

# **International Education Forum**

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# AI Empowerment and Industry-Education Integration: Exploration on the Curriculum Reform Path of Network Architecture

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**Abstract:** Against the backdrop of the digital economy and emerging engineering education construction, Network Architecture, as a core course in the field of information and communication engineering, is confronted with problems such as outdated content lagging behind technological iteration, practical teaching disconnection from industrial demands, insufficient integration of AI technology, and weak industry-education collaboration. Targeting the cultivation of network talents with AI application capabilities and industrial adaptability, this paper constructs a three-in-one reform framework of “AI-empowered teaching innovation-industry-education integrated ecosystem construction-diversified evaluation guarantee.” At the level of AI empowerment, teaching quality is improved through intelligent reconstruction of curriculum content, upgrading of teaching methods, and innovation of the practical system. At the level of industry-education integration, a dual-cycle mechanism of “campus resource integration-off-campus industrial collaboration” is established to cultivate talents jointly through cooperative training bases. At the evaluation level, a value-added evaluation model based on a knowledge graph is introduced to realize the three-dimensional process assessment of “knowledge-skills-literacy.” Empirical research verifies the effectiveness of the reform path, providing a replicable practical paradigm for the AI-based transformation and in-depth industry-education integration of engineering courses.

**Keywords:** AI empowerment; Industry-education integration; Network architecture; Curriculum reform; Value-added evaluation; Virtual simulation

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## 1. Research background and significance

Driven by policies including the *14th Five-Year Plan for Digital Economy Development* and the *Three-Year Action Plan for Emerging Engineering Education Construction (2021–2023)*, China’s digital economy has exceeded 50 trillion yuan in scale, generating a surging demand for interdisciplinary talents who understand networks, master AI, and possess practical capabilities<sup>[1–2]</sup>. As a core course at the intersection of communication and computer science, *Network Architecture* systematically delivers core contents such as OSI/RM, TCP/IP protocol stack, network topology design, and performance optimization, serving as a key carrier for cultivating students’ capabilities in network planning, operation, and maintenance, and innovation.

However, current network technologies are transforming from traditional static architectures to AI-driven, dynamic intelligent architectures. The popularization of technologies such as Software Defined Networking (SDN), Network Function Virtualization (NFV), 6G satellite communication, and AI-based network fault diagnosis requires the curriculum to break through the traditional paradigm and achieve in-depth coupling with cutting-edge technologies.

The current teaching of *Network Architecture* is plagued by multiple contradictions:

Outdated content lagging behind technological iteration: Traditional teaching focuses on classic systems such as OSI/TCP/IP, with insufficient coverage of cutting-edge content, including SDN/NFV, 6G satellite communication networks, and AI-driven network optimization, leading to a “technological gap” between what students learn and actual enterprise demands.

Teaching methods disconnected from practical scenarios: Dominated by “PPT lectures + NS3 simulation experiments”, the course lacks simulation of real network environments (e.g., multi-domain collaborative communication), making it difficult for students to understand the dynamic interaction logic of complex networks.

Insufficient integration of AI technology: AI tools (e.g., intelligent fault diagnosis) have not been integrated into the whole teaching process, leaving students short of the thinking and ability to “solve network problems with AI.”

Weak industry-education collaboration mechanism: School-enterprise cooperation mostly stays at the level of “enterprise visits” and “case sharing”, lacking in-depth collaboration modes such as real project-driven learning, joint training, and dual-supervisor guidance, so graduates need retraining to qualify for posts after entering enterprises.

Simplified evaluation system: Mainly composed of final written examinations (accounting for more than 70%) + experiment reports (accounting for less than 30%), it ignores the assessment of students’ procedural growth, AI application capabilities, and industrial problem-solving abilities, failing to fully reflect the quality of talent training.

## 2. Research status at home and abroad

Domestic exploration on the reform of *Network Architecture* has achieved certain progress. In terms of curriculum content, some universities have added modules of “SDN/NFV technology” and “satellite communication networks”, but still offer limited coverage of AI-network integration contents (e.g., AI-driven routing optimization and fault diagnosis). In terms of teaching methods, some universities adopt “project-driven teaching” and guide students to apply theoretical knowledge with tasks such as “campus network planning”, yet practical scenarios are still confined to campuses without connection to real enterprise demands. In terms of industry-education integration, Xidian University has built an “intelligent network laboratory” with Huawei, introducing enterprise equipment for practical training, but cooperation mostly focuses on hardware support, with insufficient collaboration between curriculum content and enterprise technical standards. In terms of the evaluation system, Southeast University has attempted “process assessment” by incorporating experiment reports and classroom discussions into scores, but has not formed a three-dimensional dynamic evaluation mechanism of “knowledge-skills-literacy.”

In the general research field of AI empowerment and industry-education integration, scholars have explored valuable experiences: Li Zhoukang (2025) used AI tools (e.g., DeepSeek intelligent retrieval) to

assist teaching in *Forage Crop Cultivation*, verifying the role of AI in improving practical capabilities<sup>[3]</sup>. Li Qiurong (2025) constructed a content system of “basics + topics + frontiers” in the *Building Construction* course and introduced VR technology to realize the visualization of building structures, providing a reference for content reconstruction and virtual simulation of network courses<sup>[4]</sup>. Fu Gaoqin (2025) proposed a ternary collaborative framework of “technology-education-ecology”, whose concept of “multimodal perception + dual-cycle ecology” provides theoretical support for AI integration and industry-education collaboration of network courses<sup>[5]</sup>. Hu Zhenni (2025) applied a knowledge graph to value-added evaluation in vocational education, solving the problem of “emphasizing results over process” in traditional evaluation, which can be transplanted to dynamic assessment of network courses<sup>[6]</sup>.

The reform of network-related courses in foreign universities focuses on technical application and industrial connection. MIT introduces an “AI-driven network experiment platform” in the *Computer Networks* course, enabling students to optimize routing strategies through reinforcement learning algorithms and observe real-time changes in network performance. Stanford University cooperates with Cisco to develop an “SDN practical course”, integrating real enterprise network topologies and fault cases into teaching; students are required to complete tasks such as “enterprise-level SDN controller configuration” and “traffic anomaly detection.” In addition, the EU “Digital Skills and Jobs Coalition” promotes universities to build “5G/6G talent training centers” with enterprises such as Ericsson and Nokia, realizing synchronous updating of curriculum content and industrial standards<sup>[7]</sup>.

