

# Research on the Practice and Effectiveness of College Foreign Language Teachers' Digital Literacy Development under the 5D4N Model——A Case Study of the Construction of the Course Hospitality English

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**Abstract:** China's national strategy for educational digitalization raises systematic requirements for college foreign language teachers' digital literacy. Guided by the Teacher Digital Literacy framework, this study proposes a Five Dimensions and Four New Goals (5D4N) model and reports action research during the 1.5-year development and teaching of the provincial online open course Hospitality English. Results show that the 5D4N model—covering digital awareness, technological knowledge and skills, application, social responsibility, and professional development, with renewal goals of new technologies, concepts, methods, and roles—effectively supports teachers in integrating digital literacy and transforming their professional roles through authentic curriculum tasks. Using platforms such as SuperStarLearn, reconstructing content via post competence, Moral Education, and digitalization, and implementing data-driven teaching and assessment, the project developed a high-quality online open course and verified the model's role in facilitating teachers' shift from technology users to teaching innovators and ecosystem co-builders. This study provides a replicable paradigm and empirical evidence for enhancing foreign language teachers' digital literacy in curriculum development.

**Keywords:** 5D4N Model; Teacher Digital Literacy; Online Open Course; Hospitality English; Foreign Language Teaching Reform

## 1. Introduction

Against the backdrop of global educational digital transformation and China's strategy to build a learning society, online open courses have become key drivers of pedagogical change and resource sharing. For university foreign language teaching, their development is not merely content digitization but a comprehensive test of teachers' digital literacy, requiring systematic integration of digital awareness, knowledge, skills, ethics, and innovation throughout curriculum design, delivery, and iteration.

Hospitality English, a practice-oriented course with strong intercultural features, urgently needs digital upgrading. Traditional methods cannot fully simulate service scenarios or integrate curriculum-based moral education and digital competencies. As a provincial online open course, it presents representative challenges that offer an ideal context for developing teachers' digital literacy.

Guided by the 5D4N framework, this study explores how systematic development of the Hospitality English online open course can promote teachers' coordinated growth across five literacy dimensions and their transformation into four new teacher roles. Through one and a half years of action research, it documents learning through development and growing through application, aiming to provide an empirically validated model for advancing the digital upgrading of foreign language teacher teams through high-quality curriculum projects.

## 2. Literature Review and Theoretical Basis

### 2.1 Literature Review

Amid the global wave of educational digital transformation, teachers' digital literacy has become a core issue in building a high-quality and professional teaching workforce<sup>[1]</sup>. As key subjects in cultivating intercultural communication talents, college foreign language teachers' digital literacy development is an inevitable requirement to adapt to the dual-driven development of *AI + Education*<sup>[2]</sup>. Educational digital transformation promotes the reform of college majors and curricula, and also puts forward an urgent demand for improving teachers' digital literacy<sup>[3]</sup>. Currently, the academic community has formed rich research results on the connotation definition, framework construction, and cultivation paths of teachers' digital literacy, providing a solid reference for the construction and practice of the *5D4N* model.

At the international level, by sorting out seven representative teachers' digital literacy frameworks, the European Union has extracted five core elements: digital teaching, content creation, communication and collaboration, safety assurance, and evaluation and feedback. It has also formed diversified cultivation paths including infrastructure improvement, training empowerment, and community construction. Its multi-dimensional and three-dimensional framework and progressive development model have provided important references for the construction of global teachers' digital literacy systems<sup>[4]</sup>. Foreign research also shows an evolutionary trend from a technical operation orientation to an ecological value orientation, defining digital literacy as an individual's comprehensive ability to integrate digital technology to achieve social participation and knowledge innovation, covering multiple dimensions such as awareness, skills, and responsibility.

