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An Analysis of the Audio Engineering Program Basis for An Action Plan

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Abstract

Although the PDCA cycle model is well-established in improving engineering quality, its application in education is still in the exploratory stage and not yet fully mature. This study utilizes PDCA as a reference to systematically analyze the talent cultivation plan, syllabi, and teaching resources in the Audio Engineering program at Guilin Tourism University. aiming to enhance teaching quality and improve students' comprehensive capabilities.

The study identifies several key problems, such as unclear talent cultivation objectives, insufficient teaching resources, misalignment between course offerings and industry demands, and inadequacies in practical training. In-depth interviews and surveys with 4 school leaders, 8 faculty members, 215 undergraduate students, 26 alumni, and 12 employers reveal prominent problems: 1) Shortage of both quantity and quality of faculty in the audio engineering program; 2) Insufficient laboratory and practice facilities; 3) Difficulties in understanding theoretical knowledge; 4) Insufficient practical operation opportunities.

Based on these findings, The study proposed targeted action plans for school leaders, faculty members, students and alumni. This study emphasizes prioritizing the renewal of outdated equipment, strengthening cooperation with enterprises, and promoting curriculum updating and practical opportunities. By applying the PDCA cycle, educational managers can regularly assess and optimize these aspects to promote the sustainable development of the program and ensure continuous improvement in teaching quality and learning outcomes.

Keyword: *PDCA Cycle Model; Educational Management; Teaching Quality Enhancement; Audio Engineering program*

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Chapter 1
THE PROBLEM AND ITS BACKGROUND

Introduction

Audio engineering is an interdisciplinary program integrating art and engineering. Since Beijing Film Academy first opened the course of film recording in 1951, it has been developed for more than 70 years. In the field of traditional audio engineering, film sound recording is its core and foundation, and then it has derived music recording, electronic music production, music and sound design and other branches. In recent years, music technology, soundscape ecology, gaming and interactive media have gradually merged in technology and concept. Obviously, audio engineering program is constantly integrating various media, technologies and concepts, reflecting a general trend. At present and in the near future, interactive multimedia and virtual reality sound technology are expected to become the key development direction of audio engineering. In this context, the market is no longer the limiting factor of the development of audio engineering, and the real challenge is to cultivate talents in related fields.

Currently, the discipline of audio engineering faces various challenges in China, including vague disciplinary positioning(Jing, 2016), non-standardized program offerings (Meng, 2021; Jing, 2016), limited research achievements in the field, lack of top-level disciplinary design, significant differences in audio engineering program orientations among different art schools, unbalanced and unreasonable disciplinary layout, stagnant disciplinary culture(Jing, 2016), urgent need for integrated disciplinary resources (Meng, 2021; Wang, 2020; Jing, 2016), and severe shortage of teaching staff (Wang, 2020; Meng, 2021; Li, 2019). Against the backdrop of media convergence, the demand for professional audio practitioners in the market is continuously increasing. However, the speed at which universities are nurturing talents in the field of sound arts lags far behind societal needs (Zhang, 2021; Li, 2019; Liang and Wang, 2017; Jing, 2016). Presently, there are only 32 undergraduate institutions nationwide offering programs in audio engineering, including both undergraduate and graduate programs, with fewer than 3,000 graduates in this field annually. Regional universities face more pronounced issues, such as low comprehensive quality of incoming students (Meng,2021; Zhang,2021), lack of teaching staff, inadequate investment in teaching hardware facilities, low awareness of the audio engineering profession among current examinees leading to low application rates, and limited availability of course materials and references (Zhang, 2021).

Guilin Tourism University, located in Guangxi, a region with underdeveloped economic conditions in China. The Audio Engineering program is one of the distinctive

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specialties among the arts program at our university. Formerly known as Audio Engineering, it was established in 2004 and belongs to the college. In 2019, the Audio Engineering program was upgraded into an undergraduate program. In March 2023, Guilin Tourism University successfully completed its undergraduate accreditation, and in October of the same year, it underwent a restructuring and consolidation of its organizational structure. This restructuring included the addition of three new secondary schools, one of which is the School of Tourism Performing Arts, under which Audio Engineering program is now housed. This signifies a new plan for the overall development of the university.

Considering the current state of the audio engineering profession in the country, this study will use Plan-Do-Check-Action (PDCA) cycle model to analyze the Audio Engineering Program at Guilin Tourism University in depth. By Analyzing aspects such as the talent cultivation plan, syllabi and teaching resources, this research seeks to provide valuable insights into the strengths and areas for enhancement of teaching quality and students' comprehensive capabilities.

Statement of the Problem

This study seeks to describe and analyze the audio engineering program in terms of talent cultivation plan, syllabi and teaching resources. enhance the teaching quality of audio engineering program and offer recommendations to enhance the effectiveness of the curriculum, ultimately promoting the students' comprehensive capabilities to meet the needs of the industry.

Specifically, the study shall seek to answer the following questions:

1. How is the Audio Engineering Program of Guilin Tourism University be described and analyzed using the PDCA cycle model along the following:
    1.1 Talent Cultivation Plan
    1.2 Syllabi
    1.3 Teaching Resources
2. What are the problems met by the Audio Engineering Program?
    2.1 From the Perspective of School Leaders
    2.2 Form the Perspective of Faculty Members
    2.3 From the Perspective of Students
    2.4 From the Perspective of Alumni
3. What action plan can be proposed?
4. What is the implication of the study to Educational Management?

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Significance of The Study

To **school leaders,** this study can provide essential data and suggestions for school leaders to better position and support the development of the Audio Engineering program, optimize resource allocation and investment to ensure competitive advantage. It analyzes university development needs, especially for audio engineering, to inform decisions on resource allocation. The study also put forward specific suggestions on curriculum design, faculty team development and practical training, enhancing teaching quality and students' practical skills, promoting long-term sustainable development.

To **faculty members,** the research provides detailed analysis on talent cultivation plan, syllabi and teaching resources, course content, and student feedback, helping faculty improve their teaching strategies and enhance instructional effectiveness. It identifies faculty' needs in professional development and training, assisting the school and university in offering more targeted support and resources to foster faculty' professional growth.

To **students,** the purpose of this study is to improve students' learning experience and practical ability by optimizing teaching resources and curriculum design, so as to improve their employability. This study gives students a platform to express their opinions and suggestions, and also can enhance their participation and sense of ownership in the program development.

To **future researchers,** this study provides an enhanced talent cultivation model for improving the quality of education through PDCA cycle model. Taking Audio Engineering program at Guilin Tourism university as the study object, this research makes a comprehensive analysis in the aspects of talent cultivation plan, syllabi and teaching resources. The findings and outcomes of the study can provide some reference for enhancing the audio engineering program in other universities. This study points out the importance of continuous improvement in education, and constructs a replicable teaching quality diagnosis and reform system, which future researchers can apply to different disciplines and backgrounds to further promote the continuous improvement of education quality.

Scope and Delimitation of the Study

Although the Audio Engineering program established on 2004, In this study, only do the research from 2019 when it upgraded into four-year undergraduate. The Participants covered one (1) president of Guilin Tourism University, one (1) dean of School of Tourism Performing Arts, two (2) directors and eight (8) faculty members from Audio Engineering program, the first 31 graduates in the year of 2023 and 215 current undergraduates of Audio Engineering program and 12 employers from audio industry.

Literature Review and Related Studies

Introduction of Audio Engineering Program

According to the documents of the Ministry of Education, the program of Audio Engineering belongs to the discipline of drama and film and television under the category of Arts. Feng (2021) believes that film sound recording is the core construction major of this program, while other majors, such as music recording, music production, live sound reinforcement, sound design and other majors, are complementary and

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perfect for the program of Audio Engineering. Feng pointed out that the core mission of the Audio Engineering program is to record and present artistic sounds. From the technical point of view, the pursuit is to record the sound and its sound field in high fidelity, and to restore the sound at high resolution anytime and anywhere. From an artistic point of view, the Audio Engineering program focuses on how to design and recreate sounds artistically and visually, explore the synthesis and innovation of sounds, and perfectly integrate these sounds with other art forms.

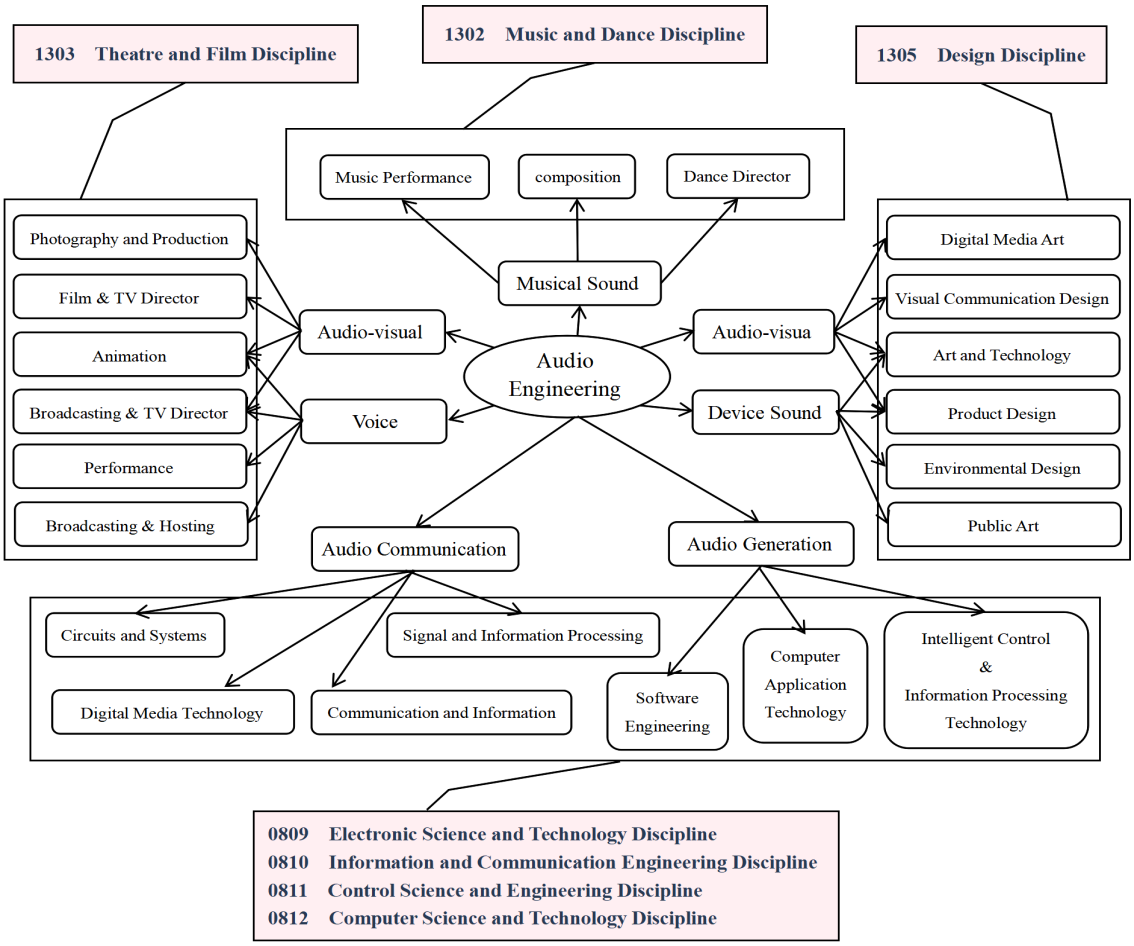

Figure 1 Interdisciplinary Integration Chain of the Audio Engineering Program.

