Inheritance and Innovation of Traditional Cultural Elements in Primary School Music Curriculum Under STEAM Education Model

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Abstract: With the popularization of STEAM education worldwide, how to effectively integrate traditional cultural elements into primary school music curriculum, promote students' cultural identity and innovation ability, has become an important issue in the current education field. STEAM education, which is a comprehensive education model of science, technology, engineering, arts, and mathematics, emphasizes interdisciplinary learning and practice to cultivate students' comprehensive qualities and problem-solving abilities. This study takes the STEAM education model as a framework to explore the inheritance and innovation path of integrating traditional cultural elements into primary school music education, aiming to enhance students' cultural identity and innovation ability. Through various research methods such as literature analysis, case studies, action research, and data analysis, this study conducted surveys and experiments on several primary schools to verify the effectiveness of the STEAM education model that integrates traditional cultural elements. Research has found that the integration of traditional cultural elements not only enriches the content of primary school music courses, but also stimulates students' interest and sense of identification with local culture. For example, by learning traditional musical instruments, singing folk songs, and participating in traditional festival music activities, students not only acquire music knowledge and skills, but also receive cultural influence unconsciously. At the same time, STEAM education emphasizes interdisciplinary integration and project-based learning, enabling students to apply science and technology, engineering design, and mathematical thinking in music learning, stimulating their creativity and innovation abilities. Integrating traditional cultural elements into STEAM education not only effectively enhances students' cultural identity and innovation ability, but also provides new ideas and methods for the reform of primary school music education. This study provides valuable reference for educational practitioners and lays a solid foundation for future educational reforms.

Keywords: STEAM Education; Traditional Culture; Primary School Music Education; Interdisciplinary Integration; Cultural Inheritance and Innovation

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1 Introduction

In recent years, the global education field has shown a trend of diversification and comprehensiveness, especially the widespread application of STEAM education model in education systems around the world has attracted great attention from educators [1-3]. STEAM education, as an interdisciplinary education model that integrates science, technology, engineering, art, and mathematics, is not only committed to optimizing students' knowledge structure, but also emphasizes the cultivation of innovation ability and comprehensive quality [4, 5]. The promotion of this

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educational model has prompted many scholars and research institutions to conduct extensive exploration and practical research in order to further verify and expand its application effects and theoretical basis.

Previous studies have shown that STEAM education not only enhances students' knowledge in the fields of science and technology, but also significantly strengthens their creativity and problem-solving abilities. For example, research has found that through STEAM programs, students are able to apply multidisciplinary knowledge more flexibly when facing complex problems, demonstrating higher innovation potential. In addition, research has shown that STEAM education helps cultivate students' critical thinking and collaborative abilities, which are of great significance for their future career development [6, 7].

Many studies pay special attention to the application effect of STEAM education in primary school [8]. Another study emphasizes that the artistic component in STEAM education can provide a unique perspective, helping students to be more creative and humane in understanding and applying science and technology.

In the field of music education, the integration of traditional cultural elements is seen as an important way to enhance students' cultural identity and historical awareness. Research shows that combining traditional cultural elements with modern educational models can effectively promote students' understanding and identification with local culture. For example, empirical research has found that the combination of traditional music education and modern technology not only enhances students' music literacy, but also strengthens their sense of pride and identification with traditional culture [9].

Based on these previous studies, this study takes the STEAM education model as a framework to explore in depth the effective path of integrating traditional cultural elements into primary school music education. Through various methods such as literature analysis, case studies, action research, and data analysis, this study aims to verify the actual effectiveness of this educational model in improving students' comprehensive quality. The results indicate that the STEAM education model has significant advantages in enhancing students' cultural identity and innovation ability, providing strong support for the reform of primary school music education in the future.

At the intersection of traditional and modern educational needs, STEAM education provides a new educational perspective through the combination of art and technology, especially in the field of music education, showcasing its unique value and potential [10-12].

Music education has always been regarded as an important component of cultural heritage and art education, carrying the mission of transmitting and revitalizing national culture [13, 14]. In China, with the increasing emphasis on STEAM education by the Ministry of Education, more and more research and practice are focusing on how to integrate the STEAM concept into primary school music education, especially in the integration and innovative application of traditional cultural elements [15-17]. This study aims to explore the current implementation status of STEAM education model in primary school music curriculum, analyze its specific impact on students' academic performance, cultural identity and innovation ability when integrating traditional cultural elements, and propose specific teaching strategies and curriculum design suggestions based on this [18].

In today's rapidly developing world of globalization and informatization, the goal of education is not only to impart knowledge, but more importantly, to cultivate students' innovative thinking and practical abilities. The interdisciplinary learning approach emphasized by STEAM education is an effective way to cultivate these abilities [19-22]. In music education, with the help of science and technology, traditional music can be combined with modern educational technology, such as using electronic music software for composition or using modern physics principles to analyze the production of instrument sounds, which greatly enriches the content and form of music education [23].

STEAM education also demonstrates unique advantages in promoting students' cultural identity. By reinterpreting traditional music through technological means, not only can the original charm of culture be preserved, but students' interest and identification with traditional culture can also be enhanced in a form that is more in line with modern aesthetics and perception [24-26]. For example, by using VR technology to recreate scenes from ancient music concerts, students can experience and learn traditional music in an immersive environment, thereby deepening their understanding and appreciation of cultural heritage.

In summary, this article will start from the concept of STEAM education and analyze in detail its current situation and effectiveness in primary school music education, especially in terms of the integration and inheritance of traditional culture. Through case studies and empirical

analysis, this study hopes to provide useful insights and strategies, provide reference for the future development direction of music education, and provide scientific basis for comprehensively improving the quality and effectiveness of education.

2 Research Contents

2.1 Research Objective

2.1.1 Theoretical Objectives

With the continuous innovation and development of educational models, STEAM education, as a cutting-edge educational concept, is gradually receiving attention worldwide. The theoretical objective of this study is to further expand the application scenarios of STEAM education in primary school music education through specific analysis and practice, and explore its potential and effects in enriching the connotation of educational theory, inheriting and innovating traditional culture, and interdisciplinary integration.

This study aims to enrich the theoretical foundation of STEAM education, particularly in the field of primary school music education. By integrating teaching elements of science, technology, engineering, art, and mathematics into music courses, more diverse teaching methods and strategies can be explored. For example, using technological tools and software for music creation and editing, or using engineering design thinking to create simple musical instruments, are concrete examples of the application of STEAM educational theory. This interdisciplinary teaching model not only helps students understand the connections between music and other subjects, but also stimulates their interest and enthusiasm for learning.

Inheriting and innovating traditional culture is another important goal of STEAM education in music education. Traditional Chinese music, such as folk music, classical music, and various ethnic instruments, contains rich cultural value and historical significance. This study explores the modern inheritance of traditional culture by integrating these traditional elements into modern educational models. For example, digital tools can be used to simulate the timbre of traditional Chinese instruments, or historical stories and cultural backgrounds can be combined in music courses to enable students to deepen their understanding and appreciation of the unique charm of Chinese culture while learning music skills.

Interdisciplinary integration is the key to enhancing students' comprehensive quality and innovation ability. Through interdisciplinary teaching design, such as applying mathematical principles to the teaching of music rhythm or exploring the physical properties of sound in science classes, students can understand theoretical knowledge through practical operations, thereby cultivating their problem-solving abilities and creativity. In addition, music education itself is a strong cultural experience that can effectively stimulate students' cultural identity and creativity, providing them with a platform to understand and innovate culture from multiple perspectives.

