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Research on the Development of Interdisciplinary Teaching Competence for Junior High School English Teachers from the Perspective of Professional Learning Communities

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Abstract

The Compulsory Education English Curriculum Standards (2022 Edition) has introduced "interdisciplinary thematic learning," requiring English teachers to develop interdisciplinary teaching competence—a demand further intensified by increasingly interdisciplinary Zhongkao examination papers. However, most junior high school English teachers, typically trained in English-related majors, lack sufficient interdisciplinary knowledge and instructional design capacity, and existing school-based teaching and research systems rarely support interdisciplinary collaboration. Adopting the perspective of Professional Learning Communities (PLC), this paper combines literature review, text analysis of the 2023–2024 Nanchong Zhongkao English papers, and theoretical deduction to examine how PLCs can facilitate teachers' interdisciplinary teaching competence. The paper proposes three core mechanisms through which PLCs promote such competence: interdisciplinary knowledge co-construction, collective reflection and practice improvement, and professional identity reconstruction. Building on these mechanisms, four practical pathways are further designed, namely constructing interdisciplinary teaching and research communities, carrying out interdisciplinary lesson study, establishing online interdisciplinary learning networks, and providing school-level institutional safeguards.

Keywords

Professional Learning Community; Interdisciplinary Teaching Competence; Teacher Professional Development; Lesson Study; Junior High School English; Curriculum Reform 2022

1. Introduction

1.1. Research Background

In April 2022, the Ministry of Education promulgated the Compulsory Education

English Curriculum Standards (2022 Edition), which, for the first time, set up the "interdisciplinary thematic learning" module in the curriculum content, explicitly proposing that "English curricula should strengthen comprehensiveness and practicality, and promote interdisciplinary integration" (Ministry of Education, 2022, p. 2). This policy orientation means that English teaching is no longer confined to the transmission of linguistic knowledge, but requires teachers to possess the ability to integrate multidisciplinary knowledge and design interdisciplinary thematic learning activities.

Notably, the Curriculum Standards also explicitly advocate for the establishment of teacher learning and research communities, calling on schools to "create an atmosphere characterized by full participation and innovation with integrity," to "pool the educational wisdom of all teachers in the teaching and research group," and to "establish practice-oriented learning and research communities" that enable teachers to "stimulate research enthusiasm through listening, dialogue, sharing, and intellectual exchange" (Ministry of Education, 2022, p. 34).

At the same time, examination paper design is also actively responding by incorporating interdisciplinary knowledge into various question types.

Taking the English examination papers for the senior high school entrance examination in Nanchong City, Sichuan Province, as an example, in 2023, Cloze Passage A used the migration of monarch butterflies as the textual vehicle, involving knowledge of animal behavior; Reading Comprehension A centered on sunflower planting, requiring students to understand agronomic concepts such as sowing temperature and growth cycles. In 2024, the depth of interdisciplinary integration intensified further. The reading comprehension gap-fill section adopted the Amazon rainforest ecosystem as its theme, covering core concepts from biology and geography, such as species diversity, energy transfer in food chains, and the vertical stratification structure of forests, requiring students to possess a preliminary awareness of environmental science. Interdisciplinary content has also consistently appeared in examination papers in recent years, reflecting a trend of interdisciplinary assessment moving from "background infiltration" to "in-depth conceptual understanding."

However, there exists a considerable gap between the interdisciplinary demands of the current curriculum and assessment and the actual knowledge base and teaching capacity of junior high school English teachers. The vast majority of junior high school English teachers come from English major backgrounds; their university curriculum system primarily covers linguistics, literature, and foreign language teaching methodology, with very little involvement of science knowledge such as physics, biology, or geography (Wang & Liu, 2023, p. 5). After entering the profession, the "within-discipline" nature of the school teaching and research system further entrenches knowledge boundaries. Institutionalized communication channels between the English teaching and research group and teaching and

research groups of other disciplines are lacking. Although some schools organize "expert lecture and centralized training" style teacher training, such training often suffers from overly broad themes, detachment from real classroom situations, and a lack of sustained follow-up, making it difficult for teachers, who are in a passive reception state, to translate training content into teaching behaviors. In addition, frontline teachers face heavy teaching and lesson preparation pressures, and coupled with widespread professional burnout, teachers tend to disengage from formalized and ineffective teaching and research activities, perceiving them as additional burdens rather than meaningful professional learning opportunities. Against this backdrop, the Professional Learning Community, as a teacher development model centered on collaboration, reflection, and continuous improvement, provides a theoretical basis and practical pathway for breaking through the aforementioned predicaments.