Feng also mentioned that the audio engineering program itself is combine with art and technology. It belongs to the discipline of drama and film, closely related design, music and dance, engineering and so on. photography and production, director, animation and other programs rely on sound design to achieve complete audio-visual effects (see in figure 1). Performance and broadcast hosting programs involve voice recording and sound reinforcement systems, and also require the participation of audio engineering. Digital media art and visual communication design in design

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create surreal dynamic images with the help of digital technology, and the corresponding sound design needs to be completed by digital effector and sound synthesis system. Sound interaction design in public art, environmental design and other disciplines is also closely related to digital sound design. The audio engineering program support the creation of music and the production of choreographers. It also collaborates with engineering disciplines on technologies such as audio signal recording, timbre synthesis and multimedia processing, where audio engineering program are advanced users of these technologies, and practitioners of the program apply technologies in technical feedback and development. The interdisciplinary cooperation further enriches the program connotation of audio engineering.

Jing (2016) point out that audio engineering is an indispensable element in music, dance, drama, film, television, radio and other art forms. There's a difference between it and the other basic art forms. Audio engineering does not create complete, new works of art, but serves as an assistance to design and creation.

Variables of a program construction

Jing (2016) believes that discipline construction covers three aspects: talent cultivation, scientific research and social service. In "talent cultivation", the core elements of program construction include "determining the discipline direction", "formulating talent cultivation plan" and "carrying out curriculum setting (including syllabi formulating and content design)". These elements together constitute the basis of program construction.

Based on the PDCA model, Zhao (2023) conducted a detailed assessment of the current situation of talent cultivation for digital media art program in Shandong Engineering Vocational and Technical University, identified the problems existing in the current talent cultivation plan, and put forward targeted optimization and improvement suggestions. Zhao mainly analyzes the cultivation objectives, curriculum system and faculty construction. Based on these analyses, the paper puts forward specific optimization measures using PDCA model at various stages to continuously improve talent cultivation plan, improve education quality, and meet the social demand for digital media art talents.

Geng (2023) made an in-depth analysis of talent cultivation plan, syllabi formulation, teaching resources, faculty team construction and educational quality evaluation system in the construction of film and television programs from multiple perspectives. Geng discussed how to improve the social reputation and industry recognition of film and television programs, and puts forward ways and methods to create a new situation of film and television programs' education with Chinese characteristics, which provides valuable insights for promoting the high-quality development of film and television programs.

Zhang (2019) pointed out that the construction of faculty team and the level of scientific research are the two core elements in the integration of teaching resources in colleges and universities. As an important software resource, the quality of faculty team directly affects the teaching level and the cultivation of students' comprehensive quality.

Xiao et al. (2024) through the testing results of teaching methods, teaching resources and syllabi, the teaching quality assurance system based on PDCA cycle

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model can effectively promote the overall development of teaching quality in higher vocational colleges and improve the overall level of teaching quality.

Li et al. (2018) In their article "The Construction of a Quality Assurance System Based on the PDCA Model" discusses the problems in the teaching quality assurance system of Chinese universities. So as to improve the quality of talent cultivation, a closed-loop quality assurance system based on PDCA model was proposed. This system emphasizes a cycle of decision-making, implementation, monitoring and improvement, The aim is to ensure the steady enhancement of the teaching quality of universities through systematic planning, full participation and continuous improvement.

The paper, "Implementing the Plan-Do-Check-Act (PDCA) Pedagogy in Industrial Engineering Education" (Loyd and Gholston, 2016) explore the effects of implementing PDCA pedagogy in industrial engineering education. Their study involved 31 students over the course of a semester. The results showed that the PDCA approach significantly improved student performance, retention, and improved 94% of students' performance and 90% of students' confidence in applying knowledge by emphasizing continuous feedback and mastering based learning. Although limited in scope, the study suggests that PDCA may be more effective than traditional methods in science and engineering education.

According to the PDCA theory, the article studies the quality improvement of talent cultivation for engineering excellence classes in universities. Analyzes the status and puts forward improvement recommendations. The aim is to build a systematic and continuous improvement training model for engineering talents, in order to improve the training quality of excellent engineering talents (Xiang, 2021).

"The Improvement of Talent Cultivation plan for Digital Media Arts Majors in Vocational Undergraduate Colleges Based on the PDCA Model" (Zhao, 2023) explores how the PDCA model can be used to enhance the talent cultivation plan for digital media arts program at their University. The research identifies the problems in the program and suggests enhancements at each stage of the PDCA cycle, Zhao also emphasize the continuous improvement the educational outcomes to align with the market demands.

Education Status of Audio Engineering Program

During the 2017-2018 academic year, Webster University undertook a program-level review of its B.A. in Audio Production, Bielmeier (2017) prompted the two-year study identified gaps and misalignment in the curriculum with industry standards and employer expectations. Bielmeier used SSL to collect feedback from 40 students through a questionnaire survey. The results showed that the overall skills of the students improved after the training, but there were still shortcomings in communication and technical abilities. In this study, They have made significant adjustments to the curriculum based on the needs of the industry as well as feedback from students. They incorporating the core skills of audio technology into recording and production projects with excellent teaching results.

Lu (2023), in the article "Discussing the Importance of Audio System Logical Thinking in the Teaching of Audio Engineering Program" highlights the challenges in teaching audio engineering. Despite the program's growing popularity due to the booming film and television industry, students often lack a deep understanding of the field, leading

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to learning difficulties. The audio engineering program requires a strong foundation in electronic technology, computer knowledge, acoustics, and system design, alongside skills in mathematics, film, television, and music appreciation. Lu emphasizes the importance of enhancing students' logical thinking about audio systems to improve their grasp of this complex, technically demanding subject.

Chen (2022) proposes the integration of production and education is the innovation point in the design of talent cultivation plan for application-oriented undergraduate colleges. Audio Engineering program need to combine the development needs of industry enterprises, take students' entry into the industry as the training goal, upgrade the experimental training course for audio engineering, rationally use various educational resources from enterprises, integrate the training course into the talent cultivation plan, enhance the training work for application-oriented undergraduate programs, enhance students' humanistic quality and professional quality, and cultivate excellent recording professionals in all directions.

Jing (2016) found that "Audio Engineering" in higher art education in China is subject to varied interpretations, with divergent views prevailing among industry and academia. These viewpoints can be summarized as follows: Sound technology-centric (Focuses on achieving precise, artistic recording processes through advanced equipment design and improvement); Sound science-centric (Emphasizes control over all recording-related research fields through a broader understanding of sound science); Music production-centric (Views audio engineering as a sub-discipline of musicology, emphasizing its role in the second creation of music art through technical recording means).

Jing (2016) identifies several deficiencies in the construction of audio engineering disciplines: first, blurred subject positioning and irregular professional settings, leading to disconnection between professional and disciplinary construction; second, insufficient research on the ontology of recording art and a lack of systematic results in disciplinary system construction; Third, mismatch between talent demand and graduate numbers, exacerbating supply-demand contradictions; Forth, uneven and unreasonable distribution of disciplinary regions; Fifth, Low-level disciplinary culture, necessitating urgent integration of subject resources.

The article entitled "On the particularity of recording art talent training" (Zhang 2021) pointed out Vision and hearing are essential elements in film and television works, and each element has its own significance and value to illustrate its own uniqueness. What restricts its further development is no longer the film market corresponding to the film sound itself, but the difficulty and special methods of talent training. Discusses the uniqueness of talent cultivation in the recording arts major, emphasizing the difficulty and special methods required for cultivating such special talents. Regarding the current situation of audio engineering talents in China's universities, he believes most of the courses on film and television sound creation are limited to the course of Audio-visual Language. Moreover, many lectures are mainly visual, and the combination of audio-visual thinking is not achieved.

Li (2019) elaborated from three aspects: professional characteristics, professional development and how professionals adapt to the cultural industry development from the perspective of talent demand in Yunnan Cultural Industry, combined with the model of cultivation in colleges, and taking recording arts as the research object. He pointed out that the orientation of talent training in recording arts program tends to

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the direction of sound engineering, sound creation and computer music production. He believes that the establishment of majors and the cultivation of talents need to consider the local functional orientation and what kind of social contribution can be made to the local area. The cultivation of professional cultural talents in recording arts in Yunnan needs to be market-oriented, industrialized and intensive, make full use of market resources, integrate favorable resources in Yunnan's cultural industry, make unified planning and deployment, form an organic management system according to the market, and establish the development concept of intensive, market-oriented and industry-oriented.

Ma (2021) Points out that with the background of university transformation, the teaching reform of Audio Engineering program mainly focuses on "practical teaching reform", in which "professional ability training" is the focus of the reform, which can effectively improve students' practical ability and professional quality. As a combination of art and technology, Audio Engineering program covers science, engineering, art and other disciplines, and has strong practicality. It requires students to have high artistic quality and accomplishment, profound musical skills, be familiar with all kinds of recording equipment, and master certain recording theories and skills at the same time. Therefore, under the background of the transformation of colleges, the practical teaching reform of audio engineering program should pay attention to the cultivation of students' professional ability, continuously improve their professional skills and qualities, and lay a foundation for the subsequent comprehensive ability and expansion ability training.

Meng (2021) examines the differences in talent cultivation models between China and foreign countries using the CIPP evaluation model. The study highlights the impact of audio creative talent development on China's cultural and creative industries, as well as its broader cultural strategy. Through comparative analysis, Meng identifies significant differences in the teaching objectives, course structures, and educational approaches of audio engineering programs between China and abroad.

The study finds that foreign programs have clearer professional settings, emphasizing cross-industry technological innovation and encouraging independent research. In contrast, Chinese programs focus on integrating media fields, fostering creative innovation, and linking educational outcomes with product development. The study also notes disparities in student recruitment, with China's top programs concentrated in Beijing and Shanghai, while student quality in other regions is inconsistent. Foreign universities, on the other hand, employ more effective resource utilization and maintain lower enrollment rates.

Meng also points out the challenges in teaching staff in China, where the average number of full-time teachers per program is less than 10, with a lack of strong industry connections. In terms of teaching facilities, both Chinese and foreign universities have built high-standard recording studios and editing rooms. However, there are notable differences in curriculum design; Chinese programs devote more than 40% of class hours to basic courses, while foreign programs allocate less than 30%. Additionally, Chinese courses are mainly lecture-based with some experimental creation, whereas foreign universities emphasize project-based learning and interdisciplinary innovation from the freshman year. Overall, Meng's study provides a scientific basis for improving higher education in audio engineering and creative talent development.

