

The Interdisciplinary Teaching Competence of English Teachers: Composition and Development Pathways

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Abstract: Teachers' interdisciplinary teaching competence is the key to the successful implementation of interdisciplinary education. This paper constructs a model for the interdisciplinary teaching competence of English teachers, which comprises three dimensions: interdisciplinary teaching awareness, interdisciplinary teaching knowledge, and interdisciplinary teaching skills, and provides in-depth illustration of each component under the three dimensions. To enhance English teachers' interdisciplinary teaching competence, institutional support, teacher community learning and technological empowerment jointly provide possible pathways in the continuous growth of teachers' professional development.

Keywords: Interdisciplinary; Core competencies; Interdisciplinary teaching competence

1. Introduction

In the information age and knowledge society, modern society's demand for talent has undergone a transformation. Relying solely on single-discipline knowledge is insufficient to address the complex and diverse challenges of reality. The *Compulsory Education Curriculum Plan and Standards (2022 Edition)* (hereinafter referred to as the *New Curriculum Standards*) explicitly stipulates that "in principle, each subject should allocate no less than 10% of class hours to interdisciplinary thematic learning."^[1] It further requires teachers to design themes that are both subject-related and closely tied to students' daily lives. Through inquiry-based, project-based, and collaborative learning, students' ability to transfer and apply knowledge in real-world contexts is activated, with a focus on cultivating their capacity to comprehensively apply multidisciplinary knowledge to solve practical problems. This requirement directly aims to promote the integrated development of students' core competencies.

Within the framework of traditional education, which encompasses specialized disciplines, teacher training in interdisciplinary instruction is often constrained, whose limitation arises from the traditional practice of compartmentalizing subjects.^[2] For teachers, interdisciplinary teaching competence is critical to synthesize knowledge from different subjects, design interdisciplinary curricula and activities, and enhance students' interdisciplinary thinking abilities. Developing interdisciplinary teaching competence is not only a professional response to the requirements of the new curriculum standards, but also an essential requirement to leverage the educational functions of key courses as well as achieve the value goal of holistic education. Particularly in the context of digital transformation and the rise of artificial intelligence, the deep integration of interdisciplinary teaching competence with teachers' digital literacy has become one of the core competencies for teachers to adapt to the new educational ecosystem and achieve professional development.^[3]

Interdisciplinary teaching competence has become the core professional competency for English teachers to implement the *New Curriculum Standards* and fully leverage the educational functions of the discipline. However, current English teachers lack systematic interdisciplinary knowledge structures and teaching training, with many teachers experiencing cognitive ambiguity and practical confusion regarding the rationale and approaches to interdisciplinary teaching and learning. Therefore, systematically constructing an interdisciplinary teaching competence framework for English teachers not only promotes their professional development but also serves as a key measure to achieve core competency goals and deepen English curriculum reform.

2. Literature Review

Interdisciplinary teaching is an educational approach that integrates multiple subjects to enhance learning and foster deeper understanding among students. This method encourages the connection of concepts across different disciplines, allowing students to see the relevance and application of their knowledge in real-world contexts. Interdisciplinary teaching entails the use and integration of methods and analytical frameworks from more than one academic discipline to examine a theme, issue, question or topic. Interdisciplinary education makes use of disciplinary approaches to examine topics, but pushes beyond by taking insights from a variety of relevant disciplines, synthesizing their contribution to understanding, and then integrating these ideas into a more complete, and hopefully coherent, framework of analysis.

Interdisciplinary teaching, by integrating knowledge from multiple disciplines, promotes students' holistic cognition and ability to solve complex problems.^[4] With interdisciplinary teaching and learning widely advocated and underscored in schools, teachers' interdisciplinary teaching competence has garnered significant academic attention in recent years as a key factor for the effective implementation of interdisciplinary teaching. Initially, most of the research on the interdisciplinary teaching literacy model focuses on the professional development of STEM teachers. It is also found that teachers need guidance, adequate knowledge and skills, cooperation, and instructional designs or plans to guide them for interdisciplinary practice.^[5] Studies also revealed that an interdisciplinary approach was relatively useful, however, teachers did not effectively implement it in in-class activities.^[6]