Based on the above background, this paper focuses on the following core question: Under the realistic predicaments faced by junior high school English teachers—insufficient interdisciplinary knowledge reserves, deficient instructional design ability, and lack of collaboration platforms—how can the Professional Learning Community (PLC), as a teacher development mechanism, promote the improvement of English teachers' interdisciplinary teaching competence? To address this question, this paper first diagnoses the predicaments confronting junior high school English teachers in developing interdisciplinary teaching competence, then draws on PLC theory to analyze the mechanisms through which collaborative professional learning can address these challenges, and finally proposes actionable pathways for school-level implementation.

1.2. Research Purpose and Significance

Existing research mostly focuses on interdisciplinary teaching at the high school or university level, with relatively insufficient attention paid to the junior high school stage. At the level of theoretical exploration, existing studies mostly emphasize the "what" question—that is, the connotation definition and constituent elements of interdisciplinary teaching competence—while discussions on the "how to cultivate" question, namely the development mechanisms and pathways for teachers' interdisciplinary teaching competence, are relatively scarce. Professional Learning Community, as a teacher development model rooted in social learning theory, provides an explanatory framework for answering the "how to cultivate" question, yet research on its application in the specific context of interdisciplinary teaching remains relatively weak.

Therefore, this paper adopts PLC as its theoretical perspective and uses the Nanchong Zhongkao English examination papers as the basis for textual analysis. Building upon sorting out the connotation of interdisciplinary teaching competence and the core theories of PLC, this paper explores how junior high school English

teachers can enhance their interdisciplinary teaching competence through professional communities, and proposes corresponding practical pathway suggestions. The theoretical significance of this paper lies in bridging PLC theory with the development of English teachers' interdisciplinary teaching competence, thereby expanding the application context of PLC. The practical significance lies in providing actionable reference ideas for junior high schools to construct interdisciplinary teaching and research communities.

1.3. Research Method

This paper is primarily a theoretical inquiry supplemented by documentary-textual analysis. Three specific methods are adopted.

First, the literature research method is employed to systematically examine the theoretical evolution of Professional Learning Communities, tracing its development from Dewey's democratic community and Senge's learning organization to the more recent operational frameworks proposed by Hord (1997) and DuFour (2013). Key dimensions of interdisciplinary teaching competence are also identified and synthesized from existing scholarship and policy documents, particularly the Compulsory Education English Curriculum Standards (2022 Edition).

Second, the text analysis method is applied to the 2023 and 2024 Nanchong senior high school entrance examination English papers. All test items are screened for interdisciplinary content, and the identified items are categorized by question type, interdisciplinary theme, disciplines involved, and required interdisciplinary knowledge. The resulting distribution tables serve as empirical evidence of the increasing interdisciplinary demands placed on junior high school English teachers, thereby substantiating the practical urgency of the research problem.

Third, on the basis of the literature review and text analysis, theoretical deduction is used to articulate the internal mechanisms through which PLC facilitates the development of interdisciplinary teaching competencies and to design corresponding practical pathways.

2. Theoretical Framework

2.1. Connotation of Interdisciplinary Teaching Competence

Interdisciplinary teaching refers to a teaching philosophy and approach that applies knowledge, methods, and concepts from two or more disciplines to comprehensively solve theme-focused problems. It is anchored in a specific discipline while integrating relevant knowledge from other disciplines around a unifying theme, thereby enabling disciplinary and interdisciplinary learning to complement and reinforce each other (Wang & Liu, 2023). Accordingly, the interdisciplinary teaching competence in the English discipline can be divided into the following four dimensions (Huang, 2026, pp. 127-129): First, interdisciplinary knowledge integration competence, that is, the ability to identify and integrate

knowledge connections between English and other disciplines to form an organic system. Second, thematic context design competence, that is, the ability to create interdisciplinary thematic learning contexts based on authentic problems and design integrated tasks. Third, interdisciplinary teaching evaluation competence, that is, the ability to design evaluation tasks oriented toward interdisciplinary learning objectives. Fourth, reflection and improvement competence, which involves conducting collective and systematic reflection on the implementation of interdisciplinary teaching.

