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An Ecological Perspective Interpretation of the Role of EFL Teacher Agency in Facilitating Digital Literacy Development

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Abstract

Digital technologies have made digital literacy an increasingly important aspect of EFL teachers' professional development. Existing research has identified its major dimensions and influencing conditions, but how EFL teachers actively engage with these conditions to facilitate their digital literacy development remains underexplored. Drawing on an ecological perspective of teacher agency and a focused conceptual synthesis, this paper proposes a three-level framework for EFL teachers in Chinese higher education, linking the ecological basis of agency, agentic mechanisms, and digital literacy development. The framework conceptualizes teacher agency through noticing, selecting, judging, enacting and adapting, and reflecting under enabling and constraining ecological conditions. These processes may contribute recursively to digital literacy development, but purposeful action and reflection do not guarantee improvement. It further suggests that teacher development should be experience-sensitive, practice-based, reflective, and supported by enabling institutional conditions.

Keywords

EFL Teacher Agency, Digital Literacy, Ecological Perspective, Professional Development

1. Introduction

Digital technologies have become increasingly embedded in English language teaching, shaping teachers' use of instructional materials, classroom interaction, assessment, and professional learning. Digital literacy is therefore an important part of EFL teachers' professional competence (Jiang, 2025). It extends beyond operating tools to accessing, evaluating, using, and creating digital information

appropriately and responsibly in context (Law et al., 2018). For teachers, it also involves using technology to address pedagogical needs and improve practice (Ministry of Education of the People's Republic of China (MOE), 2022). Studies in Chinese higher education have examined the dimensions of EFL teachers' digital literacy (Feng & Sumettikoon, 2024) and the challenges and conditions shaping its development at multiple levels (Jiang, 2025). These studies clarify the concept and its associated conditions, but do not fully explain how teachers interpret those conditions, make professional choices, and use available resources for their own development.

Research on language teacher agency helps address this question. Ashton (2022) shows that teachers assess responses to technological change against their professional concerns and goals. Lee and Jeon (2024) link teachers' recognition and use of ICT affordances to pedagogical beliefs, technological experience, and contextual conditions. These studies primarily examine agency in technology use and pedagogical adaptation. How agency contributes to teachers' own digital literacy development has received less explicit theoretical attention, leaving the relationship between the two insufficiently explained.

The ecological approach understands agency as achieved through teachers' interaction with their conditions for action (Priestley et al., 2015). This perspective offers a basis for examining how EFL teachers may develop digital literacy through agency. This paper proposes a framework to explain this process among EFL teachers in Chinese higher education and considers its implications for teacher training and professional development.

The framework is developed through a focused conceptual synthesis of the literature discussed in Sections 2 - 4. Foundational accounts are selected to define agency and its temporal and contextual dimensions; studies of language teachers' technology use are considered where they illuminate professional choice, situated action, or reflection; and digital literacy frameworks and research in Chinese higher education specify what development may involve. The synthesis compares these accounts to distinguish ecological conditions, teachers' engagement with them, and possible changes in digital literacy. It then brings these distinctions together in the three-level framework presented in Section 5. Studies from other educational settings inform the interpretation of agentic processes, rather than establish their effects in Chinese higher education. Selection is purposive and guided by conceptual relevance, without an exhaustive search or a systematic review protocol.

2. EFL Teacher Agency from an Ecological Perspective and Related Research

2.1. EFL Teacher Agency and Its Role in Teacher Professional Development

Teacher agency concerns purposeful choices and actions in professional practice. It is context-sensitive: teachers exercise agency through engagement with professional, social, and institutional conditions (Eteläpelto et al., 2013). In language

education, this involves interpreting situations, making decisions, and responding to opportunities and constraints in the working environment (Tao & Gao, 2021).

Teachers interpret new knowledge and external requirements through their previous experience and adapt them to their teaching contexts. Agency shapes their engagement in professional learning (Lai et al., 2016), while identity commitments influence responses to curriculum reform and the pursuit of professional change (Tao & Gao, 2017). Professional agency also shapes how teachers negotiate identities and practices in changing educational environments (Vähäsantanen, 2015). These findings suggest that development depends on both available learning opportunities and teachers' engagement with them. EFL teachers also face curriculum reform, institutional demands, learner diversity, and technological change, making agency relevant to their professional development. The following comparison of theoretical perspectives clarifies how agency has been understood and establishes the position adopted in this paper.

