1.00	Agree	
2)	+1 +1 +1	1.00	Agree	
1.4earning resources				
1)	+1 +1 +1	1.00	Agree	
2)	+1 +1 +1	1.00	Agree	
3)	+1 +1 +1	1.00	Agree	
2.The process of Learning Model				

1)	+1 +1 +1	1.00	Agree	
2)	0 0 +1	0.33	Disagree	Explain how gamification manifests itself
3)	0 +1 +1	0.67	Agree	

Table 18 IOC index value to evaluation Lesson plan

Item	Experts	IOC	Result	Suggestions
	1 2 3			
1. 1 week				
Before class	+1 +1 +1	1.00	Agree	
During class	+1 +1 +1	1.00	Agree	
After class	+1 +1 +1	1.00	Agree	
2. 2 week				
Before class	+1 +1 +1	1.00	Agree	
During class	+1 +1 +1	1.00	Agree	
After class	+1 +1 +1	1.00	Agree	
3. 3 week				
Before class	+1 +1 +1	1.00	Agree	
During class	+1 +1 +1	1.00	Agree	
After class	+1 +1 +1	1.00	Agree	
4. 4 week				
Before class	+1 +1 +1	1.00	Agree	
During class	+1 +1 +1	1.00	Agree	

After class	+1 +1 +1	1.00	Agree
5. 5 week			
Before class	+1 +1 +1	1.00	Agree
During class	+1 +1 +1	1.00	Agree
After class	+1 +1 +1	1.00	Agree
6. 6 week			
Before class	+1 +1 +1	1.00	Agree
During class	+1 +1 +1	1.00	Agree
After class	0 +1 +1	0.67	Agree
7. 7 week			
Before class	+1 +1 +1	1.00	Agree
During class	+1 +1 +1	1.00	Agree
After class	0 +1 +1	0.67	Agree
8. 8 week			
Before class	+1 +1 +1	1.00	Agree
During class	+1 +1 +1	1.00	Agree
After class	0 +1 +1	0.67	Agree
Final exam			

Final exam questions	+1 +1 +1	1.00	Agree
Student Learning Performance Change Questionnaire	+1 +1 +1	1.00	Agree

Table 19 IOC index value to evaluation question types and practice platform usage instructions in the evaluation lesson plan

Item	Experts			IOC	Result	Suggestions
	1	2	3			
1.	+1	+1	+1	1.00	Agree	
2.	+1	+1	+1	1.00	Agree	
3.	+1	+1	+1	1.00	Agree	
4.	+1	+1	+1	1.00	Agree	
5.	+1	+1	+1	1.00	Agree	
6.	+1	+1	+1	1.00	Agree	
7.	+1	+1	+1	1.00	Agree	

Table 20 IOC index value to evaluation student learning performance test (student knowledge ability test questions)

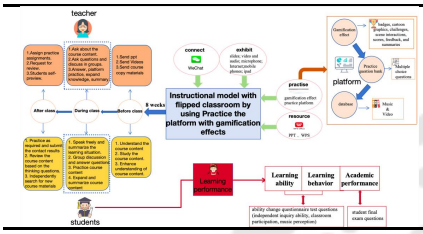
Item	Experts	IOC	Result	Suggestions
	1 2 3			
According to different types of film and television video clips to find and choose the right music (including sound effects) with clip				
1.	+1 +1 +1	1.00	Agree	
2.	+1 +1 +1	1.00	Agree	
3.	+1 +1 +1	1.00	Agree	
4.	0 +1 +1	0.67	Agree	
Code of points				
1.	+1 +1 +1	1.00	Agree	
2.	+1 +1 +1	1.00	Agree	
3.	+1 +1 +1	1.00	Agree	
4.	+1 +1 +1	1.00	Agree	
5.	0 +1 +1	0.67	Agree	

Table 21 IOC index value to evaluation students' learning performance test(student Ability and Behavior Questionnaire)

Item	Experts	IOC	Result	Suggestions
	1 2 3			
Gende	+1 +1 +1	1.00	Agree	
Major	+1 +1 +1	1.00	Agree	
Academic background	+1 +1 +1	1.00	Agree	
Assessment of self-inquiry ability				
1.	+1 +1 +1	1.00	Agree	
2.	+1 +1 +1	1.00	Agree	
3.	0 +1 +1	0.67	Agree	
4.	0 +1 +1	0.67	Agree	
5.	+1 +1 +1	1.00	Agree	
6.	+1 +1 +1	1.00	Agree	
Class Participation Assessment				
1.	+1 +1 +1	1.00	Agree	
2.	+1 +1 +1	1.00	Agree	
3.	+1 +1 +1	1.00	Agree	
4.	+1 +1 +1	1.00	Agree	
5.	+1 +1 +1	1.00	Agree	