Domestic research focuses on policy guidance and practical implementation. With the release of the *Teacher Digital Literacy* standard, the academic community generally recognizes that digital literacy should include five core dimensions: digital awareness, knowledge and skills, application capabilities, social responsibility, and professional development, forming a hierarchical and classified evaluation approach<sup>[1]</sup>. In the field of college teachers, existing studies have constructed an evaluation index system covering dimensions such as digital technology use, information management, and content creation<sup>[5]</sup>, and some studies have proposed that digital literacy should be integrated into the construction of professional curriculum systems to form a collaborative education mechanism<sup>[6]</sup>. In the field of foreign language education, most studies focus on primary and secondary school English teachers or pre-service foreign language teachers, discussing influencing factors such as age, educational background, and digital nativity, and proposing improvement strategies such as concept innovation and technology empowerment<sup>[7, 8]</sup>. Under the background of building an education powerhouse, college foreign language teachers' literacy has been given a new position, and the improvement of digital literacy has become an important direction<sup>[9]</sup>. Currently, there are still dilemmas such as weak teachers' digital literacy in the practice of digital empowerment of educational development<sup>[10]</sup>, and there is still a lack of systematic development model research targeting college foreign language teachers. In particular, there is a shortage of integrated practical exploration combining the *five-dimensional literacy main line* and the *four new development goals*, which also constitutes the core entry point of this study.

### 2.2 Theoretical Basis

#### 2.2.1 Teacher Digital Literacy Framework Theory

Centered on the *Teacher Digital Literacy* standard, this theory clarifies that teachers' digital literacy is a five-dimensional integration encompassing digital awareness, digital technological knowledge and skills, digital application, digital social responsibility, and professional development, emphasizing the systematicness and progressiveness of literacy development<sup>[1]</sup>. It provides a direct basis for constructing the *5D main line* in the *5D4N* model, defining the core dimensions and evaluation criteria for the digital literacy development of college foreign language teachers. Meanwhile, it echoes the common understanding of core elements such as technological application and safety responsibility in the European Union's digital literacy framework<sup>[4]</sup>, ensuring the scientificity of the model. In addition, the practical experience of taking digital literacy cultivation as the orientation in the construction of information technology courses in higher vocational colleges<sup>[11]</sup> also provides a reference for the application of this theory in the field of college foreign language education.

### 2.2.2 Educational Digital Transformation Theory

This theory views digital transformation as a systemic reform in education, driven by deep integration of digital technology with teaching to innovate concepts, methods, and models. It emphasizes teachers' active adaptation to new technologies for role remodeling and professional upgrading. Supporting the 4N goals of the 5D4N model, it clarifies that developing foreign language teachers' five-dimensional digital literacy promotes educational digitalization, enhancing both teaching quality and teachers' professional growth.

### 2.2.3 Situated Learning Theory

This theory emphasizes that learning is a process of meaning construction achieved by individuals through interaction and practice in real situations. In this study, it provides guidance for the design of the practical path of the **5D4N** model, advocating that the digital literacy development of college foreign language teachers should be embedded in real foreign language teaching situations. Through contextualized activities such as digital teaching practice and inter-college collaborative communication, the in-depth integration of digital technology and foreign language teaching is realized, rather than pure technical training divorced from teaching. This also ensures the practicality and effectiveness of literacy development.

## 3. Theoretical Framework: Reconstruction of the 5D4N Model from the Perspective of Online Open Course Construction

The construction of online open courses is a systematic project, which itself can be regarded as a *micro digital education ecosystem*. From this perspective, the **5D4N** model is no longer an abstract development guideline, but a specific action program directly mapped to all links of curriculum construction.

### 3.1 Specific Connotations of Core Dimensions (5D) in Curriculum Construction

The five core dimensions (5D) form a hierarchical, logically rigorous teacher digital literacy system structured around the chain *driving* → *foundation* → *practice* → *regulation* → *sublimation*. Figure 1 presents Specific Connotations of the 5D Core Dimensions in Curriculum Development. Digital awareness acts as the driving layer, motivating teachers to become curriculum designers. Digital technological knowledge and skills serve as the foundation layer, supporting platform operation, resource development, and design. Digital application is the core layer, translating literacy into four key practices: instructional design, resource development, teaching implementation, and assessment feedback, ultimately generating curriculum outcomes. This reflects a vertical, progressive logic from motivation to skills to practical output.

