Research on the Integration Path of Artificial Intelligence Data-intelligence Literacy and Project-based Learning in Higher Vocational English

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Abstract: Under the background of the digital education strategy in education, the cultivation of artificial intelligence data-intelligence literacy among vocational college students is becoming increasingly urgent. At present, higher vocational English teaching is confronted with dual challenges. Project-based learning (PBL) has deficiencies in cultivating higher-order qualities, while students' use of generative artificial intelligence shows the characteristics of high frequency and low quality, lacking criticality and ethics. To this end, this study has constructed an integrated path for systematically cultivating data-intelligence literacy in PBL of higher vocational English. This research not only refines the connotation and cultivation mechanism of artificial intelligence literacy in specific disciplinary contexts, expands the theoretical boundaries of PBL teaching, but also provides an operational integrated solution for front-line teaching.
***Keywords*:** data-intelligence literacy, artificial intelligence, project-based learning, vocational English

1. Introduction

Under the strategic drivers of educational digitalization and artificial intelligence, vocational education must cultivate students' literacy in utilizing AI tools to solve complex problems. Currently, public English teaching in higher vocational colleges faces a dual disconnection: teaching models are misaligned with occupational demands, and student motivation is insufficient. Meanwhile, instruction fails to effectively respond to the proliferation of generative artificial intelligence. Students' usage of AI tools exhibits high-frequency but low-quality patterns, lacking critical discernment, creative transformation, and ethical application capabilities, revealing a systematic gap in data-intelligence literacy. Project-Based Learning (PBL), recognized for its authenticity, is regarded as an effective model to address the disconnection between learning and application. However, existing research rarely systematically explores how to deeply, orderly, and effectively integrate AI into the entire PBL process to foster higher-order thinking and comprehensive literacy development. The core of this study lies in addressing the following practical challenge: In higher vocational English Project-Based Learning, how can a systematic instructional pathway be designed and implemented to effectively develop students' data-intelligence literacy, thereby achieving the simultaneous enhancement of English application skills and key competencies for the intelligent era? The research aims to fill the gap in systematically embedding data-intelligence literacy throughout the full cycle of PBL.

2. Literature Review

2.1 Artificial intelligence data-intelligence literacy and project-based learning

Research on artificial intelligence literacy is evolving rapidly with technological iterations. Early studies, such as that by Cao Bing (2017)[1], primarily focused on the cognitive and technological dimensions, defining it as the ability to understand the basic concepts and principles of artificial intelligence and master the operation of relevant tools. With the explosive application of generative artificial intelligence, the research focus has shifted significantly. Currently, international academic circles, as represented by Xiao Haiqing et al. (2026)[2] , generally emphasize the integration of critical, ethical, and social dimensions, arguing that the core of artificial intelligence data-intelligence literacy lies in the ability to critically evaluate the output of artificial intelligence, understand its limitations and biases, and use it responsibly within an ethical framework. Domestic research closely follows international frontiers, characterized by a combination of application - orientation and literacy concerns under the impetus of policies. Scholars like Zhang Yuchen et al. (2026)[3] and Wang Yanhong et al. (2026)[4] have begun to construct a localized artificial intelligence literacy framework, highlighting its fundamental role in cultivating innovative talents. However, existing research has two main limitations: first, it is macro - general, mostly concentrating on the discussion of universal frameworks, lacking in - depth integration with specific disciplines and teaching contexts; second, it is inclined to separation, often regarding literacy cultivation and the cultivation of specific disciplinary

abilities as two parallel lines, with insufficient exploration of the mechanism for their symbiotic development in the same teaching process. This provides scope for this study to define contextualized data-intelligence literacy in the specific field of vocational college English.

This study defines the digital and intelligent literacy of artificial intelligence as the comprehensive literacy demonstrated by learners in specific learning or task scenarios to achieve high - quality results. It involves effectively, critically, innovatively, and ethically utilizing artificial intelligence technologies and tools for information processing, knowledge construction, and problem - solving. It emphasizes the qualitative change from tool use to intelligence enhancement, as well as operational and collaborative capabilities. Learners should be able to select and proficiently operate appropriate generative artificial intelligence tools according to task requirements and understand the basic logic of human - machine collaboration.

Project-based Learning (PBL) is rooted in constructivism and Dewey's concept of "learning by doing". Its application in language teaching has been widely verified. Studies such as Wang Haiguo (2022)[5], Yang Maoxia et al. (2021)[6], and Gao Duo (2017)[7] all indicate that PBL, by creating real or simulated language application tasks, can effectively enhance students' learning motivation, language comprehensive application ability, collaboration and problem-solving skills. In the field of vocational education teaching, the value of PBL is particularly prominent because it emphasizes outcome orientation and situational learning, which is highly consistent with the practicality and application nature of vocational education. A large number of empirical studies have proved that a well-designed English PBL can significantly improve students' language communication ability in simulated or real workplace scenarios. Higher vocational English project-based learning refers to a teaching model in the public English courses of higher vocational education. It is driven by a complex and real English communication task that is close to the students' major or future career scenarios.

The current PBL design principles mainly focus on core elements such as authenticity, driving questions, continuous inquiry, and student autonomy. However, in the specific practice of higher vocational English teaching, the implementation of PBL faces two major challenges: Firstly, it is difficult to precisely align the project design with students' future careers, which often ends up being merely a formality; Secondly, the process management and systematic development of students' qualities are insufficient.