2.2. Major Theoretical Perspectives on Teacher Agency

Social cognitive, sociocultural, and positioning approaches have been influential in language teacher agency research (Kayi-Aydar, 2019). Each foregrounds different aspects of teachers' purposeful action and its conditions.

Social cognitive theory associates agency with intentionality, self-regulation, self-reflection, and the ability to influence one's actions and circumstances (Bandura, 2001). It helps explain differences in teachers' willingness to initiate change, persist in professional learning, and regulate their development. Bandura (2001) recognizes reciprocal relations between individuals and their environments, although the analytical emphasis remains on the agentic individual. This perspective is useful for understanding initiative and self-directed action. For the present paper, however, it offers a less direct account of how teachers achieve agency through changing professional conditions over time.

Sociocultural approaches understand agency through participation in professional practices and socially mediated action. Institutional, cultural, and relational resources shape what teachers can do. Lasky (2005) showed that teachers' agency during reform was mediated by their professional histories and the surrounding sociocultural conditions. Drawing on activity theory, Feryok (2012) similarly linked an EFL teacher's actions to previous experience and participation in socially mediated activities. These approaches explain the roles of professional history, social interaction, and institutional context, which are also relevant to digital practices. Their accounts, however, do not always explicitly connect past experience, present judgment, and future professional orientations.

Positioning approaches examine how discourse, identity, and professional relationships shape possibilities for action. Davies and Harré (1990) argue that people are positioned, and position themselves, through discourse. Kayi-Aydar (2015) found that pre-service teachers' positioning in relationships with mentors and learners influenced their emerging identities and reported agency. Intention alone

therefore does not determine what teachers can do; their understanding of their positions within professional relationships also matters.

These perspectives are complementary. Social cognitive theory emphasizes intention and self-regulation, sociocultural theory examines mediated participation, and positioning theory addresses identity and relational possibilities. The ecological perspective adopted here brings professional experience, contextual conditions, and temporality into one analytical framework.

2.3. An Ecological Understanding of EFL Teacher Agency

Biesta and Tedder (2007) describe agency as achieved through interaction with contexts for action, rather than possessed as an individual capacity. This view is further informed by Emirbayer and Mische (1998), whose temporal account connects past experience, present judgment, and future possibilities. Building on this account, Priestley et al. (2015) developed the iterational, practical-evaluative, and projective dimensions of teacher agency. The model explains agency through the interaction of experience, current conditions, and future goals, without attributing it solely to personal qualities or external structures.

Studies in English language education support this account. Wang (2022) linked Chinese EFL teachers' agency during curriculum reform to professional experience, current working conditions, and future goals. Lee and Jeon (2024) found that teachers' use of ICT in language assessment reflected the interaction of beliefs, technological experience, and cultural, structural, and material conditions. The ecological perspective thus helps explain teacher action in changing educational environments. EFL teachers approach digital technologies with different professional histories, institutional and material conditions, and teaching goals. The ecological perspective connects these influences and examines how teachers interpret and respond to them through agency, making it relevant to digital literacy development.

This paper adopts the ecological model of teacher agency. Section 4 examines its three dimensions in relation to digital literacy development. Section 3 first clarifies digital literacy in EFL teachers' practice and reviews the conditions influencing its development.

3. EFL Teachers' Digital Literacy and Factors Influencing Its Development

To examine the contribution of agency, this section clarifies digital literacy in EFL teachers' professional practice and reviews the conditions associated with its development.

3.1. Components of EFL Teachers' Digital Literacy

Digital literacy includes more than operating devices or software. Eshet-Alkalai (2004) identifies cognitive, technical, and socio-emotional abilities needed for participation in digital environments. Ng (2012) likewise distinguishes technical, cognitive, and social-emotional dimensions, including information evaluation

and appropriate conduct. Law et al. (2018) define digital literacy through accessing, managing, understanding, integrating, evaluating, communicating, and creating information safely and appropriately with digital technologies. These accounts establish a multidimensional concept encompassing technical proficiency, judgment, and responsible participation.