Meanwhile, *digital social responsibility* acts as the regulatory layer. Its principles regarding intellectual property rights, online behavior, and ethical culture are not independent links, but horizontally run through and restrict all the above construction activities, ensuring the legality, compliance, and morality of the entire process. As the sublimation layer, *professional development* promotes teachers to achieve the role transition from *practitioners* to *scholar-type teachers* through reflection, research, and knowledge transformation of construction practices. This sublimation is not only a summary and improvement of the preceding process, but the new cognition and capabilities generated also feed back and strengthen the initial digital awareness and skill foundation, thus forming a virtuous cycle of continuous evolution and spiral improvement.

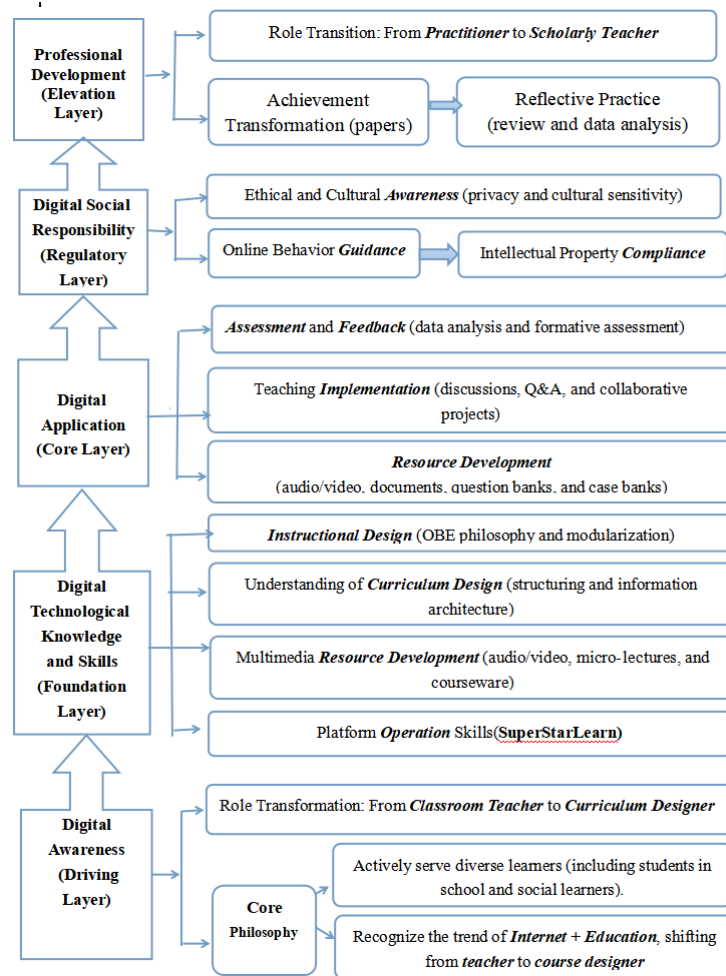


Figure 1: The Specific Connotations of the 5D Core Dimensions in Curriculum Development

### 3.2 Manifestation of Development Goals (4N) in Construction Achievements

The successful development and operation of online courses reflect the coordinated achievement of the 4N goals. The process begins with embracing new technologies, integrating digital resources and AI tools to build technical foundations and innovative learning experiences. Technological application is guided by new concepts, shifting from teacher-centered to student-centered approaches and learning design principles. With technological empowerment and conceptual guidance, teachers explore new methods such as task pre-positioning and peer-driven reflection. These practices reshape teachers' roles, transforming them into curriculum architects, resource curators, data analysts, online facilitators, and lifelong learners. The four dimensions form a cyclical, mutually reinforcing ecosystem: technology drives concepts, concepts guide methods, methods reshape roles, and roles further deepen technology use and concept internalization. Together with the 5D framework, they create a dynamic, sustainable model for educational digital transformation.