The research on interdisciplinary teaching competence of teachers in China started relatively late, but it has developed rapidly in recent years. Interdisciplinary teaching competence is unanimously defined as a teacher's ability to transcend disciplinary boundaries in instructional design, implementation, and evaluation. This involves the organic integration of multidisciplinary knowledge, methodologies, and thinking patterns to foster students' interdisciplinary understanding and comprehensive problem-solving skills. The competence encompasses three key dimensions: teachers' recognition of the value of interdisciplinary pedagogy (emotional dimension), the grasp of interrelated disciplinary concepts (knowledge dimension), and the practical abilities in designing interdisciplinary lessons, implementing classroom instruction, assessing learning outcomes, and conducting continuous reflection and improvement.^[7]

In terms of what kind of ability and quality teachers need to have to be competent for interdisciplinary teaching practice, researchers have proposed different models of the interdisciplinary teaching competences. A four-dimensional model developed by Zhan et al. comprises four primary indicators: Interdisciplinary Teaching Affect (K), Knowledge (A), Competence (I), and Professional Development Competence (D).^[8] Hu et al. established a framework through empirical research, identifying five core competencies, covering interdisciplinary understanding, relational skills, open design, integrated implementation, and evaluation improvement, along with 18 secondary competencies.^[9] A model for assessment of interdisciplinary literacy was constructed with grounded theory including four dimensions: interdisciplinary awareness, knowledge, competence, and value, and was tested on primary and secondary teachers.^[10] Li and Liang summarized these into three core competencies: interdisciplinary teaching design, implementation and evaluation.^[11]

It is evident that the existing research has established the key position of teachers' interdisciplinary teaching ability in the contemporary educational reform, and a basic consensus has been reached on its nature of integration and practice, and attempts have been made to construct structural models with theoretical and practical guidance. Although these models put emphasis on the dimension division, they share the common characteristics of being systematic and multi-dimensional. However, research on English teachers remains underdeveloped, with the framework of interdisciplinary teaching competence still requiring further exploration. To address this, this study proposes a framework for interdisciplinary teaching competence, grounded in the intrinsic characteristics of English as a discipline and the logic of professional practice.

3. Components of English Teachers' Interdisciplinary Teaching Competence

A teacher's teaching competence is a complex integrated system deeply rooted in their professional intrinsic qualities. While externally manifested through concrete instructional design and practice, its foundation and form are actually shaped and driven by three key elements: teachers' cognition such as beliefs and knowledge, emotional engagement and attitudes, and value orientations. Teachers' cognition,

for example, the teaching belief guides the direction of teaching decisions, knowledge provides the basis for teaching behaviors in specific contexts, and emotion infuses warmth and endurance into teaching practices. It is through this dynamic interplay between intrinsic qualities and observable behaviors that instructional competence is generated and developed. Likewise, English teachers' interdisciplinary teaching competence is a multi-dimensional structure comprising components including interdisciplinary teaching awareness, interdisciplinary teaching knowledge, interdisciplinary teaching implementation skills.

3.1 Interdisciplinary Teaching Awareness

English teachers' interdisciplinary teaching awareness encompasses a conscious and value-driven cognitive tendency and professional sensitivity, which enables English teachers to understand the nature of English as a cross-cultural communication tool and a hub of knowledge connection, and actively and consciously seek and establish connections with multiple disciplines in teaching, so as to promote students' holistic cognition and core literacy development.

English teachers' interdisciplinary teaching awareness first of all dwells on teachers' cognition and understanding of the inherent interdisciplinary nature of English. The English language fundamentally serves as a tool to represent, carry, and transmit information. The significance as well as the value of the English language inheres in the content it expresses. While students are learning English through texts, English learning inherently cannot be separated from specific thematic content. In China, English textbooks present materials through three thematic frameworks—humanity versus self, humanity versus nature, and humanity versus society, in the form of diverse discourses including scientific expository writing, historical biographies, news reports, and argumentative essays, etc. These texts not only employ linguistic structures but also deeply embed the logical frameworks, knowledge systems, and cognitive patterns of natural sciences, social sciences, and humanities.

