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Construction of a Project-based Interdisciplinary Collaborative Education Model for English Teaching in Higher Vocational Colleges Under the Background of New Liberal Arts

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Abstract: ***The evolving landscape of higher vocational education and the new liberal arts construction demand innovative teaching methodologies to prepare students for the modern workforce. The increasing need for interdisciplinary talents with a broad understanding of various fields necessitates a shift from traditional, subject-oriented education to more holistic approaches. The project-based interdisciplinary collaborative education model emerges as a promising solution, integrating English language skills with knowledge and skills from other disciplines to cultivate well-rounded talents. This model is built on a strong theoretical foundation, drawing from interdisciplinary collaborative education theory and PBL. It emphasizes learner-centered objectives, relevant and practical content, diverse teaching methods, comprehensive evaluation systems, and a professional teaching team. Through case analysis of the project of cross-border e-commerce platform construction, the application strategies of the model in practical teaching have been demonstrated, focusing on project selection and design, teacher allocation and training, student team building, curriculum resource integration, and interdisciplinary collaboration and subject integration. Adopting this model can promote students' comprehensive development, fostering critical thinking, problem-solving, and teamwork skills. It also enhances their practical abilities and adaptability, equipping them with the interdisciplinary competencies sought by employers. Ultimately, the project-based interdisciplinary collaborative education model contributes to the advancement of higher vocational education, preparing students for success in a rapidly changing and interconnected world.***

Keywords: Interdisciplinary collaborative education model, Project-based English teaching, Higher vocational colleges, New liberal arts**.**

1. Introduction

With the acceleration of economic globalization and the swift advancement of technology, the societal expectations for talents are continuously evolving. The dynamic work environment and the increasingly complex global challenges necessitate individuals equipped with interdisciplinary knowledge and skills, who can adapt flexibly and innovate. However, traditional higher vocational education models often struggle to meet these emerging needs, suffering from disconnection with industrial progress and outdated teaching materials. Moreover, the upgrading and transformation of industrial structures have highlighted the urgent need for multidisciplinary talents.

In response to this challenge, new liberal arts education has emerged, emphasizing interdisciplinary integration and innovation, with the aim of cultivating well-rounded talents with a broad perspective, profound humanistic literacy, and the capacity for innovation. The essence of new liberal arts education lies in breaking down academic barriers, fostering the convergence of knowledge across different fields, and constructing a comprehensive and in-depth knowledge system to meet society's demand for diverse and integrated talents.

In light of this context, the Chinese government has placed high expectations on the development of vocational education and has issued a series of policy documents to guide and support its growth. The "Guiding Opinions on Promoting the High-Quality Development of Modern Vocational Education" (2021), the "Opinions on Deepening the Reform of the Modern Vocational Education System" (2022), and the "Notice on Accelerating Key Tasks in the Construction and Reform of the Modern Vocational Education System" (2023) collectively underscore the importance of establishing a vocational education system that is closely aligned with economic and social development, one that can cultivate talents capable of innovation and adapting to the challenges of globalization.

In response to the policy call and to meet the challenges of the times, a project-based interdisciplinary collaborative education model for English teaching in higher vocational colleges is proposed, which integrates the philosophy of new liberal arts. This model combines English language skills with vocational disciplines and practical projects to cultivate students' cross-cultural communication abilities, teamwork spirit, and problem-solving skills, thereby better preparing them for the demands of the globalized workplace. By embodying the spirit of new liberal arts in higher vocational education, this model is expected to promote the comprehensive development of students, enhance their employability, and cultivate a greater number of high-quality multidisciplinary talents for society.

2. Significance of Constructing a Project-based Interdisciplinary Collaborative Education Model

The construction of a project-based interdisciplinary collaborative education model is vital for higher vocational college English programs, especially in the context of the new liberal arts construction.

Integrating English language skills with knowledge and skills

from other disciplines, this model promotes students' comprehensive development. It enhances their language proficiency and cultivates critical thinking, problem-solving, and teamwork abilities, preparing them for diverse career paths.

Breaking free from traditional subject-oriented education, the model stimulates innovation and creativity. It encourages exploration of new teaching methods and curriculum designs, fostering engagement and motivation. Students learn to apply English in authentic contexts through interdisciplinary collaboration, further boosting their motivation and engagement in language learning.

In the current job market, employers are increasingly seeking employees with diverse skills and knowledge. This model can provide students from higher vocational colleges with opportunities to gain interdisciplinary competencies that are highly valued by potential employers. It can also help them develop the ability to adapt to the rapidly changing job market and to work effectively in an interdisciplinary and multicultural environment.

In sum, the construction of this model holds great significance for promoting students' comprehensive development, fostering innovation, cultivating professional adaptability, and contributing to the advancement of higher vocational education as a whole.