6.	+1 +1 +1	1.00	Agree
Perceptual ability assessment			
1.	+1 +1 +1	1.00	Agree
2.	0 +1 +1	0.67	Agree
3.	+1 +1 +1	1.00	Agree
4.	+1 +1 +1	1.00	Agree
5.	0 +1 +1	0.67	Agree
6.	0 +1 +1	0.67	Agree
7.	0 +1 +1	0.67	Agree
8.	+1 +1 +1	1.00	Agree

Table 22 IOC index value to expert evaluation form for confirmation instructional model

Item	Experts	IOC	Result	Suggestions
	1 2 3			
Graphic model （see details）				
	+1 +1 +1	1.00	Agree	
Components of an instructional model combining the flipped classroom with gamified learning on digital platforms.				
1	+1 +1 +1	1.00	Agree	
2	+1 +1 +1	1.00	Agree	
3	+1 +1 +1	1.00	Agree	
4	0 +1 +1	0.67	Agree	
5	+1 +1 +1	1.00	Agree	
6	+1 +1 +1	1.00	Agree	
7	+1 +1 +1	1.00	Agree	
8	+1 +1 +1	1.00	Agree	
9	+1 +1 +1	1.00	Agree	
The impact of an instructional model combining the flipped classroom				

with gamified learning on digital platforms on students and teachers			
1	+1 +1 +1	1.00	Agree
2	0 +1 +1	0.67	Agree
3	+1 +1 +1	1.00	Agree
4	+1 +1 +1	1.00	Agree
5	+1 +1 +1	1.00	Agree
6	+1 +1 +1	1.00	Agree
7	+1 +1 +1	1.00	Agree
Process of an instructional model combining the flipped classroom with gamified learning on digital platforms.			
1	+1 +1 +1	1.00	Agree
2	+1 +1 +1	1.00	Agree
3	+1 +1 +1	1.00	Agree
4	+1 +1 +1	1.00	Agree
Overworth the model			
1	0 +1 +1	0.67	Agree
2	+1 +1 +1	1.00	Agree

Appendix C

Research Tool Styles and Forms

Appendix 1

Questionnaire On Students' Learning Status And Existing Problems In Film And Television Scores Course

(For students)

In this questionnaire, the detection level of students is divided into 5 levels, and the standards are as follows:

5 means Always

4 means Often

3 means Sometime

2 means Seldom

1 means Never

Your gender: Male/FEMALE

Your major: Media, Drama, film and television

Your academic background: Music foundation, audio-visual language, directing Foundation, nonlinear editing, film and television aesthetics

Questions	Evaluation level				
	5	4	3	2	1
Current situation of students' learning					
1.Are there sufficient learning resources?					
2.Do you conduct before class preview independently?					
3.Do you actively participate in classroom learning activities?					
4.Can you quickly understand the content of the class?					
5.Is there enough time for study and practice?					
6.Are you able to complete your homework effectively?					
7.Do you receive effective feedback from teachers on your assignments?					
8.Do you know your current ranking and grade in the class?					
9.Do you like the traditional teaching methods?					
10. Do you think teachers' teaching methods need to be changed and innovated?					
11. Do you like the challenging activities that teachers arrange in class sessions?					
Students have problems learning					
1.Can I accurately find the course preview materials?					
2.Have you learned the basics of music and film before starting this course?					

Questions	Evaluation level				
	5	4	3	2	1
3.Can I effectively integrate and understand the music I feel with the film and television?					
4.Is the content of each class fully understood?					
5.Are you unable to actively participate in the group after the classroom activities begin?					
6.Is there a gap between the current academic performance and expectations?					
7.Can you finish your homework accurately and quickly?					
8.Are you willing to do enough exercises?					
9. Do you have strong expectations and interest in learning film and television scores course?					
10.Is it impossible to better arouse one's own learning interest and independent inquiry ability in the traditional teaching mode?					

Appendix 2

Expert Interview Form

(For model experts)

The definitions of the symbols in this form refer to:

Q means Question

S means Scope answer

	Question and Scope question
1	Q:What are the specific components and general of an instructional model combining the flipped classroom with gamified learning on digital platforms? S:gamified learning on digital platforms; flipped classroom framework; lesson plan; teaching syllabus; teaching activities; teaching time; test questions; teaching process; teaching tools
2	Q:What types of directions should be included in the test of an instructional model combining the flipped classroom with gamified learning on digital platforms? S:Examination questions; ability change questionnaire test questions (self-exploration ability, classroom participation, music perception)
3	Q:What should the framework diagram of an instructional model combining the flipped classroom with gamified learning on digital platforms look like? S:Framework name; experimental course name; lesson planning process; teaching activities; teaching tools; teaching time; teaching objectives
4	Q:How does a instructional model combining the flipped classroom with gamified learning on digital platforms test students' learning performance? S:Classroom observation records; questionnaires