Junior high school English teachers should possess the aforementioned interdisciplinary competences to better cultivate students' interdisciplinary abilities. According to the Compulsory Education English Curriculum Standards (2022 Edition), the core competencies of the English discipline include linguistic competence, cultural awareness, thinking quality, and learning ability. The cultivation of core competencies in the English discipline needs to be realized through practices at the intersection of multiple disciplines (Huang, 2026, p. 128). Interdisciplinary English teaching is an important pathway for realizing core competencies. English teachers should take these four dimensions as their goal and continuously enhance their own interdisciplinary teaching competence. Interdisciplinary teaching is a practical vehicle for comprehensive competence; through interdisciplinary knowledge exploration, teachers can understand what students need to learn, thereby promoting their all-around, multi-dimensional competence development (Rojas-Avilez et al., 2023).

2.2. Professional Learning Community (PLC)

The theoretical foundation of PLC can be traced back to early educational scholarship on collaborative and experiential learning. Dewey (1916) proposed core ideas such as "the school as society" and "education as the continuous reconstruction of experience" in Democracy and Education, emphasizing that a democratic community is the basic social form in which education occurs. Schools should construct democratic communities in which teachers grow continuously through collaboration. This idea was systematically developed after the rise of learning organization theory. Senge (2006) mentioned the concept of "learning organization," emphasizing that organizations should possess the capacity for continuous learning, and that their core elements include two components: shared vision and team learning. This concept provided support for the theoretical construction of PLC from the perspective of organizational learning.

Hord (1997) defined the professional learning community as a "professional learning community" or a "community of continuous inquiry and improvement." Teachers and administrators in schools cooperate long-term and share resources to improve teachers' professional competence and promote student learning. This definition places greater emphasis on the transformation of the school's collective

culture and interpersonal relationships. It explicitly stipulates the ideal form of PLC, that is, a group that jointly inquires and jointly improves professional learning.

Different from theoretical concepts, DuFour (2013) operationally treats PLC as a "process" rather than, like Hord, treating PLC as a "project." He emphasizes that PLC should take a collaborative culture as the process and focus on the school work process and practice framework that centers on learning and results. Its purpose is to "ensure that all students learn," which also highlights DuFour's student-centered emphasis.

Senge provided the philosophical ideas for defining PLC, Hord constructed the analytical framework, and DuFour provided the implementation tools. Scholars have characterized PLCs in varying ways. This paper is based on Stoll et al.'s (2006) characteristic framework of PLC. Stoll et al. (2006), building on Hord and DuFour's frameworks, defined PLC as an organization with the following five characteristics: shared values and vision, collective responsibility for student learning, reflective professional inquiry, collaboration, and facilitation of team and individual learning. This study also pointed out that the effectiveness of PLC is built upon practical knowledge, reflective practice, and learning embedded in work.

2.3. Three Core Characteristics of PLC Related to Interdisciplinary Teaching

PLC is a mode of teacher teamwork that centers on collaboration, reflection, and inquiry. It is an internal organizational form and cultural ecology within schools in which teachers are jointly committed to improving teaching practice and student learning. In the specific context of interdisciplinary teaching, the following three characteristics are particularly critical.

First, the structured collaborative learning platform provided by PLC creates an institutional space for English teachers and teachers of other disciplines to jointly explore interdisciplinary teaching problems (Timperley et al., 2007). The key difficulty in interdisciplinary teaching lies in English teachers' unawareness of the knowledge systems and teaching methods of other disciplines. Within the PLC framework, teachers can observe each other's classes, jointly refine lesson plans, and collectively analyze student work, which directly corresponds to the "shared personal practice" dimension in Hord's five-dimensional framework—that is, teachers of different disciplines observe, analyze, and discuss each other's teaching processes, enabling English teachers to directly understand the thinking modes and teaching logics of other disciplines (Hord, 1997).

Second, interdisciplinary teaching emphasizes student core competence development as its goal orientation, which highly aligns with the "focusing on results" principle among DuFour's (2013) three big ideas. The ultimate goal in PLC of "ensuring that all students learn" rather than merely "finishing teaching" requires teacher teams to jointly develop, revise, and share interdisciplinary teaching cases,

thematic design schemes, and evaluation rubrics. Teachers no longer complete their respective disciplinary teaching tasks in isolation, but instead design learning experiences around students' overall competence development collaboratively.