3. Theoretical Basis for Constructing a Project-based Interdisciplinary Collaborative Education Model

To lay a solid foundation for the project-based interdisciplinary collaborative education model, it is essential to delve into the underlying theories. An exploration of the theories of interdisciplinary collaborative education and Project-based learning is conducted to elucidate their core concepts and practical principles. This exploration is intended to enhance the understanding of these educational methodologies and to offer theoretical direction for the implementation of the model.

3.1 Interdisciplinary Collaborative Education

Interdisciplinary collaborative education is a kind of collaborative education that crosses disciplinary boundaries. It emphasizes the integration of different disciplines and the collaboration of different fields in educational practice, suggesting that students can benefit from a more holistic and comprehensive education by integrating knowledge and skills from various disciplines, and by working collaboratively with peers from different backgrounds.

Its interdisciplinary nature emphasizes the interconnectedness of knowledge and the importance of understanding complex issues from multiple perspectives. By incorporating knowledge from different disciplines, students are encouraged to think critically, solve problems creatively, and make connections across different fields. This approach not only enriches students' learning experiences, but also helps them develop a more well-rounded and adaptable set of skills that are increasingly demanded in the modern workforce (Ferns et al., 2021).

Furthermore, its collaborative nature emphasizes the importance of teamwork and communication in educational practice. By working with peers from different disciplines, students can learn to appreciate diverse viewpoints, communicate effectively, and leverage their combined strengths to achieve common goals. This not only enhances their interpersonal skills, but also prepares them for the collaborative work environments they are likely to encounter in their future careers.

In the context of higher vocational college English teaching, interdisciplinary collaborative education can be particularly beneficial. By integrating English language learning with practical skills from other disciplines, such as hotel management, information technology, or business administration, students can develop a more comprehensive skill set that is relevant to their chosen career paths. Additionally, by working on interdisciplinary projects with peers from different majors, students can gain valuable insights into how their English language skills can be applied in a practical, real-world context.

In conclusion, interdisciplinary collaborative education provides a strong theoretical foundation for the construction of the higher vocational college English program in the context of the new liberal arts. By emphasizing the integration of different disciplines and the collaboration of different fields, this educational concept has the potential to enrich students' learning experiences, develop their critical thinking and problem-solving skills, enhance their interpersonal and communication skills, and prepare them for success in their future careers.

3.2 Project-based Learning

Project-based learning (PBL) is a student-centered, project-driven pedagogical approach that aims to foster critical thinking, problem-solving skills, teamwork, and intercultural communication abilities through real or simulated projects (Wang, 2019; Tong et al., 2020). PBL emphasizes active student engagement and inquiry-based learning, integrating theory with practice to help students apply their knowledge to solve real-world problems.

The core concepts of PBL include project-driven focus, student centrality, authenticity, and reflectiveness. Project is the heart of PBL, where students learn and apply knowledge through involvement in projects related to their professional fields. These projects can be real or simulated and are connected to students' career development goals (Ananyina et al., 2021). Students are the masters of their learning, actively participating in all stages of the project, including design, planning, implementation, and evaluation, and taking on corresponding responsibilities. PBL emphasizes the authenticity of learning, meaning that projects should be relevant to the real world and capable of addressing actual issues. Students are expected to learn and apply knowledge in real or simulated contexts to better understand the significance and value of knowledge (Nguyen, 2021). PBL focuses on student reflection, requiring students to continuously reflect on their learning process and outcomes

throughout the project, gaining experience and lessons. Reflection can help students deepen their understanding of knowledge and enhance their problem-solving and teamwork skills.

PBL is the cornerstone of interdisciplinary collaborative education models, providing students with a structured framework to engage in interdisciplinary projects that simulate the complexity of the real world. Combining PBL with interdisciplinary collaborative education aligns with the goal of empowering students with autonomous learning through interdisciplinary collaborative education. This approach encourages students to draw knowledge and skills from multiple disciplines, creating an environment where interdisciplinary collaboration is not only encouraged but also essential. By focusing on real-world problems, PBL necessitates a multidisciplinary approach to finding solutions, which is at the core of interdisciplinary collaborative education.

The value of PBL in higher vocational college English teaching is reflected in several aspects. PBL can integrate English language learning with professional knowledge, practical skills, and intercultural communication skills into projects, helping students to establish an interdisciplinary knowledge system and cultivate their ability to apply knowledge comprehensively to solve complex problems (Liao, 2019). PBL can cultivate students' critical thinking, problem-solving skills, teamwork, and intercultural communication abilities, which are core competencies essential for students' future careers. By linking English learning with students' career development goals and life experiences through real or simulated projects, PBL stimulates their interest and motivation in learning and improves their learning efficiency (Warr & West, 2020). PBL also can promote the development of students' analytical, synthetic, evaluative, and creative higher-order thinking, enhancing their employability in a global context (Du, 2022).