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In the article "Adjustment and Construction of Audio Engineering Discipline in Hubei Province under the Background of 'Double First-class' ", (Li, 2021) analyzed the curriculum system, professional connotation and teaching mode of audio engineering discipline. The following five current situations of this discipline are presented: First, there are only one school with unbalanced distribution; Second, the discipline orientation is traditional, the caliber is not broad; Third, the training mode is traditional, but the content is not rich; Fourth, the faculty team is weak, the level of faculty is not balanced; Fifth, social demand is strong, and supply and demand are asymmetrical. In the future, we will try to carry out new construction in cultural inheritance, social services, innovation, scientific research and international exchanges.

Feng (2021) By deeply analyzing the connotation and extension of the audio engineering program. It aims to identify the direction of discipline development and offer scientific basis for discipline construction. The article emphasizes the importance of accurately positioning discipline development in the background of new liberal arts construction. Audio engineering program in China has continuously merged into various branches in the historical development. Although the program in domestic colleges and universities has gradually formed a multi-faceted and multi-level teaching, practice and talent cultivation system after years of reform and running-in, audio engineering program is inherently interdisciplinary and the development of knowledge structure is highly changeable. Under this context, it is necessary to deeply analyze the connotation and extension of this program to make clear that the discipline chain involved in this program is to correctly determine the development direction of the discipline.

Zhao (2019) pointed out in "The Influence of the moderate reverse of Work Flow and teaching Flow on the teaching Effectiveness of education: A Case study of Audio Engineering Program in Higher vocational Education" that "work flow" has been the basis of teaching design in vocational education circles for many years. The appropriate use of reverse design in teaching can enable students to understanding the learning content and production requirements in the teaching logic of "first understand the demand for production materials in the next process, and then learn the production method in the previous process", to better enhance the teaching effect. In view of the research on "reverse instructional design", this paper carries out the "reverse" adjustment experiment teaching in the course module of recording art major, and analyzes the experimental results in detail, which provides a valuable reference for the teaching design of recording art major.

Jin (2020) analyzes the social adaptability of Yunnan audio engineering graduates. It is found that to combine the theory and practice can significantly improve students' employability. It is suggested to strengthen basic knowledge education, pay attention to industry dynamics, and improve students' practical skills through project teaching, so as to better adapt to the complex social and market environment.

Wang and Wang (2020) Points out that in the face of new higher education situations and job competency requirements, the recording arts program must understand the specific requirements of social job positions for comprehensive talents, adjust the curriculum teaching system design, and promote educational reform.

Liang and Duan (2017) Discusses the employment-oriented talent training strategy of recording art major in Hebei University of Media and Communication, and emphasizes on improving students' skills and employability through curriculum reform

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and practical teaching. By combining with the needs of the industry and emphasizing project-based teaching, the program aims to enhance students' professional competence and prepare them well for employment.

Wang (2020) Analyzes the existing problems in the talent cultivation of recording arts programs in Yunnan University, such as low quality of students and lack of teaching staff, and proposes reform and innovation suggestions.

Conceptual Framework

The paradigm is based on Deming's PDCA cycle model to assist in the analysis of the Audio Engineering program in Guilin Tourism University. Based on PDCA cycle model, this study analyzes and enhances the quality and effect of Audio Engineering program in Guilin Tourism University. The study is divided into four parts, each of which delves into key aspects of the program.

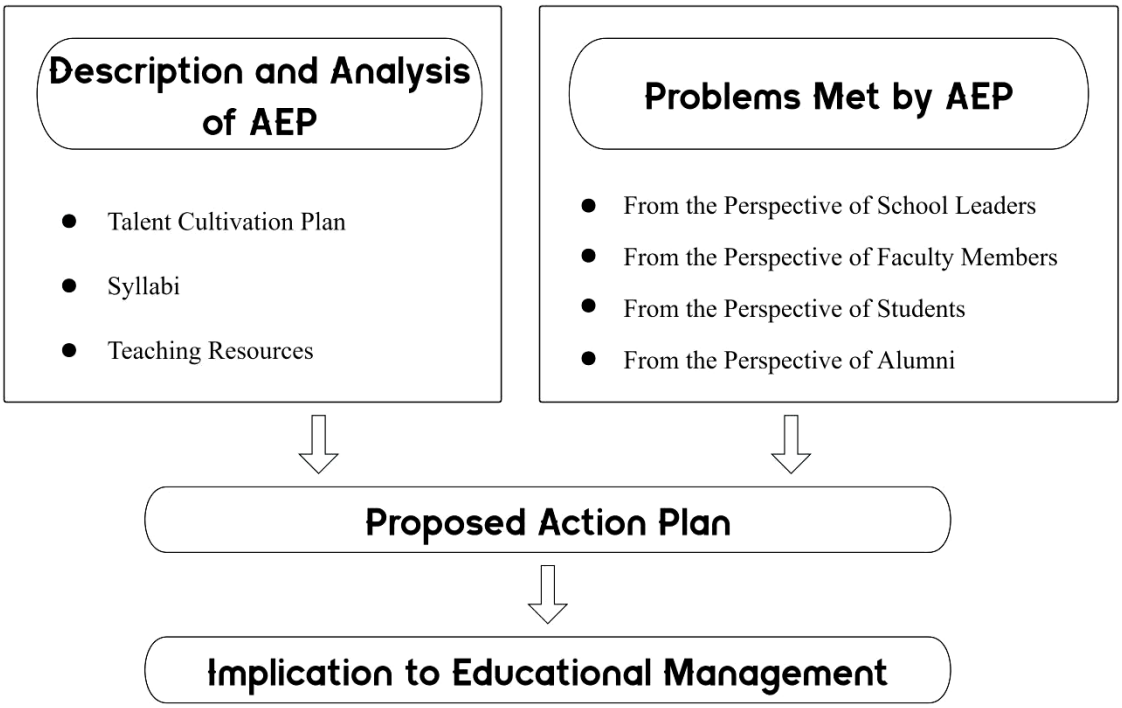

Figure 2 Paradigm of the Study

Description and Analysis of Audio Engineering Program

In this part mainly uses the PDCA cycle model to investigate the alignment between the existing talent cultivation objectives of audio engineering program and the industry, to make ensure that graduate have the necessary capabilities. Through analyzing the syllabi objectives, content, relevance of existing courses, the study checked whether current courses meet students' educational and career needs, and explored how they can be improved to keep up with technology and industry trends. It also analyzed the availability, quality, and use of teaching resources, including

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faculty team construction, hardware facilities, software resources, and their impact on student learning outcomes.

Problems met by Audio Engineering Program

From the perspective of school leadership, this section focuses on constraints and issues in resource allocation, professional visibility, and strategic direction. From the faculty members' perspective, this section analyzes the problems faculty member faced in terms of syllabi implementation, student engagement, and professional development opportunities. From the perspective of students, this section focuses on students' problems in academic achievement, practical training and employability after graduation, reflecting students' experience and dilemma in actual professional learning. These three perspectives together present the multi-faceted problems encountered in the cultivation process of Audio Engineering program.

Proposed Action Plan

In this part, the purpose is to improve the teaching quality of audio engineering by addressing the problems identified in the inspection process. The research-based solutions focus on optimizing course design, improving resource management, and enhancing the effectiveness of internships and practices.

Implication to Educational Management

Based on the PDCA cycle model applying in the educational management of audio engineering, the findings and outcomes of this study will provide references for educational administrators in the theory and practice of more educational projects, programs and discipline management, and will promote the further development of educational management.

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Chapter 2
METHODS OF STUDY AND SOURCES OF DATA

Research Design

Given the research problem of this study, combining qualitative and quantitative analyses is the most suitable approach. Qualitative data collection will involve conducting interviews with school leaders (President, Dean, Directors) to gather insights on their vision, goals, expectations, challenges, and recommendations for the Audio Engineering program. To ensure the validity and reliability of the interview guidelines, they were reviewed by industry experts for potential improvements. Additionally, document reviews include the talent cultivation plan and 31 syllabi for core courses, aiming to describe the current state of program development.

The analysis of the talent cultivation plan clarify the program's objectives, while the syllabi analysis focus on teaching methods, resource support, assessment methods, and practices that encourage student participation. Feedback from employer questionnaires highlight the recognition of internship students and the skills and professionalism valued by enterprises. Furthermore, administering questionnaires to faculty and students were collected qualitative insights on areas for improvement and quantitatively assess the impact of ten factors from the talent cultivation plan, syllabi, and teaching resources on students' employability. This data ultimately be used to evaluate whether the outcomes of the talent cultivation plan align with industry needs.

Locale of the Study

The locale of the study was conducted in Guilin Tourism University which is a higher education institution focused on tourism-related fields. This study was conducted within the Audio Engineering program under the School of Tourism Performing Arts, and focuses on the construction of the program, the problems met, and the proposed action plan to address the industry demand and the recent restructuring of the university.

Participants of the Study

Since the Audio Engineering program upgraded into four-year undergraduate program in 2019, the participants of the study in include all the stakeholders: one (1) President of Guilin Tourism University, the Dean from School of Tourism Performing Arts, two (2) directors from Audio Engineering program and eight (8) faculty members currently teaching courses in the Audio Engineering program, thirty one (31) alumni of the Audio Engineering program, two hundred and fifteen (215) undergraduates of Audio Engineering program and twelve (12) employers from audio and tourism industry.

Excluding the thirty (30) undergraduate students and five (5) alumni who participated in the pilot test, two hundred and nineteen (219) questionnaires should have been collected, and two hundred and fourteen (214) were actually returned. After removing five (5) invalid questionnaires with a response time of less than sixty (60) seconds and completely repetitive content, it obtained two hundred and nine (209) valid questionnaires, and the valid return rate is 95.43%. Among these, eight (8) faculty questionnaires were collected, and the valid return rate is 100%, one hundred and seventy five (175) undergraduate student questionnaires, with a valid return rate of 94.59%, and twenty six (26) alumni questionnaires, with a valid return rate of 100%. An

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overview of the demographic information of the valid survey respondents is presented in Table 1.