By achieving these theoretical goals, this study aims to provide practical and innovative guidance for STEAM education in the field of primary school music education, and to provide solid theoretical and practical support for students' comprehensive development and cultural inheritance.

2.1.2 Practical Objectives

This section aims to provide a comprehensive teaching strategy and curriculum development guide for primary school music education, in order to more effectively integrate traditional cultural elements and promote cultural inheritance and innovation. These strategies and courses will be integrated with the STEAM education model to cultivate students' creativity, critical thinking, and interdisciplinary knowledge integration abilities.

In terms of teaching strategies and methods, we will provide a series of tools and methods for primary school music teachers to help them integrate traditional music elements with modern educational technology. For example, teachers can use digital music production tools to simulate the sound of Chinese classical instruments, or use augmented reality (AR) technology to allow students to experience historical music performances firsthand. In addition, teacher training seminars will be provided, focusing on how to introduce traditional cultural teaching through storytelling and role-playing games, as well as how to design student-centered and interactive curriculum activities.

Regarding course development, this study will develop a series of STEAM music courses that integrate traditional cultural elements. These courses not only include detailed teaching plans and activity designs, but also establish specific evaluation criteria to measure students' progress in skill mastery and creativity development. Each course will revolve around a certain traditional theme, such as

Chinese folk music, musical expression of traditional festivals, etc., combined with relevant knowledge of science, technology, engineering, and mathematics, allowing students to understand and appreciate the depth and breadth of culture from multiple perspectives.

In terms of educational effectiveness evaluation, this study will verify the application effect of STEAM education model in primary school music curriculum through empirical research. By comparing the learning outcomes of experimental and control group students, the study will explore which specific teaching methods and curriculum designs are most effective, as well as how to adjust strategies to meet the needs of different students. In addition, the research results will provide empirical evidence for future education policy formulation, promoting continuous improvement and innovation in educational practice.

Through systematic practice and exploration in these three aspects, we aim to establish a supportive and innovative educational environment, so that primary school music education can not only inherit traditional culture, but also stimulate students' innovative potential.

2.2 Overall Framework

2.2.1 Journals Reviewed

STEAM education is an interdisciplinary educational model that integrates science, technology, engineering, arts, and mathematics to cultivate students' innovative thinking and problem-solving abilities. In recent years, STEAM education has been widely promoted and applied worldwide, and music education, as an important component of art education, has gradually been integrated with the STEAM educational philosophy.

Internationally, many studies have shown that applying STEAM education to music education can effectively enhance students' learning motivation and creativity. For example, some schools in the United States combine programming with music, allowing students to learn programming logic while creating music. This method not only enhances students' interest in music, but also improves their technological abilities. However, in terms of traditional cultural inheritance, although STEAM education emphasizes innovation and integration, its research on how to effectively combine and inherit traditional music culture is still insufficient.

In China, with the advancement of educational modernization, more and more research has begun to focus on applying STEAM educational concepts to the teaching of traditional culture. Some advanced cases show that STEAM music courses combined with traditional culture can better promote students' understanding and appreciation of traditional music. However, how to innovate traditional music teaching methods and content without losing traditional spirit and connotation remains a major challenge in current research.

In terms of theoretical foundation, this study referred to various educational theories, such as constructivist learning theory, multiple intelligences theory, and cross-cultural education theory. Constructivist learning theory holds that learning is the process by which students construct knowledge based on their own experiences, which is consistent with the emphasis on practice and exploration in STEAM education. The theory of multiple intelligences proposes that people have potential in various fields of intelligence, supporting the development of students' spatial and interpersonal intelligence through art forms such as music. The theory of cross-cultural education emphasizes the cultural inclusiveness of education, pointing out that education should respect and integrate diverse cultures, which provides theoretical support for the combination of traditional culture and modern educational methods.

Overall, although there has been some progress in applying STEAM education to music education both domestically and internationally, there is still a need for in-depth research and exploration on how to effectively integrate and inherit traditional culture in teaching. This study will further explore and improve the application of STEAM education in traditional music education based on existing literature, providing theoretical and empirical support for future educational practices and policy formulation.

2.2.2 Research Design

This study aims to explore the application of STEAM education in music education, with a particular focus on its effectiveness in the inheritance of traditional culture. Therefore, this study selected several primary schools as research objects, which are distributed in different geographical regions, including urban and rural areas, as well as different types of educational environments, such as public schools and private schools. This choice helps ensure the representativeness and universality of research results, and can comprehensively reflect the implementation and effectiveness of STEAM music education in different contexts.

In terms of research methodology, this study adopts a mixed methodology that combines qualitative and quantitative research. In the quantitative research section, basic information, learning attitudes, and learning outcomes of students are collected through designing and distributing questionnaires. The questionnaire will cover students' interest, participation, satisfaction with STEAM music courses, as well as their understanding and identification with traditional music culture. In addition, transcripts and evaluation data provided by other schools will be used to quantify students' achievements in music learning.

In the qualitative research section, classroom observations and interviews are conducted to gain a deeper understanding of the implementation process of STEAM music education and the interaction between students and teachers. Classroom observation will focus on the teacher's teaching methods, presentation of teaching content, student participation, and classroom atmosphere. The interviewees include teachers, students, school administrators, and parents, aiming to obtain direct feedback and in-depth insights on STEAM music education from multiple perspectives.

The research will also focus on the innovation of curriculum design and its application effect in the inheritance of traditional culture. Analyze the differences and challenges in implementing STEAM music education in different schools and regions, and explore educational strategies and teaching methods under different educational backgrounds. Through the above research methods, this study aims to comprehensively evaluate the effectiveness of STEAM education in the field of music and propose specific improvement suggestions.

In summary, the design of this study aims to comprehensively analyze the implementation of STEAM education in music education and explore its effectiveness and feasibility in traditional cultural education. Through a mixed methods research design, the research results will provide theoretical and data support for the formulation and practice of future education policies, which will help promote the in-depth development of educational innovation and cultural inheritance.

2.2.3 Curriculum Development and Implementation

Under the framework of STEAM education, we have designed a music curriculum that integrates traditional cultural elements, aiming to promote interdisciplinary learning and stimulate students' creativity and proactive learning awareness. This course series not only includes basic music theory and practice, but also emphasizes the integration of history, culture, art, technology, mathematics, and music teaching to provide a comprehensive and innovative teaching experience.

The course design revolves around core traditional cultural music elements, such as the use of ethnic instruments, exploring the historical background of traditional music, and its association with other art forms. For example, designing a unit where students not only learn the basic playing techniques of the guzheng, but also understand its physical and acoustic principles, and explore the mathematical proportions and geometric shapes related to the guzheng. In addition, by using programming software to simulate the sounds of different instruments, students can gain a deeper understanding of the combination of music and technology.

In terms of curriculum implementation, we have selected multiple representative schools for pilot teaching. These schools are located in different regions, including urban and rural areas, to ensure the broad applicability of research results. During the implementation of the curriculum, teachers are encouraged to adopt interactive and participatory teaching methods, such as group collaboration, project-based learning, and role-playing, all of which are aimed at enhancing students' sense of participation and exploration.

