

Research on Collaborative Teaching in University Courses Based on Multi-Teachers Teaching in the Same Classroom

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Abstract

Collaborative teaching with the main feature of multiple teachers teaching in the same classroom is an important educational reform. It emphasizes effective collaboration among multiple teachers at various stages to enhance student interest and foster comprehensive skills more effectively. This paper starts by analyzing the concept and models of collaborative teaching, summarizes the practical exploration of collaborative teaching in university courses in China, taking the graduate geography course at a university as an example, and showcases student perspectives and demands on multi-teacher collaborative teaching. Drawing from existing theoretical research, it concludes the effectiveness and issues of collaborative teaching with multiple teachers in the same classroom.

Keywords

Collaborative Teaching, Multiple Teachers Teaching in the Same Classroom, University Courses, Teaching Evaluation

1. Introduction

Since entering a new era, the comprehensive pilot reforms in higher education and the exploration of a distinctive Chinese-style development model have been pivotal. This model, with its focus on high-quality education as the guiding principle, has shifted from an element-based development view to a holistic one. It has been exploring the establishment of an educational philosophy and model

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that are adapted to China's national conditions and carry distinctive Chinese characteristics. This has allowed China to make its voice heard in the global higher education community, offering Chinese experiences and contributing Chinese wisdom to the world. With concrete evidence such as enhanced research output, there is a significant advancement in talent cultivation quality (*Department of Higher Education, Ministry of Education: The Achievements of Ten Years of Reform and Development in Higher Education—Official Government Portal of the Ministry of Education of the People's Republic of China, n.d.*). Traditional teaching models often emphasize students' academic achievements while neglecting their abilities in language expression, teamwork, and other comprehensive skills. Therefore, the collaborative teaching model involving multiple teachers has become a hot topic in the field of education. This model is dedicated to enhancing teaching quality by innovating teaching methods and strategies, and creating a diversified learning environment for students. This model is a response to the need for a more holistic approach to education that values not just academic success, but also the development of essential life skills. Such an environment not only caters to the personalized learning needs of different students but also stimulates their enthusiasm and intrinsic motivation for learning, thereby promoting their active exploration and in-depth learning (Nevin et al., 2009). This model recognizes that a well-rounded education is crucial for preparing students for the complexities of the modern world. In April 2022, the latest revised compulsory education curriculum plan and curriculum standards by the Ministry of Education further emphasized the importance of interdisciplinary teaching, promoting the integration and synthesis of educational content. This approach aligns with the collaborative teaching model's goals, as it seeks to break down the silos between subjects and encourage a more interconnected understanding of knowledge. This is a necessary means of cultivating high-quality talents. However, this also implies that teachers need stronger interdisciplinary teaching abilities and comprehensive qualities to achieve common teaching goals, maximize teaching effectiveness (Bergmark, 2020), and also require better collaborative cooperation and communication skills to integrate and coordinate course content and teaching methods (Weddle, 2022). The collaborative teaching model, therefore, not only benefits students but also challenges and supports teachers in their professional development.

In the current context of education reform, higher education institutions are actively seeking innovative teaching methods to update teaching concepts and promote students' comprehensive development (Li, 2019). In this process, the collaborative teaching model, as an emerging teaching strategy in the field of education, has attracted widespread attention (Cloonan, 2018). For students, the collaborative teaching model promotes the formation of inclusive thinking patterns by enhancing their cognitive abilities. It provides students with a diversified learning environment, enriches their learning experiences, and exposes them to a broader range of knowledge fields and professional content. This

model not only broadens students' cognitive scope but also meets their diverse learning needs, stimulates their interest and motivation for learning, and enhances their enthusiasm for the profession, thereby improving their comprehensive abilities, helping them better grasp subject knowledge, and cultivating interdisciplinary comprehensive abilities. The collaborative teaching model emphasizes attention to students' individual differences and needs, providing personalized and diversified learning support through the collaboration of multiple teachers. This not only stimulates students' interest and motivation for learning but also enhances their self-directed learning ability, innovation ability, and comprehensive qualities, thereby promoting their overall development (Chian et al., 2021). For teachers, the collaborative teaching model enhances teaching quality and effectiveness, enriching teachers' teaching experiences. In this model, teachers can learn from and complement each other, achieve interdisciplinary complementarity, progress together, improve classroom teaching levels, and also enhance their professional and teaching abilities. Moreover, research and practice of the collaborative teaching model are of great significance for enriching and perfecting the theoretical system of teaching. By exploring and applying the collaborative teaching model in depth, guiding teaching theories and experiences with significance can be summarized, providing reference and guidance for the reform and innovation of other teaching models.

2. Concepts and Models of Collaborative Teaching

Collaborative teaching involves the cooperation of multiple teachers from different professional backgrounds who form a teaching team to jointly complete teaching tasks, serving as the primary or sole instructors for a particular class (Rabin, 2019). This approach addresses various teaching challenges such as the high workload in important courses, the complexity of interdisciplinary courses, and the long-term stability of teaching quality. Collaborative teaching not only enhances teaching quality but also adds variety to the teaching process, enriching students' learning experiences, improving their engagement, and enhancing their learning outcomes. During the collaborative teaching process, teachers from different fields can jointly design the curriculum, set course objectives, and collaboratively assess students' learning outcomes. This approach better showcases students' strengths and professional abilities, thereby improving teaching quality. Additionally, collaborative teaching creates a diverse learning environment, catering to different students' learning needs, increasing their interest in learning, and improving their critical thinking skills (Cui & Zhang, 2024).