For EFL teachers, digital literacy includes evaluating technology's educational value and integrating it into teaching, assessment, communication, and professional learning. China's *Digital Literacy of Teachers* identifies five dimensions: digital awareness, digital technology knowledge and skills, digital application, digital social responsibility, and professional development (Ministry of Education of the People's Republic of China (MOE), 2022). These dimensions connect general digital capabilities with teachers' professional responsibilities.

The five dimensions provide the teacher-specific structure used here. Digital awareness concerns understanding and willingness to engage with digital transformation; digital technology knowledge and skills underpin professional use. Digital application covers instructional design, teaching, assessment, and related activities. Digital social responsibility addresses ethical, legal, and safe conduct, while professional development concerns using technology for continuing professional learning (Ministry of Education of the People's Republic of China (MOE), 2022).

The framework connects general digital capabilities with teachers' professional practice. Its relevance to EFL teachers has also received empirical support. Feng and Sumettikoon (2024), in their study of EFL teachers in Chinese higher education, found meaningful relationships among the five dimensions and showed that digital knowledge, awareness, professional development, and classroom application are interconnected rather than isolated aspects of teacher development. The findings also indicate that awareness of digital technology does not necessarily translate directly into effective application, suggesting that digital literacy development involves more than acquiring technological knowledge.

Accordingly, this paper uses digital literacy as its central concept and adopts the five dimensions in *Digital Literacy of Teachers* as its main structural reference. Digital literacy is therefore understood here as an ongoing form of professional development involving teachers' awareness, technological knowledge and skills, pedagogical application, responsible digital participation, and continuing professional learning.

The framework is intended primarily for EFL teachers in Chinese higher education. China's *Digital Literacy of Teachers* provides a contextually relevant reference because it articulates professional expectations for teachers' digital practice (Ministry of Education of the People's Republic of China (MOE), 2022), and its dimensions have been examined with EFL teachers in Chinese higher education (Feng & Sumettikoon, 2024). Its use here specifies possible areas of development rather than demonstrating that agency produces gains in each area. Application to other EFL settings would require attention to local professional standards,

teaching purposes, and institutional conditions.

3.2. Factors Influencing the Development of EFL Teachers' Digital Literacy

Existing research suggests that EFL teachers' digital literacy develops through the interaction of both individual and contextual conditions. This distinction is useful analytically, although the two categories are closely connected in practice. Wohlfart and Wagner's (2023) umbrella review, for example, shows that teachers' participation in educational digitalization is associated with a combination of personal capabilities, professional learning, technological resources, collaboration, and institutional support. Figure 1 groups these influences into two analytically distinct but interacting categories: individual and contextual conditions.

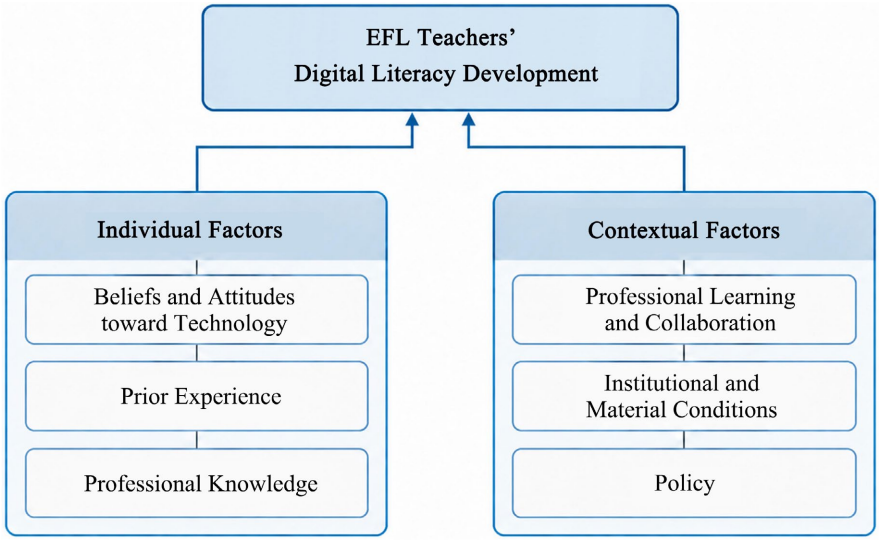

Figure 1. Factors influencing EFL teachers' digital literacy development.