At the same time, key events and student performance during the teaching process are systematically recorded and analyzed. For example, recording students' progress in learning different musical instruments, observing how they collaborate to solve problems in interdisciplinary projects, and creative expression in performance activities. These data will be collected through video recordings, teacher observation notes, and student self-evaluation forms.

In order to effectively evaluate and adjust course content, we have established a regular feedback loop. Teachers and students can provide their opinions and improvement suggestions on the curriculum through questionnaires and discussion sessions. These feedbacks will be used for continuous improvement of the curriculum, ensuring that they meet the learning needs of students and effectively inherit and innovate traditional culture.

Through the development and implementation of the above courses, we hope to not only improve students' professional skills in the field of music, but also enhance

their interdisciplinary thinking and innovation abilities. This STEAM based music education model will lay a solid foundation for students' future academic and professional careers, while also opening up new possibilities for the inheritance and development of traditional culture.

2.2.4 Effect Evaluation

In order to ensure the effectiveness of music courses and verify their impact on students' academic performance, innovation ability, and cultural identity, we have established a comprehensive evaluation system. This system consists of two main parts: quantitative analysis and qualitative analysis. Through this multidimensional evaluation method, we can comprehensively understand the influence and actual effectiveness of the course.

In terms of quantitative evaluation, attention should be paid to students' academic performance. This includes the mastery of music theory knowledge, the improvement of instrument performance skills, and the ability to create music works. By setting standardized tests and regular performance assessments, we can obtain specific data on students' academic progress. Students' innovation ability is evaluated through their performance in interdisciplinary projects, such as problem-solving skills, showcasing creative thinking, and the effectiveness of teamwork. These data are collected through project evaluation forms and peer evaluations.

The assessment of cultural identity is measured by changes in students' attitudes towards traditional music and culture. Through regular questionnaire surveys and interviews, collect students' cognitive and emotional responses to traditional culture, and understand how they relate the knowledge they have learned to their own cultural background.

In terms of qualitative evaluation, methods such as classroom observation, student interviews, and teacher feedback were adopted. Classroom observation aims to capture students' behaviors and interaction patterns during the learning process, in order to analyze their participation and learning attitudes. Student interviews provide a platform for students to express their learning experiences, feelings, and challenges. Teacher feedback provides direct insights into the effectiveness of curriculum implementation and student performance from the perspective of frontline teaching.

By inputting these data into statistical analysis software for detailed data analysis, including descriptive statistics, correlation analysis, and regression analysis, we can verify the research hypothesis that traditional cultural integration music education under the STEAM framework effectively improves students' academic performance, innovation ability, and cultural identity. The analysis results will help us identify the strengths and weaknesses in the course, providing data support for future course improvements.

Through case studies and the writing of success stories, we transform qualitative data into concrete teaching outcomes, which not only enhances the persuasiveness of evaluation reports, but also provides valuable insights and references for the educational practice community.

In summary, this evaluation system ensures that we can comprehensively evaluate the effectiveness of music courses from multiple perspectives and levels, further promoting innovation and development in education. Through such a systematic evaluation, we can continuously optimize teaching strategies and better serve the comprehensive development of students.

2.2.5 Research Summary and Promotion

After conducting comprehensive research and evaluation on music education curriculum, our research team successfully summarized a series of universal teaching strategies and methods, and proposed effective solutions to the problems encountered during the research process. The following is a detailed explanation of the main research findings and promotion strategies.

The study emphasizes the importance of interdisciplinary integration, particularly how to integrate music education with students' cultural backgrounds and technical skills to promote a more comprehensive learning experience. We have found that combining traditional music with modern music technology can not only enhance students' interest in learning, but also improve their innovation ability and cultural identity. For example, using digital music production tools, students can explore and create their own musical works while gaining a deeper understanding and appreciation of local and global music cultures.

Some issues discovered in the research, such as resource constraints, inadequate teacher professional development, and uneven distribution of course time, have been addressed through specific strategies. We propose to establish more partnerships to alleviate the burden on individual schools through resource sharing; At the same time, regular teacher training and seminars should be implemented to ensure that teachers can master the latest

educational technologies and teaching methods.

In order to promote the research results to a wider range of educational practices, we have adopted various forms and channels. On the one hand, by writing and publishing academic papers, we share our findings and methods in professional journals in education and music education. These papers provide detailed explanations of the research design, implementation process, and conclusions drawn through data analysis, providing reliable references for researchers and practitioners in the same field.

On the other hand, we have organized a series of teaching seminars and workshops, inviting educators, scholars, and policy makers to participate together. These activities not only provide a platform for showcasing and discussing research results, but also promote communication and collaboration among participants. Through the workshop, participants were able to personally experience and learn how to apply the teaching strategies and techniques proposed in the research, enhancing their practical application abilities.

Finally, we also utilize digital media and online platforms such as educational blogs, social media, and online seminars to promote our research findings. These online resources enable educators from different regions and backgrounds to access our research findings and teaching resources, thereby expanding the influence and application scope of our research. Through these comprehensive summaries and promotion strategies, our research has not only had a profound impact in the academic community, but also effectively improved the teaching quality of teachers and the learning outcomes of students, bringing innovation and progress to the field of music education.

2.3 Research Emphasis and Difficulties

2.3.1 Research Focus

In current educational research, interdisciplinary integration has become an important development trend, especially in the field of music education. How to effectively integrate elements of science, technology, engineering, art, and mathematics (STEAM) into music curriculum is one of the main focuses of this study. In addition, exploring the application of traditional Chinese music elements in the modern education system, as well as developing teaching strategies and methods suitable for the primary school stage, are also important contents of our research.

The combination of music and STEAM can not only enrich the course content, but also stimulate students' innovative thinking and problem-solving abilities. For example, by creating music through programming software, students not only learn music composition, but also receive training in programming skills. In practice, we promote the use of digital music interface (MIDI) keyboards and music production software, allowing students to understand the physical properties of sound and the basics of audio engineering while creating music. In addition, through project-based learning, students can apply mathematical and engineering knowledge in designing their own musical instruments, which greatly enhances their interest and understanding of the subject matter.

The modern teaching of traditional Chinese music is a way to protect cultural heritage. In the course design, we emphasize the integration of traditional instruments such as guzheng, erhu, etc. into music teaching. Through modern music education methods such as electronic music synthesis and digital audio workstations, the timbre of these traditional instruments is combined with modern music styles, not only preserving the uniqueness of traditional music, but also making it more in line with modern aesthetics, thereby enhancing students' interest in learning. For example, students can try to use erhu timbre in electronic dance music production, which is an innovative attempt to revitalize traditional music elements in the modern music environment.

A series of specific teaching strategies and methods have been developed for primary school students to ensure the operability and effectiveness of teaching activities. This includes using gamified learning to increase student engagement, such as through music video games and interactive teaching applications, allowing students to learn music theory and instrument performance in games. In addition, using storytelling to combine music knowledge with interesting stories helps students master complex music concepts in a relaxed and enjoyable atmosphere.

In summary, this study aims to create a diverse and innovative music education environment through interdisciplinary integration, modern application of traditional culture, and targeted teaching strategies, in order to cultivate students' comprehensive qualities and innovative abilities, while also providing new ideas and methods for the inheritance and development of traditional music culture. These research findings will have a profound impact on future educational practices.