In current explorations and practices of collaborative teaching models, Southwest University of Political Science and Law began implementing this teaching reform experiment in 2001. In 2011, the "Three-Teachers-in-One-Classroom" model was successfully implemented in classrooms at Capital Primary School, garnering nationwide attention and demonstrating the potential of the "Multi-Teachers-in-One-Classroom" collaborative teaching model for broader applica-

tion in various educational fields. However, challenges in the practical implementation of this model include the complexity of coordinating multiple teachers, significant human and material resource investment, and increased workload for teachers. Furthermore, this teaching model is not yet widespread, and some teachers are reluctant to participate in such a model. Therefore, it is essential to address these issues, optimize the teaching model, and motivate teachers to promote its further adoption (Kirschner & Peltan, 2019).

Scholars have conducted in-depth research on collaborative teaching, encompassing several teaching models. These include the cooperative learning model (Çiğdemoğlu et al., 2014; Cui et al., 2024; Dugan & Letterman, 2008), which involves group learning where members work together to learn, solve problems, and complete tasks, fostering teamwork and collaboration skills; the project-based learning model, where students engage in challenging activities to explore subject knowledge and problem-solving methods, enhancing their practical, innovative, and independent thinking abilities; the community-based learning model, which allows students to participate in community activities, internships, and practices, collaborating with community workers and organizations to gain insights into social development trends and industry dynamics, thereby fostering cross-disciplinary cooperation and communication skills. The personalized learning model provides individualized teaching guidance and support based on students' needs, abilities, and habits, utilizing online learning platforms and AI technology for personalized diagnosis and guidance, helping students find suitable learning methods. The innovative education model employs diverse and multidimensional teaching methods, such as interdisciplinary integration, inquiry-based learning, and design thinking, to stimulate students' creativity and innovative potential, cultivating innovative talents. The collaborative teaching model emphasizes the cooperative abilities of teachers, providing students with comprehensive and effective learning support and guidance, enabling them to better master professional knowledge and develop practical skills (Fennick & Liddy, 2001).

3. The Practical Exploration of Collaborative Teaching in China

The collaborative teaching model is a novel approach in education, actively explored by universities in China. It emphasizes the cooperation among teachers, students, and teaching resources to enhance both teaching effectiveness and learning outcomes. In China, the practical exploration of this model has achieved significant results.

Northwest University of Political Science and Law has dedicated efforts to exploring interdisciplinary collaborative teaching models, specifically focusing on strategies for interdisciplinary collaboration in the "Legal Linguistics" course. The university has established a framework guided by teaching objectives, based on teacher-student collaboration, centered on teaching models, linked by teach-

ing methods, and supported by complementary measures. This framework aims to create a “teaching ecosystem” where the three subsystems of teaching models, teaching methods, and complementary measures are both independent and interwoven, promoting collective development. In practice, Northwest University of Political Science and Law has proposed several models suitable for interdisciplinary collaborative teaching. The first is the invisible model, where teachers and industry experts from different disciplinary backgrounds spontaneously form teaching teams. They jointly optimize teaching resources, design content, processes, methods, and assessments, and take overall responsibility for the course. The second is the relay model, involving at least two main lecturers who teach according to their respective fields of expertise or research areas, collaborating as equals. The third is the co-teaching model, where teachers use their specialized knowledge to analyze problems from multiple perspectives in the same class, encouraging active student participation in discussions. The fourth is the guest model, where one teacher designs the main teaching content, while other lecturers act as guest or visiting professors, providing occasional lectures or intensive courses to supplement potentially overlooked knowledge, particularly in challenging or crucial areas.

While these models differ in the depth and manner of teacher collaboration, they all enhance communication and knowledge sharing among teachers, complementing each other’s knowledge structures. They effectively address the limitations of traditional teaching, such as the lack of practical application and interaction in knowledge transmission. The collaboration spans cognitive, behavioral, and emotional aspects. Overall, the invisible model serves as the foundational mode of collaborative teaching due to its broad applicability, low cost, and ease of content design. The relay and co-teaching models, with their higher degree of collaboration, present greater teaching challenges. The guest model is relatively easier to implement. However, these models are just a few operational approaches to collaborative teaching. Course design should be grounded in practical experience, avoiding blind imitation, and teachers should flexibly apply or combine these models, innovating based on their foundation. Northwest University of Political Science and Law has actively explored the collaborative teaching model, and its research findings provide valuable insights for the instructional design of other interdisciplinary courses, facilitating the implementation of collaborative teaching in various disciplines. This model has proven effective in fostering well-rounded talent development and aligns with the goals of cultivating innovative talent, suggesting its potential to become a widely applicable model in higher education.