Finally, PLC leverages the concept of "shared repertoire" from Wenger's (1998, pp. 82-85) communities of practice theory to realize the transformation of knowledge production modes in interdisciplinary teaching contexts. Traditional teacher development models follow the logic of "knowledge-for-practice" (Cochran-Smith & Lytle, 1999, p. 254), adopting a top-down expert lecture path in which teachers are positioned as passive knowledge recipients. In contrast, within the PLC framework, teachers of different disciplines continuously collaborate to accumulate interdisciplinary teaching resources and jointly construct interdisciplinary cognitive frameworks. The existence of a shared repertoire makes PLC a learning system with knowledge accumulation and a common cognitive foundation, rather than a one-time experience exchange. These three characteristics, elaborated further in Chapter 4, respectively underpin the mechanisms of interdisciplinary knowledge co-construction, collective reflection and practice improvement, and professional identity reconstruction.

Under the combined effect of the above characteristics, PLC can provide a "five-step closed loop" practical pathway for the development of English teachers' interdisciplinary teaching competence: determining interdisciplinary themes, jointly designing lesson plans, rotating teaching and classroom observation, joint discussion and feedback, and collective reflection and iteration. This closed loop directly corresponds to the core of PLC theory, namely shared values and vision (theme determination), collective learning and application (joint design), shared personal practice (teaching and observation), and reflective professional inquiry (discussion, feedback, and reflection iteration), thereby transforming the abstract theory of PLC into an operational teaching improvement process.

3. Realistic Predicaments of Interdisciplinary Teaching for Junior High School English Teachers

3.1. Knowledge Level: Solidified Disciplinary Boundaries and Insufficient Interdisciplinary Knowledge Reserves

The knowledge structure of English teachers is primarily based on linguistic knowledge and language teaching methodology, covering the fields of linguistics, literature, and pedagogy. However, the disciplinary divide between the humanities and the sciences established at the university stage remains pronounced. As a liberal arts orientation, the English education major's curriculum system rarely involves science knowledge, such as physics, biology, or geography. The knowledge scope of individual English teachers is necessarily limited, rendering it difficult to cover all relevant disciplines comprehensively, especially when involving biology, geography, physics, and other fields where knowledge reserves are relatively weak, resulting in

difficulties when building interdisciplinary connections for students and analyzing students' interdisciplinary examination questions.

3.2. Competence Level: Deficient Interdisciplinary Instructional Design Competence

The selection and design of interdisciplinary themes constitute a prominent problem faced by English teachers. In the classroom, English teachers not only need to explain linguistic knowledge, but should also expand students' knowledge of other disciplines. However, most teachers lack experience in selecting appropriate interdisciplinary themes and find it difficult to organically integrate language objectives with disciplinary knowledge objectives. In addition, curriculum resources in some regions are scarce; teachers lack practical opportunities and reference cases for interdisciplinary unit design, which further constrains the development of interdisciplinary instructional design competence.

3.3. Support Level: Lack of Institutions and Platforms for Interdisciplinary Collaboration

The work focus of existing teaching and research groups centers on administrative arrangements—coordinating schedules, assigning tasks, arranging teaching progress, etc.—rather than professional inquiry centered on teaching practice. Teaching and research groups usually take "within-discipline" as their boundary; essentially, they are administrative organizations (DuFour, 2013). Opportunities for interdisciplinary exchange are extremely rare. In contrast, PLC focuses on student learning, is oriented toward learning outcomes, and is a cultural ecology and continuous way of working centered on student learning and characterized by teachers' continuous reflection and collaboration.

As the research by Vescio et al. (2008) demonstrates, traditional teaching and research groups tend to transmit individuals' "knowledge-for-practice" from veteran teachers to new teachers in a one-way manner, whereas PLCs encourage teachers to actively construct knowledge within the community. The absence of institutional arrangements for interdisciplinary exchange in existing teaching and research groups means that English teachers rarely have opportunities to communicate with teachers of other disciplines about students' difficulties in interdisciplinary learning or to jointly analyze interdisciplinary examination questions, thereby exacerbating the predicaments of solidified disciplinary boundaries and deficient interdisciplinary instructional design competence. This institutional gap precisely provides the practical space and the necessary basis for the construction of PLC.