4. Basic Principles for Constructing a Project-based Interdisciplinary Collaborative Education Model

Following an in-depth examination of the theoretical frameworks, the fundamental principles will be outlined for guiding the construction of a project-based interdisciplinary collaborative education model in higher vocational college English education, ensuring a seamless transition from theory to practice.

4.1 Principles for Setting Teaching Objectives

When setting teaching objectives, several pivotal principles must be taken into consideration to ensure their effectiveness and relevance.

First and foremost, the teaching objectives must be centered on the learners. The development of an interdisciplinary collaborative education model necessitates a deep understanding of students' varied backgrounds, interests, and learning styles. Objectives should be tailored to meet the unique needs of each student, allowing for a flexible and adaptive learning experience. This may translate into establishing tiered objectives that correspond to different levels of English proficiency and creating avenues for students to delve into their particular interests within the interdisciplinary setting.

In alignment with the broader aims of interdisciplinary education, the teaching objectives must resonate with the integrated approach of the new liberal arts. This model seeks to synthesize knowledge and skills from across disciplines, offering a comprehensive education. Consequently, the objectives for English instruction in higher vocational colleges should be formulated to bolster the overarching aims of interdisciplinary learning. This includes fostering objectives that stimulate critical thinking, creativity, problem-solving, and effective communication, as well as nurturing an appreciation for the interconnectivity of disciplines and their practical applications.

The teaching objectives must be firmly grounded in practical skills and directed towards actionable outcomes. Within the project-based, interdisciplinary collaborative education model of high vocational English, the focus should be on cultivating skills vital for students' professional futures. This encompasses communication, teamwork, problem-solving, and critical thinking abilities. The design of these objectives should empower students to engage actively in PBL, apply linguistic skills to real-world situations, and collaborate seamlessly with peers from diverse disciplines.

The teaching objectives must be quantifiable and attainable. It is crucial to establish clear and specific goals that are within reach and can be assessed to track student advancement. Breaking down the objectives into smaller, assessable learning outcomes, utilizing a mix of formative and summative assessment methods, enables ongoing evaluation of student performance and informs the adjustment of teaching strategies to align with students' learning requirements.

Additionally, the teaching objectives should be dynamic and malleable. In the fast-paced and ever-evolving landscape of the new liberal arts, the objectives must be adaptable to the shifting needs and challenges of the interdisciplinary education model. Regular reviews and revisions of the objectives, informed by feedback from students, the interdisciplinary teaching team, and industry collaborators, guarantee that the objectives stay pertinent, responsive, and instrumental in preparing students for their future professional endeavors.

4.2 Principles for Designing Teaching Content

The interdisciplinary essence of the teaching content is paramount, necessitating a blend of knowledge and skills from across various fields. The English curriculum, therefore, extends beyond language skills to integrate aspects of business, technology, and culture. This approach equips students with a broader understanding and a comprehensive skill set that has direct relevance to real-world scenarios.

Relevance and practicality are key to the teaching content, which should aim to tackle real-world problems and challenges. In higher vocational education, the English

curriculum is crafted to provide students with the linguistic and communicative tools essential for their prospective careers. Incorporating industry-specific knowledge, case studies, and practical projects that mirror market demands allows students to appreciate the tangible benefits of their English studies and prepares them for their future professional roles (Tong et al., 2021).

The design of teaching content should prioritize students' engagement by accommodating their diverse learning profiles and personal interests. This necessitates the development of materials that are both flexible and customizable, accommodating the unique learning styles and proficiency levels of each student. The content should also be designed to foster active involvement and participation, empowering students to take charge of their learning journey and explore their interests within the interdisciplinary curriculum.

Alignment with the program's learning objectives and outcomes should also be taken into consideration when designing teaching content. The content should be carefully planned and sequenced to ensure that it effectively contributes to the development of students' language proficiency, critical thinking, problem-solving skills, and other desired competencies. Additionally, regular review and updating of the content are necessary to keep pace with evolving industry trends, technological progress, and societal requirements.

4.3 Principles for Selecting Teaching Methods

To address the multifaceted demands of interdisciplinary collaboration and project-based teaching, it is imperative to embrace a variety of dynamic and flexible teaching methods. This calls for a thoughtful combination of approaches, including but not limited to, experiential learning, collaborative learning, and problem-based learning. By integrating these methods, students can acquire knowledge from different disciplines, develop critical thinking skills, and enhance their ability to solve real-world problems. Moreover, this principle also encourages the use of technology-enhanced teaching methods, such as digital simulations, virtual reality, and online collaborative platforms, to create a more immersive and interactive learning environment for students.