Hubei University of Economics has also practiced and explored the collaborative teaching model in the teaching of Advertising. Through practical application, it has been demonstrated that the collaborative teaching model offers advantages that traditional teaching methods cannot match. In practical application, the collaborative teaching model has shown unique advantages. Given the increasing number of students in art programs and the relative shortage of faculty, it is challenging to offer enough specialized courses. The collaborative

teaching model effectively alleviates the pressure of expanding enrollment in programs like Advertising and addresses the limitations of large-class teaching. Through close cooperation among teachers, joint preparation, and teaching, the strengths of each teacher can be fully utilized, creating a synergistic effect and forming a strong team dynamic. This approach promotes the development of the entire teaching system, achieving the goal of talent cultivation and more effectively nurturing professional talent. Additionally, the collaborative teaching model can stimulate students' interest in learning, improve learning efficiency, help students clarify their goals at each stage of learning, understand the value of each course, and facilitate the transfer and integration of knowledge. The implementation of the collaborative teaching model is based on a strict organizational structure and efficient management mechanism. At this university, the collaborative teaching model is executed under the direction of a teaching director. The teaching director is a teacher with the rank of associate professor or higher, possessing extensive teaching experience and strong management and coordination skills. They are responsible for setting the overall teaching objectives and the tasks for each phase of the semester according to the training program, and for organizing teaching teams and student groups. Each course is equipped with a teaching team that, based on the training program, develops the syllabus and content, and collaborates through various forms of the collaborative teaching model to ensure continuity in teaching. During the teaching process, both decentralized and concentrated teaching methods are used, applied flexibly according to the course content. Given the strong practical nature of the discipline, theory and practice are integrated, with theory guiding the design of practical activities, ultimately leading to the development of comprehensive professional skills. Through the practice of the collaborative teaching model, both the ability and level of collaborative teaching have improved. This approach fosters students' sense of autonomy and significantly enhances their comprehensive professional practical abilities, effectively meeting the goals of talent cultivation.

At Hunan University of Arts and Science, the collaborative teaching model has been explored for local undergraduate programs in economics and management. First, the positive effects of the collaborative teaching model in economics and management education were summarized. It facilitates the complementary advantages of diverse strengths and promotes positive interaction in the teaching process. The practical implementation of the collaborative teaching model is divided into several steps. First, a team of teachers is assembled for collaborative teaching, with members required to work closely together. After forming the teaching team, the teachers collaborate to draft the teaching content that matches the training program. The various phases of course delivery are then implemented, with one teacher serving as the main lecturer and others providing supplementary explanations. After the lectures, students are divided into groups for topic discussions. Finally, suggestions for improving the collaborative teaching model in economics and management programs are proposed. These include well-designed top-level planning and system innovation, optimizing the colla-

borative teaching curriculum system, building an excellent collaborative teaching team, creating a platform for collaborative education, and innovating resource-sharing mechanisms.

The practical exploration of the collaborative teaching model has achieved significant results. Through methods such as collaborative teaching among teachers, collaborative learning among students, and collaborative use of teaching resources, the model can effectively enhance teaching and learning outcomes, promoting comprehensive and personalized student development. Additionally, the collaborative teaching model fosters communication and cooperation among teachers, improving their teaching skills and professional development. As an innovative and effective teaching approach, the collaborative teaching model emphasizes the cooperation among teachers, students, and teaching resources to enhance both teaching and learning outcomes. The model has already achieved considerable success in domestic practice and holds promise for wider application and promotion in more fields and contexts in the future.

4. Typical Case Analysis

To improve the quality of graduate education, the Geography Graduate Program at a university emphasizes the reform of teaching methods. One of the key features of this reform is collaborative teaching, characterized by multiple teachers teaching in the same classroom.

4.1. Basic Information

The surveyed subjects are students from the four grades of Geography students from 2019 to 2022. In terms of the distribution among student grades, the number of students in each grade is relatively balanced. It is reported that the training of Geography majors is specifically divided into four directions: Urban Geography, Human Geography, Tourism Geography, and Geographic Information. Among the 16 courses designed for graduate students majoring in Geography, apart from the compulsory courses of Public Foreign Language and Theory and Practice of Socialism with Chinese Characteristics (either of which can be chosen with Dialectics of Nature), all other courses are elective courses in various research directions of Geography.

According to the survey, Frontier of Geography is the only course that all students have chosen to take among the numerous courses. Following this, the most popular courses are Geographic Thought and Methods, Application of Geographic Information Technology, Geographic Big Data Analysis, Resources, Environment, and Development, and Beijing Urban Research, accounting for over 90% of the choices. These six courses are the most selected courses among the major courses. In addition, Urban Geography and Planning Applications, Remote Sensing and Geographic Information Analysis, Theory and Methods of Spatiotemporal Behavior Research, Academic Ethics, and Thesis Writing all have over 50% of students selecting them, making them the most important support-

ing courses in researching geographical problems. The remaining courses are all below 50%. The proportion of selected courses is influenced by different research directions (Figure 1).