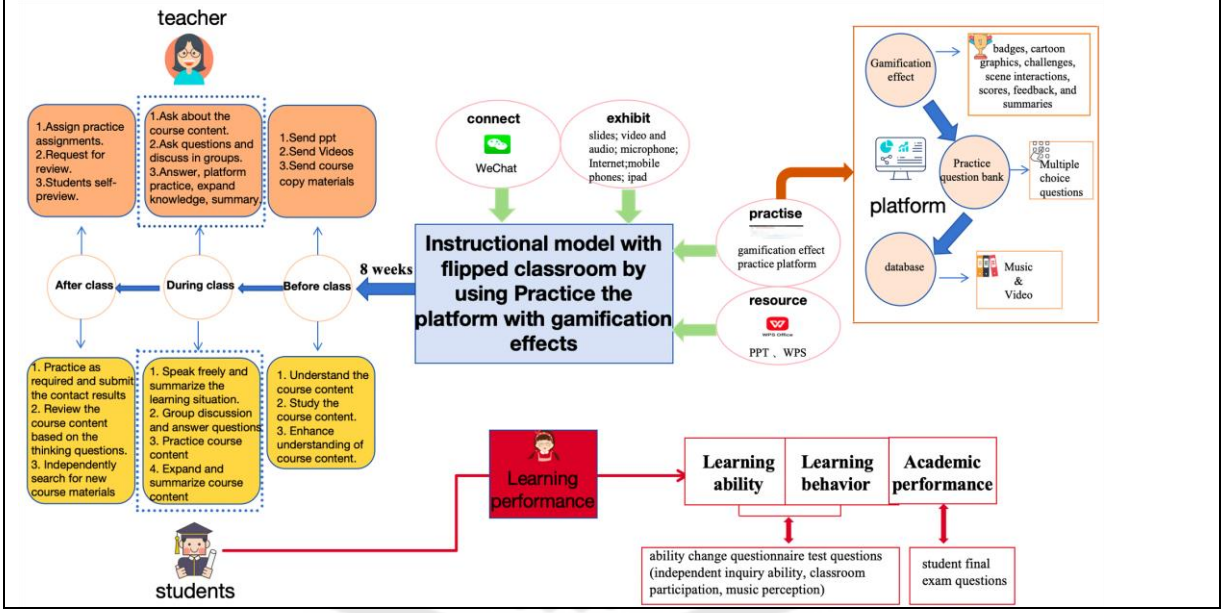
Question and Scope question	
5	Q:What is the minimum amount of time you think it would take students to complete this topic instructional model combining the flipped classroom with gamified learning on digital platforms ? S:4 weeks; 6 weeks; 8 weeks; 10 weeks
6	Q:What should be the online and offline teaching process of the instructional model combining the flipped classroom with gamified learning on digital platforms ? S:Online self-exploration and learning through video, text materials, ppt, and gamified learning on a digital platforms; offline through group discussions, asking questions, answering questions, listening to lectures, gamified learning on a digital platform special ability training, and expanding data collection
7	Q:What should be included in the media use and technology of the instructional model combining the flipped classroom with gamified learning on digital platforms ? S:WeChat; slideshow; video; audio; ppt; microphone; computer; network; gamified learning on a digital platform; mobile phone; ipad
8	Q:What should be the approach to the evaluation of an instructional model combining the flipped classroom with gamified learning on digital platforms ? S:Questionnaires; expert interviews; student performance and ability tests
9	Q:Do you think if combining the flipped classroom with gamified learning on digital platforms design the lesson plan for 8 weeks is it appropriate? S:Appropriate; Generally Appropriate; Not Appropriate

Appendix 3

Draft Of Instructional Model With Flipped Classroom By Using Practice The Platform

With gamified learning Part 1

(For model experts)

Module


Note:

1. Instructional model:
2. Teacher online teaching plan:
3. Student online learning plan:
4. Teachers' online and offline hybrid lesson plan:
5. Online and offline hybrid learning plan for students:
6. Teaching process:
7. Teaching tools;
8. Platform content;
9. Teaching objectives;
10. Evaluation methods;
11. Teacher;
12. Students;
13. Gamification effect;
14. Multiple choice questions;
15. Database;
16. Thick arrows indicate the direction of progress for each item;
17. The thin arrows indicate the details in the direction of each item of content.

Appendix 4

Draft Of An Instructional Model Combining the Flipped Classroom With Gamified Learning on Digital Platforms Part 2

(For model experts)

The detection levels of model experts in this draft are divided into 5 levels, and the standards are as follows:

5 means Most appropriate

4 means Appropriate

3 means General

2 means Inappropriate

1 means Most inappropriate

Draft Of Instructional Model With Flipped Classroom By Using Practice DigitalPlatform With gamified learnings Part 2						
Project		Evaluation level				
		5	4	3	2	1
1. The Components of Model						
1.1Platform						
1）	Gamification mechanisms in the platform include: such as Rewards, Achievement, Status or respert, and Inspiring. These gamification mechanisms can satisfy students' learning interests and help students achieve learning goals.					