When choosing appropriate teaching methods, it is important to emphasize providing personalized and student-centered learning experiences. This involves recognizing the individual learning styles and preferences of students, and tailoring teaching methods to accommodate their diverse needs. By doing so, teachers can create a more inclusive and effective learning environment that caters to the unique strengths and weaknesses of each student. Additionally, this principle also advocates for the incorporation of interdisciplinary projects and case studies into the curriculum, allowing students to apply their knowledge and skills in solving real-world problems across different disciplines.

In addition, it is proposed that teachers incorporate active learning strategies into their instructional approach, such as group discussions, debates, and hands-on activities, which are designed to actively engage students in the educational process. By embracing these strategies, students are empowered to assume responsibility for their learning, fostering the development of communication and teamwork skills, as well as a profound understanding of the subject content. The integration of active learning methods can stimulate curiosity and creativity, prompting students to investigate and challenge concepts from various academic viewpoints, thereby enhancing the interdisciplinary nature of the curriculum.

4.4 Principles for Constructing an Evaluation System

In crafting the assessment system for the project-based interdisciplinary collaborative education model, it is essential to adhere to a set of guiding principles. Primarily, the assessment system should be student-centered, focusing on the comprehensive evaluation of students' abilities to integrate knowledge and skills across disciplines to solve real-world problems. This requires a shift from traditional assessment methods that only focus on knowledge retention and rote memorization to a more holistic approach that evaluates critical thinking, creativity, communication, and collaboration skills.

The assessment system should be authentic and reflective of real-world tasks and challenges. This means that assessment tasks and criteria should be aligned with the authentic demands and standards of the interdisciplinary professional field. For example, assessment tasks could simulate real-world scenarios that require students to apply their English language skills to communicate, collaborate, and present their solutions to authentic problems in their chosen vocational field.

The assessment system should be formative and ongoing, providing students with consistent feedback and opportunities for improvement. This requires the use of diverse assessment methods that can capture students' progress and development over time, such as portfolios, presentations, performances, and peer evaluations. Additionally, the feedback provided should be constructive, specific, and actionable, guiding students towards achieving the learning outcomes of the cross-disciplinary collaborative projects.

The assessment system should be inclusive and equitable, taking into account the diverse backgrounds, experiences, and learning styles of students. This requires the design of flexible assessment tasks for students with special needs or those who may face barriers to demonstrating their full potential. In addition, the assessment criteria and standards should be transparent and communicated clearly to students, ensuring that they understand the expectations and can actively engage in their own assessment and self-reflection.

Lastly, the assessment system should be data-informed and continuously improved through the analysis of assessment results and student outcomes. This involves the collection and analysis of both quantitative and qualitative data to evaluate the effectiveness of the collaborative education model and identify areas for improvement. The feedback from the assessment system should be used to inform curriculum design, instructional strategies, and professional development for teachers, promoting ongoing refinement and enhancement of the interdisciplinary collaborative education model.

4.5 Principles for Building Teaching Team

The establishment of a diversified and professional teaching team is a foundational principle that underpins a project-based interdisciplinary collaborative educational model. The teaching team should not only include English teachers but also individuals with specialized knowledge in fields like tourism, business, and information technology. This diversity ensures that the team can provide comprehensive and practical education that integrates English language skills with the knowledge and skills required in specific vocational fields (Luo, 2023). Additionally, the teaching staff should possess extensive practical experience and strong communication skills, which are crucial for the successful implementation of project-based interdisciplinary collaborative education model.

The teaching staff should be encouraged to engage in continuous professional development. In the context of rapid changes in both English language education and vocational fields, it is essential for teaching staff to continuously update their knowledge and teaching methods. This can be achieved through participation in relevant training programs, workshops, and conferences, as well as through research and publication activities. By keeping abreast of the latest developments in their respective fields, the teaching staff can effectively integrate new knowledge and trends into the curriculum, ensuring that students are equipped with the most up-to-date and relevant skills.

In addition, emphasis should be placed on creating a collaborative and cross-disciplinary teaching culture. That is, to create a supportive and inclusive environment where teachers from different disciplines jointly design and implement English language and vocational skills integrated curriculum content. By fostering a collaborative culture, teachers can develop innovative and effective textbooks and teaching methods that reflect the interdisciplinary characteristics of the curriculum; at the same time, this collaborative approach also helps teachers exchange ideas, share best practices, leading to continuous improvement and optimization of the curriculum and teaching strategies.