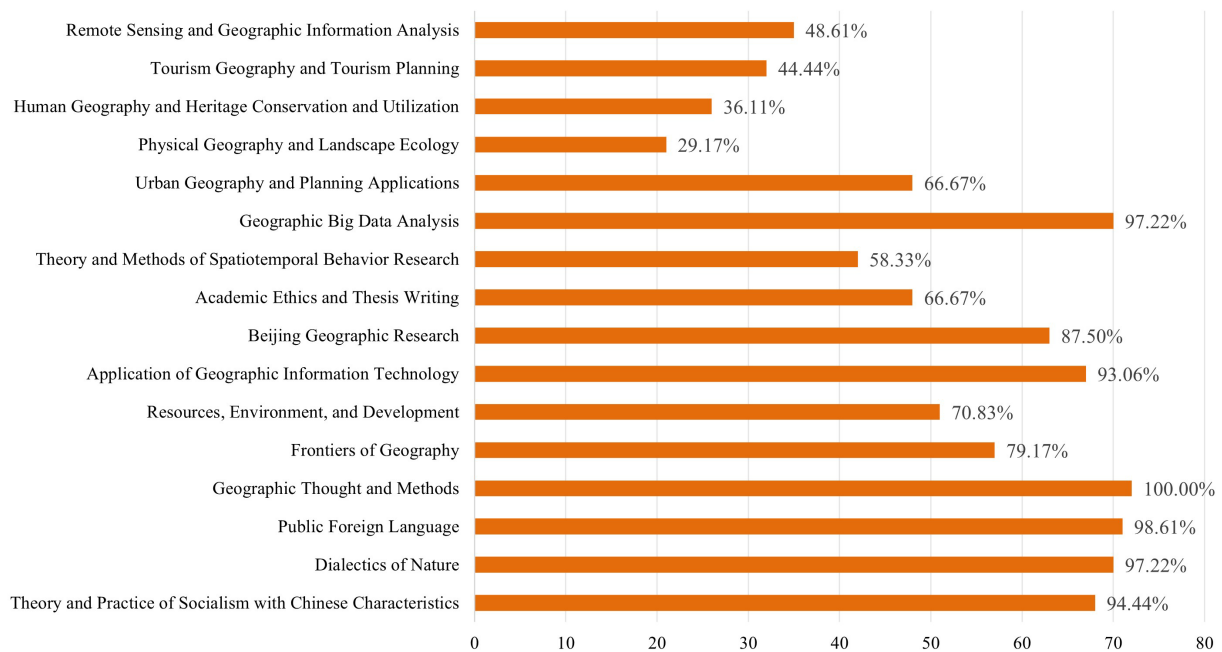


Figure 1. Courses taken situation.

4.2. Effectiveness of Collaborative Teaching Courses

Graduate courses at this university incorporate a multi-teacher collaborative teaching approach, considering the diverse research directions of students. According to surveys, students identified “Resources, Environment, and Development”, “Urban Geography and Planning Applications”, and “Geographical Frontiers” as primarily taught through collaborative teaching. Additionally, one-third of the students believed that “Geographical Thought and Methods”, “Beijing Geography Research”, “Academic Ethics and Thesis Writing” were also delivered using this approach. This variation in understanding may stem from expert lectures arranged to achieve different teaching goals or other instructors invited based on student feedback and course content.

In analyzing the effectiveness of courses taught using the collaborative teaching model, about 23% of students considered “Resources, Environment, and Development” the most effective course. Other highly regarded courses included “Geographical Frontiers”, “Urban Geography and Planning Applications”, and “Geographical Thought and Methods.” This preference is attributed to the model’s use of academic reports and classroom discussions to cultivate students’ research thinking, deepen their understanding of geography, and enhance their presentation skills. Furthermore, graduate students appreciate exposure to various fields of knowledge, enabling them to explore topics based on their interests after learning to apply the knowledge effectively (Figure 2).