More importantly, the core objective of contemporary English education has shifted from language skill training to fostering holistic human development and cultural literacy through language learning. *New Curriculum Standards* emphasizes cultivating students' cross-cultural communication skills, critical thinking abilities, and learning competencies. Achieving these higher-order goals necessitates situating language learning within complex real-world problem-solving contexts, integrating multidisciplinary perspectives through language as a tool to collectively nurture students' core competencies. It is evident that English inherently incorporates interdisciplinary requirements in its essence, materials, and objectives. Only when English teachers clearly recognize that English teaching is a language-mediated interdisciplinary teaching can they fundamentally stimulate their intrinsic motivation and awareness to engage in interdisciplinary teaching. This meta-cognition of the inherent nature of English serves as the essential element and conceptual foundation for interdisciplinary teaching awareness.

In addition, to develop the interdisciplinary teaching awareness, it is vital for English teachers to fully realize the value of interdisciplinary teaching in the all-around development of students. They should recognize that interdisciplinary teaching not only enhances language proficiency but also fosters critical thinking, innovation, and global competence in students, which are the core competencies for future citizens, and this recognition must be internalized as a conscious teaching philosophy, reflected in daily instructional decisions and practices. In this way, when the teacher recognizes the inherent nature as well as the necessity of interdisciplinary teaching, through English instruction, the teacher can utilize language as a medium to guide students into various fields of human knowledge, helping them understand the development of humanity and the world.

To help students develop core competencies, English teachers also need to be sensitive enough to identify the interdisciplinary elements in English learning content, and find the connection points between language knowledge and other disciplines, so as to achieve the integration of subjects in teaching. When teachers interpret texts and design topics, they can actively identify the historical background, scientific principles, artistic techniques, mathematical logic, geographical factors and so on contained in the texts, and think about how to use them as teaching resources. They have design thinking and tend to organize teaching around a core theme or a realistic problem. Such inclination and sensitivity of thematic integration is crucial for teachers to identify interdisciplinary teaching opportunities in practice and adeptly transforming real-world problem scenarios into valuable interdisciplinary learning opportunities.

Therefore, the interdisciplinary teaching awareness of English teachers signifies the shift of English

teachers from a subject-centered to a competency-centered teaching philosophy, and it is a composite professional consciousness based on profound disciplinary cognition, driven by strong value identification, and manifested through proactive integration intentions.

3.2 Interdisciplinary Teaching Knowledge

Seven types of teachers' basic knowledge are identified to promote student understanding: content knowledge, general pedagogical knowledge, curricular knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational context, knowledge of purposes, educational purposes and educational values and their philosophical and historical bases.^[12] This framework profoundly reveals the complexity and integrative nature of the knowledge required for exceptional teaching.

In order to conduct interdisciplinary teaching, English teachers should have a knowledge structure that extends beyond conventional frameworks. Rather, it demands the development of a professional knowledge ecosystem that effectively bridges multiple disciplines and translates into concrete teaching practices. Specifically, this knowledge system encompasses four key dimensions: profound content knowledge of the English subject, aligned with language learning fundamentals; broad general knowledge which provides content materials and cognitive perspectives for establishing interdisciplinary connections; technological pedagogical and content knowledge based on thematic-integration, which represents advanced contextualized design wisdom that guides teachers in creatively combining language objectives, multidisciplinary content, teaching strategies, and technological tools; and lastly, cross-curricular resource knowledge offering abundant authentic materials and implementation support for teaching practices.

The profound knowledge of the English language is the foundation of interdisciplinary teaching. Teachers must possess solid knowledge of the language itself and proficient language skills, which is the prerequisite to ensure that interdisciplinary teaching does not deviate from the essence of English as a discipline.

Broad general knowledge refers to the fundamental concepts, core principles, and common-sense content that teachers should master beyond the scope of the English subject, encompassing humanities, social sciences, and natural sciences etc. Such knowledge enables the teacher to possess a comprehensive knowledge base and a broad cognitive perspective, thus providing diverse entry points and expansion opportunities for interdisciplinary teaching. Only when teachers understand relevant historical contexts, scientific principles, or artistic characteristics can they naturally guide students to build meaningful interdisciplinary connections when handling corresponding English materials. Furthermore, this knowledge serves as the foundation for ensuring the rigor and depth of teaching content and helps teachers to maintain accuracy and appropriateness when selecting and integrating multidisciplinary materials. This way, language learning is integrated into a broader, authentic, and meaningful knowledge context, thus promoting students' higher-order thinking and holistic understanding, thereby truly realizing the educational value of interdisciplinary teaching.