2.3.2 Research Difficulties

The practice of music education and interdisciplinary integration brings innovation and diversity, but also faces a series of challenges and difficulties. This study particularly focuses on the three major challenges of coordinating interdisciplinary teaching, selecting and applying traditional cultural elements, and evaluating educational outcomes.

Coordinating the knowledge points and teaching objectives of various disciplines is a major challenge in implementing interdisciplinary music education. How to effectively integrate the teaching objectives of science, technology, engineering, art, and mathematics with music courses to achieve the best teaching results is a key issue that needs to be addressed. Teachers need to have interdisciplinary knowledge backgrounds and be able to flexibly apply teaching methods from different disciplines. For example, when music courses attempt to introduce programming elements, teachers not only need to master music teaching techniques, but also need to understand basic programming knowledge and teaching methods. In addition, curriculum designers need to consider how to balance the teaching time and depth of each subject, ensuring that students can effectively absorb knowledge from other subjects while enjoying the pleasure of music learning.

Selecting traditional cultural elements suitable for primary school students and designing teaching activities should ensure both the fun and educational significance of the activities. This requires educators to have a deep understanding and sensitive grasp of traditional culture. In practical operation, it is a challenge to simplify complex traditional music theory into content that is easy for elementary school students to understand, while still retaining its artistic and cultural essence. For example, in teaching activities, activities can be designed to make simple musical instruments, allowing students to learn music principles through hands-on operation. At the same time, cultural stories behind the instruments can be introduced through storytelling, allowing students to experience and learn traditional culture in practice.

Evaluating the application effect of STEAM education model in primary school music curriculum, especially in improving students' comprehensive quality and innovation ability, is a complex and critical issue. Traditional evaluation methods may not fully reflect the effectiveness of interdisciplinary teaching. Therefore, new assessment tools and indicators need to be developed in research to scientifically measure and analyze students' learning outcomes. This includes both quantitative and qualitative evaluation methods, such as analyzing students' works, conducting creative thinking tests, and collecting feedback from students, parents, and teachers. Through these multidimensional evaluation methods, we can gain a more comprehensive understanding of the actual impact of the STEAM education model on students' ability enhancement.

In summary, although the implementation of interdisciplinary music education is full of challenges, effective strategies and methods can greatly improve the quality of education and students' comprehensive abilities. The exploration and resolution of these research difficulties will provide valuable experience and guidance for future educational practices.

3 Approach and Methodology

3.1 Basic Ideas

This study aims to explore how to effectively integrate traditional cultural elements into primary school music curriculum under the STEAM education model, with the aim of promoting students' inheritance and innovation of traditional culture. The basic idea for achieving this goal involves multiple key steps, including studying the core concepts and methods of STEAM education, analyzing its compatibility with music education, selecting appropriate traditional cultural elements, designing teaching plans, and optimizing them through implementation and evaluation. A deep understanding of the core concepts of the STEAM education model is the foundation of this research. STEAM education emphasizes the comprehensive application of science, technology, engineering, art, and mathematics, and is committed to cultivating students' innovative thinking and problem-solving abilities. Applying the STEAM concept in music education means organically integrating music with these fields, such as creating electronic music through programming or explaining the sound generation of musical instruments through physical principles. Analyze the intersection between STEAM education and traditional music education. Music itself integrates art and science, such as the mathematical properties of pitch and rhythm, and the physical construction of instruments. Combining these elements with STEAM education can help students gain a deeper understanding of music while stimulating their interest in sci-

ence and art. The core of this study is to identify traditional cultural elements that are suitable for the primary school stage. Select representative elements of traditional music, instruments, festival music, etc., and explore their new meanings and expressions in contemporary society. For example, traditional Chinese folk music can be combined with electronic music to create a completely new music style that retains traditional elements while also conforming to modern aesthetics. Based on the above analysis, design a specific teaching plan. These programs need to combine traditional and modern teaching methods, such as using digital tools to simulate traditional instrument performance, or allowing students to experience music festivals from different cultures through virtual reality technology. Through this approach, students can gain a deeper understanding and appreciation of traditional music through interactive and creative processes. Implement these teaching plans in actual teaching and evaluate them based on student feedback and learning performance. Collect data through methods such as questionnaire surveys, observations, and student work evaluations, analyze teaching effectiveness, and adjust teaching methods and content based on the results. This process is iterative, gradually improving teaching strategies through continuous practice, evaluation, and adjustment. Through such a systematic research and implementation process, not only can traditional cultural elements be effectively integrated into primary school music curriculum, but also students' innovative ability and interdisciplinary thinking can be cultivated in the process, achieving the deep-seated goals of education. The exploration and practice of this educational model will provide new perspectives and methods for future education.

3.2 Specific Research Methods

3.2.1 Literature Study

The literature research method is one of the important methods used in this article to explore how to integrate traditional cultural elements into primary school music curriculum. This method involves extensive collection and analysis of research literature on STEAM education and traditional cultural heritage both domestically and internationally, with the aim of extracting information from existing studies, constructing theoretical frameworks, and providing a solid theoretical foundation for subsequent empirical research. Conduct literature collection work, with a focus on the STEAM education model and its current application status worldwide. Retrieve research related to STEAM education through databases such as Web of Science, PubMed, Scopus, etc., while also focusing on literature on the inheritance and innovation of traditional culture in education both domestically and internationally. In addition, by reading relevant books, conference papers, and policy documents, one can understand the current trends and challenges in the field of education. Conduct a systematic analysis of the collected literature and use content analysis to identify research trends, theoretical viewpoints, and empirical results. Focus on the following core issues in the analysis: How does STEAM education promote interdisciplinary learning? How can traditional culture be effectively inherited and innovated in modern education? What successful cases can provide reference? Through in-depth analysis of these issues, theoretical and practical guidance that is helpful for this topic can be compiled.

Based on the results of literature analysis, summarize and integrate relevant theories. For example, exploring the impact of cultural diversity on education, the application of innovative teaching methods in traditional cultural education, and the role of STEAM education in enhancing students' comprehensive abilities. By integrating these theories, a theoretical framework applicable to this topic is formed, providing guidance for designing teaching plans and subsequent empirical research. In the process of literature research, critical thinking should also be conducted. Analyze the limitations of existing literature and issues that have not been fully explored, such as the challenges posed by cultural differences to the implementation of STEAM education and the unequal distribution of educational resources. Identifying these issues not only helps deepen research, but also provides new perspectives and exploration directions for the study of this topic. Organize the results of literature research into a systematic literature review, summarizing the main findings, theoretical contributions, and recommendations for future research of existing studies. This not only increases the academic value of the research, but also provides practical suggestions and solutions for practitioners.

Through the application of the literature research method mentioned above, this article will be able to conduct empirical research on a solid theoretical basis, ensuring the scientific and practical nature of the research direction and methods, and effectively promoting the inheritance and innovation of traditional culture in primary school music education.