5. Strategies for Constructing a Project-based Interdisciplinary Collaborative Education Model

To translate the aforementioned principles into practice, the project of construction of a cross-border e-commerce platform will be examined as a case study to illustrate their practical application.

5.1 Project Topic Selection and Design

In constructing a project-based interdisciplinary collaborative education model, selecting and designing projects is the crucial first step, setting the tone for the entire educational experience and laying the foundation for students' interdisciplinary collaboration and learning.

The project design should closely relate to students' future career development and stimulate their interest in learning. For instance, in a deep learning course at Guilin Tourism University, Feng and Zhao (2024) selected smart tourism as the project theme, enabling students to apply deep learning technology to the tourism industry and address real-world issues more effectively. Similarly, in a project focused on building cross-border e-commerce platforms, students learn how to construct, operate, and manage such platforms, while also enhancing their cross-cultural business communication skills. These projects are closely related to students' future career development, effectively sparking their interest and engagement, and cultivating their practical abilities and problem-solving skills. By integrating theoretical knowledge with practical projects, students are able to apply what they have learned in real-world scenarios, better preparing them for the demands of the future workplace.

The project design should be meticulously planned to ensure that the diverse professional backgrounds of team members are fully leveraged. For instance, the construction of a cross-border e-commerce platform is a typical case where the team members come from various disciplines such as English, e-commerce, marketing, financial management, and information technology. Such a composition not only enriches the team's perspectives and skills but also provides students with a platform for integrating academic knowledge with practical skills. During the project implementation, each member plays a role within their area of expertise, while interdisciplinary interaction promotes the integration of knowledge and the complementarity of skills. In this project, the team members communicate in English, learn the operational rules of cross-border e-commerce, master practical skills in website development and maintenance, and participate in team collaboration and project management. These practical activities help students apply theoretical knowledge to real-world situations, enhancing their ability to solve actual problems and laying a solid foundation for their career development.

The project design should be open and flexible, encouraging students to explore a variety of solutions. Taking the promotion of Chinese traditional tea culture in the cross-border e-commerce platform as an example, students may engage in video marketing on YouTube and Pinterest for the European and American markets, showcasing the exquisite art of tea making and the high quality of tea leaves. Meanwhile, for the Southeast Asian market, they could utilize e-commerce platforms such as Tokopedia and Bukalapak to promote the sales of Chinese green tea and Pu-erh tea through live streaming sales and interactive storytelling.

The project design should build appropriate scaffolding to ensure that students have the necessary knowledge and skills to successfully complete the project. This may involve breaking down the project into smaller tasks, providing necessary resources, and offering guidance when needed. In the project of cross-border e-commerce platform construction, students could first learn the operational rules of the platform, then proceed to learn website development and maintenance, and finally engage in practical operation and management.

The project design also should include assessments aligned with the learning objectives of the project, allowing students to demonstrate their understanding and skills in a real-world manner. In the project of cross-border e-commerce platform

construction, students can submit project proposals, reports, or presentations of project outcomes to assess their English communication skills, cross-border e-commerce operation skills, and team collaboration abilities.

Industry professionals or experts should be actively involved in the project selection and design process. Their insights and contributions can ensure that the project is relevant and meets industry needs, providing students with a realistic and practical learning experience. For instance, lectures and guidance can be invited from cross-border e-commerce companies for the project of construction of the cross-border e-commerce platform, and students can be provided with opportunities for internships and practical training.

In summary, it can be said that an excellent project can stimulate students' interest in learning, cultivate their interdisciplinary abilities and problem-solving skills, and lay a solid foundation for their future career development.

5.2 Teacher Allocation and Training

In terms of teacher allocation, it is essential to ensure that teachers with different academic backgrounds and expertise are assigned to the interdisciplinary collaborative education model.

For the effective construction of the cross-border e-commerce platform, an interdisciplinary teaching team might be assembled, consisting of teachers specialized in English, marketing, e-commerce, financial management, and information technology. Each team member is assigned a specific role.

For example, English teachers focus on honing students' communication skills in English, enabling them to effectively engage with international clients. E-commerce teachers impart knowledge regarding the operation of cross-border e-commerce platforms, encompassing platform regulations, marketing strategies, and logistics management. Information technology teachers guide students in website development and maintenance to ensure the platform's smooth and stable operation. By clearly defining clear roles and responsibilities, each member of the teaching team can maximize their professional strengths, collaboratively driving the project's educational success. This structured approach not only fosters an environment where expertise is shared and utilized but also ensures a comprehensive and cohesive learning experience for the students involved in the project.