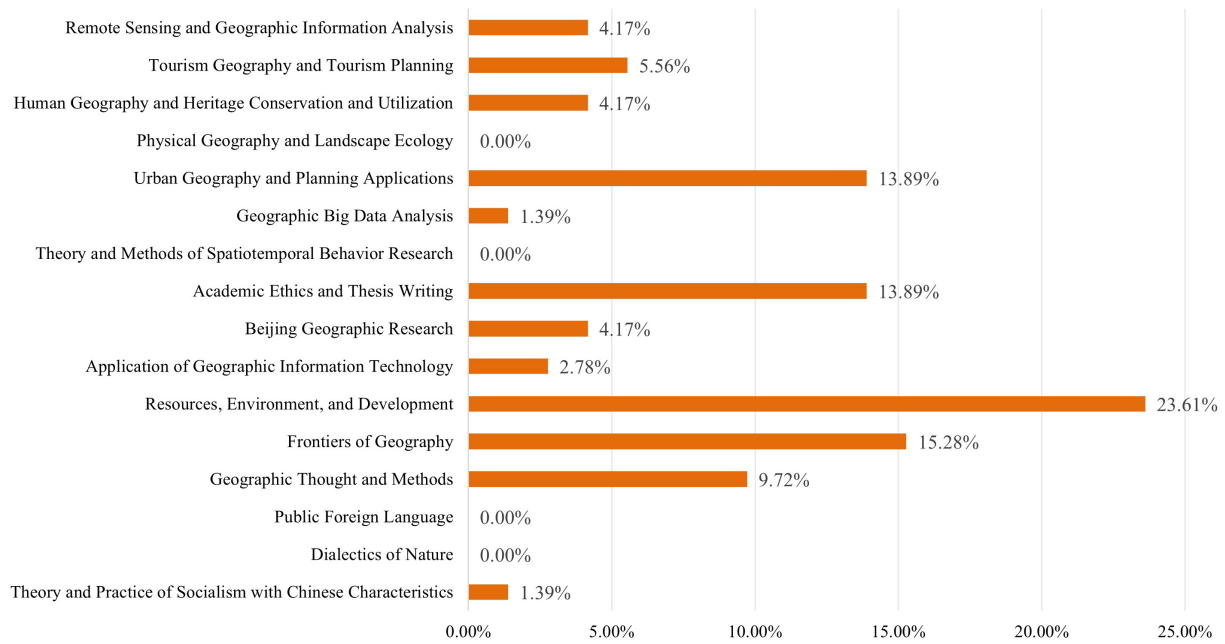


Figure 2. The courses selected by students as having the best teaching effectiveness in collaborative teaching.

In examining the reasons why the collaborative teaching method is considered most effective, it was found that approximately 72.2% of students believe that different teachers covering different content broadens their academic perspectives. About 19.4% of students attribute it to the varying teaching styles of different instructors, which enhances their interest in learning. Additionally, around 8.3% of students feel that the coordinated efforts of multiple teachers lead to better overall teaching effectiveness. From this analysis, it is evident that graduate students prefer to explore knowledge across various fields. After learning and mastering the ability to apply knowledge, they like to explore and practice based on their interests. However, a critical issue in collaborative teaching is ensuring the continuity of the content to avoid fragmentation of the courses (Figure 3).

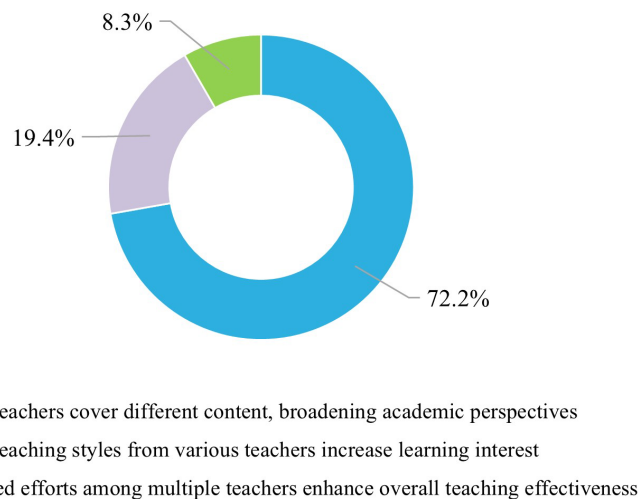


Figure 3. The reasons for the best effectiveness of collaborative teaching methods.

In the study on the effectiveness of collaborative teaching, it was found that this approach generally received positive feedback in the education of geography graduate students. Due to the diversity of research directions, students need to understand various aspects of geography. Additionally, graduate studies involve not only acquiring knowledge but also learning research methods, and developing independent thinking and research-oriented mindsets. However, collaborative teaching should not be considered a one-size-fits-all approach for all courses. In a comparison between the effectiveness of collaborative teaching and expert lectures, about 65.2% of students believed that the optimal effectiveness of collaborative teaching depends on the specific course. Furthermore, approximately 23.6% of students felt that collaborative teaching was more effective than expert lectures. Given the differences in students' grades, ages, and varying levels of interest in courses, curiosity about knowledge drives their interest. Therefore, before teaching, teachers need to spend time and effort understanding students' course needs. Only then can the teaching team further design the content to stimulate students' initiative and enthusiasm (Figure 4).

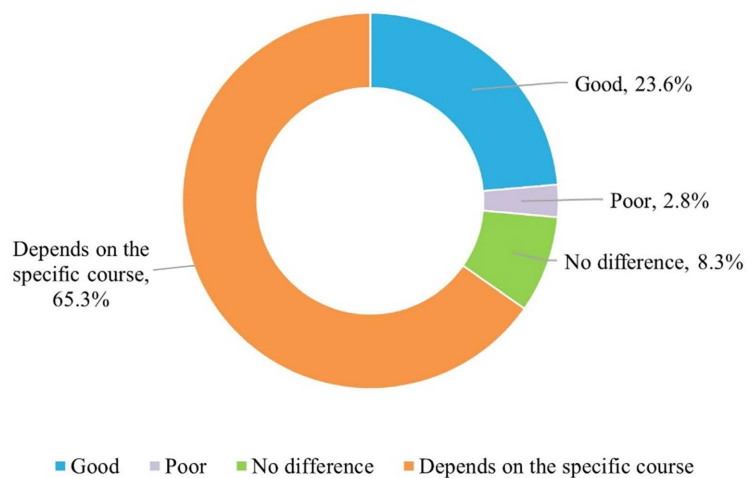


Figure 4. Students perceive that the effectiveness of collaborative teaching compared to expert lecture-based teaching.