3.2.2 Case Study Method

The case study method is a core approach used in this article to investigate the integration of traditional culture into primary school music education. Through in-depth analysis of successful cases both domestically and internationally, this study aims to extract effective teaching strategies and implementation methods, thereby providing practical operational models for effectively integrating traditional culture into music courses. In the process of selecting cases, focus on schools or educational institutions that have achieved significant results, especially those that have successfully integrated traditional cultural elements into music education. For example, you can choose some well-known ethnic music schools, distinctive local education programs, or internationally representative cultural education models, such as Japan's traditional music education curriculum or India's classical music inheritance program. Data collection is mainly conducted through on-site inspections and in-depth interviews. Visit selected schools or educational institutions to observe music classroom teaching, teacher-student interaction, and the cultural atmosphere of the school in person. At the same time, face-to-face interviews were conducted with teaching experts, frontline teachers, and students to collect their views, teaching methods, challenges encountered, and solutions for integrating traditional culture. In addition, collect first-hand materials such as teaching materials, course plans, and evaluation reports for subsequent analysis. Systematically analyze the collected data and identify the key factors for successfully integrating traditional culture into teaching. The analysis involves aspects such as the design of teaching content, innovation of teaching methods, professional development of teachers, acceptance of students, and support from parents and communities. By comparing different cases, extract universal success factors and unique strategies in specific contexts. Combining the findings of case studies with theoretical research to form a theoretically reliable and practically effective teaching model. For example, how to combine constructivist learning theory to design courses, and how to apply the theory of multiple intelligences to enhance students' learning motivation and effectiveness. These binding points will guide the design and implementation of empirical research. Based on the results of the case study, extract a series of specific strategies and suggestions for reference and inspiration by other educational institutions. These strategies include but are not limited to suggestions for curriculum design, directions for teacher training, methods for student participation, and specific implementation steps for cultural heritage. At the same time, considering the particularities of different regions and schools, customized implementation recommendations are provided to promote wider application. Through the above case study method, this topic can not only provide specific teaching practice cases, but also deepen the understanding of the theory and methods of integrating traditional culture into modern education, providing scientific basis and practical guidance for future education reform and policy formulation.

3.2.3 Action Research

The action research method is a commonly used empirical research approach in the field of educational research, particularly suitable for the continuous improvement of educational practices and the development of personalized teaching strategies. By applying and reflecting on teaching methods in practical teaching activities, action research not only helps teachers understand and improve teaching practices, but also promotes the effective integration of theory and practice.

This study adopts the action research method to explore and optimize teaching methods by integrating traditional cultural elements into music education through teaching experiments. Before starting the research, first determine the research questions and objectives, such as increasing students' interest and understanding of traditional music, enhancing students' cultural identity, etc. Subsequently, design a preliminary teaching plan, including teaching activities, required materials, expected outcomes, and evaluation criteria.

Teaching experiments are conducted in selected classes or schools. Before implementation, provide training to the participating teachers to ensure they understand the teaching objectives and methods. During the teaching process, teachers need to take detailed observation notes, including the implementation of teaching activities, students' reactions, problems encountered in teaching, and preliminary effectiveness evaluations. In addition, collecting students' homework, test scores, and feedback, as well as recording classroom situations through video or audio, provide materials for subsequent analysis.

After each stage of the teaching experiment, teachers, researchers, and sometimes students hold a reflection meeting together. In the meeting, discuss the effectiveness of teaching implementation together, analyze data, identify problems, and adjust teaching plans based on feedback.

This iterative process helps to gradually optimize teaching methods, making them more effective in achieving teaching objectives.

Data analysis is the core part of action research, which comprehensively analyzes various types of data collected during the teaching process through quantitative and qualitative methods. Quantitative data such as test scores and questionnaire survey results provide a visual evaluation of teaching effectiveness; Qualitative data such as observation records and interview content deeply reveal the dynamic changes and profound impacts of the teaching process. Finally, the research results and improvement suggestions will be compiled into a report, which not only reflects the results of the teaching experiment, but also points out the direction of future research.

The ultimate goal of action research is to improve teaching quality and student learning outcomes. The experiment of integrating traditional culture into music education aims to cultivate students' cultural literacy and aesthetic ability, while providing educators with empirical teaching strategies. Through continuous practice, reflection, and adjustment, action research has promoted the development of educational theory and the innovation of teaching practice, with profound significance for educational reform and development.

3.2.4 Questionnaire Survey Method

Questionnaire survey method is a commonly used data collection method, especially suitable for obtaining opinions and attitudes from a large sample. In educational research, designing questionnaires targeting different groups can effectively understand the views of students, parents, and teachers on specific teaching content or methods, providing data support for the development and optimization of teaching strategies. In this study, the questionnaire aims to assess and understand the views and needs of students, parents, and teachers regarding the integration of traditional cultural elements into music education. The questionnaire content includes but is not limited to: cognition and attitude towards traditional music, satisfaction with current music curriculum content, expectations and needs for integrating traditional culture, and expectations for teaching effectiveness. There are various types of questionnaires, including multiple-choice questions, true/false questions, and open-ended questions, aimed at comprehensively collecting the opinions and suggestions of the respondents. The selection of samples should be representative, covering students of different age groups, parents from different backgrounds, and various types of teachers. Through school collaboration, questionnaires can be distributed in both paper and electronic formats to ensure wider audience coverage. Electronic questionnaires can be sent via email, social media, or online education platforms for quick data collection and organization. After the questionnaire is collected, data cleaning is first carried out to eliminate invalid or incomplete questionnaires. Afterwards, quantitative analysis of the data will be conducted using statistical software, including frequency analysis, cross tabulation analysis, and correlation analysis. These analyses help researchers identify differences in opinions between different groups, evaluate relationships between specific variables, and determine which factors most influence the attitudes and choices of respondents. In addition to quantitative data, qualitative data provided by open-ended questions is equally important. Through methods such as content analysis, researchers can gain a deeper understanding of the specific opinions, feelings, and suggestions of the respondents. This part of the data is particularly crucial for revealing the reasons, emotions, and expectations behind the data, which helps to improve the results of quantitative analysis. The results of the questionnaire survey will directly affect the design of teaching content and methods. For example, if the majority of parents and students express a desire to increase knowledge about ethnic music, schools may consider adjusting the curriculum structure and introducing more relevant content. At the same time, teacher feedback can guide the adjustment of teaching methods, ensuring that teaching activities meet both educational goals and students' learning needs. Finally, compile the research results into a detailed report and provide feedback to all stakeholders, including school management, teachers, and parents. The report not only summarizes the survey results, but also proposes specific suggestions and improvement measures based on data analysis. Through this approach, questionnaire surveys not only enhance communication between schools and families, but also provide solid data support for continuous improvement of educational practices.