### 3. Research content and methods

Centering on the three cores of “AI-empowered teaching quality improvement, industry-education integrated ecosystem construction, and diversified evaluation guarantee”, the specific research contents are as follows:

AI-empowered curriculum teaching innovation: Reconstruct the curriculum content system of “basic theory + AI integration module + cutting-edge technology”, develop a hybrid teaching mode of “problem-driven + virtual simulation + AI assistance”, and build an “AI intelligent experiment platform” (including modules such as network fault diagnosis, traffic prediction, and satellite communication scheduling).

Construction of industry-education integrated collaborative ecosystem: Establish a dual-cycle mechanism of “campus resource integration—off-campus industrial collaboration”, including school-enterprise co-construction of curriculum resource libraries, joint training bases, introduction of real projects, and dual-supervisor guidance.

Knowledge graph-based value-added evaluation system: Construct a three-dimensional knowledge graph of “knowledge-skills-literacy”, design an assessment strategy combining process evaluation (classroom interaction, experiment reports, project progress) and academic evaluation (final thesis/enterprise project defense), and realize dynamic tracking of students’ growth trajectories.

The research systematically sorts out domestic and foreign literature on *Network Architecture* curriculum reform, AI education application, and industry-education integration to extract referable theoretical frameworks and practical experiences. Taking Grade 2023 students majoring in information and communication engineering as research objects, the reform is implemented in phases (September 2023 – January 2024), and the reform plan is continuously optimized through classroom observation, student interviews, and teacher reflection. An experimental class and a control class are set up to verify the reform effectiveness through score comparison, practical ability assessment, and enterprise satisfaction survey.

Typical cases are selected to analyze the specific application effects of AI and industry-education integration in the curriculum <sup>[8–10]</sup>.

#### 4. Construction of the curriculum reform path

In response to the above problems, with the core of “quality improvement through AI empowerment and efficiency enhancement through industry-education integration”, a five-in-one reform path of “teaching content reconstruction—teaching method upgrading—practical system innovation—industry-education collaboration deepening—evaluation system guarantee” is constructed. Adhering to the principle of “solid foundation, AI integration, and alignment with frontiers”, the curriculum content is reconstructed into three modules: basic theory, AI integration, and cutting-edge technology (**Table 1**). Logical connections are established through a knowledge graph to realize in-depth coupling of “theory-AI-industry.”

**Table 1.** Curriculum content

Module	Proportion	Core Content	Integration Points	Industrial Connection Points (Enterprise Cases)
Basic Theory 40%		OSI/RM and TCP/IP; Routing algorithms; Basics of satellite communication networks	Visualization of protocol logic based on knowledge graph; AI-assisted comparison of routing algorithm efficiency	Huawei “TCP Protocol Optimization” case; China Satcom “Satellite Basic Communication” case
AI Integration 40%		AI-driven network optimization; AI network fault diagnosis; Beidou satellite AI collaborative scheduling simulation	LSTM-based network traffic prediction experiment; CNN-based network fault recognition; AI scheduling for satellite communication	ZTE “AI Network Fault Diagnosis System”; BDStar “Satellite AI Scheduling” case
Cutting-edge Technology 40%		SDN/NFV technology; 6G converged network; Emergency communication	AI-assisted SDN slice configuration; AI resource allocation for 6G networks; AI routing reselection for emergency communication	ZTE “SDN Network Slice”; Huawei “6G Satellite Convergence” case

Taking core knowledge points of network architecture as nodes, a three-level practice chain of “AI + virtual + real” and an AI experiment assistance system are built. Students’ operations are monitored in real time during experiments; for example, if an SDN controller configuration error is detected, the cause (e.g., “OpenFlow protocol not enabled on the port”) is automatically prompted, and a configuration tutorial is pushed. After the experiment, AI automatically analyzes experimental data (e.g., traffic prediction accuracy) and generates an analysis report. When students configure OSPF protocols with eNSP, AI detects configuration errors in real time (e.g., “mismatched area number”, “unestablished neighbor relationship”) and provides troubleshooting steps. After the experiment, AI compares the configuration schemes of different students and analyzes the optimal path. When students simulate TCP traffic with NS3, AI automatically collects data (e.g., throughput, delay), generates visual charts (e.g., line charts, bar charts), and analyzes traffic variation rules.

Drawing on FU Gaoqin’s (2025) ternary collaborative framework of “technology-education-ecology”, a dual-cycle ecosystem of “campus resource integration—off-campus industrial collaboration” is constructed (**Table 2**) <sup>[1]</sup>.



**Table 2.** Dual-cycle ecosystem of “campus resource integration-off-campus industrial collaboration”

Type	Core Goal	Implementation Path
Internal Cycle	Intelligent Integration of Campus Resources	1. Integrate equipment, AI platforms, and curriculum to establish a “Network Teaching Resource Center”;
		2. Form a team of “campus teachers + enterprise supervisors” to jointly develop experimental projects;
		3. Establish a project incubation mechanism to support outstanding projects in connecting with enterprise demands.
External Cycle	In-depth Connection of Industrial Demands	1. Build “intelligent network joint laboratories” with communication enterprises, introducing enterprise equipment and technical standards;
		2. Enterprises provide real projects and data as practical materials for students;
		3. Enterprises participate in curriculum evaluation and formulate post competency standards.

Centered on the network architecture knowledge graph, evaluation indicators are divided into three dimensions: “knowledge”, “skills”, and “literacy.” Based on the node scores and weights of the knowledge graph, the students’ “graph weighted score” is calculated:

$$G = \frac{\sum_{i=1}^n k_i p_i}{\sum_{i=1}^n k_i} \quad (1)$$

where  $G$  is the graph weighted score,  $k_i$  is the weight of the  $i$ -th node (set according to industrial importance),  $p_i$  is the score of the  $i$ -th node (e.g., 85 points for the “TCP Protocol” node), and  $n$  is the total number of nodes.