Compared to traditional teaching methods, 51.3% of people believe that the effectiveness of collaborative teaching surpasses that of traditional methods. About 41.6% of students remain neutral, stating that it depends on the specific course. Only a small portion of students have a negative view of collaborative teaching, considering it no different from traditional teaching methods (Figure 5).

4.3. Situation and Issues of Collaborative Teaching Courses

In a survey on the number of teachers involved in collaborative teaching, it was found that having 2 teachers per course is the most common arrangement in the courses students actually select, gradually exploring ways to maximize teaching effectiveness. The next most common arrangement involves 5 or more teachers, often inviting renowned scholars in the field of geography to lecture on different

topics. Fewer courses are taught by 3-4 teachers for the same course (**Figure 6**).

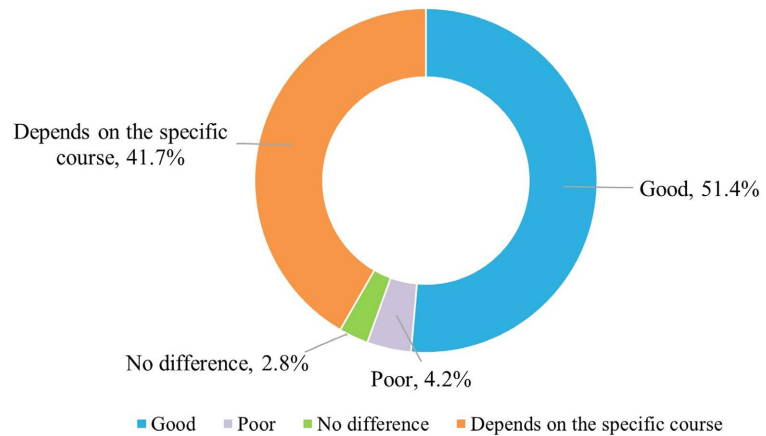


Figure 5. Students perceive the effectiveness of collaborative teaching compared to traditional teacher-led instruction.

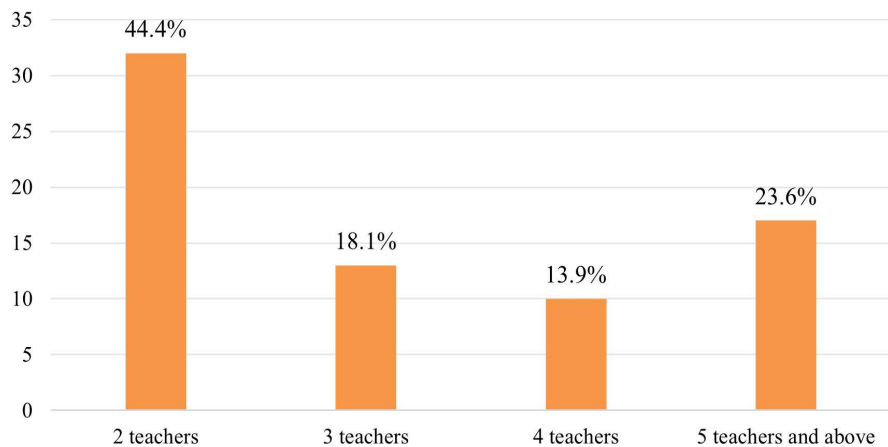


Figure 6. The number of teachers students actually chose for collaborative teaching varies.

Although collaborative teaching has many benefits, it is not a teaching model that can be applied to all courses. There are also some minor issues associated with it. Through the practical research on collaborative teaching among students in the four grades, it was found that over 42.86% of students believed that the content taught by different teachers was not related or that there was a lack of connection between the teaching content of different teachers, which is the main problem with collaborative teaching. Secondly, about 20.88% of students believed that some teachers deviated from the main theme of the course, while 16.84% of students believed that the content taught by different teachers was repetitive. A small number of students also believed that there was no difference in teaching styles among teachers. In summary, in order to achieve the ideal teaching effect of collaborative teaching, it is necessary to first listen to the students' opinions and pay attention to their feedback, and promptly make corrections and adjustments to the teaching content and progress. Secondly, teachers need to communicate deeply with each other, collaborate on the formulation of teach-

ing outlines, objectives, content, management systems, etc., to reduce the repetition of teaching content among teachers and improve teaching quality. Finally, teachers need to enhance their grasp of teaching, enrich the teaching content by combining it with practical cases or research documents, and use diverse teaching methods to improve students' enthusiasm and initiative in professional courses, gradually improving the quality of collaborative teaching. (Figure 7)

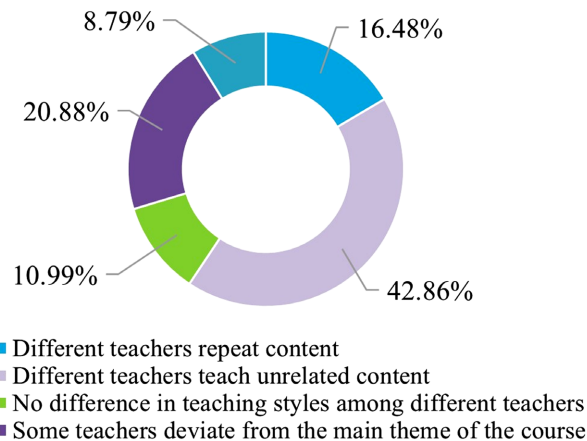


Figure 7. The issues students perceive in collaborative teaching at the present stage.