"Pedagogical content knowledge is of special interest because it identifies the distinctive bodies of knowledge for teaching. It represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction."^[13] In an era where artificial intelligence is fundamentally reshaping educational ecosystems and language learning paradigms, the interdisciplinary teaching practices of English teachers increasingly depend on a sophisticated, context-driven knowledge framework beyond the pedagogical content knowledge itself. Mishra and Koehler developed the Technological pedagogical and content knowledge (TPACK)^[14], a professional knowledge framework designed to meet the evolving needs of teachers in the information technology era, which established a new professional knowledge system that meets the needs of teachers' professional development in the era of information technology.^[15] For English teachers, technological pedagogical and content knowledge based on thematic-integration represents far more than a simple combination of English subject knowledge, general pedagogy, and digital tool skills; it embodies a comprehensive teaching wisdom that integrates holistic design thinking with digital literacy. With such knowledge, teachers can creatively and systematically design integrated solutions around real-world themes with integration potential, encompassing interdisciplinary teaching objectives, multidisciplinary content, appropriate instructional strategies, and digital tools like AI-powered systems.

Specifically, teachers are required to possess a deep understanding of the subject and deconstruction

skills to identify interdisciplinary connections between different subjects. Secondly, they must master integrating English language skills into multidisciplinary inquiry activities. Moreover, teachers should be familiar with digital tools and LLMs such as ChatGPT, DeepSeek, etc, but also have the ability to evaluate and utilize technologies in educational settings, for example, using AI for intelligent retrieval and classification of interdisciplinary materials, organizing collaborative platforms for cross-disciplinary project-based learning, or employing data analytics to assess students' language and cognitive development in interdisciplinary tasks. Thus, this knowledge essentially represents teachers' meta-design capabilities: systematically designing and implementing integrated learning experiences by leveraging technology.

For English teachers, cross-curricular resource knowledge, which originates from Shulman's "curriculum knowledge", serves as an indispensable component in interdisciplinary teaching. In the context of interdisciplinary teaching, the curriculum knowledge evolves into an open, dynamic, and practice-oriented resource integration knowledge. This requires educators not only to comprehend established curriculum frameworks but also to proactively establish and maintain a cross-disciplinary resource network with accessible channels. To be more specific, English teachers should be able to have an understanding of reliable sources for multimodal texts, authoritative databases, authentic project cases, or collaborative platforms related to specific topics; also, they have the necessary knowledge concerning how to transform resources through pedagogical adaptation and creative integration by skillfully selecting, deconstructing, reorganizing, and contextualizing materials to support inquiry-based learning according to interdisciplinary objectives and student needs. Essentially, cross-curricular resource knowledge is a crucial bridge connecting multidisciplinary content with classroom practice.

3.3 Interdisciplinary Teaching Implementation Skills

The interdisciplinary teaching implementation competence of English teachers constitutes the core competence for translating cross-disciplinary pedagogical concepts, knowledge, and awareness into concrete classroom practices that achieve desired educational outcomes. The actual attainment of teaching effectiveness depends not only on teachers' knowledge or acceptance of certain principles, but more fundamentally on their methodology, that is, their ability to systematically integrate multidisciplinary content with language learning objectives through structured instructional actions, and effectively guide students in deep integrated interdisciplinary learning. This practical operating system is primarily composed of the following three key dimensions.

The ability to design and develop interdisciplinary themes forms the foundation for implementing interdisciplinary teaching. Educators must be capable of identifying or creating core themes with integration potential based on curriculum standards, student characteristics, textbook content, and resource analysis. They should systematically design interdisciplinary teaching units or projects with clear objectives, appropriate content, and logical structure around these themes, while integrating language skill training with multidisciplinary inquiry through a series of learning activities. This capability requires teachers to accurately grasp the intrinsic connections between disciplinary core concepts and interdisciplinary themes, establish clear and measurable interdisciplinary learning goals, plan progressive learning pathways, and select and combine appropriate teaching materials and task formats. The emphasis lies in the holistic, sequential, and embedded nature of design, ensuring the scientific validity and feasibility of instructional planning.