### 3.3 Research Design and Methods

This study adopts an action research paradigm, following the spiral cycle of *planning-action-observation-reflection*, promoting curriculum construction and conducting synchronous research on teacher development in real educational contexts.

**Research Objects:** The core construction team of *Hospitality English* course, including 8 members: the course leader, main teachers, and auxiliary R&D personnel. The team has certain teaching experience, but this is the first time for all members to systematically construct an online open course.

**Research Period:** From September 2024 to January 2026, it covers three semesters including the entire process of course approval, resource development, two rounds of teaching operation, and

continuous iteration.

**Data Collection:** Triangulation is adopted to ensure the validity of the research.

**Qualitative Data:** It includes regular (quarterly) teaching and research meeting records of the team, teachers' personal reflection logs, draft plans and revision records during curriculum construction, and transcribed texts of semi-structured interviews with teachers and students.

**Quantitative Data:** It integrates data from three primary sources---learning behavior data exported from the backend of SuperStarLearn and the course platform (such as task learning, video viewing completion rate, discussion forum, homework, and test score distribution); teacher resource construction output data (audio and video duration, number of test questions, number of interactive activity designs); course evaluation data (student teaching evaluation scores, learning satisfaction questionnaires).

**Data Analysis:** Thematic coding is conducted on qualitative data, focusing on identifying teachers' cognitive changes, encountered challenges, and coping strategies in each of the 5D dimensions; descriptive statistics and comparative analysis are performed on quantitative data to objectively reflect curriculum construction achievements and teaching effects, which are mutually confirmed with teachers' qualitative reflections.

#### **4. Practical Path: Implementation of the 5D4N Model in the Construction of Hospitality English Online Course**

##### ***4.1 Phase 1: Demand Navigation and Blueprint Design (Driven by Digital Awareness)***

At the project's start, the team conducted one month of *in-depth demand navigation* instead of rushing into technical operations. By analyzing industry reports, interviewing hotel experts (including managers from Foshan PolyInterContinental Hotel), and studying similar courses, the team identified three core demands: post-skill transferability, integration of curriculum moral education, and immersive learning interactivity. This process strengthened their digital awareness (1D), helping them recognize that digital technology must address these compound needs and establish a new concept of building a converged-media online course integrating *post-curriculum-moral-competition-certificate* elements (4N-2).

##### ***4.2 Phase 2: Hierarchical Empowerment and Resource Co-creation (Laying the Foundation of Technical Knowledge and Digital Application)***

To address gaps in digital technological knowledge and skills (2D), the team used hierarchical empowerment and project-driven training. Tasks were divided into three groups: Audio-Visual Shooting, Interactive Activity Design, and Question Bank and Evaluation. Each group received targeted training---for example, scriptwriting and shooting for the audio-visual team, and H5 tools for interactive games for the activity team. Skills were immediately applied, turning technical learning into practical digital application (3D) through doing.

The curriculum resource construction strictly followed the *three-line integration* principle, as detailed below:

**Post Main Line:** Each module (such as front desk, housekeeping, catering, and recreation) takes real work processes (e.g., check-in-handling complaints-check-out) as the framework.

**Moral Education Hidden Line:** Elements such as *hospitality, integrity-based, green operation, and cultural confidence* are naturally integrated into cases and explanations. For instance, in the *Chinese food ordering service* module, the excellent traditional *Chinese culture Twenty-Four Solar Terms* was cleverly combined with Chinese food ordering service English to compile the moral education case *Grain Full at Xiaoman, Service Spreads Fragrance—Twenty-Four Solar Terms Culture Empowers Hospitality English: Post Communication Chinese Food Ordering Recommendation Practice*, which imperceptibly cultivates students while they learn English knowledge.