To verify the effectiveness of the reform path, Class 1 (experimental class, 45 students) and Class 2 (control class, 43 students) of Grade 2023 majoring in information and communication engineering are selected. There is no significant difference in admission scores and scores of previous courses (e.g., *Computer Communication*) between the two classes ( $P>0.05$ ), making them comparable. The experimental class adopts the reform plan proposed in this paper (AI-empowered teaching, industry-education integration, knowledge graph evaluation), while the control class follows the traditional teaching mode (mainly theoretical lectures, NS3 simulation experiments, summative evaluation). The two classes have identical curriculum content, class hours, instructors, and textbooks, differing only in teaching methods, practical links, and evaluation systems. The written examination covers basic theories and cutting-edge knowledge; the average score of the experimental class is 85.2, and that of the control class is 76.8, showing a significant difference ( $P<0.05$ ). The proportion of high scores (above 90) in the experimental class is 28.9%, while that in the control class is only 11.6%. No student in the experimental class scores below 60, while 5 students (11.6%) in the control class do.

Both classes complete three experimental projects: “routing optimization”, “satellite communication scheduling”, and “AI fault diagnosis.” The experimental class is significantly better than the control class in “AI tool utilization rate”, “project innovation”, and “scheme practicability” (**Table 3**).

**Table 3.** Experimental comparison

Practical Indicators	Experimental Class	Control Class	Significance of Difference
AI tool utilization rate (e.g., fault diagnosis)	75.6%	20.9%	$P<0.01$
Enterprise acceptance rate of project schemes	86.7%	39.5%	$P<0.01$
Average number of project innovations	2.30	0.80	$P<0.05$

## 5. Conclusion and prospect

The “AI empowerment + industry-education integration” reform framework for *Network Architecture* constructed in this paper has been verified effective through empirical research. Intelligent reconstruction of curriculum content effectively solves the problems of “outdated content and insufficient AI integration”; the module design of “basics + AI + frontiers” enables students to master core theories and adapt to industrial technological iteration. AI-empowered teaching methods and practical systems significantly improve students’ practical abilities and learning interests; AI-assisted experiment tools help students understand abstract knowledge and solve real industrial problems. The dual-cycle mechanism of industry-education integration deepens school-enterprise collaborative talent training, realizing a closed loop of “teaching-practice-employment” and improving students’ post-adaptability. The knowledge graph value-added evaluation system breaks through the limitations of traditional evaluation, realizing comprehensive assessment and dynamic feedback of “knowledge-skills-literacy” and providing a basis for teaching optimization.

## Disclosure statement

The authors declare no conflict of interest.

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# Practice Pathways for Graded Closed-Loop Intervention in Psychological Crises Among College Students: An Analysis of Three Typical Cases

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**Abstract:** Psychological crises among college students are often characterized by concealment, cumulative stress, and sudden escalation. Single-session interviews, one-off referrals, or experience-based responses are therefore insufficient for systematic prevention and intervention. Based on three anonymized typical cases, this paper examines yellow, orange, and red risk levels and reconstructs a closed-loop intervention pathway consisting of multi-entry screening, structured assessment, graded intervention, and dynamic follow-up. The analysis suggests that yellow-risk students should be supported through preventive care, enhancement of counseling motivation, and consolidation of social support systems; orange-risk students require stronger identification of hidden warning signs, professional assessment, school-family-medical collaboration, and continuous monitoring; and red-risk students must be managed under the principles of life safety first, medical referral priority, and full-process risk control. The study further argues that psychological crisis intervention in higher education should not be treated as an isolated emergency response. Instead, it should integrate early risk identification, unified assessment criteria, risk-matched intervention strategies, clearly defined responsibilities, and continuous review and improvement. Such a framework can improve the standardization and practical effectiveness of warning, referral, intervention, and follow-up procedures for student psychological crises.

**Keywords:** College students; Psychological crisis; Graded intervention; Closed-loop management; Case study

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## 1. Introduction

In recent years, mental health problems among college students have shown increasingly complex sources of stress, more concealed risk presentations, and faster escalation from distress to crisis. College students are in a critical developmental period involving physical and psychological maturation, academic adaptation,

interpersonal relationship building, and identity formation. Romantic setbacks, academic difficulties, family changes, financial stress, and relapse or deterioration of mental disorders may accumulate and transform general emotional distress into self-injury, suicide attempts, or other high-risk events.

National policy documents in China have emphasized the need to improve student mental health prevention, monitoring, early warning, referral, and intervention mechanisms, while promoting collaboration among schools, families, medical institutions, and social resources <sup>[1–5]</sup>. These requirements indicate that psychological crisis intervention in higher education should not remain at the level of a temporary response after a problem is discovered. Rather, it should be developed into an operational system that is identifiable, assessable, executable, traceable, and reviewable.

In practice, students in crisis do not always present through high screening scores or active help-seeking. Some students may be classified as low risk in routine psychological screening, yet their history of self-injury, previous suicide attempts, and current stressors indicate the possibility of recurrence. Others may not show prominent abnormal results on standardized scales, but hidden risks may become visible through autobiographical materials, social media posts, physical scars, dormitory interactions, peer reports, or counselor observations. Still others may already have recent suicidal behavior, intense suicidal ideation, refusal of treatment, or poor treatment adherence, and therefore require immediate emergency intervention.

Research on latent suicide risk among college students also indicates that suicide risk should be assessed through multiple indicators rather than single symptom-based screening alone <sup>[6]</sup>. Against this background, this paper uses three anonymized cases to summarize the practical pathway of graded closed-loop intervention for psychological crises among college students and to provide a reference for mental health education and crisis management in similar higher education settings.

## **2. Methods: Case sources and analytical procedure**

The cases discussed in this paper were drawn from university mental health education and crisis intervention practice. All case materials were anonymized, and necessary details were modified or omitted to prevent personal identification. The study adopted a typical case analysis approach. Student risk was divided into three levels (yellow, orange, and red), with suicide risk as the core criterion and with consideration of previous self-injury or suicide attempts, psychiatric diagnosis, current stressful events, family and peer support, help-seeking willingness, and treatment adherence.

The purpose of this paper is not to reconstruct all details of each case, but to extract the identification channels, assessment priorities, intervention strategies, and follow-up requirements for students at different risk levels. This approach is consistent with the policy orientation of moving prevention forward, improving monitoring and early warning, and strengthening referral and intervention procedures in schools <sup>[1–3]</sup>. It also corresponds to evidence that comprehensive indicators are necessary for identifying college students at elevated suicide risk <sup>[6]</sup>.

## **3. Results: Core characteristics of the three risk cases**

### **3.1. Yellow risk: Preventive care type**

Xiaohua, a first-year female student, was identified as a yellow-risk student during freshman psychological screening. During a care-oriented interview, the counselor learned that she had a history of self-injury and a

suicide attempt in junior high school. Although she had no clear suicidal ideation at the time of the interview, she reported a high level of anxiety and was affected by romantic conflict and family discord. She had a high level of trust in the counselor but remained hesitant about professional psychological counseling, which delayed professional involvement at the early stage.