Teachers' beliefs and attitudes influence their digital practices. Ertmer et al. (2012) found a close association between pedagogical beliefs and classroom technology use, suggesting that access alone does not ensure meaningful integration. Zhang (2023) found connections between EFL teachers' digital literacy and attitudes, technology-related skills, and technological access. Development therefore depends partly on how teachers understand technology's professional value and whether they feel able to use it.

Previous experience and professional knowledge provide resources for interpreting new technologies, although years of teaching alone do not determine digital literacy. Xue (2025) found different developmental processes among Chinese EFL teachers in an LLM-focused professional learning community, associated with teaching experience, AI beliefs, professional knowledge, and research experience. The value of experience thus lies in its interaction with teachers' beliefs and knowledge, not simply its duration.

Professional learning and social interaction offer contextual support for digital

literacy development. Training can introduce technologies, but its value depends on connecting them with authentic pedagogical problems. Feng and Sumettikoon (2024) found that professional development was closely associated with digital application among Chinese EFL teachers. Collaboration gives teachers access to shared knowledge, alternative practices, and support. Xue (2025) showed how social interaction and mediated activities in a professional learning community contributed to digital literacy, while participants followed different developmental processes. Learning opportunities and collaboration therefore matter, as does how individual teachers engage with them.

Institutional, material, and policy conditions also shape digital practice. Devices, platforms, technical support, time, leadership, and organizational arrangements can enable or constrain engagement. Wohlfart and Wagner (2023) identify infrastructure, support, leadership, and organizational conditions as recurring influences on educational digitalization. Jiang's (2025) review connects national, institutional, team, and individual levels in foreign language teachers' digital literacy development in China. Policy establishes professional expectations, including the areas defined in *Digital Literacy of Teachers* (Ministry of Education of the People's Republic of China (MOE), 2022). Whether these expectations inform practice depends on institutional support and teachers' interpretations and responses to opportunities and constraints.

Individual and contextual conditions interact in digital literacy development. Listing them, however, does not fully explain why similar training, resources, or policies may produce different outcomes. Teachers interpret opportunities, make professional judgments, and choose how to respond. This process connects the literature reviewed here with ecological teacher agency. Section 4 examines how teachers exercise agency within these conditions to support continuing development.

4. An Ecological Analysis of EFL Teacher Agency in Facilitating Digital Literacy Development

Teacher agency is achieved through engagement with professional environments, where individual and contextual conditions also shape digital literacy development. The question is how teachers use these conditions as opportunities for learning. Resources, training, and institutional support do not necessarily produce development, because teachers interpret, evaluate, and respond to them differently.

This paper proposes that ecological conditions shape possibilities for agency, which teachers exercise in developing digital literacy. The iterational dimension supplies experience and interpretive resources for understanding digital practices. The practical-evaluative dimension concerns selecting, applying, and evaluating technologies in specific contexts. The projective dimension connects digital learning with future pedagogical and professional goals. These dimensions interact; they are neither separate determinants nor fixed pathways to particular aspects of

digital literacy. Their contributions may include technological understanding, pedagogical application, critical judgment, and continuing adaptation. The following analysis uses the ecological model of Priestley et al. (2015) to examine these relationships.

The iterational dimension comprises the experience, beliefs, knowledge, and established practices teachers bring to new situations. Assumptions about teaching, learning, and technology influence what they notice and how they interpret unfamiliar tools. Ertmer and Ottenbreit-Leftwich (2010) connect technology integration with teachers' knowledge, confidence, pedagogical beliefs, and professional culture. These accumulated resources inform digital learning, but remain open to revision. Leijen et al. (2020) show how reflection can strengthen agency by prompting teachers to reconsider assumptions and possibilities for action. The iterational dimension thus helps teachers connect new technological knowledge with previous experience and revise existing understandings.

The practical-evaluative dimension concerns judgment and action under current conditions, including resources, institutional expectations, learner needs, workload, curriculum requirements, and professional support. Teachers must recognize possibilities, assess their pedagogical relevance, and decide how to use them. Jeon et al. (2022) found that English teachers noticed, selected, and used videoconferencing affordances in response to pedagogical challenges, institutional expectations, technological constraints, and learner characteristics. Ashton (2022) similarly linked responses during emergency online teaching to professional concerns. Chen (2022) explained online practices through the interaction of digital affordances, teaching beliefs, and social contexts. These accounts indicate the importance of situated judgment for applying and critically evaluating technologies. Selecting tools, experimenting, responding to learners, and evaluating outcomes can turn contextual possibilities into professional learning.