4.4. Students' Ideal Collaborative Teaching Research

According to the survey on students' ideal collaborative teaching models, nearly half of the students believe that modularizing knowledge is the most ideal teaching approach, dividing the teaching content into 2 to 3 modules, with each teacher responsible for one module. The next preferred teaching methods are lecture series and integrated knowledge courses. Only a very small number of students choose to have multiple teachers simultaneously teaching in the classroom. Based on the students' choices, it is evident that collaborative teaching should focus on connecting knowledge or clearly defining each teaching module. The essence of collaborative teaching is to promote students' multidimensional and multi-perspective thinking in geography, fostering independent thinking and teamwork skills. By constructing geographical research perspectives from different angles, arranging teaching content reasonably and scientifically can yield a synergistic effect in the course, where "1 + 1 > 2" in terms of effectiveness (Figure 8).

5. Evaluation of Collaborative Teaching

5.1. Benefits of Collaborative Teaching for Educational Innovation

Firstly, collaborative teaching is a unique and innovative teaching method that can adapt to different teaching content by setting different teaching methods. Teachers with different professional knowledge collaborate based on common goals and ideas to create a collaborative teaching format specific to a certain course, providing students with diversified learning experiences.

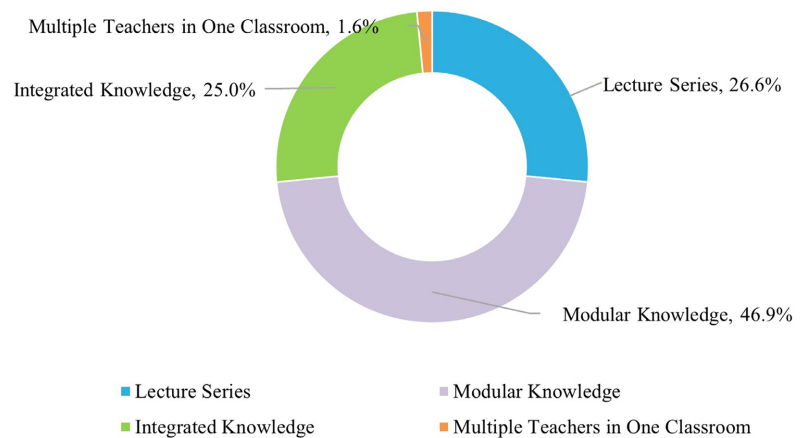


Figure 8. Students' ideal collaborative teaching methods.

Secondly, collaborative teaching greatly improves the quality of courses. It can gather the professional knowledge and teaching experience of teachers from various fields and disciplines, forming a strong teaching team. Through continuous in-depth communication and collaboration among teachers, the course content becomes enriched and deepened, enhancing students' learning effectiveness and efficiency, significantly improving the quality of teaching.

Collaborative teaching helps cultivate students' comprehensive abilities. In collaborative teaching, teachers focus on interdisciplinary teaching, broadening students' knowledge fields and enhancing their comprehensive qualities. Collaborative teaching can make full use of the professional knowledge and skills of different teachers, disciplines, and fields, providing richer and more comprehensive teaching content and methods. The teaching method of collaborative teaching differs from traditional teaching methods, enabling students to think about issues from multiple perspectives, thereby fostering their innovative thinking and practical abilities, enabling them to apply the knowledge they have learned to practical problems, and cultivating their problem-solving abilities.

The collaborative teaching model provides an important platform for academic exchanges and knowledge sharing among teachers. Under this model, teachers inspire and learn from each other through teamwork, jointly contributing to the innovation of teaching methods and the improvement of professional abilities. This spirit of cooperation not only promotes the improvement of teaching quality but also lays the foundation for creating a positive and healthy educational environment. Through interaction and communication with students, involving students in the process can better clarify their professional theories, enhance students' initiative in learning, improve the effectiveness of communication between teachers and students, and thus enhance teaching effectiveness.

In the collaborative teaching model, the team of teachers sets the teaching content based on the teaching outline, relevant textbooks, and scientific research literature, incorporating relevant research cases and materials, enriching teaching methods, and increasing the enthusiasm of students for learning.

Finally, collaborative teaching contributes to the reform and development of education. Through collaboration and communication among teachers, the improvement of teaching quality and the strengthening of the learning atmosphere can promote the improvement and innovation of traditional teaching models, thereby promoting the sustainable development of education.

5.2. Problems Existing in Collaborative Teaching

Firstly, in the process of collaborative teaching, teachers need to cooperate closely with students, which requires teachers and students to invest more time and effort. In addition to this, due to the current environment and assessment system's limitations, including heavy teaching tasks, high research requirements, and trivial administrative work, teachers face significant challenges, which may prevent them from fully engaging in collaborative teaching with multiple teachers.