Next, the ability to set real situations of language use for interdisciplinary content integration and task-driven learning lies at the center of the operational framework and implementation of interdisciplinary teaching. It focuses on how English teachers can design authentic learning environments that naturally stimulate students' interdisciplinary thinking and language application, while guiding students to actively connect and synthesize knowledge of different subjects through challenging learning tasks such as questions, case studies, projects, or simulated scenarios to contextualize abstract multidisciplinary knowledge in perceptible and exploratory settings. Also, teachers should be able to design complex tasks requiring integrated multidisciplinary perspectives and English language skills; and flexibly constructing scaffolding for students to facilitate connections, comparisons of different perspectives, and synthesis of knowledge. This ability emphasizes contextualized, interactive, and generative teaching methods, serving as the key to activating students' interdisciplinary learning and enabling proactive knowledge integration.

"Assessment is not an endpoint but an integral part of the teaching-learning cycle. The alignment among learning objectives, instructional activities, and assessment tasks is critical for educational

effectiveness.”^{[16](p263)} Effective interdisciplinary teaching must adhere to the principle of “integration of teaching, learning, and assessment,” ensuring alignment between instructional objectives, learning activities, and evaluation tasks.^[17] *New Curriculum Standards* also explicitly advocates for the integration of teaching, learning, and assessment, emphasizing that evaluation should permeate the entire teaching process to facilitate learning and teaching through assessment. Therefore, when implementing interdisciplinary teaching, educators must develop specialized skills in interdisciplinary teaching evaluation and reflection. By designing assessment tools that integrate language and multidisciplinary thinking, they can continuously diagnose and promote deep learning integration.

The ability to evaluate and reflect on interdisciplinary teaching. This constitutes a critical quality assurance and professional development component in implementation. It refers to teachers’ capacity to employ diverse assessment methods to effectively evaluate students’ language development, knowledge integration, and higher-order thinking performance in interdisciplinary learning, while continuously reflecting on and improving teaching practices based on evaluation evidence. This includes utilizing multifaceted assessment approaches such as performance-based evaluation, portfolio, and other tools that can capture both language output and interdisciplinary understanding; conducting comprehensive evaluations of students’ language proficiency, knowledge integration, collaborative skills, and innovative thinking in interdisciplinary learning; and reflecting on strengths and weaknesses in subject content integration, language support, and technology application during instructional design and implementation. This capability ensures that interdisciplinary teaching practices form an evidence-based, continuously optimized process, serving as a vital link in maintaining teaching quality while simultaneously fostering the ongoing growth of teachers’ practical wisdom.

4. Pathways to foster English Teachers’ Interdisciplinary Teaching Competence

To enhance English teachers’ interdisciplinary teaching competence, a multi-level collaborative support system must be established. Schools should integrate interdisciplinary teaching development into regular teaching research activities by organizing collaborative design workshops focused on authentic teaching units, developing localized teaching case repositories, and establishing teacher evaluation mechanisms that encourage exploration. These measures provide teachers with actionable guidance and a safe environment for innovation. Simultaneously, schools should encourage the formation of learning communities within or between schools, involving English and other subject teachers. Through routine activities such as joint lesson planning, collaborative classroom observation, and interdisciplinary curriculum discussions, disciplinary barriers can be broken down. Continuous dialogue and experience sharing will help address teaching challenges and inspire innovative interdisciplinary teaching designs. At the individual level, English teachers should proactively utilize technology to facilitate self-learning and reflection. For example, they can track cutting-edge concepts through professional online course platforms and academic databases, efficiently access and integrate multidisciplinary teaching materials using intelligent search and analysis tools, and conduct evidence-based teaching reflections and continuous improvement by documenting teaching processes and analyzing student work.

These pathways emphasize systemic coordination, practical implementation, and sustained growth, and together they form a cohesive, supportive ecosystem for advancing interdisciplinary teaching and learning, thereby ensuring that interdisciplinary teaching is not only conceptualized but also operational in daily practice.

5. Conclusion

In the context of education reform guided by core competencies, English teachers must develop interdisciplinary teaching capabilities—a requirement that aligns with contemporary demands, policy initiatives, and the discipline's inherent nature. This study elucidates the interdisciplinary nature of English education and proposes that teachers’ interdisciplinary teaching competence constitutes a comprehensive system comprising three elements: awareness, knowledge, and skills. Based on this framework, the development of such competence requires school-based professional development, community learning, and individual empowerment. Through institutional safeguards, collaborative community building, and self-reflective practice, this mechanism facilitates a transition from externally driven to internally generated professional growth.

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