2.2 The current research status of the integration of artificial intelligence and project-based learning

Currently, the exploration of integrating artificial intelligence with Project-Based Learning has emerged as a new focal point in the field of educational technology. Existing practices and research can broadly be categorized into two models: first, AI as an efficient tool, where students utilize AI tools at various stages of PBL like Cui Ying et al. (2025)[8], such as in data analysis, English writing, and translation proofreading, to enhance efficiency. Related studies often report positive effects of AI in accelerating project completion and enriching the forms of outcomes. Second, AI as an object of inquiry, where AI technology itself or its societal impact serves as the project theme like Pu Weilu (2026)[9], guiding students in conducting critical investigations. However, a review of the existing literature, particularly research focusing on higher vocational English teaching, reveals a notable gap. Most integration practices remain at a tool-based, fragmented application level, lacking a clear pathway for systematically and structurally embedding AI literacy cultivation throughout the entire PBL cycle. Literacy development is fragmented; the use of AI tools tends to be improvisational and auxiliary, not deeply aligned with the stage-specific objectives and reflective components of PBL, thereby hindering scalable development of literacy. Furthermore, teaching objectives are overly narrow, primarily focused on improving the quality of language projects through AI, while insufficient attention and design are devoted to consciously and simultaneously fostering students' critical evaluation, human-AI collaborative innovation, ethical judgment, and other dimensions of digital intelligence literacy. Finally, there is weak contextual adaptation to the higher vocational setting, with a lack of integration models that are both practical and theoretically robust, tailored to the cognitive characteristics, English proficiency, and career orientation of higher vocational students. Therefore, this study aims to directly address this gap by attempting to construct and validate an integrated pathway for systematically cultivating AI-enabled digital intelligence literacy within higher vocational English PBL, thereby advancing the integration of AI and PBL.

3. The system construction path design of AI Digital Intelligence Literacy in PBL

In the first stage, this stage aims to reduce technological unfamiliarity and foster a constructive view of AI tools. Students learn basic operations of project-relevant AI tools and understand their supportive role in professional English contexts. Through contextualized demonstration—such as showcasing AI-assisted examples of product descriptions—the potential of AI in idea generation, terminology lookup, and content refinement is visually illustrated. Instructors provide a

curated list of secure AI tools and guide groups through account setup and interface familiarization. Targeted micro-tasks, such as generating English expressions for product features using a specified AI tool, help students practice prompt input, output retrieval, and basic interaction. Finally, a preliminary discussion establishes project-specific AI usage guidelines, introducing initial ethical awareness.

In the second stage, project exploration and deepening of artificial intelligence functions. The core objective is to cultivate students' critical evaluation and cross-validation abilities of the content generated by artificial intelligence tools in the information collection and processing steps, and to be able to identify and avoid information bias, factual errors, and logical loopholes. The teaching path and strategy for this stage are guiding inquiry tasks. The teacher requires students to use artificial intelligence tools to conduct extensive information collection on key project issues. Then, a structured reflection group activity is carried out. The group needs to deliberately find at least one possible inaccuracy or ambiguity in the information provided by the artificial intelligence tool and state the reasons for suspicion. The teacher requires students to cross-verify the key information provided by the artificial intelligence through at least two other independent sources such as academic databases, enterprise websites, and authoritative industry reports, and record the similarities and differences. Then, under the guidance of the teacher, each group shares the identification experience and jointly summarizes to form a class version of the "AI-assisted Information Identification Checklist" (the content can include, verifying data sources, examining cultural presuppositions, being vigilant against overgeneralization, checking logical consistency, etc.).

In the third stage, this stage shifts the focus from simple reliance to collaborative creation between humans and AI. Its core objective is to train students in refining prompts—progressing from basic commands to detailed instructions specifying roles, tone, keywords, and structure—to guide AI tools effectively. Students then learn to creatively reinterpret, deepen, and integrate the AI-generated content, producing work that reflects human oversight and unique value. Teaching strategies include targeted prompt-engineering training aligned with project needs. Finally, through guided comparison, students analyze drafts generated solely by AI, those with initial human revisions, and deeply co-created outcomes. This highlights the irreplaceable human contributions in creativity, emotional depth, logical reasoning, and cultural adaptation.

In the fourth stage, project presentation and reflection on artificial intelligence. The core objective of this stage is to use the process of using artificial intelligence tools as a meta-cognitive object in the evaluation and reflection phase, internalize the ethical norms of responsible use, and systematically integrate and elevate the artificial intelligence digital literacy acquired throughout the project cycle. At the same time, the group should also conduct ethical scenario discussions and organize seminars. Debates are conducted around real or hypothetical ethical dilemma cases to guide students to establish ethical judgment in specific contexts. Finally, a multi-dimensional evaluation system is integrated, and the rationality and criticality of the application of artificial intelligence tools, the innovation of human-machine collaboration, the standardization and depth of reflection in the usage process are clearly included in the project evaluation scale, and the evaluation weight of the literacy goals is assigned to form a teaching loop.

4. Conclusion

This study systematically explored how to establish an effective path in the project-based learning (PBL) of higher vocational English to cultivate students' data-intelligence literacy. The study first defined the core connotation of artificial intelligence data-intelligence literacy, emphasizing that learners should be able to effectively, critically, innovatively, and ethically use artificial intelligence tools for information processing and problem-solving. At the same time, the study clarified that higher vocational English PBL is a teaching model driven by real professional scenarios and emphasizing practice and outcome orientation. To fill this research and practice gap, this study innovatively proposed a four-stage progressive system construction model, integrating the cultivation of artificial intelligence digital literacy into the four stages of PBL. This injects a new era theory perspective of human-machine collaboration into PBL teaching. It provides an operable integrated path to address the frequent and low-quality use of artificial intelligence by higher vocational students, break through the bottleneck of teaching effectiveness, and directly helps in cultivating students' key skills for future intelligent career scenarios.

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