The projective dimension connects present digital learning with longer-term professional purposes. EFL teachers may explore technologies because they support the teaching they hope to develop, beyond their availability or institutional requirements. A teacher seeking individualized feedback may investigate AI-supported assessment, while one concerned with learner autonomy may prioritize corpora, self-access resources, or online platforms. Wang (2022) found that Chinese EFL teachers' agency during reform reflected the interaction of experience, current school conditions, and future goals. Such goals guide action, although their realization depends on present opportunities and constraints. They also support continuing adaptation as technological change requires capabilities beyond a fixed set of skills.

The three dimensions operate together. A teacher considering a digital tool draws on experience, assesses classroom and institutional conditions, and considers future goals. Lee and Jeon (2024) found that agency in ICT-supported language assessment reflected previous ICT experience and beliefs alongside cultural, structural, and material conditions. Digital literacy development can therefore be

understood recursively: experience informs judgment, action generates further experience, and future goals guide subsequent learning. This interaction helps explain different developmental pathways under similar ecological conditions.

5. Constructing an Ecological Framework of EFL Teacher Agency in Facilitating Digital Literacy Development

The proposed framework offers a theoretical account of how EFL teachers' agency may contribute to digital literacy development within enabling and constraining conditions. Its first level, the ecological basis of agency, connects prior professional experience, situated judgment under current contextual conditions, and future professional orientations. These relate to the iterational, practical-evaluative, and projective dimensions (Priestley et al., 2015). The practical-evaluative dimension concerns teachers' judgments among alternatives as they engage with cultural, structural, and material conditions (Leijen et al., 2020). Resources, institutional expectations, and learner needs are conditions within which judgment occurs; they are not themselves equivalent to this dimension. The middle box in Figure 2 therefore represents teachers' situated judgment under current contextual conditions. The three dimensions describe the temporal and relational basis of agency, whereas the second level specifies processes through which agency is enacted in digital practice. At that level, judging refers more specifically to pedagogical and ethical evaluation in digital practice.