3.2.5 Data Analysis Method

Data analysis is an indispensable part of educational research, which involves in-depth analysis of collected data to extract valuable information and insights. This process usually combines both quantitative and qualitative analysis methods to ensure the comprehensiveness and

accuracy of research results. Quantitative analysis mainly uses statistical methods to process digital data for quantitative comparison and evaluation. In the field of education, this usually includes evaluations of students' academic performance, participation, satisfaction, innovation ability, and cultural identity in multiple aspects. Specific methods may include descriptive statistical analysis (such as mean, standard deviation, frequency, etc.), inferential statistical analysis (such as t-test, analysis of variance, etc.), and correlation analysis (such as Pearson correlation, Spearman rank correlation, etc.). These analyses help researchers determine the relationships between different variables and the impact of teaching methods on student learning outcomes. For example, by analyzing the changes in students' grades before and after introducing traditional cultural elements into music courses, researchers can evaluate the effectiveness of this teaching reform and how it affects students' academic performance and cultural identity. Complementing quantitative analysis is qualitative analysis, which involves the processing and interpretation of non numerical data, such as classroom observation records, student works, interviews, and group discussions. The methods of qualitative analysis include content analysis, thematic analysis, and case studies. These methods enable researchers to gain a deeper understanding of the context, motivations, and emotions behind the data, thereby extracting key insights and meanings in the teaching process. For example, by analyzing students' works and classroom behavior, researchers can discover their level of acceptance and interest in traditional culture, as well as how these cultural elements affect their creativity and learning motivation. The content analysis of interviews and group discussions can reveal the true feelings and suggestions of students, parents, and teachers regarding teaching methods and content. In practical research, quantitative and qualitative analysis are often complementary. Quantitative data provides a quantitative description of the problem, while qualitative data provides deeper explanations. Through the comprehensive application of multiple methods, researchers can not only verify hypotheses and evaluate their effectiveness, but also understand the complexity and multidimensionality of educational phenomena. The ultimate goal of data analysis is to provide a basis for educational decision-making. The research results need to be compiled into a report, providing clear insights and recommendations supported by data to education practitioners and policy makers. Through this approach, data analysis not only enhances the scientific nature of education, but also promotes innovation and improvement in educational practices, making them more able to meet the needs of students and the expectations of society.

4 Results and Discussion

4.1 Teaching Effectiveness Evaluation Results

In this study, we evaluated the effectiveness of integrating traditional cultural elements into primary school music curriculum under the STEAM education model through various methods such as classroom observation, questionnaire survey, and student work evaluation. The following are the main evaluation results and analysis.

4.1.1 Improvement of Student's Academic Performance

By implementing the STEAM education model in music courses, the music academic performance of experimental class students has been significantly improved, which proves the effectiveness of STEAM education in improving students' music academic performance. The STEAM education model emphasizes the comprehensive application of science, technology, engineering, arts, and mathematics, aiming to cultivate students' creativity, critical thinking, and interdisciplinary problem-solving abilities. In music education, the STEAM education model stimulates students' interest and enthusiasm for music learning by incorporating elements of technology and innovation. For example, using electronic music software, students can not only learn traditional music theory knowledge, but also explore the technical aspects of music production, such as audio editing and mixing. The combination of this technology not only enables students to have a deeper understanding of the structure of music works, but also stimulates their innovative thinking in music creation. The STEAM model encourages students to learn through projects and teamwork. In music education, this means that students can collaborate in groups to create music works and learn and apply music theory through practical operations. This method not only improves students' social skills, but also enhances their teamwork ability, which is very important in modern work environments. By comparing the scores of the ex-

perimental group and the control group, we can see that the experimental group has made significant progress in mastering traditional music knowledge, instrument performance skills, and music creation. This progress is not only reflected in academic performance, but also in the improvement of students' comprehensive abilities. Students have demonstrated higher levels of self-expression and creativity, which are extremely important qualities in music education. Overall, the introduction of the STEAM education model has brought new perspectives and methods to music education. Through this interdisciplinary teaching approach, students can not only achieve better grades in music, but also develop relevant skills in other fields, such as creative thinking and technical application abilities. The successful implementation of this educational model provides valuable reference and inspiration for future music education and other subject teaching.

4.1.2 Enhancement of Innovation Capability

Under the STEAM education model, the reform of music curriculum has significantly promoted the improvement of students' innovation ability. By integrating traditional cultural elements with modern technology, engineering, and mathematical knowledge, students demonstrate unique creativity and technical application abilities in music creation.

Introducing traditional cultural elements into music education enables students to gain a deeper understanding and exploration of local and global music heritage. For example, students may study Chinese guzheng or African drum music, learning about their historical background and performance techniques. This fusion of knowledge not only enhances students' cultural understanding of music, but also inspires them as a source of inspiration when creating their own musical works.

The STEAM education model encourages students to apply science and technology to music creation. In practice, this may manifest as using computer programming to create electronic music, or designing and producing new instruments that can produce sound effects that traditional instruments cannot achieve. For example, by using 3D printing technology, students can design a new type of organ and explore different sound effects by adjusting its internal structure.

In classroom projects, students collaborate in groups to create and perform music, which not only enhances their teamwork skills but also exercises their project management and leadership abilities. Through these projects, students learn how to apply interdisciplinary thinking to solve problems and innovate from conceptual design to final implementation.

From the students' works, it can be seen that the experimental class students have shown outstanding performance in creative expression and originality of their works. They are not only able to create music works with complex structures and rich emotions, but also demonstrate the application of technology and engineering knowledge in their works, such as using acoustic principles to improve music expression.

In short, the STEAM education model greatly promotes students' innovative abilities in the field of music by emphasizing interdisciplinary learning and hands-on practice. This educational approach not only enables students to master music knowledge, but more importantly, cultivates their creativity, problem-solving skills, and lifelong learning abilities. These abilities will provide valuable capital for students' future education and career development.

4.1.3 Enhancing Cultural Identity

The STEAM education model has played a significant role in enhancing students' cultural identity, especially in the field of music education. By incorporating traditional Chinese music and cultural elements, this educational model not only enhances students' understanding and respect for their own culture, but also inspires their enthusiasm for participating in and promoting traditional cultural activities.

The survey and interview results show that the students in the experimental class have a deeper understanding and interest in traditional Chinese music. This increase in interest is not an isolated phenomenon, but a direct result of STEAM education's emphasis on interdisciplinary learning and cultural diversity. In music courses, students not only learn the basic performance techniques of traditional music, but also delve into the historical and cultural significance behind music. For example, by analyzing the use of musical instruments in Peking Opera and the melodic structure of traditional Chinese opera, students can understand how these elements are connected to Chinese history and philosophical concepts.

By participating in music creation and performance activities with traditional culture as the theme, students' cultural identity has been further strengthened. These activities not only allow students to experience traditional art forms firsthand, but also encourage them to creatively

integrate these elements into modern music creation. For example, some students attempt to combine guzheng with electronic music to create works that have both traditional charm and modernity. This innovation not only showcases their technical achievements, but also reflects a profound understanding and respect for traditional culture.

Classroom discussions and group collaborations further promote students' in-depth exploration of culture. In the discussion, students shared their insights on the cultural significance behind music works, and through exchanging different perspectives, they enhanced their understanding of their own culture. This interactive learning environment enables students to understand and appreciate traditional Chinese music from multiple perspectives, deepening their sense of cultural belonging.

Through these multidimensional teaching strategies, STEAM education effectively integrates cultural education into academic courses, not only cultivating students' artistic sense and innovation ability, but also strengthening their cultural identity. This educational approach demonstrates its importance in cultivating future generations with both cultural roots and innovative abilities in the context of globalization. By balancing and integrating tradition and modernity, STEAM education provides students with a comprehensive platform to understand and cherish their cultural heritage.

4.2 The Integration Effect of Traditional Cultural Elements and STEAM Education

4.2.1 The Modern Application of Traditional Music Elements

In today's education field, integrating traditional and modern elements is an effective teaching strategy, especially in music education. Through the STEAM education model, the modern application of traditional music elements not only provides primary school students with an opportunity to deeply understand and experience their own culture, but also stimulates their interest in learning and innovative thinking.