3.4. Examples of Interdisciplinary Question Types in Zhongkao Examinations

The absence of institutionalized interdisciplinary collaboration platforms not only

constrains teachers' professional growth but also leaves them ill-equipped to respond to the increasingly interdisciplinary nature of assessment. To substantiate this claim, this paper takes the 2023 and 2024 Nanchong Zhongkao English examination papers as illustrative examples (see Tables 1 and 2).

Table 1. Distribution of Interdisciplinary Question Types in the 2023 Nanchong Zhongkao English Examination

Question Type	Items	Interdisciplinary Theme	Disciplines Involved	Interdisciplinary Knowledge Required
Cloze A	1-5	Migration of monarch butterflies	Biology	Understanding animal migration behavior and the biological mechanism by which butterflies navigate using the sun's position.
Reading Comprehension A	16-20	Methods of planting sunflowers	Biology, Agriculture	Understanding suitable sowing temperatures, growth stages, harvesting times, and methods of plant support.
Reading Gap-fill	46-50	History and craftsmanship of the traditional Chinese hand warmer	History, Physics	Understanding the development of artifacts from the Sui to the Qing dynasties, and the physical properties of copper heat conduction.

Note. Data sourced from the 2023 Nanchong Zhongkao English Examination papers.

Table 2. Distribution of Interdisciplinary Question Types in the 2024 Nanchong Zhongkao English Examination

Question Type	Items	Interdisciplinary Theme	Disciplines Involved	Interdisciplinary Knowledge Required
Cloze A	1-5	Application of 3D printing technology in the medical field	Information Technology, Medicine	Understanding basic principles of 3D printing and its medical applications, such as artificial organs and animal prosthetics
Reading Comprehension C	26-30	History of sugar painting	History, Fine Arts, Cultural Heritage	Understanding the development of sugar-making techniques from the Warring States period to the Ming Dynasty, and the artistic value of sugar painting as intangible cultural heritage
Reading Gap-fill	46-50	The Amazon rainforest ecosystem	Biology, Geography, Ecology	Understanding the vertical stratification of rainforests, species diversity, food chain relationships, and the ecological function of the rainforest as the "lungs of the Earth"

Note. Data sourced from the 2023 Nanchong Zhongkao English Examination papers.

The above tables show that in the past two years, interdisciplinary question types in the Nanchong Zhongkao English examination have already involved multiple disciplinary fields such as biology, geography, physics, history, information technology, and health science, and the depth of interdisciplinary integration has increased year by year. From 2023, where disciplinary background knowledge served as an auxiliary (butterfly migration, sunflower planting), to 2024, where students were required to have a substantive understanding of core disciplinary concepts such as food chains, ecosystems, and material form changes (Amazon rainforest, sugar painting production principles), this trend indicates that English teachers not only need to possess basic interdisciplinary knowledge reserves, but

also need to understand the thinking modes and logics of different disciplines to build effective interdisciplinary comprehension scaffolds for students in teaching. However, existing teacher training systems and school collaboration mechanisms are scarcely adequate to meet this demand, thereby highlighting the necessity of constructing interdisciplinary PLCs.

The development of interdisciplinary teaching competence is not achieved overnight. PLC realizes continuous iteration through the "planning—action—observation—reflection—improvement" cycle: collaboratively designing interdisciplinary themes, one teacher teaching while other teachers observe, collective debriefing focusing on student learning performance, identifying improvement points, and revising the plan (Lewis, 2002; Bergmark, 2023).

4. Analysis of the Mechanisms Through Which PLC Promotes the Development of Interdisciplinary Teaching Competence

4.1. Interdisciplinary Knowledge Co-construction Mechanism

Wenger's (1998) communities of practice theory provides a theoretical foundation for the operation of interdisciplinary PLCs. In a community of practice, members jointly negotiate goals, pursue a common enterprise, and accumulate shared resources through continuous interaction and relationship maintenance. "Shared repertoire" is the core product of this mechanism—teachers of different disciplines contribute their respective disciplinary knowledge, teaching strategies, and evaluation schemes to the community, and through collective discussion, screening, and integration, form interdisciplinary teaching resources that can be invoked by all members. These integrated resources include not only specific instructional design schemes and teaching materials but also represent the interdisciplinary cognitive framework jointly constructed by community members in the process of continuous negotiation. In other words, PLC is essentially a "common resource repository" collaboratively constructed and continuously updated by teachers of different disciplines. Its specific operational forms include interdisciplinary joint teaching and research and thematic unit joint design (He & Yuan, 2026, pp. 131-132).