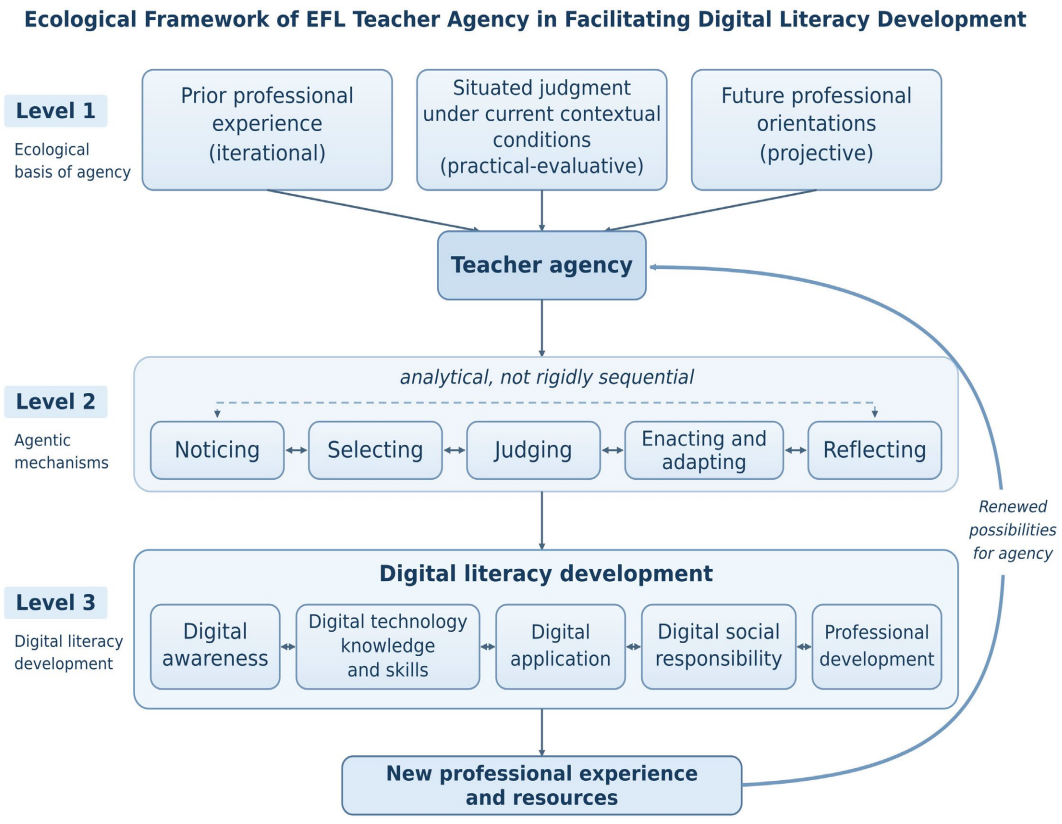

Figure 2. Ecological framework of EFL teacher agency in facilitating digital literacy development.

The second level addresses the mechanisms of agency through five interrelated processes: noticing digital possibilities or problems; selecting technologies or learning opportunities; judging their pedagogical and ethical appropriateness; enacting and adapting them; and reflecting on experience. These are analytical categories, not prescribed stages, and teachers may revisit them as demands change.

Noticing draws most directly on Jeon et al.'s (2022) account of teachers identifying and using technological affordances, while reflecting is informed by Leijen et al.'s (2020) account of reflection and subsequent agency. Selecting, judging, and enacting and adapting are distinguished here as analytical processes through a synthesis of the practical-evaluative dimension and accounts of teachers' professional responses to technology (Priestley et al., 2015; Ashton, 2022; Lee & Jeon, 2024). They specify, respectively, choosing among possibilities, evaluating pedagogical and ethical suitability, and putting decisions into practice while adjusting to local conditions. The full five-process set and its proposed links to digital literacy development constitute the present paper's synthesis and remain open to empirical examination.

The third level concerns digital literacy development that may emerge through this engagement. The dimensions discussed in Section 3 remain interconnected. Experimentation may expand technological knowledge; adaptation to language-learning tasks may strengthen digital application; and evaluating privacy, reliability, or AI-generated content may develop digital social responsibility. Reflection on these experiences may support continuing professional development. Actions also generate knowledge and experience that can inform teachers' responses to later digital possibilities, making development recursive.

A hypothetical writing example illustrates the link between action and digital literacy development. An EFL writing teacher at a Chinese university notices that students accept automated grammar feedback without checking whether a correction preserves their intended meaning. The teacher selects an available feedback tool, judges its suitability against lesson goals and institutional data-use requirements, and uses anonymized sample sentences to compare its suggestions with students' intended meanings. After identifying misleading corrections, the teacher adapts the activity so that students justify accepting or rejecting each suggestion. Reflecting on these comparisons may improve the teacher's knowledge of the tool's limitations and judgment about when automated feedback requires human checking. In a later writing task, the teacher uses this understanding to restrict automated feedback to selected issues and designs additional questions about meaning. The developmental change is the teacher's revised digital knowledge and pedagogical judgment informing a later decision, rather than simply more frequent use of the tool. This example is illustrative, not an empirical finding.

Figure 2 summarizes the three levels and the recursive loop from digital literacy development to subsequent agency.

In **Figure 2**, ecological conditions shape possibilities for agency without directly determining digital literacy development. Teachers engage with them through no-

ticing, selecting, judging, enacting and adapting, and reflecting. The resulting knowledge and experience can support later action. The framework therefore proposes a recursive relationship: agency may support digital literacy development, while developing digital literacy may expand the resources available for agency. The two can reinforce each other over time. Agency remains subject to institutional and material limits. Inadequate infrastructure, insufficient time, restrictive policies, or limited professional support can narrow possibilities for action despite teachers' efforts. Supportive conditions likewise do not guarantee development; teachers must engage with the opportunities they offer. The framework retains this relationship between teacher action and ecological conditions.

Agentic engagement may also fail to improve digital literacy. A teacher may pursue a goal, select a tool, and reflect on its use while judging success only by task completion or the number of automated corrections. If contradictory feedback and learners' explanations are dismissed, reflection may reinforce an ineffective routine rather than revise digital knowledge or pedagogical judgment. In the hypothetical case, continuing to accept every correction would reproduce tool use without demonstrating development. The recursive relationship is therefore conditional on the quality of teachers' interpretation and evaluation, including whether they reconsider assumptions and use feedback to revise later decisions. Purposeful engagement is not, by itself, evidence of digital literacy development.