Table 1 Overview of the Demographic Information of the Valid Survey Respondents

Category	**Population**	**Percentage(%)**
School Leaders	4	1.88
Faculty Members	8	3.75
Undergraduate Student	175	82.16
Alumni	26	12.21
Total	213	100.00

Research Instruments

To conduct this analysis effectively, the researcher use various research instruments to gather data from different stakeholders involved in the program. The types of instrument used and the data sources are presented in the following table:

Table 2 Research Instruments for Audio Engineering Program Analysis

Research Instrument	**Content**	**Participants**
Interviews	Gather insights into school leaders' vision, goals, and expectations for the Audio Engineering program	School leaders
	The problems met by Audio Engineering program from school leaders and the recommendations and suggestions.	
Document Analysis	Analyze the talent cultivation plans, syllabi and the employment of Audio Engineering program.	Dean Directors
Questionnaires	Obtain feedback from stakeholders on the aims of Talent cultivation plan and the curricula design, the implementation of participate in project, competition, Internship.	Faculty members Undergraduate Students Alumni
	Analyze stakeholders' perceptions of the alignment of talent cultivation plan with industry demands and student career aspirations.	Faculty members Undergraduate Students alumni
	Gather insights of the stakeholders' concern with Syllabi. Such as the course aims, course content, course products and course assessment.	Faculty Members Undergraduate Students Alumni
	Obtain feedback from stakeholders on teaching resources, such as laboratories, online learning resources, facilities and teaching skills.	Faculty Members Undergraduate Students Alumni
	Employability Tracking	Employers

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Research Instrument	Content	Participants
		Alumni
	The problems met by Audio Engineering program from all stakeholders' perspective.	Faculty members Undergraduate Students
	Recommendations from all the stakeholders	Faculty members Undergraduate Students Alumni Employers
Existing Data Analysis	Analyze academic records, graduation rates, student performance, and postgraduate entrance examination results to analyze program effectiveness.	Directors Faculty members

Five expert validators include three Filipino experts and two Chinese experts with experience in the relevant field were selected as reviewers for the validation of the research instruments. The initial version were sent to these expert validators with possess extensive knowledge and experience in the education and audio engineering program management, provided professional feedback and suggestions: 1) the instruction is clarity. 2) The interview and questionnaire questions cover multiple aspects of the program, ensuring a comprehensive analysis of the audio engineering program. 3) Questions are clear and concise, phrased accurately, and easy to understand. 4) The problem design is closely centered around program analysis and focus on single idea. 5) The questions are arranged in a certain order, and the logic is clear.

Overall, all the expert validators gave positive feedback on the interview and questionnaire design. However, they also gave some suggestions for improvement: 1) Some questions could be more specific to elicit detailed responses. 2) grouping related questions together. 3) combining some overlap questions. 4) adjusting some of the questions to make them more logically. 5) Adding some demographic questions years of work in the industry, as well as years of teaching. 6) Adding some open-ended questions to better understand students' perspectives and insights. 7) Questions that were not directly related to the study should be removed. All the interview outline and questionnaires were modified according to these suggestions.

Additionally, parts of the questionnaire underwent SPSS26 statistical analysis to assess its reliability and validity via Cronbach's Alpha and Kaiser-Meyer-Olkin (KMO) test. Due to insufficient sample size, the factor analysis could not be carried out successfully after administering Kaiser-Meyer-Olkin (KMO) test for these four groups' questionnaires. Therefore, it take 5 experts' validation instead of the factor analysis for these four questionnaires.

The final modified interview outlines and questionnaires were gave ratings by the expert validators. The rating scale from 1 to 5, where 1 indicates not valid and 5 indicates high valid. The average score for each item was calculated by taking the mean of the scores from the five experts. The validity and reliability results are presented in table 3.

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Table 3 validation results

Component	Validity Results (Experts Rating Grand Mean)	Sd.	Reliability Statistics (Cronbach's Alpha)
Interview for president	4.86	0.055	-
Interview for dean	4.86	0.080	-
Interview for directors	4.84	0.049	-
Questionnaire for faculty members	4.88	0.075	0.914
Questionnaire for undergraduate students	4.90	0.063	0.950
Questionnaire for alumni	4.88	0.075	0.949
Questionnaire for employers	4.94	0.080	0.916

The Cronbach's Alpha value of faculty members, undergraduate students, alumni and employers with 0.914, 0.950, 0.949 and 0.916 respectively, all test results a>0.7, that means the research instrument is generally considered to have good internal consistency. And also all the experts rated the research instrument more than 4.80, as "highly valid". It indicates the results were consistent and the instruments can be effectively used for data collection in the formal study.

Data Gathering Procedure

The program documents were downloaded from the school official website. And the internship evaluation documents were collected from Student internship handbooks.

The interviews with the school leaders were conducted separately on July 4th, 17th and 23th, 2024 by Tencent Meeting. The questionnaire were distributed to faculty members, undergraduate students and alumni through Questionnaire Star with a letter of consent attached to them. The questionnaires data collection start on July 12th,2024 and lasting 2 weeks. After retrieving the tool from the respondents, the data were classified, tallied and tabulated using the statistical treatment.

Data Analysis

In this study, The quantitative data collected by questionnaires were analyzed using SPSS 26. The Mean (average) was calculated to show the overall situation of the three groups of faculty, students and alumni. Percentages were used to show the proportion and frequency of each group's participation in projects, academic competitions and internships to help visualize the participation levels of different groups. Through the frequency distribution, the frequency of different options selected for each question was shown, so as to observe the selection distribution of respondents. Bar charts were used to show the main problems encountered by different groups in the management, teaching and learning of audio engineering program. The pie chart was used to visually show why students choose to enroll in audio engineering program and their willingness to work in related fields in the future.

Mean (Average), is a basic indicator that describes the centralized trend of data. The mean is calculated by adding all data points together and then dividing by the

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total number of data points, and is often used to measure the central location or typical value of a set of data.

Formula: $Mean\left(\overline{X}\right)=\frac{\sum_{i=1}^{n}X_i}{n}$

Percentage is a ratio used to express the relationship between a part and a whole. It is calculated by multiplying the ratio by 100, in the form of what percentage. The percentage were used to count the problems encountered by faculty in teaching and the problems met by students in course learning and internships, and rank these problems to analyze the main problems met by faculty and students in the teaching process.

Formula: $Percentage=\left(\frac{Frequency}{Total}\right)\times 100\%$

Multiple linear regression analysis will be utilized to investigate the independent variables such as course participation, competition participation, internship experiences, postgraduate examination participation, school-enterprise cooperation participation, dissertation and graduate projects, teaching methods, course assessment method, student interaction, these will all fall under the talents cultivation plan and syllabi and teaching resources. This method will enable understanding the contribution of each independent variable to the dependent variable and their relative importance. Regression analysis typically requires two types of data: independent variables (predictors) and dependent variables (outcomes). Independent variables are variables used to predict or explain changes in the dependent variable, while the dependent variable is the result or outcome we want to understand or predict.

Independent Variables (Predictors), these variables are typically factors that influence the dependent variable and can be either quantitative (continuous) or categorical (discrete). In this study, independent variables include participation in projects, participation in competition, participation in internship, specialized library resources, textbooks, teaching methods, clarity of course objectives, class participation, relevance of course content to the professional field and career planning.

Dependent Variable (Outcome), This is the result or target we hope to predict or explain. In this study, the dependent variable include student's employability.

Formula: $Y=\beta_0+\beta_1X_1+\beta_2X_2+...+\beta_nX_n+\varepsilon$

Where,

Y represents the dependent variable;

$X_1, X_2, ...X_n$ are the independent variables;

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β_0 is the intercept, $\beta_1, \beta_2, ..., \beta_n$ are the coefficients of the independent variables;
ε is the error term.

Potential Ethical Issues

First, all participants (including school leaders, faculty, staff, undergraduates, and employers) need to be informed of the purpose of the study, their role, and the risks and benefits that may be involved, and provide and sign informed consent to conducting interviews, questionnaires, or other data collection activities.

Second, during the data collection process for this study, it is necessary to ensure that all participants' responses are anonymous and that their personal information were properly protected from disclosure in any publication or research report.

Third, in the process of collecting research data for this study, it is necessary to ensure that all participants can freely withdraw from the study without any consequences, and it is necessary to ensure that their participation in the study is completely voluntary and no form of coercion is imposed.

Fourth, it is important to maintain accuracy and impartiality in the presentation of the findings and results of this study and to avoid reporting or cherry-picking data for a particular narrative.

Finally, the study must use the data collected from participants responsibly and ethically, ensuring that the data is used only for the purposes specified in the study and must not be diverted in any way.

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Chapter 3
RESULTS AND DISCUSSION

1. Description and Analysis of Audio Engineering Program

1.1 Talent Cultivation Plan

Talent cultivation plan is a systematic education plan formulated by colleges and universities to achieve training objectives. It mainly includes the components with cultivation objectives, curriculum system design, practical training and internships arrangement, assessment, resource allocation and quality assurance measures. Its purpose is to systematically guide students to complete their studies within a specified time through a scientific and reasonable curriculum system and teaching mode. In order to achieve the expected knowledge, skills and quality requirements, and finally cultivate high-quality talents align with the needs of society.

After the evaluation of undergraduate qualification in 2023, the university underwent a departmental restructuring and merged the Audio Engineering program into the newly established School of Tourism Performing Arts. In order to explore the relationship between this adjustment and the talent cultivation objectives of Audio Engineering program and the future development plan for this program, as well as the scientific and feasibility of talent cultivation plan, this study conducted an interview with school leaders, they point out that the program need to take professional orientation, industry demand and market trends and School-enterprise cooperation as the factors into consideration can ensure that the talent cultivation plan for audio engineering program will be scientific and reasonable in the future development, combine tradition with modern technology.

Based on the analysis of the current talent cultivation plan, this study presents the curriculum system design of audio engineering program in the form of figure (see Figure 3).

The focus of freshman year is on laying a solid foundation. Aimed at cultivating students' understanding and mastery of basic professional knowledge. For the sophomore year, the curriculum shifts towards artistic aesthetic cultivation and basic skills in audio equipment operation, enhancing students' aesthetic abilities and initial technical skills. In junior year, There is a further emphasis on practical operations, as well as the expansion of musical culture, intended to strengthen students' practical skills and deepen their understanding of music culture. In senior year, building on the skills acquired, the curriculum delves into audio system design and sound creation abilities, preparing students to possess advanced creative and design capabilities upon graduation.

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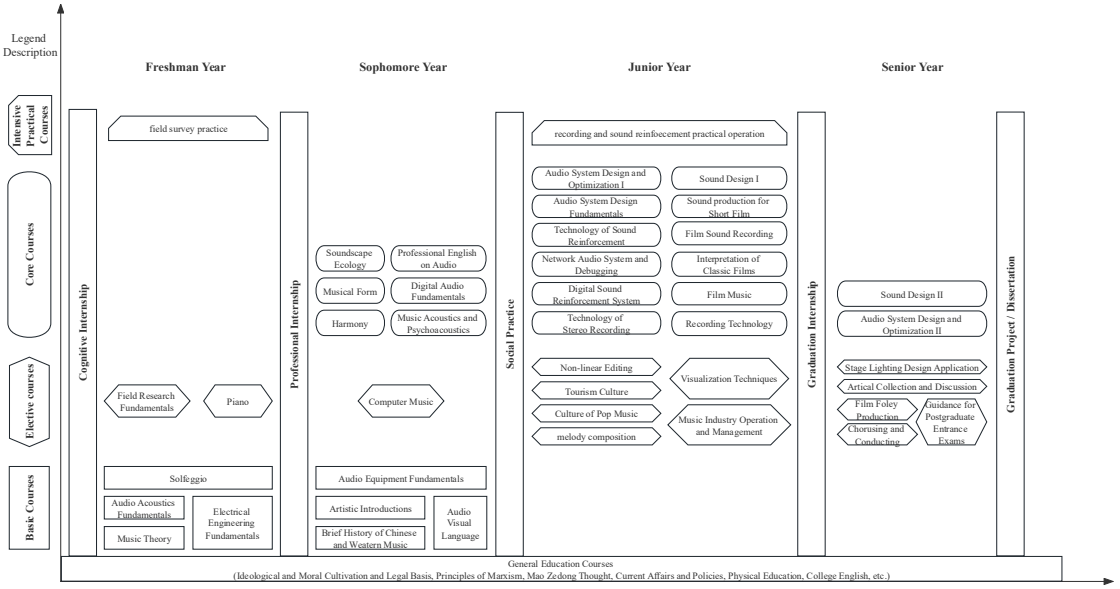

Figure 3 Curriculum System Design of Audio Engineering Program

From the interview of the dean and two directors, and the analysis of descriptive statistical results of the clearness of objectives of the talent cultivation plan, faculty members and the school leaders considered the requirements for knowledge, skills and qualities of the objectives of the talent cultivation plan unclear.