Later, after a period of marked emotional fluctuation, Xiaohua gradually entered counseling and medical follow-up with the joint support of the counselor, roommates, and parents. Her condition subsequently stabilized. This case shows that yellow risk does not mean no risk. Students without a current suicidal plan may still have potential escalation risks if they have a previous risk history, current stressors, and unstable support systems. Therefore, prior risk history, current stress events, and changes in support resources should be actively and systematically monitored.

### 3.2. Orange risk: Key follow-up type

Student Z, a first-year female student, showed no obvious abnormalities in routine scale results, but frequent self-injury was identified through daily observation. Her autobiographical materials indicated that she had attempted suicide by taking medication in junior high school and had long used self-injury as a way to regulate emotional distress. She also reported feelings of hopelessness and self-negation.

Family background was an important contextual factor: her parents were divorced, communication with her father was conflictual, and stable support was insufficient. Subsequent medical assessment suggested the risk of a mood disorder. Although Student Z did not have an immediate suicide plan, long-term self-injury, previous suicide attempts, weak family support, and possible illness fluctuation together placed her in a moderate-to-high risk group. This case suggests that university crisis identification cannot rely solely on standardized scales. Qualitative texts, peer feedback, counselor observations, physical scars, and family trauma should also be incorporated into the early warning system.

### 3.3. Red risk: Emergency intervention type

Xinyu, a first-year male student, was identified as having high-risk signals through a freshman growth report. In high school, the death of an important family member caused a significant traumatic reaction and suicidal ideation. Before returning to school, he had experienced a suicide attempt that was not detected in time. After entering university, romantic loss, examination pressure, family economic difficulty, and strong self-blame further accumulated.

Medical diagnosis indicated a relatively severe depressive episode and mood instability. Xinyu had strong suicidal intent, poor treatment adherence, and a cognitive tendency to rationalize suicide. His primary guardian was unable to arrive at school promptly because of distance and work constraints, but one relative had a stable and trusting relationship with him and could provide substitute support. This case indicates that red-risk intervention must place life safety first and rapidly implement safety monitoring, medical referral, school-family collaboration, and full-process documentation (**Table 1**).

**Table 1.** Summary of risk levels, core features, and intervention priorities

Risk level	Case type	Core risk features	Main intervention priorities
Yellow	Preventive care	Previous self-injury or suicide attempt; current anxiety; no clear current suicidal ideation; available peer and school support	Preventive care, counseling motivation, family-school communication, support consolidation, periodic follow-up

Orange	Key follow-up	Frequent self-injury; previous suicide attempt; weak family support; possible mood disorder; hidden risk not captured by routine scales	Professional assessment, school-family-medical coordination, self-injury management, continuous monitoring, structured follow-up
Red	Emergency intervention	Recent or previous suicide attempt; strong suicidal ideation; depressive episode; poor treatment adherence; multiple acute stressors	Life safety first, urgent monitoring, medical referral priority, family or substitute guardian involvement, full-process risk control

## 4. Discussion: Practice pathway for graded closed-loop intervention

Closed-loop intervention should be guided by timeliness, risk matching, and traceability. Timeliness means that once crisis-related clues appear, a verification process should be initiated rather than waiting for the student to request help. Risk matching means that intervention intensity should correspond to the risk level: low-risk students should not be over-managed, while moderate- and high-risk students should not be underestimated. Traceability means that interviews, assessments, referrals, school-family communication, and reassessments should be recorded with clear information about time, responsible personnel, student status, and follow-up measures. Embedding these principles in daily work helps transform crisis intervention from individual experience-based judgment into a stable institutional capacity <sup>[1-3]</sup>.

### 4.1. Multi-entry screening: From scale-based screening to comprehensive identification

Psychological screening is an important entry point for university crisis warning, but it should not be the only entry point. Yellow risk can often be identified through standardized scales, initial interviews, and adaptation surveys. Orange risk depends more heavily on hidden clues such as autobiographical texts, physical scars, peer reports, dormitory changes, unusual leave requests, and online expressions. Red risk requires heightened sensitivity to recent suicidal behavior, clear suicidal ideation, access to lethal means, severe psychiatric symptoms, and refusal of treatment.

Universities should establish a multi-entry warning mechanism that integrates scale screening, growth reports, daily observation, peer feedback, and school-family information. Counselors should be allowed and encouraged to report abnormal clues rapidly to the psychological counseling center for professional review. This helps reduce missed screening and delayed response, and it is consistent with policy requirements for standardized mental health monitoring and early warning <sup>[1-2]</sup>.

### 4.2. Structured assessment: Improving consistency in risk judgment

Crisis assessment should move from experience-based judgment to structured evaluation. For yellow-risk students, assessment should focus on emotional distress, previous risk history, current triggers, willingness to seek counseling, and available support resources. For orange-risk students, assessment should focus on the frequency, function, and escalation conditions of self-injury; previous suicide attempts; psychiatric diagnosis; family support availability; and treatment adherence. For red-risk students, immediate assessment is needed regarding the intensity of current suicidal intent, suicide plan and method, access to dangerous tools, recent behaviors, psychiatric symptoms, guardianship capacity, and feasibility of medical referral.

Assessment results should be documented in written form and should identify the risk level, responsible parties, follow-up frequency, school-family communication approach, and emergency plan. This structured approach is also aligned with the finding that multiple indicators are necessary to identify latent suicide risk among college students <sup>[6]</sup>.



### **4.3. Graded intervention: Matching intervention intensity to risk level**

Yellow-risk intervention should emphasize preventive care and developmental support while avoiding excessive control and stigmatization. Counselors can use stable, supportive conversations, empathic responses, and resource introduction to strengthen help-seeking motivation. The psychological counseling center can provide counseling assessment when appropriate, and medical support should be facilitated when necessary. In school-family communication, parents should be helped to understand the student's condition, reduce blame and simple moralizing, and strengthen family and peer support.

Orange-risk intervention should emphasize professional support and continuous monitoring. The psychological counseling center should lead special assessment; the counselor should monitor daily dynamics; parents or substitute family members should undertake guardianship cooperation; and medical institutions should provide diagnosis and treatment. For students with self-injury, staff should help them identify warning signs of self-injurious impulses, develop alternative emotion regulation strategies, and implement crisis notification and safety management within the minimum necessary scope.