To enhance the teaching capabilities and interdisciplinary teaching proficiency of teachers, differentiated training is required based on the teachers' academic backgrounds, teaching experience, and personal interests. For instance, English teachers could be provided with training in e-commerce and information technology to help them understand the operational rules and technical implementation of cross-border e-commerce platforms, enabling them to better guide students in project practice. E-commerce teachers could be trained in English communication skills to effectively instruct students in communicating with foreign clients, thereby enhancing their cross-cultural business communication abilities. Information technology teachers could receive training in the operation of cross-border e-commerce to understand the operational rules and marketing strategies, assisting them in better guiding students in website design and feature development. Training for finance teachers could focus on international financial regulations, e-commerce accounting practices, and risk management strategies tailored to cross-border transactions. Marketing teachers' training could emphasize digital marketing techniques, cross-cultural marketing insights, and social media strategies to effectively engage with international consumer markets. Through differentiated training, the needs of educators can be better met, and robust support can be provided for the successful implementation of the project of cross-border e-commerce platform construction.

Moreover, an effective incentive mechanism could be established to stimulate the enthusiasm and creativity of teachers (Wang et al., 2022). For example, an interdisciplinary teaching award fund could be established to reward teachers who have performed exceptionally in the project. Providing teachers with more opportunities for development, such as attending academic conferences related to cross-border e-commerce and becoming visiting scholars, can help them enhance their academic standards and interdisciplinary teaching skills. This, in turn, will foster their professional growth and provide robust support for the successful implementation of the project of cross-border e-commerce platform construction.

5.3 Student Team Building and Incentive Mechanisms

As for the construction of student team, the first step is to clarify the project goal and ensure that all the team members reach a consensus on this goal, helping them to understand their responsibilities and expectations, enhancing the team's cohesion and execution capabilities.

Assigning roles based on the professional strengths and interests of team members can maximize the potential of each individual. For instance, in the project of cross-border e-commerce platform construction, students majoring in marketing could be in charge of market research and strategic planning, leveraging their understanding of consumer behavior and market trends. Students with a background in financial management could oversee the financial planning and budgeting aspects of the project. By assigning roles that align with the team members' strengths, the team can work more efficiently and drive the project forward successfully.

Establishing an effective communication mechanism and encouraging exchange and collaboration among team members will enhance team cohesion, resolve internal conflicts, and promote the common growth of the team. For example, regularly organizing team meetings can allow members to share updates on the project, discuss issues encountered, and jointly develop solutions. Through team communication and collaboration, team cohesion can be strengthened, and the collective growth of team members can be promoted.

Furthermore, several differentiated motivational strategies can be adopted based on students' interests, strengths and needs.

An interest-oriented motivational strategy can effectively stimulate intrinsic motivation among students. By deeply understanding each student's interests and providing them with project tasks or additional challenges related to their interests, their intrinsic motivation can be effectively stimulated. For instance, students interested in technology can be encouraged to participate in the technical development and optimization of the cross-border e-commerce platform; those interested in marketing promotion can be encouraged to take charge of the platform's marketing strategies and activity planning.

A strength-based motivational strategy can enhance students' self-confidence and sense of achievement. By providing opportunities for students to showcase and enhance their skills based on their professional strengths, their self-confidence and sense of achievement can be enhanced. For example, students proficient in data analysis can be encouraged to participate in market research and data analysis to support platform decision-making; those skilled in design can be encouraged to participate in the design and optimization of the platform's interface.

A needs-matching motivational strategy can better meet students' personalized needs. Understanding students' learning needs and development goals and providing them with corresponding resources and guidance can better meet their personalized needs. For example, for students who wish to improve their English level, training and simulation opportunities in communication skills can be provided; for those who want to understand the latest trends in cross-border e-commerce, industry experts can be invited to give lectures and guidance.

An achievement-driven motivational strategy can strengthen students' sense of achievement and belonging. Recognizing and rewarding students who have made significant achievements in the project can strengthen their sense of achievement and belonging. This includes not only material rewards but also public praise, awarding titles to outstanding teams or individuals, etc.

A personal development motivational strategy can promote students' long-term development. Encouraging students to integrate project experience with their personal career planning and providing career development guidance and support can promote their long-term development. For instance, students could be guided in preparing for internships or job interviews, offered career planning counseling services, or advised to participate in related industry activities or competitions.

By employing these differentiated motivational approaches, the personalized needs of students can be better met, their intrinsic potential can be stimulated, and their participation and satisfaction can be enhanced, thereby facilitating the successful implementation of interdisciplinary projects.