The results on the participation of the talent cultivation plan implementations was gathered with four aspects, the frequency of students participating in the projects, academic competitions, internships or practical experiences and postgraduate service.

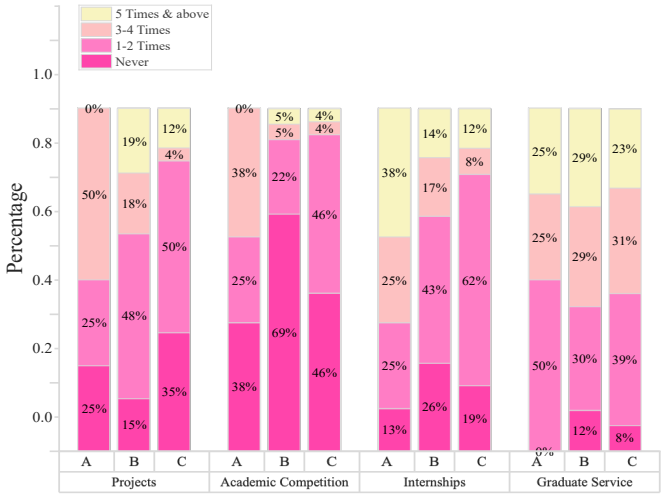

Figure 4 The Frequency of Students Participation in Different Activities

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In Figure 4, the analysis of the faculty members, undergraduate students' and alumni opinions regarding the implementation in talent cultivation plan is given. According to the survey, faculty (50%), students (63%), and of alumni(85%) participated in the projects, faculty (63%), students (81%), and alumni (82%) participated in the academic competition, faculty (38%), students (68%), alumni (81%) participated in internships or practical experiences were seldom. 42.31% of freshmen and 44.44% of sophomores reported their intention to pursue graduate studies. The existing graduate services do not adequately meet the needs of students who intend to pursue graduate studies. Overall, both faculty and students have suboptimal participation in projects, academic competitions and internships and also school's support for students' graduate preparing services is inadequate.

1.2 Syllabi

Through interviews with two directors, this study provides insight into key principles and considerations in the development of syllabi for audio engineering program. The syllabi are based on the template provided by the Academic Affairs Office to ensure consistency and standardization of the content, thus maintaining consistency in the development of the syllabi for all courses within the university. After organizing the objectives for the 31 syllabi in the Audio Engineering program, the analysis is conducted from the perspectives of standardization and teaching content.

Through interviewing two directors and analyzing the 31 syllabi of audio engineering program with directors and faculty members, the problems encountered during the implementation of the syllabi and the achievement of the objectives were clearer understand: 1) The teaching process is limited and inflexibility. 2) Combined with significant differences in student abilities, some students have insufficient cognition of professional knowledge and equipment, and most students lack of the abilities to solve practical problems. 3) Faculty and students do have different cognition in the achievement of curriculum objectives and learning outcomes, especially in the assessment standards and requirements of practical courses. 4) By analyzing the 31 syllabi of Audio Engineering program, the results show that there are overlap and irrationality in the course content design, and the faculty lack foresight and fail to fully integrate the cutting-edge content of the industry into the teaching.

1.3 Teaching Resources

In the "National Standards for Teaching Quality of Undergraduate Programs" issued by the Ministry of Education, there are relevant regulations regarding the teaching resources for the Audio Engineering program (see Table 4 for details).

Table 4 Regulations Regarding the Teaching Resources for the Audio Engineering Program

Component	**Requirements**
Requirements for Faculty Size and Structure	The age structure and title structure should reflect a hierarchy, and the academic background structure should meet the needs of professional development and talent cultivation. The faculty team should include academic leaders.

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Faculty Background	Faculty should have a master's degree or higher. Among the teachers responsible for delivering theoretical courses, the proportion with doctoral degrees should reach 30%. Teachers responsible for practical courses should have practical creative experience corresponding to the courses they teach.
Student-Teacher Ratio	According to the school-running condition indicators stipulated by relevant documents of the Ministry of Education, the student-teacher ratio should be controlled within the range of no more than 11:1.
Information Resource Requirements	There should be no fewer than 50 books per student, and at least 10 books per student should be purchased annually.
Teaching Facilities	There should be basic teaching and office facilities and equipment to meet the needs of discipline construction, teaching and research, and talent cultivation. Necessary teaching equipment, such as professional lighting equipment, stage sound systems, tracks, and recording equipment, should be provided. Multimedia professional classrooms and laboratories (such as non-linear editing rooms and recording studios) should be established and equipped as required to meet the needs of teaching and research. Data on equipment status and usage of internship sites must be collected and recorded.
Teaching Fund	Mainly used for the purchase of books and materials, textbook development, teaching team building, construction of practical teaching bases, and laboratory construction.
Practical Teaching Bases	Relatively stable on-campus or off-campus practical teaching bases should be established to meet the needs of practical teaching. A sound system for external exchanges between teachers and students should be in place, with plans to send teachers and students abroad for internships or study tours. Each major should provide sufficient internship funds to ensure the effectiveness of practical teaching.
Managing and Evaluating Teaching Data	(1)The value of equipment per student should not be less than 10,000 yuan. (2)The usage time of internship sites per student should be at least 100 hours over four years. (3)Students should have practical opportunities to use internship equipment, accumulating at least 200 hours over four years per student.

By analyzing the background of faculty in audio engineering program, it consists of 8 full-time faculty members, including 1 senior title (12.5%) instructor, 5 intermediate titles (62.5%) instructors, and 2 teaching assistants (25%) instructors. All faculty members hold master's degree, and there are no doctoral degrees. In addition, most faculty members have work experience in the performing arts and audio industries, providing a solid foundation for theoretical and practical teaching. There are 215 students enrolled in the audio engineering program and only 8 faculty, for a student-teacher

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ratio of about 27:1. With 215 students in the audio engineering program, which means that at least 10,750 books should be available. The total number of existing books is 46,300, which is far beyond the standard and meets the requirements. There are 10 practice teaching bases for the audio engineering program, of which 3 are on-campus and 7 are off-campus, basically meeting the standard requirements in quantity.

Through interviews with school leaders, they realized the number of faculty is seriously short, the structure is unreasonable and the international exchange program in this program would be the plan in next development stage. Based on the descriptive statistics on how was the textbooks meet students learning needs, library resources, teaching equipment, and the number of laboratories and laboratory availability, faculty members clearly expressed the greatest dissatisfied with the hardware facilities in the audio engineering program.

Table 5 Descriptives Results Related with Faculty Training Opportunities of Teaching Resources

component	**Percentage(%)**				**Mean**	**Sd**
The school provides sufficient training opportunities for faculty.	strongly disagree	disagree	agree	strongly agree		
	37.5	37.5	25.0	0.0	1.88	.835

As the table 5 shows, faculty members were dissatisfied with the training opportunities provided. 75% of the faculty members believe that the training opportunities are inadequate. This reflects a significant shortfall in providing sufficient training opportunities, and faculty are urgently in need of more training to improve their teaching skills and professional expertise.

In short, the problems were encountered in teaching resources: 1) Aging equipment and lack of maintenance and update. 2) Insufficient equipment and resources. 3) The construction of faculty teams are unreasonable. 4) The practical operation and internship opportunities for students are limited. 5) The lack of international exchange program. 6) the use application of the laboratory is complicated.

2. Problems met by Audio Engineering program

This section systematically investigates and discusses the problems encountered in the teaching management and teaching process of audio engineering program from four dimensions: school leaders, faculty members, students and alumni.

2.1 School Leaders

The interview results of the management perspective of school leaders with the problems met in audio engineering program are shown in figure 5.

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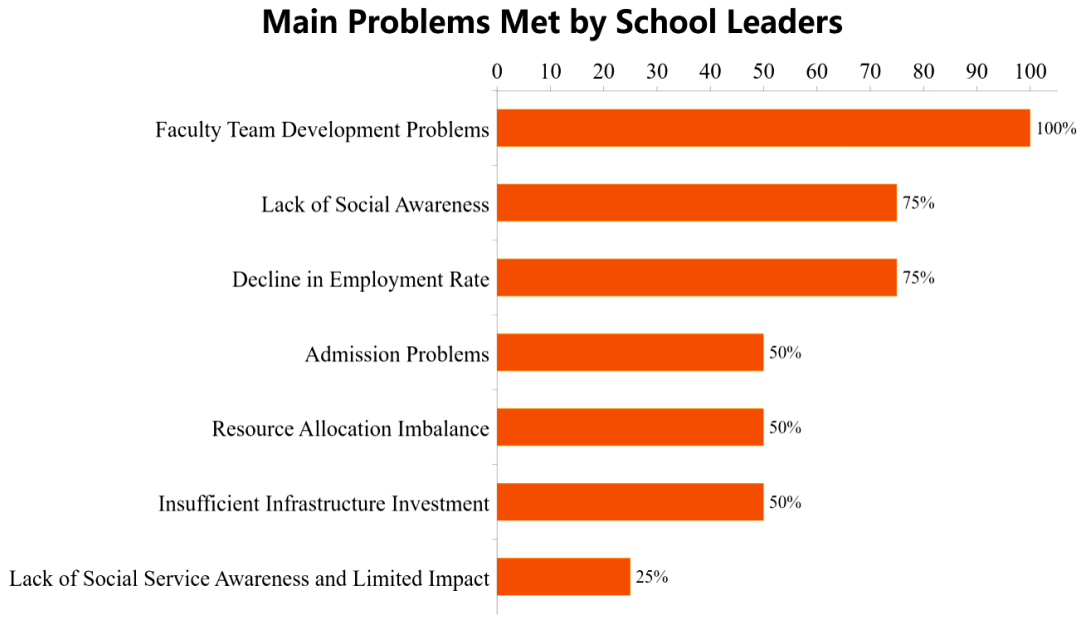

Figure 5 Problems Met by School Leaders

According to the interview of school leaders shown that they had a deep understanding of the development of audio engineering program, and put forward a lot of constructive opinions and suggestions. These feedback, from the perspective of management, reveal the current problems of the program and provide clear directions for future improvement and development. The main top 3 problems identified from the school leaders' perspective are as follows: 1) **Faculty Team Development Problems**, from the figure shown that 100% of the school leaders were recognized that the faculty team development in audio engineering program specialized faculty is challenging because the program requires highly skilled educators, and such talent is scarce. 2) **Lack of Social Awareness**, Parents and society have insufficient awareness of the Audio Engineering program, leading to low student enrollment willingness, which affects the quality and quantity of student intake. Many students have transferred into the Audio Engineering program from other programs (see figure 6). 3) **Decline in Employment Rate** (see table 6), The data clearly shows a decline in the employment rate, with a decrease from 87.09% in 2023 to a significantly lower 55.26% in 2024, representing a drop of 34.74 percentage points. This suggests that the competitiveness of 2024 graduates in the job market or the employment environment might be facing challenges.