**Digital Auxiliary Line:** Various technical forms are used to present content. Core knowledge is demonstrated through high-definition on-site videos; complex processes (such as hotel PMS system operation) are illustrated with mind maps; AI speech evaluation is introduced for situational dialogue practice; and key service scenarios (such as emergency handling) are equipped with digital human

micro-course modules for immersive training. This process greatly enhanced the team's ability to explore new methods (4N-3).

#### ***4.3 Phase 3: Teaching Implementation and Data-Driven Iteration (Deepening Digital Application and Professional Development)***

After launching Hospitality English, teaching implementation tested the team's literacy. Assuming the new role of online learning facilitator (4N-4), teachers designed guiding topics to stimulate cross-cultural discussions instead of only releasing resources. Using SuperStarLearn's early-warning function, they provided personalized reminders to underperforming students.

Data-driven decision-making became the core reform. First-round data revealed a low pass rate in the Western food ordering module. Instead of blaming students, the team analyzed the problem and found videos were too long and theory-heavy. They then reflected and iterated (5D-5): videos were shortened, and an interactive spelling game was added as formative practice. Second-round data showed the pass rate increased by 22%. This data-reflection-optimization cycle marked teachers' shift from empiricism to evidence-based professional development (5D-5).

#### ***4.4 Phase 4: Ethical Review and Community Construction (Digital Social Responsibility and Ecosystem Co-construction)***

Throughout course development and operation, the team maintained strong digital social responsibility (5D-4). All images, audio, video, and cases were properly sourced, and resources were co-created with students. Forum management included clear online etiquette, guiding students to evaluate hotel service information critically. The team shared moral education cases and digital materials in regional teaching and research platforms, attracting wider participation and expanding from a curriculum team to a teaching innovation community. This reflects the highest form of teachers' new roles (4N-4) and transforms digital literacy development into ecological co-construction.

### **5. Research Findings and Effectiveness Analysis**

After three semesters of practice, the implementation effects of the **5D4N** model have been manifested in two aspects: curriculum achievements and teacher development.

#### ***5.1 Curriculum Construction Achievements***

A structurally complete and resource-rich provincial online course has been built: a total of nearly 100 high-quality teaching videos (with a total duration of approximately 684 minutes) and nearly 200 audio clips (nearly 400 minutes) have been produced, 24 interactive discussion activities have been launched, and a question bank covering all positions (with more than 1,000 questions) has been constructed.

The course has been launched on the national-level SuperStarLearn platform, adopted by more than 17 colleges and universities, with the cumulative number of registered students exceeding 2,025 and page views surpassing 2.3 million.

The course has formed a distinctive feature of deep integration of post competence, moral education, and digitalization, breaking textbook limitations and gaining strong industry recognition. Student satisfaction with content practicality and teaching innovation both exceed 95%. Course operation data from 2025–2026 (215 students, 34,000 activities, 170,000 visits) directly reflect teachers' 5D literacy development: digital awareness drives large-scale course design; technological skills ensure stable, high-concurrency operation; and digital application transforms into concrete achievements in design, resources, implementation, and evaluation. Learning data supports reflective professional growth, while smooth operation implies solid digital social responsibility. These results also verify achievement of the 4N goals: proficient use of new technologies, student-centered concepts, innovative methods for large-scale interaction, and teachers' evolution into curriculum architects, resource curators, community facilitators, and data analysts.

The course data confirm the effectiveness of the 5D4N model, quantitatively showing how teachers' digital literacy dimensions (5D) jointly support high-quality online teaching and revealing the path of *literacy-to-practice* transformation through new technologies, concepts, methods, and roles (4N). This

reflects a shift from technical use to a virtuous cycle of *literacy-driven* innovation and data-supported professional growth, with activity and completion rates significantly above platform averages.

### **5.2 Effectiveness of Teachers' Digital Literacy Development**

Through the coding analysis of teachers' reflection logs, interviews, and behavioral data, it is found that the team has achieved significant improvements in all five dimensions (5D):

Digital Awareness (1D): Transformation from *task-driven* to *value recognition*. Teachers generally believe that online course construction is no longer an additional burden, but an inevitable way to enhance teaching influence and realize professional value.