5.4 Curriculum Resource Integration and Development

When integrating course resources, it is possible to maximize the use of existing resources by consolidating materials from various disciplines, as well as online platforms and libraries. As an example, for the project at hand, it is suggested to combine resources from English, cross-border e-commerce, marketing, information technology, and financial management courses. These courses complement each other to form a complete knowledge system, providing students with comprehensive knowledge for building a cross-border e-commerce platform. The English course offers training in English communication skills; the cross-border e-commerce course imparts platform operation knowledge; the marketing course guides marketing strategies; the information technology course instructs website development and maintenance techniques; and the financial management course provides financial management knowledge. By integrating these course resources, the curriculum content can be aligned with project requirements, promoting students' learning.

Moreover, the English course can be combined with the cross-border e-commerce course to jointly explore the operation rules and English communication skills of the platform; the marketing course can be combined with the cross-border e-commerce course to jointly study marketing strategies; the information technology course can be combined with the cross-border e-commerce course to jointly research development and maintenance techniques; the financial management course can be combined with the cross-border e-commerce course to jointly study financial management knowledge. By fully utilizing existing resources, the quality and efficiency of the courses can be improved.

Meanwhile, learning materials can be developed and enriched through the utilization of case studies, practical projects, and simulation experiments, helping students better understand and master the knowledge and skills required for the project. The development of learning materials can be approached from the following aspects.

Develop learning materials that align with project requirements. In order to help students master the knowledge and skills needed for building a cross-border e-commerce platform, learning materials related to English communication skills, platform operation knowledge, marketing strategies, information technology skills, and financial management knowledge can be developed. To put it more specifically, comprehensive training materials on crafting English business correspondence can be created to empower students to master the art of effective communication with foreign clients; immersive case studies on the operation rules of cross-border e-commerce platforms can be designed, enabling students to analyze and internalize operational strategies and skills through the examination of authentic scenarios; advanced practical projects on marketing strategies can be developed, enabling students to master marketing skills through hands-on operation; simulation experiments on information technology skills can be developed, allowing students to acquire technical knowledge through immersive simulation experiments. Among them, integrating virtual cross-border learning environments into the curriculum can enhance students' practical learning experience. This immersive simulation replicates professional scenes from the real world, promoting authentic language use and cultural interaction. Students participate in complex scenarios that reflect the challenges they may face in their future careers, providing a realistic

educational experience. To further elaborate, a practical section on international payments and settlements can be carefully designed to enable students to simulate the payment and settlement process of cross-border e-commerce platforms, including currency exchange, payment method selection, and risk control. This practical approach enables students to deepen their understanding of the complexity involved in cross-border e-commerce payments and settlements, while enhancing their risk management skills.

Develop challenging learning materials such as case studies and practical projects to stimulate students' interest and enthusiasm for learning. For example, an operational challenge competition can be designed where students operate a virtual cross-border e-commerce platform within a limited time, with challenges including increasing sales, optimizing inventory management, and reducing operational costs. This competition can test students' operational strategies and decision-making abilities while also stimulating their innovative thinking and team spirit.

Develop interactive learning materials such as virtual learning environments and online learning platforms to improve students' learning outcomes. For example, a virtual role-playing activity can be designed, allowing students to play different roles in a simulated cross-border e-commerce environment, such as platform operation managers, customer service representatives, and technical support. This interactive method effectively stimulates students' interest in learning (Xie, 2019), and enhances their comprehension of the roles and workflows associated with various positions, improving their professional qualities and teamwork capabilities.

5.5 Interdisciplinary Collaboration and Discipline Integration

Interdisciplinary collaboration is an education model based on teamwork, aimed at promoting the integration of knowledge and the complementarity of skills across different disciplines. This educational model not only broadens students' horizons but also cultivates their ability to solve complex problems. To enhance the practice of interdisciplinary collaboration, the following strategies can be employed.

Establishing interdisciplinary teams is the cornerstone of interdisciplinary collaboration. These teams should be assembled based on the specific needs of the project, carefully selecting students with different academic backgrounds to form a diverse team. Each member should choose the project module they are responsible for according to their professional expertise and interests, ensuring that each team member can maximize their potential in their area of strength. Regular team meetings should be held to not only share project progress but also discuss challenges and issues encountered, and jointly develop solutions. In addition, daily communication among team members is encouraged to promote the sharing of knowledge and experience, helping to build trust and a spirit of cooperation within the team.

Establishing an interdisciplinary communication mechanism is essential for facilitating collaborative efforts. To this end, an online discussion forum specifically tailored for interdisciplinary projects should be created, providing students with a platform to engage in in-depth discussions and the exchange of ideas related to project issues. This forum serves as a valuable resource for students to obtain feedback, share insights, and solve problems. Furthermore, invite industry experts to participate in project guidance, providing cutting-edge industry knowledge and practical experience, which can help students better understand and apply interdisciplinary knowledge, and also enhance their awareness and sensitivity to industry trends.