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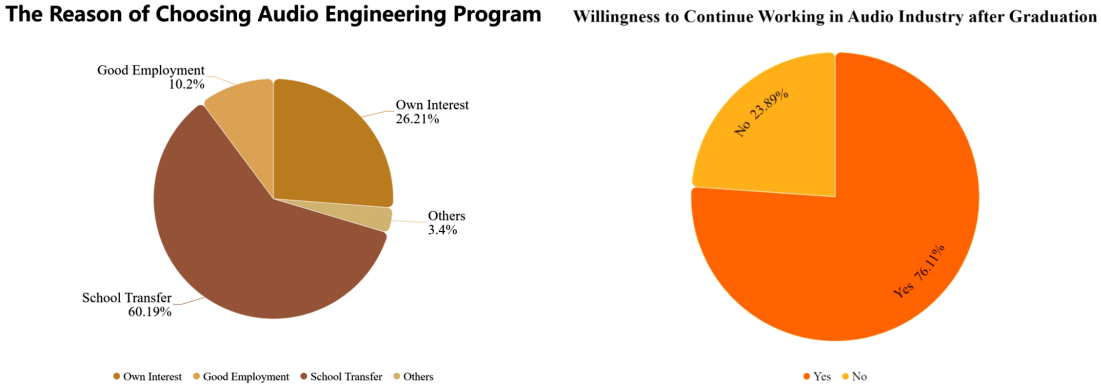

Figure 6 Status of Audio Engineering program Students' choosing and willingness

Despite the majority of students entering the Audio Engineering program through a transfer from other programs and having little understanding about the field beforehand, most students are willing to continue working in related jobs after studying audio engineering. This suggests that students gradually recognize and develop interest and confidence in the audio engineering program throughout their studies. Consequently, the program has a high level of acceptance among students. However, this also highlights the need for increased promotion and awareness of the program among students, parents, and society, as its recognition remains relatively low.

Table 6 Status of Employment in Audio Engineering Program

Enrollment Year	Graduation Time	Population	Population of Employment	Proportion (%)	Professional Relevance Rate(%)	
					2023	2024
2019	2023	31	27	87.09	70.37	60.00
2020	2024	38	21	55.26	-	80.95

To better understand the actual employability levels of students in the Audio Engineering program, this study collected data from 31 students on 10 factors that may influence their employability. Using multiple linear regression, the study established a causal relationship between these factors and the students' employability to determine whether these factors significantly impact their employability. The dependent variable Y represents employability, while the 10 independent variables are represented by X_1, X_2, X_3,..., X_{10}. The multiple linear regression equation for the dependent variable Y in relation to the independent variables X_1, X_2, X_3,..., X_{10} is as follows: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_{10} X_{10} + \varepsilon$, where $\beta_1, \beta_2, \ldots, \beta_{10}$ represents the partial regression coefficients, and ε represents the random error term.

The primary tasks of regression analysis include estimating the model parameters using sample data, performing hypothesis tests on the model parameters, applying the

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regression model to predict the dependent variable, and investigating the influence of each independent variable X on the dependent variable Y.

Table 7 Regression Analysis Results for Student Employability

X	β	SEM	Beta	t	Sig.	VIF	R^2	Adjusted R^2	DW	F
Constant	-1.529	.585	-	-2.612	.017	-				
Participation in projects	.272	.114	.375	2.383	**.027**	3.270				
Participation in competition	.276	.123	.290	2.252	**.036**	2.188				
Participation in internships	.057	.106	.071	.536	.598	2.334				
Specialized Library Resources	.098	.099	.109	.992	.333	1.593				
Textbooks	-.046	.134	-.049	-.344	.735	2.721	.849	.773	1.729	11.218 (p=0.000)
Teaching methods	-.001	.174	-.001	-.007	.994	2.977				
Clarity of course objectives	.192	.148	.158	1.297	.209	1.953				
Class participation	-.273	.224	-.171	-1.219	.237	2.593				
Relevance of Course Content to the Professional Field	.467	.249	.289	1.873	.076	3.144				
Career Planning	.411	.185	.288	2.220	**.038**	2.225				

From Table 7, it can be seen that the Durbin-Watson (DW) value of the model is 1.729, which is close to 2, indicating that there is no significant issue with autocorrelation in the model's residuals, and the independence of the samples has passed the test. The R^2 value of the model is 0.849, meaning that 84.9% of the variation in students' employability can be explained, suggesting that the explanatory power of the independent variables on the dependent variable is strong. The F-value is 11.218, and

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the p-value is 0.000, which means the overall model is statistically significant, indicating that at least one independent variable has a significant impact on the dependent variable. The test for multicollinearity in the model found that all VIF values are less than 5, indicating that there is no issue with collinearity.

For the independent variable "participation in projects" the regression coefficient β_1 is 0.272, indicating that for every unit increase in project participation, the employability score increases by an average of 0.272. The t-value is 2.383, and the Sig. value is 0.027 (Sig. < 0.05), indicating that project participation has a significant positive impact on employability. For the independent variable "participation in competition" the regression coefficient β_2 is 0.276, indicating that for every unit increase in competition participation, the employability score increases by an average of 0.276. The t-value is 2.252, and the Sig. value is 0.036 (Sig. < 0.05), indicating that competition participation has a significant impact on employability. For the independent variable "career planning" the regression coefficient β_{10} is 0.411, with a t-value of 2.220, and a Sig. value of 0.038 (Sig. < 0.05), indicating that career planning has a significant impact on employability.

Based on the regression analysis results, the variables that significantly influence students' employability include "participation in projects" "participation in competition" and "career planning" Therefore, the final regression equation can be written as: Employability= -1.529 + 0.272 × Participation in projects + 0.276 × Participation in competition + 0.411 × Career planning.

This equation indicates that project participation, competition participation, and career planning have a significant positive impact on students' employability. Other variables did not have a significant impact under the current model and thus were not included in the final equation.

An F-test was conducted on the model, and it was found that the model passed the F-test (F = 11.218, p = 0.000 < 0.05), indicating that the construction of the model is meaningful.

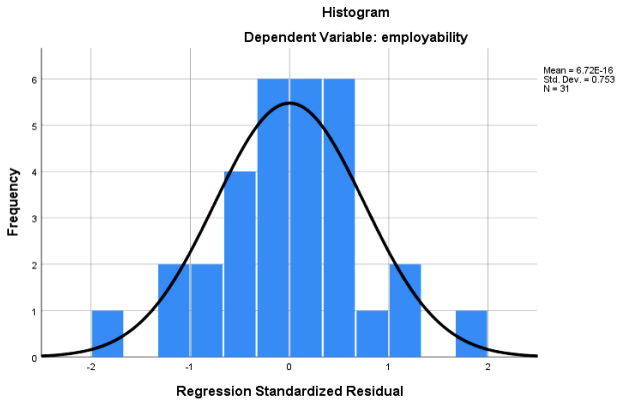

Figure 7 Histogram of Regression Standardized Residual

From the histogram, the distribution of standardized residuals appears to follow a roughly normal distribution, with minimal skewness, indicating that the residuals of the regression model approximately satisfy the normality assumption.

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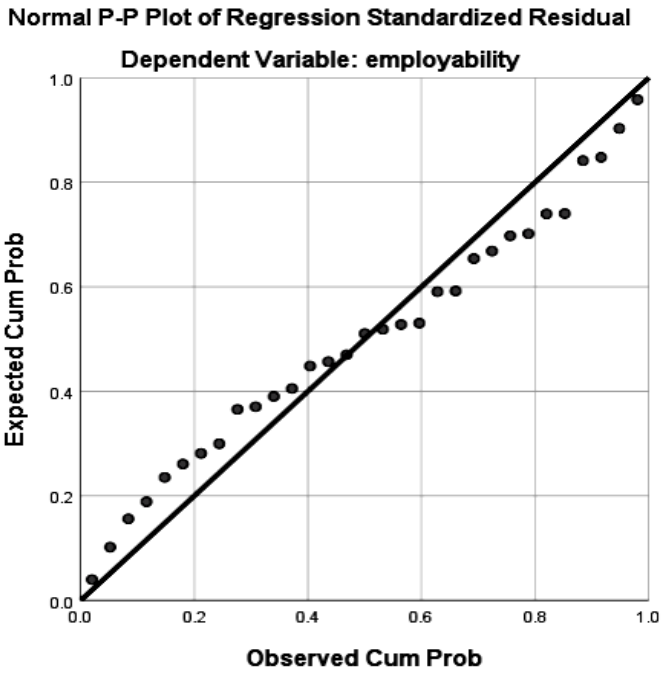

Figure 8 Normal P-P Plot of Regression Standardized Residual

In the P-P plot, it can be observed that the data points are mostly aligned along the diagonal, indicating good normality of the residuals, which suggests that the model's prediction errors are uniformly distributed and that the model is relatively robust.

Through the above regression analysis, it is found that **student participation in projects, academic competitions, and career planning** are key factors influencing employability. To improve students' employability, efforts can be strengthened in these areas.

2.2 Faculty Members

In the actual teaching process, faculty members were encountered various problems that affect the teaching effect as well as students' learning outcomes and professional growth.