Red-risk intervention must follow the principles of life safety first, medical priority, and full-process control. The university should immediately activate an emergency plan, arrange continuous accompaniment, remove dangerous objects, prevent the student from staying alone in enclosed spaces, and contact family members or trusted relatives to assume guardianship responsibilities. For students who refuse treatment, refuse urgent referral channels, or show poor treatment adherence, the university should work with family members, medical institutions, and relevant internal departments to develop a protective intervention plan on the basis of legal compliance and adequate documentation <sup>[1-3]</sup>.

### **4.4. Dynamic follow-up: From “case closure” to continuous reassessment**

Crisis intervention cannot end with a single interview, a single referral, or a written commitment. Yellow-risk students may be followed weekly to monthly, depending on their state, and the follow-up frequency can be gradually reduced after symptom relief while maintaining accessible support. Orange-risk students may initially require one or two follow-ups per week, with monthly special reassessment focused on self-injury, emotional fluctuation, medication adherence, and family conflict. Red-risk students should receive daily safety confirmation and continuous records, with emergency reassessment at key points.

Removal from key attention or crisis management should be based on professional assessment, medical recommendations, family feedback, functional recovery, and a sustained period of stability. Management should not end merely because a student verbally states that everything is fine. Continuous review and improvement are essential for building an accountable and effective crisis intervention system <sup>[1, 3]</sup>.

## **5. Practical implications**

First, risk classification should take suicide risk as the core while incorporating contextual conditions. Scale scores, interview performance, and students' verbal assurances should not be used as the sole basis for judgment. Previous self-injury or suicide attempts, psychiatric diagnosis, current stress, support systems, and treatment adherence should be analyzed dynamically.

Second, intervention strategies should be matched with the risk. Low-risk students need to be seen and supported; moderate-risk students need to be assessed and continuously followed; and high-risk students need to be protected and referred for timely medical care.

Third, collaborative work should have clear responsibility boundaries. Counselors are responsible for daily observation, information communication, and supportive accompaniment; psychological counseling centers are responsible for professional assessment and intervention planning; parents or substitute guardians are responsible for guardianship and life support; medical institutions are responsible for diagnosis and treatment; and peers should only provide companionship, observation, and timely reporting rather than professional intervention.

Fourth, school-family communication should balance confidentiality and safety. When a student has actual self-injury or suicide risk, confidentiality exceptions should be activated within the minimum necessary scope. Relevant guardians and responsible parties should be informed of risk factors, intervention recommendations, and guardianship requirements while avoiding intensification of parent-child conflict.

Fifth, institutional development should emphasize review and improvement. After each crisis event, an anonymized review should examine whether early warning was timely, assessment was sufficient, referral was smooth, records were complete, and follow-up was continuous. Case experience should be transformed into process optimization, staff training, and institutional refinement.

Taken together, these implications correspond to national policy directions that emphasize prevention, monitoring, early warning, referral, and coordinated intervention, as well as empirical evidence supporting multi-indicator assessment of suicide risk among college students <sup>[1, 5–6]</sup>.

## 6. Conclusion

Psychological crisis intervention among college students is a highly professional, collaborative, and continuous task. The three cases analyzed in this paper show that yellow, orange, and red risks differ in urgency, but all should be incorporated into a closed-loop system of multi-entry screening, structured assessment, graded intervention, and dynamic follow-up. Yellow risk focuses on prevention and consolidation; orange risk focuses on identification and prevention of escalation; and red risk focuses on emergency control and medical referral.

For higher education institutions, especially those with large student populations, limited full-time mental health professionals, and counselors who undertake substantial frontline student work, this framework has practical applicability. By designing screening entry points, reporting procedures, assessment criteria, intervention intensity, and follow-up frequency according to risk level, universities can prioritize limited resources for students with higher risk, more urgent needs, and weaker support systems while still providing continuous but non-excessive care for lower-risk students.

The core value of the framework is not to increase administrative burden, but to reduce information omission, unclear responsibility, and repeated communication through standardized procedures. In this way, crisis intervention can shift from post-event remediation to front-end prevention, process coordination, and outcome review. This paper is based on practice cases, and the number of cases is limited. Future studies may combine psychological screening data, follow-up records, and intervention outcome evaluation to further examine transition patterns and effective intervention factors among students at different risk levels.

## Disclosure statement

The author declares no conflict of interest.

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# The Impact of Short-Video Addiction on Sleep Quality among College Students: The Mediating Role of Fear of Missing Out in an Educational Context

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**Abstract:** This study focuses on the role of short video addiction in college students' sleep quality and tests whether "fear of missing out" plays a mediating role. A total of 306 valid questionnaires were collected in different regions using the Short Video Addiction Scale, the Fear of Missing Out Scale, and the Pittsburgh Sleep Quality Index (PSQI). The results showed that short video addiction can not only directly affect the sleep quality of college students, but also indirectly disrupt their sleep patterns by increasing the level of fear of missing out. The above results suggest that behavioral addiction and cognitive emotional mechanisms contribute to sleep disorders in college students. Finally, this paper discusses the significance of the research findings in educational practice and mental health intervention.

**Keywords:** Sleep quality; Short-video addiction; Fear of missing out; College students

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## 1. Introduction

The China Sleep Health Research White Paper 2026 reveals that sleep quality has become an increasingly important issue among college students. Existing research suggests that good sleep is not only linked to emotional stability and physical health but also has a profound impact on cognitive function, attention levels, and information processing abilities <sup>[1]</sup>. More importantly, Prior research has demonstrated that sleep is closely related to emotional regulation, cognitive functioning, and academic performance <sup>[2]</sup>. Consequently, sleep issues among college students are not merely research topics within the fields of psychology or medicine; they should also be incorporated into the scope of educational research, as they are closely linked to the quality of talent cultivation in higher education. Research into the factors affecting college students' sleep quality is therefore particularly urgent. Existing studies have found that behavioral factors such as

mobile phone addiction are important predictors of sleep quality<sup>[3-4]</sup>. With the deepening of research, scholars have gradually focused their attention on more specific media forms, such as short video use behavior.