Project		Evaluation level				
		5	4	3	2	1
2）	Elements in the platform include practice test elements, gamification elements, equipment, database content, answer score summaries and simple analysis. For example, the exercises include multiple-choice questions (listen to music and choose the appropriate video, or watch the video and choose the appropriate music); gamification elements include badge collection, cartoon graphics, scores, challenges, and clearance; devices include smartphones, mobile iPads, and computers. Mobile network or Wi-Fi, open the link and enter your account and password to enter the platform cover; the database content includes a music database summarized according to different music types and styles; answer score summary and simple analysis include score summary and score analysis. The content classification of the music database is clear, the database is clearly marked and students can use it conveniently, the difficulty level of the exercises in the exercise database is within the acceptable range of students, and the classification of the exercise database can clearly distinguish the types of questions and make it convenient for students. Use,exercises from the exercise question database to meet the,students' learning goals.					

Project		Evaluation level				
		5	4	3	2	1
1.2Learning environment						
1）	The flipped classroom framework includes: such as before class, during class and after class;					
2）	Teaching activities include: such as independent viewing of learning videos, classroom interactive questions, group discussions, classroom exercise training, expanding course content, and students independently searching for classified course materials.					
3）	Teaching time includes: for example, maintaining the duration of teaching content for no less than 6 weeks and no more than 10 weeks.					
1.3Evaluation						
1）	Testing includes: student final exam questions.					
2）	Methods for students' learning performance include: ability change questionnaire test questions (independent inquiry ability, classroom participation, music perception).					

Project		Evaluation level				
		5	4	3	2	1
1.4Learning resources						
1）	The lesson plan includes: online learning for students before class, offline and online hybrid learning for students during class, and online homework training and independent review of course content for students after class;					
2）	The syllabus includes: 8 chapters of film and television scores course contents, which are: Multiple relationships between film and musicians and the aesthetic characteristics and aesthetic way of film and television music;Basic theoretical knowledge of film and television music; Film and Television Sound;The role of music and sound in film and television;The Classification of TV Music and the artistic Characteristics of the constituent elements (dominated by movies and TV series);The Art conception of Film and television Music and Sound;The concept of the soundtrack;Perception, analysis, selection and training of film and television music and sound.					

Project		Evaluation level				
		5	4	3	2	1
3）	Teaching tools include: WeChat; WPS; slides; video and audio; microphone; Internet; gamified learning on a digital platform; mobile phones; ipad.					
2.	**The process of Learning Model**					
1)	Before class: Teachers send videos, text materials, and ppts, and students learn independently online according to requirements.					

Project		Evaluation level				
		5	4	3	2	2
2)	During class: Students engage in offline and online blended learning. The teacher arranges group discussions, asks questions, answers questions, special topic ability training on the gamified learning on a digital platform(The gamified learning will evaluate and motivate students in an interactive way. Students can challenge the practice questions again and complete them again to obtain higher points. After completing the exercises, you will get corresponding game badges based on your points), and expands the collection of materials and other teaching activities to enable students to actively participate in classroom activities and practice music. Perception. There are four classes per week, including two theoretical and two practical classes, each class is 45 minutes long; a total of 8 weeks.					
3)	After class: The teacher arranges the number of homework exercises based on the classroom content. The students complete the platform exercises online according to the requirements and submit the results. The teacher collects information and provides feedback, and the students review the course content independently. Improve independent inquiry learning ability and music perception.					

Appendix 5

Lesson Plan Part 1

(For model experts)

The detection levels of model experts in this draft are divided into 5 levels, and the standards are as follows:

5 means Most appropriate

4 means Appropriate

3 means General

2 means Inappropriate

1 means Most inappropria

Lesson Plan Part 1									
Time	Content of courses	Teaching activities	Teaching Tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
1 week	1. The multiple relationships between film and television and musicians, and the aesthetic characteristics and aesthetic ways of film and television music	**Before class:** online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes					
		During class: (offline and online) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	Video ; Audio; PPT; gamified learning on digital platforms	offline during class Teaching 2 credit hours , online practice 2 credit hours , 45 minutes per class					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
		After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarizing the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarize knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
2 week	2. Basic theoretical knowledge of film and television music	**Before class:** online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes					
		During class: (offline and online) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content) content)	Video ; Audio; PPT; gamified learning on digital platforms	offline during class Teaching 3 credit hours ,online practice 1 credit hour, 45 minutes per lesson					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
		After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarizing the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarize knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
3 week	3.film and television sound	**Before class:** (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes					
		During class: (offline and online) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	Video ; Audio; PPT; gamified learning on digital platforms	offline during class Teaching 3 credit hours ,online practice 1 credit hour, 45 minutes per lesson					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
		After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarizing the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarize knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
4 week	4. The role of music and sound in film and television	**Before class:** (offline) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes					
		During class: (offline and online) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	Video ; Audio; PPT; gamified learning on digital platforms	offline during class Teaching 2 credit hours ,online practice 2 credit hour, 45 minutes per lesson					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
		After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarizing the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarize knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
5 week	5. The classification of TV music and the artistic characteristics of its constituent elements (dominated by movies and TV series	Before class: (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes					
		During class: (offline and online) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	Video ; Audio; PPT; gamified learning on digital platforms	offline during class Teaching 2 credit hours ,online practice 2 credit hour, 45 minutes per lesson					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
		After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarizing the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarize knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
6 week	6. Artistic conception of film and television music and sound	**Before class:** (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
		During class: (offline and online) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	Video ; Audio; PPT; gamified learning on digital platforms	offline during class Teaching 3 credit hours ,online practice 1 credit hour, 45 minutes per lesson					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
		After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarizing the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarize knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
7 week	7. The concept of the soundtrack	**Before class:** (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes					
		During class: (offline and online) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	Video ; Audio; PPT; gamified learning on digital platforms	Off-fline during class Teaching 1 credit hours ,online practice 3 credit hour, 45 minutes per lesson					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
		After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarizing the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarize knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
8 week	8.Film and television music and sound perception, analysis, selection and training	**Before class:** (online) Send the before-class preview materials to strengthen the students' independent inquiry and learning ability —Teacher-prepared curriculum content framework ppt —Course content video —Additional course copywriting materials	Preview materials; WeChat; PPT; Video ; Audio	A 20-minute online video before class, with a total teaching time of no less than 30 minutes					
		During class: (offline and online) Enter the classroom teaching and practice link, improve the students' classroom participation ability —Teaching link (asking, asking questions, face-to-face discussion in groups, speech, answering, knowledge expansion, summary) —Practice link includes (set up the platform practice content)	Video ; Audio; PPT; gamified learning on digital platforms	offline and online during class Practice 4 credit hour, 45 minutes per lesson					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
		After class: (online) Review and consolidate the practice link to improve students' independent inquiry learning and music perception ability —Arranging practice homework (platform and other homework, reporting and summarizing the practice results) —Make a request for review —Require students to independently explore and learn to expand knowledge, and summarize knowledge, send it to teachers, and at the same time, the teacher makes a summary of the evaluation.	gamified learning on digital platforms; WeChat	online practice after class for no less than 30 minutes a day					

Time	Content of courses	Teaching activities	Teaching tools	Class hour arrangement	Evaluation level				
					5	4	3	2	1
Final exam		**Final** Arrange the final questions to reflect the final scores after study Evaluation criteria for the final examination: Final grade of 100%	South China Agricultural University Pearl River College strong intelligence system						
		Student Learning Performance Change Questionnaire	Questionnaire Star Questions and Answers						

Appendix 6

Lesson Plan Part 2

(For model experts)

The detection levels of model experts in this draft are divided into 5 levels, and the standards are as follows:

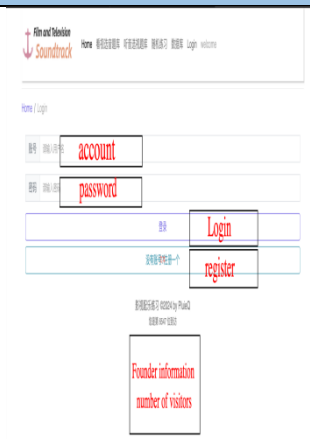
5 means Most appropriate

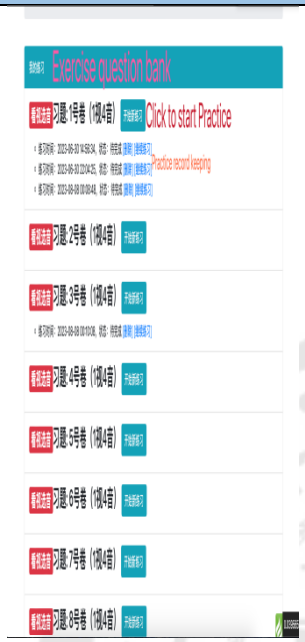
4 means Appropriate

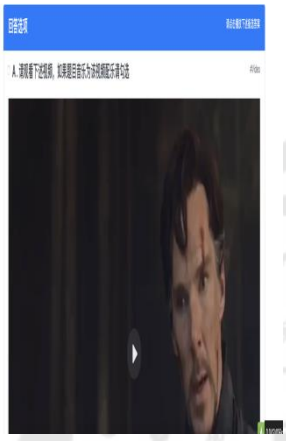
3 means General

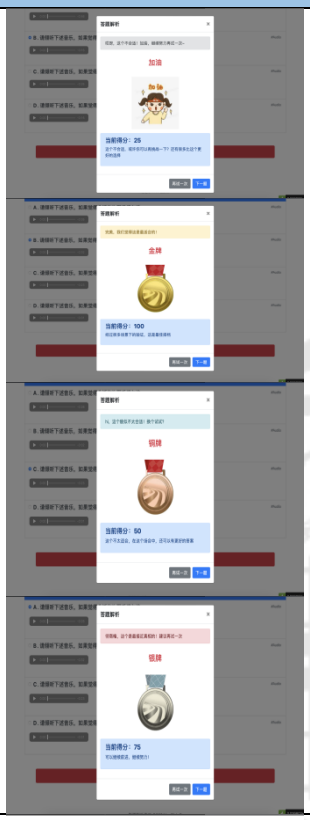
2 means Inappropriate

1 means Most inappropriate

Description of question types and usage of the practice platform in the lesson plan 2							
Steps for usage	Drawings and instructions		Evaluation level				
			5	4	3	2	1
1		**Platform cover:** 1) First click on the link http://study.xbox.yongit.com/ to enter the practice platform; 2) After entering the page, click Register, apply for an account and set a password. 3) Enter your account number and password and click Login					
2		**Platform homepage:** 1) Click on the logo on the first line of the page, including watching videos and selecting audio exercises, listening to music and selecting video exercises, random exercises for questions, and database 2) Home means returning to the homepage 3) The medal image on the homepage shows the badge reward points obtained.					

Steps for usage	Drawings and instructions		Evaluation level				
			5	4	3	2	1
3		**Platform practice page:** 1) Enter the practice page, you can choose the number of question sets at will, click Start Practice in the blue box and practice. There are 20 questions in each set. 2) The practice time and status will be recorded under each set of practice questions. If it is not completed, you can click on the blue font to continue practicing when you log in next time.					

Steps for usage	Drawings and instructions		Evaluation level				
			5	4	3	2	1
4	   	**Enter practice state:** 1) Listen to music and select videos: Click the triangle button in front of the music progress bar to enter the music listening mode. 2) After listening to the music, click the triangle button on the video among the four options of ABCD to watch the video, and click the circle in front of the video option to choose the answer. 3) The method of using the music to practice by watching the video is the same as above. **Summary:** The exercises in the above two directions are mainly used in the after-school stage. This exercise combines music and video training to improve students' quick and accurate perception of music. At the same time, the practice platform has a certain gamified learning while doing exercises, thereby improving students' ability to independently explore the exercises.					

Steps for usage	Drawings and instructions		Evaluation level				
			5	4	3	2	1
5		Page after completing each question: 1) Obtain different types of badges based on different scores, and the number of badges will accumulate. 2) If you are not satisfied with the practice results, you can select the try again button in the gray box and click the blue box to enter the next question.					
6		Page after completing each set of questions: 1) Different types of badges will be awarded based on the total score obtained for each set of questions, and the number of badges will be accumulated. 2) If you are not satisfied with the exercise results, you can select the try again button in the gray box, or click the blue box to complete this set of exercises and enter the answer analysis.					

Steps for usage	Drawings and instructions		Evaluation level				
			5	4	3	2	1
7		Enter the database page: 1) The database page is classified according to music type and style. 2) You can click on the blue words to enter learning according to different needs. **Summary:** The above exercises are mainly used in the class stage. This database exercise uses the database to classify and integrate the styles of music and film and television, thereby improving students' quick and accurate perception of music. At the same time, the exercises of the platform database are used in a targeted manner in classroom practice sessions, thereby improving students' classroom participation.					

Appendix 7

Draft Student Learning Performance Test Part 1

(For content experts)

The detection levels of content experts in this draft are divided into 5 levels, and the standards are as follows:

5 means Most appropriate

4 means Appropriate

3 means General

2 means Inappropriate

1 means Most inappropriate

Draft Student Learning Performance Test Part 1							
Video exam questions		Evaluation level					
		5	4	3	2	1
According to different types of film and television video clips to find and choose the right music (including sound effects) with clips							
1	Video footage: A documentary film						
2	A Video clip: A movie						
3	Video clip: Short video						
4	Video clip: Advertising video						
Code of points							
1	Whether the selected music clearly distinguishes and summarizes the video theme content (30)						
2	Whether the rhythm beat of the selected music matches the rhythm of the main movement of the video picture (30))						
3	Whether the selected music can properly describe the main character of the video in the tone, color and music texture (10)						
4	Whether the selected music plays a role of foil to the picture, foreshadowing, rendering and so on (15)						
5	Whether the selected music can be complete and coherent, including several music pieces (sound effects) interspersed with combined clips (15)						

Table 23 Data collection results for Part 1 of the student learning performance test questions.