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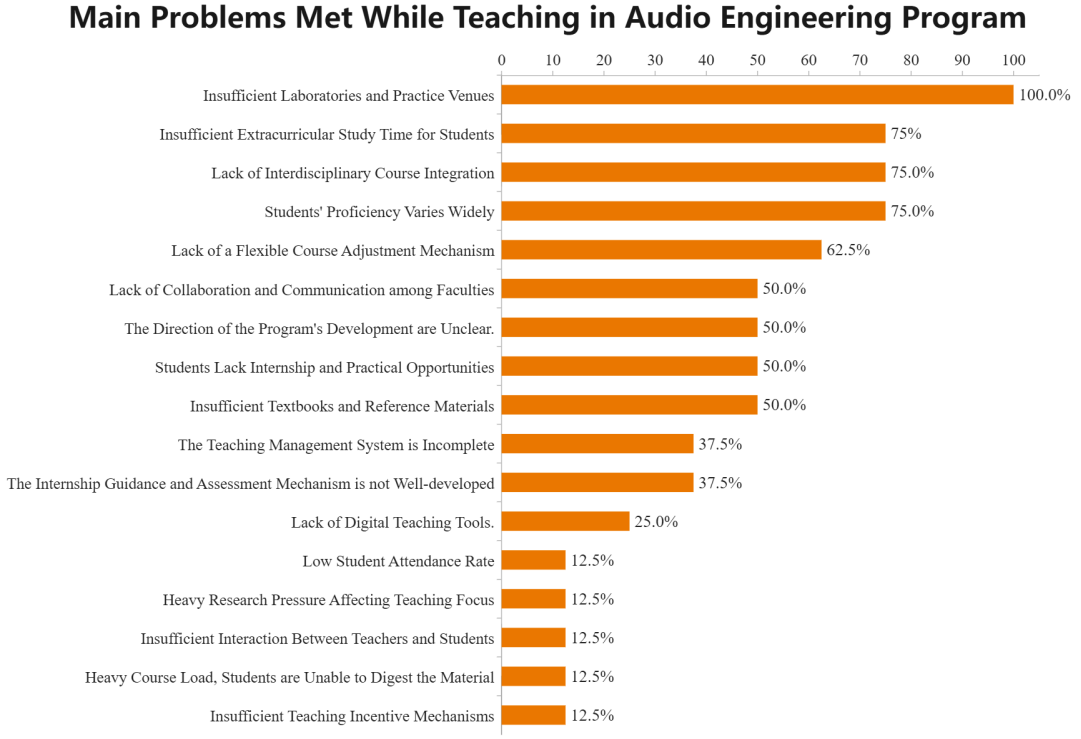

Figure 7 Main Problems Met by Faculty Members During Their Teaching

Based on the distribution of responses with the problems met by faculty members from figure 7, we can clearly see that the prominent problems commonly encountered by faculty members mainly include: 1) Insufficient laboratory and practice facilities; 2) Insufficient extracurricular study time for student; 3) Lack of interdisciplinary course integration; 4) Student's proficiency varies widely; 5) Lack of a flexible course adjustment mechanism.

2.3 Students and Alumni

Before the formal questionnaire send to students, the researcher have collected the main problems met by students by survey. Then offered the check lists for students and alumni to choose what problems they met during course learning and internships. Through questionnaire survey, this study collected the main problems encountered by students in the learning process from the two dimensions of course learning and Internship. The survey collection result is presented in figure 8-9.

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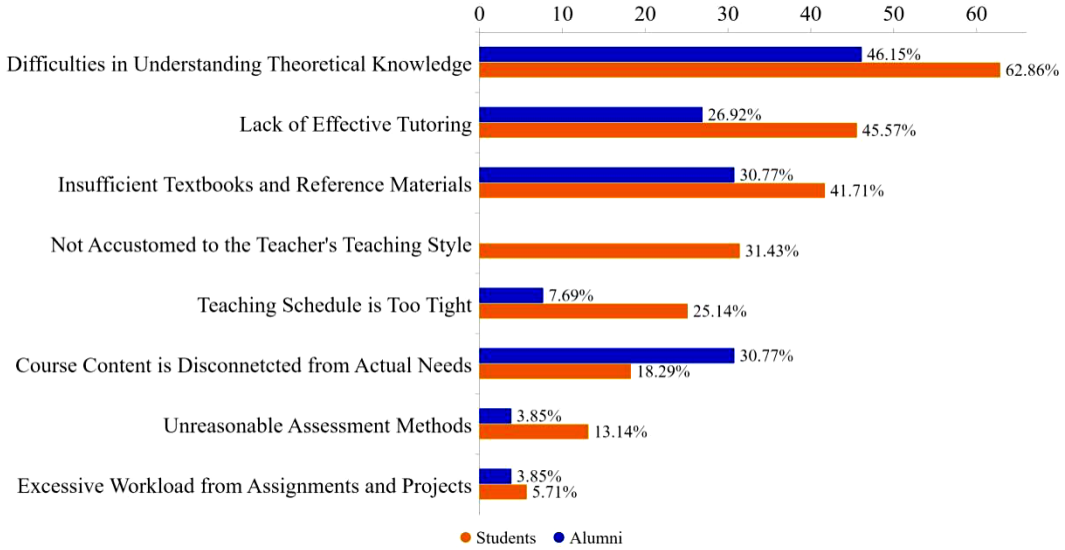

Figure 8 Main Problems Met by Students and Alumni During Their Course Studies

The statistical results from Figure 8 reveal that the top three problems students met in their Audio Engineering courses study include: 1) 62.86% of students and 46.15% of alumni reporting the problem of difficulties in understanding theoretical knowledge; 2) 45.57% of students lack of effective tutoring; 3) 41.71% of students and 30.77% of alumni considered they encountered the problem of insufficient textbooks and reference materials. 4) 30.77% of alumni pointed out that they met the problem of course content is disconnected from actual needs.

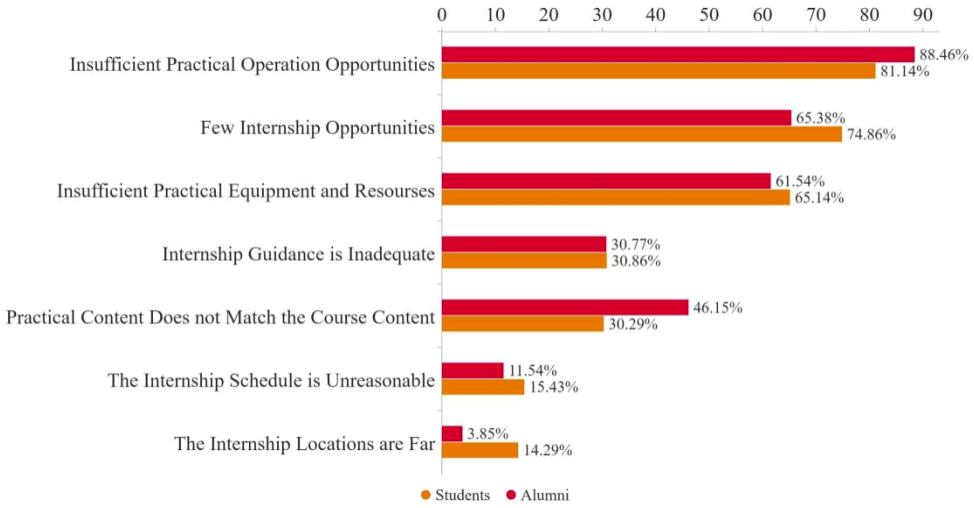

Figure 9 The Main Problem Met by Students and Alumni During their Internship

The top three problems encountered by students and alumni in the process of internship were concentrated in these aspects: 1) with the proportion of Students

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(81.14%) and alumni (88.46%) insufficient practical operation opportunities; 2) 74.86% of students and 65.38% of alumni reported lack of internship opportunities; 3) 65.14% of students and 61.54% of alumni cited a lack of adequate practice equipment and resources.

It can be seen from these data and similar problems from students, since the upgrade of the audio engineering program in 2019, the communication and cooperation with enterprises in the internship stage is still insufficient. Although there is a certain basis for cooperation, it can not effectively meet the practical needs of internship. There is a gap between enterprises and school in the realization of internship practice requirements, which affects the depth and breadth of students' participation in practical operation. Internship opportunities and practical resources on campus also do not meet the needs of most students. Especially in terms of equipment and guidance, there are obvious shortcomings.

3. Proposed Action Plan

According to the problems met by school leaders, faculty members, students and alumni in audio engineering program, the most challenging problems they met such as faculty team development problem, insufficient laboratories and practice venues, difficulties in understanding theoretical knowledge and insufficient practical operation opportunities.

And base on the 4 interviewees responses of school leaders (see appendix E question 18-19), questionnaire feedback from respondents of 8 faculty members (see appendix E question 20) and 175 undergraduate students (see appendix E) and 26 alumni to question of specific suggestions regarding the problems they encountered during the teaching, course study and practical training. These recommendations mainly including:

1) **From the perspective of school leaders,** they could optimize recruitment conditions to attract higher-level talents, while strengthening faculty training to enhance the teaching and scientific research capabilities; they could promote the audio engineering program through various platforms to increase public and parental awareness and recognition; in the long term, by serving the local community to enhance the program reputation to establish brand recognition and attract more high-quality students; by strengthening student participation in projects, academic competition and offering career planning guidance to enhance the students' employability.

2) **From the perspective of faculty members,** they may actively explore existing resources by promoting the sharing of laboratory equipment, designing innovative small-scale experiments, and utilizing virtual resources like virtual equipment and practice platforms to maximize the effectiveness of practical teaching with limited hardware facilities; they may consider students' time management and abilities, encouraging self-study with flexible online resources and guidance for more effective extracurricular study; they could collaborate with colleagues from other disciplines to design interdisciplinary courses or projects, enabling students to integrate knowledge from different fields; they also could implement differentiated teaching through layered teaching and provide targeted support and resources according to the different learning levels of students; they may incorporate a degree of flexibility into course design.

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3) **From the perspective of students and alumni,** they could improve their understanding by preparing before class, reviewing after class, and using library and online resources; as well as forming study groups to explore difficult topics and questions together; they may make full use of after-class tutoring, peer assistance programs, and online learning platforms like MOOCs and professional forums to seek additional guidance and expand learning channels; they also could utilize library resources and seek additional online materials if necessary, while organizing their own class notes and resources from forums to create a shared learning resource library with peers for mutual improvement. For the problems met during internship, they should actively engage in practical activities like on-campus projects, workshops, and simulated projects to compensate for limited internships, and proactively seek more opportunities by connecting with teachers, alumni, or enterprises.

Based on the afore research results and findings, the researcher put forward the following three proposed action plans, as showed in table 8.

Table 8 Proposed Action Plan

Key Result Area	**Suggested Program**	**Objective**	**Strategies**	**Activities**	**People Involved**	**Time Frame**	**Expected Outcome**
The shortage of both quantity and quality of faculty in the audio engineering program	***School Leaders' Faculty Team Development and Recruitment Action Plan***	To optimize the construction of faculty team	Adjusting recruitment policies to attract high-level professionals by offering competitive salaries and industry collaboration opportunities. Implementing a professional development program for existing faculty, including industry-led training and faculty fieldwork in the industry.	Revise recruitment policies to include industry experience and offer competitive packages to attract skilled professionals; Organize ongoing professional development workshops and training programs where industry experts conduct workshops on the latest technologies, or arrange for faculty to gain hands-on experience in industry settings.	School leaders HR department External trainers Industry partners Faculty members	3-6 months for recruitment policy adjustments. Training held once per semester	Increased recruitment of high-quality faculty. Improved teaching and research capabilities of existing faculty, leading to better student outcomes and employability.