Secondly, when courses are taught collaboratively, besides the need for close cooperation between teachers and students, there are also practical difficulties. Because of the lack of long-term communication and understanding between teachers and students, lack of extensive communication and communication, the teaching content between teachers may not be connected, causing confusion and doubts among students, which greatly affects teaching effectiveness and disrupts the teaching process. Moreover, collaborative teaching involves multiple teachers, students, and other stakeholders, requiring effective management and coordination; otherwise, confusion and inefficiency may occur.

Finally, selecting teaching content for collaborative teaching is also a challenge. Because there may be knowledge duplication or conflicts among different teachers, thorough discussion and negotiation are required to ensure the consistency and accuracy of the teaching content. The teaching content must be suitable for students' professional learning, suitable for simultaneous teaching by teachers from different disciplines, and can stimulate students' interest and motivation to learn. Therefore, selecting teaching content is crucial, requiring teachers to engage in joint discussions and negotiations.

6. Conclusion and Prospects

In today's advancing era, education reform is constantly underway. The collaborative teaching model has achieved significant effectiveness in practice. It integrates the expertise of multiple teachers, allowing students to acquire relatively comprehensive knowledge from various teachers, thus promoting mutual learning. The collaborative teaching model can better meet modern teaching requirements, breaking through traditional teaching methods, facilitating the exchange and sharing of knowledge and information, and optimizing resource allocation. During the teaching process, teachers incorporate their own research experiences and relevant cases and materials to innovate teaching content and methods, enrich teaching methods, enhance students' interest in learning, and enable students to understand target knowledge and explore and practice knowledge

during the learning process, thus better achieving teaching objectives. It also diversifies and innovatively applies teachers' teaching experiences and disciplinary knowledge.

This study found through a survey of geography graduate students that most students hold a positive attitude towards collaborative teaching, believing that it can improve teaching quality. However, some students believe that collaborative teaching is not helpful for teaching and learning, indicating that collaborative teaching also has some problems. Therefore, proactive exploration and innovation are needed for collaborative teaching. Attention should be paid to the design of collaborative teaching courses for geography graduate students, designing collaborative teaching methods according to the actual situation and needs of students to help students better understand the collaborative teaching model and thus improve teaching quality.

The collaborative teaching model has proven its effectiveness in enhancing educational practices. It integrates diverse expertise, fostering an environment conducive to comprehensive learning and mutual enhancement among students and educators. To advance this model in alignment with modern educational demands, it is crucial to delineate clear roles and responsibilities. Educational institutions and department heads must take the helm in steering the strategic implementation of collaborative teaching initiatives. They are tasked with the orchestration of resources, the alignment of faculty expertise, and the facilitation of knowledge exchange. Faculty members, particularly those involved in collaborative teaching, bear the responsibility of innovating and customizing their teaching methodologies to meet the dynamic needs of students. They should actively integrate their research experiences and real-world cases into their teaching practices to stimulate student interest and facilitate deeper understanding. Students, as key stakeholders, are encouraged to participate actively in the collaborative learning process, providing valuable feedback that can inform the continuous refinement of teaching strategies. Their involvement is essential in assessing the model's effectiveness and in driving improvements that resonate with their learning experiences. Administrators and educational policymakers play a pivotal role in supporting the professional development of teachers engaged in collaborative teaching. They must ensure that teachers are equipped with the necessary training and opportunities to enhance their interdisciplinary and collaborative skills. By assigning clear responsibilities to these key groups—institutions, faculty, students, and administrators—we can ensure a coordinated and effective implementation of the collaborative teaching model. This structured approach will not only address the current challenges but also set the stage for future enhancements, such as interdisciplinary integration, increased student participation, and the ongoing professional growth of educators, thereby enriching the educational landscape and elevating the collaborative teaching model to new heights of effectiveness and innovation.

In summary, the collaborative teaching model emerges as a dynamic and innovative pedagogical approach that has demonstrated substantial benefits for

educational innovation, including the diversification of learning experiences, enhancement of course quality, and the cultivation of students' comprehensive abilities. It serves as a vital platform for academic exchange and knowledge sharing, fostering a spirit of cooperation that enriches the educational environment and contributes to the reform and development of the educational system. However, the model is not without its challenges, which include the need for significant time and effort investment, potential disconnections in teaching content due to lack of coordination, and the complexities of selecting and integrating appropriate teaching materials. To fully harness the potential of collaborative teaching and address these challenges, it is imperative to develop a more nuanced and comprehensive evaluation framework. This framework should encompass a systematic assessment of the model's effectiveness, taking into account the interplay between diverse teaching methods, the collective expertise of the teaching team, and the impact on students' learning outcomes. It should also provide a structured mechanism for feedback and continuous improvement, ensuring that the collaborative teaching model remains responsive to the evolving needs of educators and learners alike. Furthermore, the evaluation process must be designed to facilitate the professional development of educators, offering them opportunities to refine their interdisciplinary teaching skills and enhance their collaborative competencies. By integrating these evaluative insights, the collaborative teaching model can be further optimized, leading to more impactful educational experiences and nurturing a new generation of talents equipped to excel in an increasingly interconnected world.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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