4.2. Collective Reflection and Practice Improvement Mechanism

Schön (1983) argued that practice itself possesses its own cognitive modes and knowledge production mechanisms. High-quality professional practice is not simply the "application" of theory into practice, but rather a process of "reflective dialogue" between the practitioner and the situation. The improvement of interdisciplinary teaching competence is a highly contextualized and iteratively cyclical process. English teachers must venture into unfamiliar cognitive domains where they have limited prior knowledge and pedagogical experience.

In interdisciplinary teaching practice, each teacher generates individual "reflection-in-action" in their respective teaching processes. For example, an English

teacher discovers that students cannot use English to articulate the causal relationships of historical events. These individual, tacit reflections are, in the PLC's sessions, such as "peer lesson observation and feedback" and "collective lesson refinement," gathered into collective "reflection-on-action" through dialogue and sharing, thereby directly enhancing teachers' interdisciplinary teaching evaluation and reflection competence.

4.3. Identity Reconstruction Mechanism

Schön (1983, pp. 51-55) also emphasized that knowledge in professional practice is often tacit; teachers' understanding of other disciplines' teaching methods and thinking modes is also often fragmented and informal. Traditional English teacher identity is mainly constructed around "language teaching expert"—proficiency in English grammar, vocabulary, and skills teaching. With the continuous development of interdisciplinary thematic teaching in PLC, English teachers' professional identity gradually expands. In the process of continuously participating in interdisciplinary thematic design, collective lesson observation and discussion, and reflective dialogue, teachers begin to position themselves as instructional designers of "language and interdisciplinary themes."

This identity transformation is naturally generated through continuous dialogue and practical participation among teachers of different disciplines in PLC. As Wenger (1998) pointed out, participating in a community is itself a process of identity negotiation and reconstruction. In the interdisciplinary teacher professional community, teachers come to view teaching not merely as the technical application of codified knowledge, but as an intellectually and creatively demanding practice that requires both scientific rigor and adaptive artistry, through thinking exchanges with other educators, enabling education to more fully realize its function of promoting students' all-round development. In the interdisciplinary teacher professional community, teachers not only acquire knowledge resources from other disciplines, but also redefine "what I can do" and "what I should pay attention to," which has a deeply driving effect on the long-term development of interdisciplinary teaching competence.

In synthesis, the above three mechanisms—knowledge co-construction, collective reflection, and identity reconstruction—do not operate independently of each other; rather, they intertwine and cyclically reinforce each other in the daily operation of PLC. Knowledge co-construction provides a shared cognitive resource and discussion foundation for collective reflection; collective reflection provides a verification and correction mechanism for the quality of knowledge co-construction; and identity reconstruction is not only the natural product of the long-term operation of the former two, but also, in turn, enhances teachers' intrinsic motivation to participate in knowledge co-construction and reflective dialogue. These three collectively constitute the internal mechanism chain through which PLC

promotes the development of English teachers' interdisciplinary teaching competence.

5. Practical Pathways for PLC to Support Interdisciplinary Teaching

5.1. Constructing Interdisciplinary Teaching and Research Communities

The primary condition for the implementation of interdisciplinary PLC is breaking down the organizational barriers of existing "single-discipline teaching and research groups." Schools may, while retaining the original disciplinary teaching and research groups, establish interdisciplinary teaching and research subgroups such as "English + Science" or "English + Liberal Arts," carrying out regular thematic seminars on a monthly basis. Themes for seminars may be launched around specific tasks such as analysis of interdisciplinary Zhongkao questions, interdisciplinary thematic unit joint design, and diagnosis of student difficulties in interdisciplinary learning, ensuring that each seminar has a clear output goal. It should be emphasized that the operation of interdisciplinary teaching and research subgroups should not be an "additional burden" for teachers, but should be integrated with teachers' daily teaching and examination analysis work.