Short video addiction refers to the continuous dependence state formed by individuals in the process of repeatedly watching short videos<sup>[5]</sup>. With fragmentation, high stimulation, and algorithm recommendation, short videos are easy to continuously activate the reward system, weaken self-control, and may damage deep learning and attention, thus causing anxiety, depression, and sleep problems<sup>[6-8]</sup>. According to the excitement hypothesis, high-intensity audio-visual stimulation of short videos continuously activates the nervous system and increases the level of arousal, thereby delaying sleep and disrupting work and rest; at the same time, short video addiction may also lead to deep cognitive and emotional mechanisms, such as missed anxiety by strengthening psychological dependence.

Fear of Missing Out (FoMO) refers to a persistent anxiety state caused by the individual's fear of missing important information or positive events that others are experiencing<sup>[9]</sup>. In the social media environment, the high-frequency update and instant dissemination of information aggravate the individual's concern about "lagging behind others." According to the theory of social cognition, individuals will constantly adjust their cognition by observing others' behavior and information feedback, thus amplifying their sensitivity to social deprivation<sup>[10]</sup>. Meanwhile, the Use-and-Satisfaction Theory suggests that individuals with a severe FoMO tendency are more likely to use media at night, which may delay sleep latency and reduce sleep quality<sup>[11]</sup>. Existing studies have also revealed the impact of social media use on sleep from the perspective of loss anxiety<sup>[12-13]</sup>.

In short, college students' sleep problems have gone beyond the level of personal health and become a key factor affecting academic performance. Although the existing research involves the relationship between social media and sleep, it rarely discusses short video addiction and its psychological mechanisms. In particular, it lacks the analysis of the mechanism of short video addiction affecting sleep quality through missing anxiety from the perspective of education. Therefore, this study focused on college students to examine how short video addiction affects sleep quality through FoMO.

## 2. Methods

### 2.1. Participants

A total of 306 valid questionnaires were obtained after excluding invalid responses. Among the participants, 84 were male, and 222 were female. The sample included 53 freshmen, 29 sophomores, 80 juniors, 106 seniors, and 38 postgraduate students.

### 2.2. Measures

The Short-Video Addiction Scale, which consists of 14 items across four dimensions<sup>[14]</sup>. If a participant answers "yes" to any four of the seven diagnostic items, they may be diagnosed as having an addiction. Higher scores indicate stronger addictive tendencies, and the scale demonstrated good reliability ( $\alpha = 0.91$ ).

Fear of Missing Out Scale (FoMOS) comprises eight items, divided into two dimensions: fear of missing out on information and fear of missing out on social situations<sup>[15]</sup>. The scale employs a five-point Likert scale, with higher scores reflecting greater fear of missing out ( $\alpha = 0.72$ ).

The Chinese version of the Pittsburgh Sleep Quality Index (PSQI), which has 18 scoring items, covers seven dimensions<sup>[16]</sup>. Higher total scores indicate poorer sleep quality. A total score exceeding 7 is considered

indicative of a sleep disorder ( $\alpha = 0.84$ ).

### 2.3. Statistical analysis

Data were analyzed using SPSS 26.0. Descriptive statistics, correlation analysis, and mediation analysis (PROCESS Model 4 with bootstrap method) were conducted.

## 3 Results

### 3.1 Correlation analysis among sleep quality, short-video addiction, and fear of missing out

The correlation analysis results in **Table 1** showed that short video addiction was positively correlated with sleep quality ( $r=0.28$ ,  $P<0.01$ ); that is, the higher the addiction level, the worse the sleep quality. There was also a positive correlation between short video addiction and FoMO ( $r=0.31$ ,  $P<0.01$ ). In addition, FoMO was positively correlated with sleep quality ( $r=0.57$ ,  $P<0.01$ ). The fear of missing information may not only interfere with the process of falling asleep, but also further damage the quality of sleep by improving the level of cognitive arousal. In summary, the above results verify the path of short-video addiction affecting sleep quality through emotional and cognitive mechanisms.

**Table 1.** Correlation analysis among sleep quality, short-video addiction, and fear of missing out ( $N=306$ )

	M	SD	1	2	3
Short-video addiction	3.11	0.78	1.00		
Fear of missing out	3.17	0.78	0.57**	1.00	
PSQI	6.91	3.36	0.28**	0.31**	1.00

Note: \* $P<0.05$ , \*\* $P<0.01$ , \*\*\* $P<0.001$

### 3.2. Testing the mediating effect of fear of missing out

When using the Bootstrap test, Model 4 was selected in the PROCESS section to test the simple mediating effect. According to **Table 2**, mediation analysis showed that short-video addiction significantly predicted sleep quality ( $\beta=0.28$ ,  $t=5.06$ ,  $P<0.001$ ) and FOMO ( $\beta=0.57$ ,  $t=12.22$ ,  $P<0.001$ ). When these two variables were included at the same time, the direct effect of short-video addiction on sleep quality was weakened, but still statistically significant ( $\beta=0.15$ ,  $t=2.32$ ,  $P<0.05$ ).

**Table 2.** Regression analysis of the mediating effect of Fear of Missing Out

Regression equation		Overall fit index			Regression coefficient significance		
Result variables	Predictive variables	$R$	$R^2$	$F$	$\beta$	$SE$	$t$
PSQI	Short-Video Addiction	0.28	0.08	25.59***	0.28	0.06	5.06***
Fear of Missing Out	Short-Video Addiction	0.57	0.33	149.32***	0.57	0.05	12.22***
PSQI	Short-Video Addiction	0.33	0.11	18.59***	0.15	0.07	2.32*
	Fear of Missing Out				0.22	0.07	3.28**

Note: \* $P<0.05$ , \*\* $P<0.01$ , \*\*\* $P<0.001$

The analysis results of the mediating effect are shown in Table 3. The 95% confidence interval of the

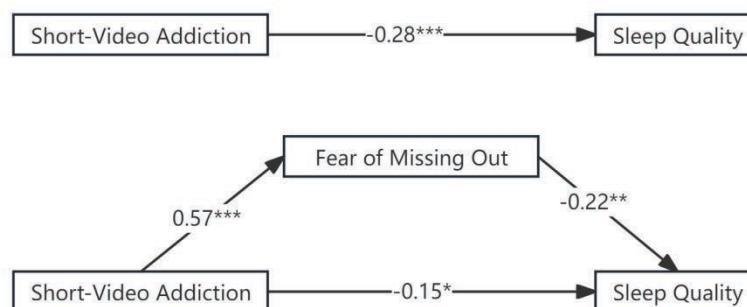
total effect (LLCI=0.17, ULCI=0.39) and indirect effect (LLCI=0.06, ULCI=0.20) of short video addiction on sleep quality does not include 0, indicating that the mediating effect of missing anxiety between short video addiction and sleep quality is statistically significant. The direct effect (LLCI = 0.02, ULCI = 0.28) was also significant, indicating that missed anxiety played a partial mediating role between short video addiction and sleep quality, and the mediating effect accounted for 46.43% of the total effect.