Video exam questions	$\bar{x}$	S.D.	Meaning
According to different types of film and television video clips to find and choose the right music (including sound effects) with clip			
1.Video footage: A documentary film	4.66	0.57	Most appropriate
2.A Video clip: A movie	4.66	0.57	Most appropriate
3.Video clip: Short video	4.33	1.15	Most appropriate
4.Video clip: Advertising video	4.66	0.57	Most appropriate
Code of points			
1.Whether the selected music clearly distinguishes and summarizes the video theme content (30)	4.66	0.57	Most appropriate
2.Whether the rhythm beat of the selected music matches the rhythm of the main movement of the video picture (30))	4.66	0.57	Most

			appropriate
3.Whether the selected music can properly describe the main character of the video in the tone, color and music texture (10)	5.00	0.00	Most appropriate
4.Whether the selected music plays a role of foil to the picture, foreshadowing, rendering and so on (15)	4.66	0.57	Most appropriate
5.Whether the selected music can be complete and coherent, including several music pieces (sound effects) interspersed with combined clips (15)	5.00	0.00	Most appropriate
Overall average value	4.70	0.200	Most appropriate

Appendix 8

Draft Student Learning Performance Test Part 2

(For students)

In this questionnaire, the detection level of students is divided into 5 levels, and the standards are as follows:

5 means Always

4 means Often

3 means Sometime

2 means Seldom

1 means Never

Draft Student Learning Performance Test Part 2						
Question		Evaluation level				
		5	4	3	2	1
Your gender: male / female						
Your major: media, drama, film and television						
Your academic background: Fundamentals of Music, Audio-visual Language, Foundation of Director, Nonlinear Editor, Film and Television Aesthetics						
Independent inquiry ability						
1	I would like to try to find information related to the content of the class by myself.					
2	I began to organize the course content in an organized and logical way.					
3	I began to be able to more accurately grasp the focus of the classroom content and learning purpose.					
4	I would like to start trying to learn the content and problems that are more difficult than the course content.					
5	I can set regular learning goals according to my own learning needs.					

Question		Evaluation level				
		5	4	3	2	1
6	I am willing to use the gamified practice platform to train and do the exercises repeatedly, and to reflect on the reasons for the wrong questions.					
Class Participation Assessment						
1	I can actively answer the questions raised by the teacher in class.					
2	I can keep up with the class schedule.					
3	I can take the initiative to have face-to-face group discussion and research with my classmates, and clearly express my views and opinions.					
4	I can take the initiative to communicate feedback with teachers on problems I do not understand.					
5	I can keep a happy, more relaxed mood to participate in the classroom learning environment.					
6	I can participate in every part of the classroom learning.					

Question		Evaluation level				
		5	4	3	2	1
Perceptual ability assessment						
1	I can master the basic knowledge of music.					
2	I can master more basic knowledge of film and television.					
3	I could gradually tell the style and type of each music I heard.					
4	I can gradually feel the musical emotions of different types and styles.					
5	I can more accurately perceive and analyze each basic content in the music.					
6	Gradually, I can more accurately combine the feelings and emotions expressed by the music that I hear with the film content and emotions that I see.					
7	I can start to complete the music classification and film and television classification andependently.					
8	I accelerated my perception of music and television.					

Table 24 Data collection results for Part 2 of the student learning performance test questions.

Question	$\bar{x}$	S.D.	Meaning
Independent inquiry ability			
1.I would like to try to find information related to the content of the class by myself.	4.25	0.63	Always
2.I began to organize the course content in an organized and logical way.	4.40	0.68	Always
3.I began to be able to more accurately grasp the focus of the classroom content and learning purpose.	4.40	0.68	Always
4.I would like to start trying to learn the content and problems that are more difficult than the course content.	4.15	0.58	Often
5.I can set regular learning goals according to my own learning needs.	4.35	0.58	Always
6.I am willing to use the gamified practice platform to train and do the exercises repeatedly, and to reflect on the reasons for the wrong questions.	4.50	0.60	Always
Class Participation Assessment			
1.I can actively answer the questions raised by the teacher in class.	4.40	0.68	Always
2.I can keep up with the class schedule.	4.25	0.63	Always
3.I can take the initiative to have face-to-face group discussion and research with my classmates, and clearly express my views and opinions.	4.35	0.67	Always

4.I can take the initiative to communicate feedback with teachers on problems I do not understand.	4.35	0.58	Always
5.I can keep a happy, more relaxed mood to participate in the classroom learning environment.	4.05	0.51	Often
6.I can participate in every part of the classroom learning.	4.60	0.50	Always
Perceptual ability assessment			
1.I can master the basic knowledge of music.	4.20	0.69	Always
2.I can master more basic knowledge of film and television.	4.35	0.67	Always
3.I could gradually tell the style and type of each music I heard.	4.25	0.71	Always
4.I can gradually feel the musical emotions of different types and styles.	4.35	0.67	Always
5.I can more accurately perceive and analyze each basic content in the music.	4.40	0.59	Always
6.Gradually, I can more accurately combine the feelings and emotions expressed by the music that I hear with the film content and emotions that I see.	4.60	0.59	Always
7.I can start to complete the music classification and film and television classification andependently.	4.65	0.48	Always
8.I accelerated my perception of music and television.	4.55	0.51	Always
Overall average value	4.37	0.15	Always

Appendix 9

Expert Evaluation Form For Confirmation Instructional Model

(For model experts)

The detection levels of model experts in this draft are divided into 5 levels, and the standards are as follows:

5 means Most appropriate

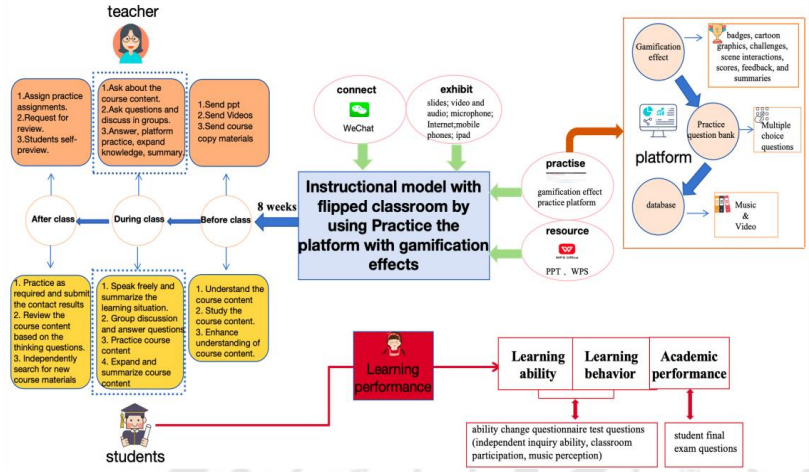
4 means Appropriate

3 means General

2 means Inappropriate

1 means Most inappropriate

Expert Evaluation Form For Confirmation Instructional Model					
Expert evaluation content	Evaluation level				
	5	4	3	2	1
Graphic model （see details）					



Note:

1. Instructional model:
2. Teacher online teaching plan:
3.Student online learning plan:
4. Teachers' online and offline hybrid lesson plan:
5.Online and offline hybrid learning plan for students:
6.Teaching process:
7. Teaching tools;
8. Platform content;
9. Teaching objectives;
10. Evaluation methods;
11.Teacher;
12.Students;
13. Gamification effect;
14. Multiple choice questions;
15. Database;
16. Thick arrows indicate the direction of progress for each item;
17. The thin arrows indicate the details in the direction of each item of content.

Expert Evaluation Form for Confirmation Instructional Model							
Expert evaluation content		Evaluation level					
		5	4	3	2	1
Components of an instructional model combining the flipped classroom with gamified learning on digital platforms							
1	The components in the model are clear						
2	The design of the teaching link in the model matches the teaching content						
3	The instructional design process is complete in the model						
4	The lesson plan in the model is appropriate (including teaching time, teaching content, teaching weeks, teaching tools, teaching course types)						
5	Models with gamified learning on a digital platform is effective						
6	Educational technology tools used in the model correspond to teaching activities						
7	The assessment tests in the model are consistent with the teaching content						
8	The assessment tests in the model are consistent with the teaching content						
9	The teaching objectives in the model match the teaching process						

Expert Evaluation Form for Confirmation Instructional Model						
Expert evaluation content		Evaluation level				
		5	4	3	2	1
The impact of an instructional model combining the flipped classroom with gamified learning on digital platforms on students and teachers						
1	The teaching link in the model can improve students' independent inquiry ability and participation in the classroom					
2	The gamified learning on a digital platform in the model can improve students' perception of music					
3	The instructional medium used in the model is acceptable to the students					
4	The difficulty level of the teaching content in the model can be accepted by the students					
5	The test section in the model can clearly detect the students' learning performance					
6	Using the instructional model, the teaching effect of teachers is more vivid and interesting					
7	Lessons prepared by teachers using instructional models are enriched					

Expert Evaluation Form for Confirmation Instructional Model						
Expert evaluation content		Evaluation level				
		5	4	3	2	1
Process of an instructional model combining the flipped classroom with gamified learning on digital platforms						
1	Before class online teaching activities in the instructional model ——PPT before class ——Before class video ——Before class text materials					
2	During class offline and online teaching activities in the instructional model ——Teacher question in class ——Teachers ask questions in the classroom, students discuss face-to-face in groups, make speeches, teachers answer and expand knowledge ——Using the gamified learning on a digital platform for practical practice in the classroom ——Students report the results of the exercises in the classroom, and the teacher summarizes and expands knowledge					

Expert Evaluation Form for Confirmation Instructional Model						
Expert evaluation content		Evaluation level				
		5	4	3	2	1
3	After class online teaching activities in the instructional model ——online practice platform homework training and review of classroom content after class ——After class, the practice results will be reported online, and the teacher will summarize and evaluate ——After class, students organize their own materials, search and accumulate knowledge after class, prepare learning questions and send them to teachers through wechat, and Teachers evaluate content submitted by students					
4	Student learning performance detection part in the instructional model ——Student learning performance test question part 1, test question to test student performance ——Student learning performance test question part 2, questionnaire detects students' behavioral changes and ability changes after learning					
Overworth the model						
1	Components of a instructional model combining the flipped classroom with gamified learning on digital platforms					
2	Learning process of an instructional model combining the flipped classroom with gamified learning on digital platforms					

VITA