Implementing collaborative learning strategies is integral to fostering interdisciplinary understanding and skills. These strategies include the design of activities and tasks that facilitate team collaboration, such as group discussions, brainstorming sessions, role-playing exercises, and simulation activities. These methods encourage knowledge sharing and skill complementarity among students from diverse academic backgrounds, thereby promoting a richer learning experience. Moreover, the adoption of PBL enables students to apply their interdisciplinary knowledge to practical projects aimed at addressing real-world problems. This approach not only enhances students' practical abilities and innovative thinking but also equips them with the capacity to address complex issues effectively.

Constructing a multifaceted evaluation system is crucial for accurately assessing the performance of team members in interdisciplinary projects. This system should comprehensively evaluate the application of interdisciplinary knowledge, as well as teamwork, leadership, innovative thinking, and problem-solving skills. By doing so, it enables a deeper understanding of each member's contributions and progress. Moreover, emphasizing the importance of interdisciplinary cooperation and providing rewards and recognition for outstanding team members can significantly motivate them to actively participate in interdisciplinary team collaboration. This, in turn, boosts the morale and motivation of the entire team, fostering a positive and productive learning environment.

Implementing these strategies enhances interdisciplinary collaboration and integration, creating a comprehensive, interactive, and innovative learning environment for students. Such an environment is crucial for fostering the development of students' comprehensive abilities, preparing them to meet the demands of the future society and equipping them with the capacity to tackle complex issues.

However, the journey towards successful interdisciplinary collaboration is fraught with challenges. A significant challenge arises from the differences in knowledge systems, skill levels, and research methods among students from diverse academic backgrounds. These differences can potentially lead to communication obstacles and low cooperation efficiency. Taking the project of cross-border e-commerce platform construction as an example, students majoring in English may have advantages in language communication and copywriting, while those majoring in information technology may be more proficient in website development and maintenance. To overcome this challenge, communication and training among team members can be enhanced, promoting the complementarity and integration of knowledge and skills, thereby improving the overall

collaboration efficiency of the team.

The boundaries between disciplines are also a problem that cannot be ignored. Teachers and students from different disciplines may find it difficult to cross these boundaries, which may hinder in-depth cooperation. To break down the barriers between disciplines, interdisciplinary seminars, workshops, and other activities can be organized to facilitate discussions and problem-solving efforts among students and teachers from diverse academic backgrounds, thus promoting communication and integration between different disciplines.

As the diversity of team members increases, so does the difficulty of management. The management of interdisciplinary teams requires more complex coordination and communication mechanisms to ensure the smooth progress of the project. To this end, it is necessary to establish a dedicated interdisciplinary project management team responsible for the overall coordination and advancement of the project. At the same time, , team members could be encouraged to engage in open communication and collaborative problem-solving, which can facilitate the resolution of management issues and ensure the smooth progress of interdisciplinary cooperation. By implementing these strategies, the educational model of interdisciplinary collaboration could reach its full potential, thereby offering students a more comprehensive and profound learning experience.

6. Conclusion

The study has explored the significance and practical approaches for constructing a project-based interdisciplinary collaborative education model for English teaching in higher vocational colleges under the background of new liberal arts. Based on the theories of interdisciplinary collaborative education and PBL, a set of principles for constructing a project-based interdisciplinary collaborative education model have been proposed. These include student-centered teaching objectives, interdisciplinary curriculum design, diverse teaching methods, comprehensive evaluation system construction, and the building of a professional teaching team. Through case analysis of the project of cross-border e-commerce platform construction, the application of the model in practical teaching has been demonstrated, highlighting its effectiveness in cultivating students' cross-cultural communication skills, team spirit, and problem-solving abilities.

Although an innovative educational model has been provided and its application in specific cases has been demonstrated, there are certain limitations. Firstly, the limited scope of the case study sample may potentially affect the assessment of the model's universality. Secondly, there is insufficient evaluation of long-term effects and sustainability in the research. In addition, the degree of integration and collaboration between different disciplines may vary due to differences in schools, teachers, and students, which have not been fully explored in the current research.

In light of the above limitations, future research can be expanded in multiple directions. For example, large-scale interdisciplinary empirical research can be conducted to verify the universality and effectiveness of the educational model; the impact of interdisciplinary collaborative education on students' long-term career development, including the enhancement of vocational skills and lifelong learning abilities, can be further explored; and the adaptability and adjustment strategies of the model in different disciplines and educational stages can be studied.

In summary, this study provides a new perspective and methodology for English teaching in higher vocational colleges, which is of great significance for promoting the comprehensive development of students and improving the quality of higher vocational education. It is anticipated that future research will validate and expand upon the findings of this study within a broader scope, providing more insights and guidance for educational reform and practice.

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