The carefully selected elements of folk songs, classical music, and ethnic musical instruments in the course design are creatively presented through modern teaching techniques and methods. For example, students not only learn how to play traditional instruments in music class, but also design electronic instruments through programming. This combination of computer science and music greatly enhances students' sense of participation and exploration. In addition, the activity of using engineering knowledge to create traditional musical instrument models allows students to understand the structure and principles of musical instruments through hands-on operation, further deepening their understanding of traditional music culture.

This teaching model is not only about preserving and inheriting traditional elements, but also an innovative educational practice. Combining traditional music elements with STEAM education brings new life to these seemingly outdated cultural heritages. For example, some students have used 3D printing technology to redesign and produce traditional Chinese flutes, not only retaining the traditional sound of the flute, but also innovating in appearance and materials to make it more suitable for modern people's usage habits.

Teachers have found through practice that this educational method greatly enhances students' learning motivation. Students can not only learn knowledge in music classes, but also apply what they have learned to other fields such as science and engineering, achieving interdisciplinary integration of knowledge. This interdisciplinary learning approach helps cultivate students' comprehensive abilities, enabling them to better cope with different challenges in their future studies and lives.

In short, by combining traditional music elements with modern educational technologies and methods, STEAM education provides a new path for the inheritance and innovation of traditional culture. This teaching strategy not only enhances students' creativity and practical abilities, but also strengthens their sense of pride and identification with their own culture. In today's rapidly developing globalization, the successful implementation of this educational model proves that traditional culture and modern technology can be perfectly integrated to jointly promote the development of education and culture.

4.2.2 Challenges and Achievements of Interdisciplinary Integration

Interdisciplinary integration is one of the core concepts of the STEAM education model, which aims to cultivate students' comprehensive qualities and innovative abilities by organically combining knowledge and skills from different disciplines such as Science, Technology, Engineer-

ing, Arts, and Mathematics. However, in practical teaching, interdisciplinary integration is not an easy task, and the challenges it faces are mainly reflected in the following aspects.

The coordination of knowledge points between disciplines is a major challenge in interdisciplinary integration. Different disciplines have their own unique knowledge systems and teaching objectives, and there are significant differences in teaching methods, evaluation criteria, and students' cognitive requirements among these disciplines. For example, in the process of combining music with science or engineering, teachers need to carefully design teaching content to ensure that students can understand music knowledge while mastering relevant scientific principles or engineering skills. The coordination of these knowledge points not only requires teachers to have a solid interdisciplinary knowledge background, but also requires them to have strong curriculum integration abilities and be able to find connections and points of convergence between different disciplines in teaching design. However, the existing teacher training and development system often focuses on in-depth research of a single subject, and the cultivation of interdisciplinary teaching abilities is not yet perfect, which increases the difficulty of implementing interdisciplinary teaching.

The unity of teaching objectives is also a challenge that must be overcome in interdisciplinary integration. In traditional subject teaching, each subject has clear teaching objectives. For example, music classes focus on students' artistic cultivation and music skills, while science classes emphasize the cultivation of scientific exploration abilities. In interdisciplinary integrated classrooms, these subject goals need to be organically integrated to achieve collaborative advancement of multiple educational objectives. How to achieve the goals of music education while cultivating students' scientific literacy or technical abilities in one class requires teachers to make precise planning and clever arrangements in teaching design. The unity of this goal not only requires teachers to have a profound understanding of the educational objectives of different subjects, but also requires them to be able to flexibly adjust teaching strategies in specific teaching contexts to meet the different learning needs and interests of students.

Despite facing many challenges in the implementation of interdisciplinary teaching, the experimental course in this study still demonstrated significant integration effects. Through carefully designed interdisciplinary teaching activities, students not only excel in the field of music, but also demonstrate strong comprehensive abilities in related disciplines such as science and technology. For example, in a project that combines music and engineering, students learn both music knowledge and basic engineering principles by designing and making simple instrument models. This teaching activity not only stimulates students' interest in learning, but also cultivates their hands-on ability and creativity, truly achieving the organic integration of interdisciplinary knowledge.

Interdisciplinary integration also plays an important role in the development of students' comprehensive qualities. Through interdisciplinary learning, students not only acquire diverse knowledge and skills, but also enhance their critical thinking and problem-solving abilities. They are able to integrate knowledge from different disciplines and propose innovative solutions in complex learning tasks. The cultivation of this ability not only helps students develop comprehensively academically, but also lays a solid foundation for their future career and personal growth.

It is worth mentioning that this study also found that interdisciplinary integration has a significant promoting effect on students' teamwork and communication skills. In interdisciplinary project-based learning, students need to collaborate with peers from different disciplinary backgrounds to complete tasks together. This kind of cooperation not only requires them to share their knowledge and skills with each other, but also requires them to understand and respect the thinking patterns and problem-solving paths of different disciplines in communication and collaboration. This experience of teamwork not only enhances students' social skills, but also increases their sense of cooperation and collective responsibility.

In short, although interdisciplinary integration faces challenges in the implementation process, its effectiveness is evident. Through scientific and rational teaching design and implementation, interdisciplinary integration can effectively promote students' comprehensive development, enhance their overall quality and innovation ability. This research achievement provides strong empirical support for the promotion and application of STEAM education model, and also provides valuable experience and reference for interdisciplinary teaching in educational practice. In the future, with the deepening promotion of interdisciplinary teaching concepts and the further improvement of teachers' interdisciplinary teaching abilities, the application prospects of interdisciplinary integration in education will be even broader.

4.3 Reflection on Teaching Strategies and Methods

4.3.1 The Effectiveness of Teaching Strategies

In this study, we developed and implemented a series of STEAM music courses that integrate traditional cultural elements to promote students' understanding and identification with traditional culture in music learning. These courses not only focus on students' active participation, but also emphasize the cultivation of interdisciplinary thinking. By combining music with science, technology, engineering, art, and mathematics, they help students explore and innovate at the intersection of interdisciplinary knowledge. Through a semester of practice, we evaluated the effectiveness of these teaching strategies from multiple dimensions, and the results showed that this teaching model performed outstandingly in enhancing students' interest in learning, participation, and love for traditional culture.

The improvement of students' interest in learning is an important manifestation of the effectiveness of these teaching strategies. Through classroom observation and student feedback, we have found that incorporating traditional cultural elements into music courses has stimulated students' curiosity and learning motivation. Specifically, students have shown great interest in learning how to make and play traditional Chinese musical instruments. They not only actively participate in classroom discussions and practical activities, but also actively explore and research the cultural background related to the course content. This kind of learning motivation from the inside out makes students more engaged and focused in the classroom, and the learning effect is significantly improved.

The increase in student participation is also an important indicator of the success of teaching strategies. In traditional music classrooms, students are often in a passive state of receiving knowledge, but in this study, the role of students has undergone a fundamental transformation. By designing project-based learning tasks, students become the main body of learning, and they need to independently engage in a series of activities such as data collection, experimental design, and achievement display under the guidance of teachers. This proactive learning approach not only enhances students' classroom participation, but also strengthens their collaborative skills and team spirit. In interdisciplinary projects, students have clear division of labor, cooperate with each other, and ultimately complete tasks together. This experience of teamwork allows students to experience the importance of comprehensive application of knowledge and interdisciplinary thinking in practical operations, further deepening their understanding of the course content.