5.2. Carrying Out Interdisciplinary Lesson Study

Lesson Study is the core vehicle for PLC operation. In the interdisciplinary context, its process can be unfolded along a five-step closed loop: an interdisciplinary team composed of teachers from English, biology, geography, and other disciplines first determines an interdisciplinary theme; subsequently, teachers of each discipline jointly design a thematic teaching scheme; one teacher implements the teaching while the remaining teachers enter the classroom for observation and recording, focusing on observing students' performance in understanding interdisciplinary concepts; immediately after class, a joint seminar is carried out, with teachers of each discipline providing feedback from their respective disciplinary perspectives; finally, the scheme is collectively revised, reflection logs are written, and the revised instructional design and reflection records are stored in a shared case library for reference and iteration by subsequent teachers. This regularly conducted lesson study cycle transforms the theoretical characteristics of PLC—shared personal practice, collective learning and application, and reflective professional inquiry—into concretely visible teaching and research behaviors.

5.3. Establishing Online Interdisciplinary Learning Networks

Participants in interdisciplinary PLC are not limited to one school. With the help of information technology, cross-regional and cross-school teacher learning networks can break through the constraints of physical space, enabling English teachers in

resource-poor areas, especially in rural schools, to also establish collaborative relationships with teachers in high-quality urban schools. Specific forms may include interdisciplinary thematic online training platforms, thematic forums, shared cloud disk case libraries, etc. Compared with teachers of other disciplines, English teachers have certain advantages in language and cross-cultural resource access, and should play the role of resource searcher and international perspective expander in online networks. Existing research indicates that online teacher learning communities have a positive effect on promoting educational equity and teacher professional development, which, to a certain extent, provides a feasibility basis for the online implementation of interdisciplinary PLC.

5.4. Institutional Safeguards: Support at the School Level

The sustainable development of PLC cannot be separated from systematic institutional support at the school level. First, time safeguards. Schools should set up fixed interdisciplinary teaching and research time slots when arranging schedules, incorporating them into the formal timetable rather than as after-class additional arrangements, so as to reduce teachers' time pressure. Second, incentive mechanisms. Incorporate teachers' participation in interdisciplinary PLC activities into the reference indicators for annual teacher assessment or professional title evaluation, granting it the same level of institutional recognition as traditional teaching and research activities. Third, resource safeguards. Schools should equip interdisciplinary PLCs with basic material conditions, such as dedicated spaces for collective discussion, teaching recording and broadcasting equipment, and literature resources, enabling them to have the foundation for sustainable operation. The purpose of institutional safeguards is not to turn PLC into another administrative task, but to provide necessary structural support for teachers' autonomous collaboration.

6. Conclusion

6.1. Main Conclusions

Interdisciplinary teaching competence has become an indispensable professional attainment for frontline English teachers. In recent years, many regions have carried out practical explorations such as interdisciplinary thematic instructional design competitions, signaling the transition of interdisciplinary teaching competence from a policy mandate to an embedded feature of classroom practice. However, the development of interdisciplinary teaching competence cannot rely on individual teachers' solitary efforts; rather, it needs the collaborative mechanisms provided by PLC—knowledge co-construction, collective reflection, and identity reconstruction—to support the sustained development of competence, thereby promoting the overall improvement of English teachers' professional competence. This study indicates that PLC is not only applicable to the professional development

of university teachers but is also an important supporting mechanism for primary and secondary school teachers to advance project-based learning and promote educational equity.

6.2. Research Limitations and Prospects

This paper explores the mechanisms and pathways for PLC to promote junior high school English teachers' interdisciplinary teaching competence development at the theoretical level. However, it lacks the support of empirical data and fails to verify the operational effects of the proposed mechanisms in actual school contexts through interviews, questionnaires, case studies, or other methods. Future research may adopt qualitative or mixed research methods, select junior high schools that have already carried out interdisciplinary teaching and research practices as cases, and track the actual impact of PLC on the development of English teachers' interdisciplinary teaching competence. In addition, with the rapid penetration of artificial intelligence technology in the field of education, whether AI tools, such as intelligent lesson preparation systems, interdisciplinary knowledge graphs, and AI-assisted classroom observation and analysis tools, which can assist the localization practice of PLC, particularly in providing technical support in the aspects of interdisciplinary knowledge integration and reflective dialogue, is also a direction worthy of further exploration.

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