**Table 3.** Indirect and direct effects of Fear of Missing Out on Sleep Quality of college students

	Effect value	Standard error	95%BootLLCI	95%BootULCI
Total effect	0.28	0.06	0.17	0.39
Direct effect	0.15	0.07	0.02	0.28
Mediating effect	0.13	0.04	0.06	0.20

Note: \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$

This result shows that the mechanism of the effect of short video addiction on sleep can be understood from two levels (**Figure 1**): first, at the behavioral level, individuals occupy sleep time due to continuous viewing of short videos; the second is the cognitive emotional level. Missing anxiety increases the individual's psychological arousal, making it more difficult to enter a relaxed state before bedtime. Both of them work together, leading to sleep delay and sleep quality decline. From the perspective of education, this dual mechanism of "behavior-cognition" caused by the use of digital media may further affect college students' learning engagement and academic performance. Therefore, it is necessary to pay attention to students' media use behavior and its psychological impact in educational practice.



**Figure 1.** The mediational role of Fear of Missing Out

## 4. Conclusion

This study confirms that short video addiction can damage the sleep quality of college students. This effect can be explained by mechanisms at both behavioral and psychological levels.

First, from the behavioral level, strong audio-visual stimuli in short videos can easily increase the level of physiological arousal, such as accelerating heart rate, enhancing neural activity, and thus preventing sleep. Second, the study found that there is a significant correlation between short video addiction and a higher degree of FoMO, which also reflects the built-in reinforcement mechanism of the short video platform. More importantly, people with higher FoMO levels often experience enhanced cognitive arousal near bedtime because they are always worried about missing important information or social experiences. This high level

of mental activity may delay the time to fall asleep and reduce sleep quality.

Overall, existing studies have revealed that short video addiction impairs sleep quality through a dual-path mechanism. The behavioral level is reflected in time dislocation and enhanced physiological activation; the cognitive-emotional level is characterized by FoMO and increased cognitive arousal. The two paths interact with each other and jointly contribute to the sleep problems of college students.

Follow-up studies can deeply examine the long-term effects of short video use on learning outcomes, and evaluate the interventions designed around the FoMO psychology and media use behavior, so as to provide more targeted reference for educational practice.

## 5. Implications

Based on the findings of this study, several practical suggestions can be extracted from the perspective of education and psychology.

First, colleges and universities should strengthen the guidance of students' use of digital media and incorporate media literacy education into the student training system. At present, many college students lack a critical understanding of the algorithm recommendation mechanism and the psychological motivation behind media addiction. Schools can design "digital media and self-regulation" related courses, focusing on attention management, behavioral addiction, and information screening. At the same time, teachers can introduce reflective discussions on media use in the classroom, and encourage students to critically look at how short video consumption affects their learning efficiency and cognitive engagement.

Second, psychological intervention needs to pay more attention to the core cognitive-emotional variable of FoMO. In the mental health education project, content related to FoMO can be added to help students understand the psychological mechanisms generated by it, such as generation comparison, lack of belonging, and information overload. Cognitive-behavioral therapy can be used to adjust irrational cognition, while mindfulness training helps to reduce the individual's automatic response to external information stimulation and improve the awareness of current experience. For students with severe sleep problems, targeted intervention strategies should be introduced, such as sleep hygiene education, including guiding them to reduce the time they use electronic devices before going to bed and develop regular routine habits.

Third, in the broader framework of the student development support system, it is especially important to strengthen the cultivation of self-regulation ability. Colleges and universities can systematically open training courses on time management and behavior control, covering goal setting, task disassembly, and self-supervision. With the help of digital tools, students can better monitor and limit their usage time on the short video platform. At the same time, the adoption of active teaching methods such as project-based learning and problem-based learning to improve the level of academic investment is conducive to stimulating internal learning motivation, thus reducing the dependence on short videos caused by seeking psychological comfort.

In general, the value of this study is not limited to intervention at the individual level. From a systematic perspective, it is necessary to organically combine media literacy education, mental health education, and student development projects. By working together in the three dimensions of cognition, behavior, and environment, it is conducive to shaping healthier media usage habits and improving sleep conditions, thereby promoting students' academic growth and physical and mental health development.



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## Disclosure statement

The author declares no conflict of interest.

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# A Podcast-Based ICT Intervention to Enhance Multimodal Literacy and Oral Communication Skills in Teaching Poetry among Grade 7 Learners

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**Abstract:** This study investigated the effectiveness of a podcast-based information and communication technology (ICT) intervention in enhancing multimodal literacy and oral communication skills in teaching poetry among Grade 7 learners in the Division of Calaca, Calaca City, Batangas. Despite the recognized importance of integrating technology in language instruction, limited research has examined structured podcast-based interventions that develop pronunciation, fluency, clarity of ideas, and confidence in secondary learners. The study employed a sequential explanatory mixed-method design. A total of 108 learners from the Special Program in Foreign Language and Science and Technology Education Program were selected through random sampling for the quantitative phase, which utilized a Likert-scale survey to measure their effectiveness, as well as the issues and challenges that the learners encountered in creating and presenting their self-composed poems through podcast-based multimodal activities. Subsequently, ten purposively selected participants were interviewed to enrich and validate quantitative findings. Results revealed that learners perceived the intervention as highly effective, with overall composite means of 3.3–3.4 across pronunciation, fluency, clarity of ideas, confidence, and ICT integration. Notably, a strong negative correlation ( $r = -0.7624$ ,  $P < .00001$ ) was found between learners' positive perceptions and the challenges they encountered, indicating that the intervention mitigated common difficulties in composing and presenting poems. The study demonstrated that integrating podcast-based multimodal activities facilitated self-assessment, peer collaboration, and reflective practice, which enhanced learners' oral performance and digital literacy. Hence, the researcher proposed Project V.O.I.C.E. as an innovative, technology-enhanced project that enabled learners to produce meaningful poetry outputs while fostering 21st-century communication skills.