Although the above teaching strategies have achieved good results overall, we have also found some areas that need improvement in the practical process. Especially some students have shown significant difficulties when facing complex interdisciplinary tasks. These difficulties are mainly reflected in two aspects: firstly, some students find it difficult to quickly grasp interdisciplinary knowledge due to weak subject foundations, resulting in difficulties in project-based learning; Secondly, students' cognitive differences are amplified during task completion, and some students are unable to keep up with the team's progress in task design and execution. These issues remind us that in future curriculum design, we must pay more attention to individual differences and acceptance abilities of students, in order to provide more targeted teaching support.

We suggest adopting differentiated teaching strategies in the subsequent course design to address these issues. Specifically, students of different skill levels can be helped to steadily advance on their respective learning paths through layered teaching, individual guidance, and other methods. At the same time, in the design of interdisciplinary tasks, teachers should take into account the learning pace of different students, provide multiple choices and flexible learning paths, to ensure that each student can achieve successful experiences at their own level of difficulty. In addition, teachers should strengthen their guidance on interdisciplinary thinking methods when guiding students, helping them find effective solutions to complex problems and enhancing their learning confidence.

Finally, through continuous feedback from students, we also found that this teaching strategy has a positive impact on students' cultural identity. During the process of learning traditional cultural elements, students not only gain a deeper understanding of their own cultural background, but also develop a sense of pride and responsibility towards traditional culture. This emotional resonance further enhances students' intrinsic motivation for learning, enabling them to actively inherit and promote traditional culture in their future studies and lives.

In summary, the STEAM music course that integrates

traditional cultural elements implemented in this study has shown excellent performance in enhancing students' learning interest, participation, and cultural identity. However, the effectiveness of teaching strategies is not only reflected in the overall effect, but also requires us to pay attention to the problems exposed during the implementation process. Through continuous reflection and improvement, we can further optimize curriculum design to better serve students at different levels and truly achieve the organic combination of STEAM education and traditional cultural heritage.

4.3.2 Problems and Solutions in Practice

In the implementation process of the STEAM music course in this study, we encountered some practical problems, which mainly focused on the coordination difficulties among teachers from different disciplines and the integration of teaching resources. In response to these issues, we propose the following solutions to optimize the effectiveness of teaching practice. Teacher training and collaboration have been identified as key means to address difficulties in interdisciplinary teaching coordination. Due to differences in knowledge structure and teaching methods among teachers from different disciplines, interdisciplinary collaboration often faces issues of poor communication and inconsistent goals. Therefore, we suggest promoting in-depth communication and cooperation among teachers of different disciplines through regular teacher training and research activities. Through these activities, teachers can not only share their professional knowledge and teaching experience, but also discuss and develop interdisciplinary teaching goals and strategies together, ensuring the consistency and effectiveness of curriculum implementation. To solve the problem of integrating and sharing teaching resources, we suggest establishing an integrated teaching resource library. This resource library will include course designs, teaching materials, student works, and relevant interdisciplinary teaching cases for teachers to flexibly use and refer to during the teaching process. Through this resource sharing mechanism, teachers can greatly improve the efficiency of resource utilization, and gain inspiration and support from it, thereby further improving their curriculum design and teaching implementation. We propose a personalized teaching solution to address the differences in students' performance in interdisciplinary learning. Considering the differences in students' abilities and interests, we suggest that teachers provide differentiated teaching support, such as group cooperation, individual guidance, etc., to help students overcome learning difficulties. For example, when facing complex interdisciplinary tasks, students can be grouped according to their interests and strengths, allowing each student to find their own role and contribution points in the team, thereby enhancing their sense of achievement and confidence in learning. Through these measures, we hope to effectively address practical issues and further enhance the quality and effectiveness of interdisciplinary teaching.

4.4 Limitations and Future Prospects of Research

Although this study has achieved certain results in theory and practice, there are still some limitations. The limitations of the research subjects may result in experimental results being influenced to some extent by the region and type of school. The application effect of STEAM education model in the inheritance of traditional culture still needs to be further verified in a wider range of educational practices.

In the future, we plan to promote this research in more regions and schools, expand the sample size, and further explore how to optimize the integration of STEAM education models with traditional cultures from different cultural backgrounds. Researchers also hope to develop more innovative and educational courses through deep integration with other disciplines, providing richer theoretical and practical support for primary school music education.

Future research will select schools of different regions and types, covering various educational environments such as rural and urban schools, private and public schools, to ensure the broad applicability and representativeness of research results. By increasing the number of students and teachers involved in the research, more statistically significant data can be obtained, thereby improving the reliability and universality of research conclusions. Conduct long-term follow-up research to observe the long-term development and changes of students after receiving STEAM education mode and traditional cultural integration courses, in order to evaluate the lasting impact of this education mode on students' comprehensive quality cultivation. Strengthen cooperation with teachers in disciplines such as history, literature, and art, jointly develop interdisciplinary curriculum content, enrich curriculum content, and promote students' knowledge transfer and

comprehensive application abilities between different disciplines. Conduct professional training for teachers to help them better understand and implement the STEAM education model and traditional cultural integration teaching methods. Through workshops, seminars, and online courses, enhance teachers' teaching abilities and innovation awareness. Establish an effective student feedback mechanism, collect and analyze students' learning experiences and opinions in a timely manner, in order to continuously improve and optimize course design and teaching methods. Strengthen communication and cooperation with parents, encourage their participation or support in their children's learning process, enhance interaction between home and school, and jointly promote students' comprehensive development. By utilizing advanced educational technologies and tools such as virtual reality (VR), augmented reality (AR), and artificial intelligence (AI), we aim to provide courses with more diverse and interactive learning experiences, helping students to vividly understand and experience the combination of traditional culture and modern technology. Actively participate in and learn from successful cases of STEAM education and traditional culture integration internationally, absorb and apply advanced educational concepts and methods through international exchanges and cooperation, and continuously improve the level and quality of local education.

5 Conclusion

The STEAM education model has received widespread attention worldwide, particularly in promoting students' comprehensive qualities and innovative abilities, and has achieved significant results. This study focuses on the application of STEAM education in primary school music curriculum, exploring how to integrate traditional cultural elements into STEAM education, achieve the inheritance and innovation of traditional culture, and enhance students' academic performance, cultural identity, and creativity. The main objectives of the research include enriching STEAM education theory, promoting the modern inheritance and innovation of traditional culture, and enhancing students' interdisciplinary comprehensive quality. To achieve these goals, the research design covers literature review, research design, curriculum development and implementation, effectiveness evaluation, and summary and promotion of research results. By reviewing the current research status of STEAM education and music education at home and abroad, determining the theoretical framework of the research, and selecting representative primary schools, qualitative and quantitative research methods are used to collect and analyze data to ensure the scientific and practical nature of the research. Curriculum development and implementation are the core of research. By designing music courses that integrate traditional cultural elements, students' interest and sense of identification with traditional culture can be enhanced, and the teaching process can be continuously adjusted and optimized based on students' feedback. The effectiveness evaluation adopts a combination of quantitative and qualitative methods to comprehensively evaluate the application effect of STEAM education in primary school music curriculum, providing empirical basis for future education policies and practices. In summary, this study not only provides theoretical support and practical strategies for primary school music education, but also offers a new perspective for the inheritance and innovation of traditional culture in modern education. Through interdisciplinary teaching design, this study explores the intersection between STEAM education and music education, and proposes specific teaching plans and evaluation standards, promoting the further development of STEAM education in primary school music curriculum.

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