Key Result Area	Suggested Program	Objective	Strategies	Activities	People Involved	Time Frame	Expected Outcome
Insufficient laboratory and practice facilities	***Faculty Members' Resource Optimization and Innovation Action Plan***	To maximize the utilization of existing resources and improve practical teaching effectiveness	Promoting the sharing of laboratory equipment with other departments. Designing innovative small-scale experiments and practical activities. Explore and integrate virtual resources, such as virtual equipment, virtual software and practice platforms.	Organize cross-departmental meetings to discuss the feasibility of sharing equipment and establish rules and schedules for shared usage. Faculty members design small-scale experiments based on existing equipment, and hold teaching seminars to optimize experimental plans, ensuring maximum efficiency of equipment use; explore and integrate virtual practice platforms and software suitable for audio engineering education, to complement or replace physical hardware for teaching purposes.	Faculty members School administration Other departments	Sharing of equipment and facilities in the next semester. Implementation of small-scale experiments in the next semester. Integration of virtual resources (platforms, equipment and software)within 1 year.	Increased access to practical resources through shared equipment. Enhanced practical teaching effectiveness despite limited hardware. Reduced dependence on physical equipment through virtual tools.

Key Result Area	Suggested Program	Objective	Strategies	Activities	People Involved	Time Frame	Expected Outcome
Difficulties in understanding theoretical knowledge	***Student Driven Knowledge Action Plan***	To improve students' understanding of theoretical concepts	Encouraging pre-class preparation and post-class review. Promoting collaborative learning through study groups.	Students preview course materials ahead of class, identify confusing areas, and come prepared with questions, reviewing content after class; Using library resources, online materials, or relevant literature to deepen understanding of challenging topics; Form study groups where students collaborate, discuss difficult topics, and solve theoretical questions together.	Students Faculty members Peer study groups	Immediate implementation, with ongoing pre-class and post-class activities. Study groups formed within the first month of each semester.	Improved understanding of theoretical knowledge through structured pre-class and post-class activities. Enhanced problem-solving and analytical skills through collaborative learning in study groups

Key Result Area	Suggested Program	Objective	Strategies	Activities	People Involved	Time Frame	Expected Outcome
Insufficient practical operation opportunities	***Student Practical Experience Action Plan***	To increase students' practical operation opportunities and hands-on experience	Encouraging participation in on-campus and off-campus projects and workshops. Promoting simulated projects for students unable to secure internships. Encouraging students to proactively seek internships or hands-on opportunities through faculty or school-enterprise collaboration.	Organizing practical workshops where students can work on real or simulated projects related to audio engineering. Partner with local enterprises to arrange short-term internships or project-based collaborations Developing and assign simulated practice tasks Facilitate connections between students and alumni or industry partners to create networking opportunities for internships. Include students in faculty research	Students, Faculty members, School administration Local enterprises Alumni	Practical workshops held each semester. Enterprise partnerships and internships arranged within 1-2 semesters. Simulated tasks available throughout the academic year.	Establish a permanent audio technology workshop that provides audio engineering support for various school and external events. Enhanced practical skills and experience through real and simulated practice. Improved employability through active participation in internships.

Key Result Area	Suggested Program	Objective	Strategies	Activities	People Involved	Time Frame	Expected Outcome
				projects to provide hands-on practice.			

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4. Implication of the Study to Educational Management

This study found that the description of knowledge, skills and quality requirements in the talent cultivation plan of Audio Engineering program is broad, and the teaching process is inflexibility, which cannot be adjusted according to the actual situation of students. As a result, some students lack the cognition of professional knowledge and equipment, and lack the ability to solve practical problems. Therefore, the educational managers of audio engineering could draw inspiration from this finding, review and optimize the talent cultivation plan, and clarify the objectives.

In addition, the study also found that the teaching resources of audio engineering program have insufficient equipment aging, maintenance and updating, and students have limited practical opportunities. In the aspect of education management, the construction of faculty team development met dual challenges in quantity and quality, especially the shortage of instructors with senior titles and the difficulty of recruiting high-level teachers. In addition, the course management system has not been fully improved, especially in the areas of course selection, course adjustment and internship supervision. School educational managers should draw inspiration from it, actively strengthen the construction of faculty, optimize the teaching management system, improve the supervision and management level of courses and practice, and ensure the learning quality of students.

This study puts forward four action plans for the most intractable problems in the audio engineering program, "School Leaders' Faculty Team Development and Recruitment Action Plan", "Faculty Members' Resource Optimization and Innovation Action Plan", "Student-Driven Knowledge Action Plan", "Student Practical Experience Action Plan". These programs are designed to systematically address the problems met by the audio engineering program in management, teaching, course learning, and internship.

Although PDCA is very mature in the field of improving engineering quality, its application in the field of education is still in the exploratory stage and is not yet fully mature. This model provides an important reference for the action plan in this study. Based on this, the study made an in-depth analysis of the talent cultivation plan, syllabi and teaching resources of the audio engineering program, found some problems and puts forward suggestions for continuous improvement. On this basis, educational managers can systematically assess and optimize all aspects to promote the sustainable development of the program. The continuous improvement of teaching quality can be achieved through regular assessment and optimization of talent cultivation plan, syllabi and teaching resource allocation.

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Chapter 4
SUMMARY, CONCLUSION AND RECOMMENDATIONS

Findings and Summary

In the talent cultivation plan, there is a problem with overly broad description of knowledge, skills and quality requirements and lacks specificity. In addition, the teaching process is limited and inflexibility, which fails to adjust the learning procedures according to the actual situation of students. Combined with significant differences in student abilities, some students have insufficient cognition of professional knowledge and equipment, and most students lake of the abilities to solve practical problems. thus affecting the overall teaching progress and effect. There are also overlap and irrationality in the course content design, and the faculty lack foresight and fail to fully integrate the cutting-edge content of the industry into the teaching. At the same time, faculty and students have different cognition in the achievement of curriculum objectives and learning outcomes, especially in the assessment standards and requirements of practical courses. In addition, both faculty and students have suboptimal participation in projects and academic competitions, and the school's support for students' graduate preparing services is inadequate. These problems collectively affect the overall talent cultivation effectiveness.

In terms of teaching resources and practical opportunities, the problems met by Audio Engineering program such as aging equipment, lack of maintenance and update, and insufficient resources, which directly affect the teaching quality. At the same time, the practical operation and internship opportunities for students are limited, and the infrastructure construction and investment are difficult to meet the needs of the development of modern audio technology. In addition, the use of the laboratory is complicated, limiting students' experiment and practice opportunities. Moreover, the lack of international exchange programs makes it difficult for students and teachers to expand their international horizons, which together restrict program development and advancement.

In terms of educational management, the audio engineering program met problems in the construction of faculty teams, the number of faculty and those with senior titles is seriously insufficient, and it is difficult to recruit high-level teachers. In addition, the teaching management system is not fully development in course selection, course adjustment and the supervision and management of the internships, which affects the students' learning experience and the outcomes. Moreover, the social recognition of the program is low, which limits the improvement of enrollment and talent cultivation quality. In addition, the employment rate of graduates has declined, further exacerbating the challenges in education management.

Limitation

Although the PDCA cycle model has been widely used in the field of quality management and its development has been very mature, its application in education management is still in the exploration stage, and the existing cases are relatively few, resulting in limited reference basis in the process of research. In this study, the PDCA cycle model is used to provide a structured framework for analyzing and enhancing the audio engineering program. Although the effectiveness of the implementation of this model in the future may be influenced by school culture, policy environment, and faculty and student acceptance, this study still shows the potential value of PDCA cycle model in educational management, and provides a certain reference value for future applications.

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The study included all stakeholders in the Audio Engineering program, with a sample of 215 students, 8 faculty members, and 31 alumni. On individual questions, the survey options are more dispersed, which can increase the variability of the results in a small number of data. However, the study still provides valuable insights into the current status of the audio engineering program, explaining key problems. These findings provide strong support for enhancing the teaching quality of audio engineering program.

Conclusions

This study took PDCA cycle model as the analysis framework, and conduct in-depth analysis from three aspects, such as talent cultivation plan, syllabi and teaching resources. All stakeholders in this study have a positive attitude of audio engineering program, but the main problems are concentrated in teaching resources, which are manifested as serious shortage of faculty team, aging and insufficient hardware facilities, and lack of internship and practice opportunities.

Some of the toughest problems for audio engineering program in terms of management, teaching, course study and internship include: 1) the shortage of both quantity and quality of faculty in the audio engineering program; 2) Insufficient laboratory and practice facilities; 3) Difficulties in understanding theoretical knowledge; 4) Insufficient practical operation opportunities. To address these problems, this study proposes four action plans: 1) "School Leaders' Faculty team Development and Recruitment Action Plan", 2) "Faculty Members' Resource Optimization and Innovation Action Plan", 3) "Student-Driven Knowledge Action Plan", 4) "Student Practical Experience Action Plan". The aim is to systematically solve these key problems and improve the teaching quality of audio engineering program and the comprehensive ability of students.

Recommendations

Recommendations for School Leaders, it is recommended that school leaders may give priority to solving the problem of aging equipment and insufficient resources, and the possibility of increasing the investment in facilities to ensure that the quality of teaching meets the needs of modern audio technology. At the same time, the possibility may give a chance to strengthen the cooperation with the enterprises in audio and tourism industry, jointly develop courses and provide practical opportunities to ensure that the course content keeps up with the development of the industry. Finally, enhancing the program awareness, attracting high-quality students, and promoting the sustainable development of the program are needed.

Recommendations for Faculty Members, it is suggested that faculty members may optimize the course design, avoid overlapping content, add forward-looking content, and enhance the practicability of the course through interdisciplinary cooperation. At the same time, the possibility of strengthening practical teaching, combining simulation training, project practice and school-enterprise cooperation to improve students' practical ability are simultaneously essential. Regular routines to collect student feedback, adjust teaching methods, and encourage teachers to participate in seminars and training are also helpful to update professional knowledge and improve teaching quality.

Recommendations for Students, it is suggested that students may take the initiative to improve their self-learning ability and enhance their understanding and application of theoretical knowledge through preview, review and group learning. It could lead to active participation in internship and project practice to accumulate experience and enhancement for professional competitiveness. At the same time, the possibility of doing a good job of career planning, using school resources and industry opportunities to enhance employment readiness

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and workplace adaptability could help reduce huge incomprehension for students when in an internship or a workplace.

Recommendations for policy makers, it is recommended that policy makers may increase support for application-oriented disciplines, especially in teaching facilities, laboratory construction and faculty training, the possibility of ensuring that educational resources meet the needs of modern teaching. Policy makers may formulate policies conducive to school-enterprise cooperation, may encourage more enterprises to participate in education projects, may jointly cultivate high-quality application-oriented talents, and promote the deep integration of education and industry.

Recommendations for Future Research, future research could increase the universality and representation of research by expanding the sample size to cover more student groups and industries. At the same time, it is suggested to conduct a long-term follow-up study of graduates, analyze their career development, comprehensively evaluate the effect of talent cultivation mode, and optimize the teaching management strategy. In addition, it is also necessary to explore the integration of emerging technologies such as artificial intelligence and big data into the PDCA cycle model to achieve intelligent and data-driven teaching management, and further improve education quality and management efficiency.

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