Digital Technological Knowledge and Skills (2D): Transformation from *fear of unfamiliar technologies* to *proactive exploration of tools*. The team can not only proficiently use established tools but also take the initiative to search for and try new AI-assisted design tools to improve work efficiency.

Digital Application (3D): Transformation from *simple technical transplantation* to *in-depth integration of teaching methods*. Teachers have a profound understanding of how technology serves specific teaching objectives and can design innovative teaching activities empowered by technology.

Digital Social Responsibility (4D): Transformation from *vague concept* to *conscious action*. Intellectual property review and ethical case design have become standard links in the resource development process.

Professional Development (5D): Transformation from *isolated practice* to *research-oriented collaboration*. Based on curriculum construction practice, the team has jointly written and submitted 3 teaching and research papers, and applied for 5 related teaching reform projects, realizing the transformation of practical achievements into academic achievements.

### **5.3 Key Transformation Mechanism: Connecting 5D and 4N**

This study identifies three key mechanisms through which online course construction guides 5D literacy development toward 4N teacher transformation. The real *task-driven* mechanism, such as creating digital teaching scenarios, compels teachers to integrate and improve multiple literacy dimensions. Real-time feedback from platform data and students enables continuous *practice-reflection-learning* cycles, accelerating professional growth. Community collaboration within the team and through external teaching and research platforms builds a supportive environment where teachers consolidate new concepts and enact new roles through shared wisdom and mutual support.

## **6. Discussion: Challenges, Countermeasures, and Model Generalizability**

### **6.1 Challenges and Responses in Practice**

Initial Competence Anxiety and Time Investment: The response strategy is starting with small-scale breakthroughs and driven by a sense of achievement. Begin with developing an excellent unit to accumulate successful experience, then expand gradually. School-supported incentive mechanisms (such as workload recognition and achievement rewards) are crucial.

Rapid Technological Iteration: 1) Adhere to the principle of application-oriented and appropriately forward-looking. 2) Do not pursue overly flashy technologies; instead, select the most stable ones that best meet teaching needs. 3) Establish long-term cooperation with educational technology departments to obtain continuous support.

Insufficient Depth of Online Teaching Interaction: It can be improved with consciously fostering an online learning community culture by elaborately designing discussion topics, introducing peer assessment, and teachers participating in in-depth replies with high frequency.

### **6.2 Generalizability and Transfer Suggestions of the 5D4N Model**

This study indicates that implementing the 5D4N model based on the construction of high-quality online open courses is an efficient path for developing foreign language teachers' digital literacy. The model can be transferred to the construction of other professional foreign language or public foreign

language courses. The key to successful transfer lies in three aspects: 1) Identify a core, challenging real construction task as the driver, rather than fragmented training. 2) Build a support system consisting of technical, pedagogical, and disciplinary experts. 3) Establish a team culture that respects trial and error and encourages sharing, and take the construction process itself as an important research object for reflection and experience extraction.

## 7. Conclusion

Through the full-cycle empirical research on the construction of the provincial online course *Hospitality English*, this study verifies the effectiveness and operability of the **5D4N** model as a framework for developing college foreign language teachers' digital literacy. Online course construction is not merely a teaching resource development project, but an integrated teacher development intervention program and research field. By placing teachers in multiple roles as *designers, developers, implementers, and researchers*, it systematically hones and integrates their digital awareness, knowledge, skills, ethics, and innovative capabilities in practice, ultimately promoting their transformation into **4N** teachers.

Future research can further track the long-term effects of digital literacy development among teachers in this course team, and explore the application of the **5D4N** model in broader teacher professional development activities (such as virtual teaching and research sections, blended teaching reform projects). Meanwhile, it should pay attention to the differentiated development trajectories of individual teachers under this model to form more refined support strategies, contributing more flexible and viable solutions to the construction of foreign language teacher teams under the educational digitalization strategy.

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