The framework extends the factor-based account in Section 3 by examining teachers' engagement with conditions for development. Resources, professional communities, institutional support, and training offer possibilities that teachers notice, evaluate, enact, and reconstruct. The next section considers what implications can be derived from the constructed framework.

6. Implications for EFL Teacher Training and Professional Development

Within the intended scope of Chinese higher education, the framework suggests that EFL teachers' digital literacy may develop through agency informed by prior professional experience, situated judgment under current contextual conditions, and future professional orientations, and enacted through the five agentic processes. The implications derived from the framework should therefore not be understood as general recommendations for technology training. Rather, they concern how professional development can activate particular elements of the framework and support the recursive relationship between agency and digital literacy development.

6.1. Building on EFL Teachers' Existing Experience and Developmental Needs

The iterational dimension indicates that professional development should begin with teachers' existing experience rather than assume a common starting point. EFL teachers differ in their technological backgrounds, pedagogical beliefs, class-

room experience, and previous engagement with digital tools, which shape how new technologies are interpreted. Training should therefore diagnose teachers' existing practices and provide differentiated opportunities that connect new digital knowledge with prior professional experience. Teachers with limited experience may need support in basic digital application, while more experienced teachers may benefit from work on digital assessment, AI-supported teaching, or ethical decision-making. The aim is not simply to provide different levels of technical instruction, but to help teachers use prior experience as a resource for further development. Connecting professional development with teachers' prior knowledge and everyday practice can make it more meaningful (Desimone, 2009).

6.2. Activating Agentic Mechanisms through Authentic and Collaborative Practice

The practical-evaluative dimension and the framework's second level direct attention to professional judgment in authentic contexts. Training should let teachers notice possibilities, select resources, judge their pedagogical and ethical suitability, enact and adapt them, and reflect on outcomes. Activities can address digital feedback, learner autonomy, technology-mediated assessment, or responsible use of generative AI. Working with colleagues allows teachers to compare interpretations, observe alternatives, and revise decisions. Professional learning communities and collaborative lesson design can therefore support agency through practice as well as provide information. Active learning, collaboration, feedback, and reflection are also associated with effective professional development (Darling-Hammond et al., 2017). Training should strengthen teachers' judgment about when, why, and how to use technology, rather than treat increased use as an end in itself.

6.3. Sustaining Future-Oriented and Recursive Digital Literacy Development

The projective dimension and the framework's feedback loop point to the importance of future goals and conditions for pursuing them. Professional development should help teachers identify priorities such as feedback, classroom interaction, learner autonomy, or critical responses to emerging technologies. These goals can guide experimentation and reflection, generating experience for subsequent agency. Sustained development also requires infrastructure, technical support, time, collaboration, and professional autonomy. Opfer and Pedder (2011) understand professional learning through the interaction of individual development, learning activities, and school conditions. Institutions should accordingly provide resources and room for professional judgment and continuing adaptation, so that digital literacy development can continue beyond individual training events.

7. Conclusion

This paper has examined how EFL teacher agency may contribute to digital liter-

acy development from an ecological perspective, primarily with reference to Chinese higher education. Research identifies dimensions of digital literacy and associated individual and contextual conditions, but does not fully explain teachers' different responses to similar opportunities. Connecting this literature with ecological teacher agency provides an account of its development as situated in professional contexts and shaped over time.

The framework connects prior experience, situated judgment under current contextual conditions, and future orientations with teachers' noticing, selecting, judging, enacting and adapting, and reflecting. Digital literacy may develop recursively through this engagement; access, training, or technological exposure alone does not ensure development. The framework therefore supports professional development that builds on experience, addresses practice, encourages reflection, and is sustained by institutional support.

The framework requires empirical examination. Longitudinal case studies combining interviews and classroom observations could investigate agency across stages of digital learning and examine how changing professional conditions shape the process over time.

Such studies should distinguish changes in digital knowledge or pedagogical judgment from technology use alone and examine unsuccessful engagement as well as development.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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