**Keywords:** Podcast-based learning; Multimodal literacy; Oral communication; Project VOICE

**Online publication:** June 16, 2026



## 1. Introduction of the research

According to De Gala, language is seen as a powerful instrument essential for communication and for expressing oneself clearly. Through language, understanding, and learning are brought together. This aligns with the vision of the Department of Education, which aims to develop globally competitive learners. It has also been revealed that exposure to a new language is necessary to provide adequate input and opportunities for learners to use the language meaningfully. Moreover, there is a clear distinction between simply knowing a language and being able to explain how it works and what it does. To understand a language deeply, learners must be given meaningful experiences that develop both their knowledge and their ability to apply it <sup>[1]</sup>.

Aligned with this understanding of language as a foundation for communication and learning, the enhanced K–12 curriculum places emphasis on literature in the first quarter, as reflected in the learning competencies and performance standards of both elementary and secondary learners. In the elementary level, particularly in Key Stage 2 (Grade 2), competency EN2PA-11 requires learners to recognize rhymes in chants, poems, and stories heard. Meanwhile, learners in Key Stage 3 (Grade 7) are expected to compose and publish an original multimodal literary text. The integration of multimodal literacy through podcast-based instruction is highly relevant to 21st-century learners, as many students prefer to learn through the use of digital media such as sounds, images, and interactive tools like podcasts <sup>[2]</sup>.

The researchers, both experienced English teachers, observed that allowing learners to publish their written poetry outputs through a podcast-based ICT strategy motivates them to become more interested in and appreciative of both their final outputs and literature itself. This approach also helps improve their pronunciation as they listen to their own recorded voices, thereby enhancing their oral communication skills.

This topic aligns with New Literacy Theory, which, according to Araña, offers expanded insights into the ideas and scope of literacy and literacy education. From the New Literacy perspective, literacy is not only about printed and written texts but should also take the new forms of representation of the target language portrayed by digital technologies into consideration <sup>[3]</sup>. In this context, the integration of podcast-based ICT strategies in teaching poetry allows learners to produce multimodal, student-centered outputs.

The researchers also believe that this study is necessary, as it encourages 21st-century teachers to be innovative and creative in teaching poetry. This may result in innovative teaching practices that not only enhance learners' engagement and skills but also strengthen teachers' competence in adapting to current educational trends in teaching language and literature.

## 2. Innovation, intervention, and strategy

**Innovation:** This study will innovate the creation of PROJECT V.O.I.C.E. (Valuing Oral Interaction through Communication and Expression). It is an ICT-driven, skills-focused innovation designed to develop learners' oral communication skills, specifically pronunciation, fluency, clarity of ideas, confidence, and ICT integration, through podcast-based multimodal activities. The project addresses the lack of supplementary audio materials, the limited availability of classroom audio equipment, and the need for 21st-century, learner-centered approaches in English instruction.

**Intervention:** Based on the results of the study, several interventions were implemented to directly address learners' needs. The first intervention is the development of a centralized podcast-based learning resource, which serves as a unified platform containing all podcasts, videos, and learning materials for easy and consistent access.

Strategies of Project V.O.I.C.E.: Project V.O.I.C.E. employed a set of classroom strategies that were aligned with the quarterly content standards and supported by the findings of the study. The first strategy involved quarter-based thematic performance tasks. During the first quarter, learners focused on poetry through spoken poetry performances, commentary sharing, open-mic sessions, and podcast production. The second strategy centered on interactive and collaborative learning, where students participated in pair and group activities, open dialogues, Q&A sessions such as “Share a Mic”, and peer feedback discussions. These activities helped enhance learners’ fluency, confidence, and ability to express ideas clearly.

### **3. Action research questions**

This study aims to determine the impact of a podcast-based ICT intervention in enhancing multimodal literacy and oral communication skills in teaching poetry among Grade 7 learners in Dacanlao Gregorio Agoncillo Integrated National High School, for the School Year 2025–2026.

Specifically, this research seeks to answer the following questions:

1. To what extent is the podcast-based ICT intervention effective in improving Grade 7 learners’ oral communication skills in terms of pronunciation, fluency, clarity of ideas, and confidence when delivering poetry?
2. What are the learners’ perceptions of using podcast-based ICT integration in developing their multimodal literacy and oral communication skills in poetry learning?
3. What issues and challenges do students encounter in creating and presenting their self-composed poems through podcast-based multimodal activities?
4. Is there a significant relationship between learners’ perceptions of podcast-based ICT integration in developing multimodal literacy and oral communication skills, and the issues and challenges they encounter when creating and presenting their self-composed poems through podcast-based multimodal activities?
5. Based on the findings of the study, what podcast-based learning resource intervention can be designed
6. and implemented to further improve Grade 7 learners’ oral communication skills?

### **4. Action research methods**

The researcher will employ a sequential explanatory design, a type of mixed-method approach proposed by Creswell <sup>[4]</sup>. This two-phase design begins with the quantitative phase, followed by the qualitative phase. In the first phase, quantitative data will be collected and analyzed using statistical tools such as the weighted mean and frequency to interpret the data gathered from the survey questionnaire. The second phase will involve qualitative data collection through audio-recorded interviews, which will serve to explain, validate, and enrich the quantitative findings. This design is appropriate because it allows for a comprehensive understanding of both measurable outcomes and in-depth insights related to the effectiveness of podcast-based ICT integration in poetry learning.

Participants and/ or other sources of data: For the quantitative phase, the researcher will employ a random sampling technique to select respondents from among Grade 7 students enrolled in the Science and Technology Education Program (STEP) and the Special Program in Foreign Language (SPFL). From a total population of 148 students, 108 respondents will be determined using Slovin’s formula with a 0.05 margin of

error. The selection of SPFL students was particularly justified by the insights of De Gala, who emphasized that the Special Program in Foreign Language-Korean all over the Philippines envisions a multilingual Filipino learner who is globally competitive and equipped with 21st-century skills in a culturally diverse environment while preserving their national identity <sup>[5]</sup>. Since the participants in this study are engaged in advanced language learning through SPFL, they are ideal respondents for examining the effectiveness of podcast-based ICT interventions in enhancing oral communication skills.

Data gathering method: The research instrument will be a Likert scale questionnaire validated by research experts and consisting of three parts: (1) the extent of the podcast-based ICT intervention's effectiveness in improving learners' oral communication skills in terms of pronunciation, fluency, clarity of ideas, and confidence in delivering poetry; (2) learners' perceptions of podcast-based ICT integration in enhancing multimodal literacy and oral communication; and (3) issues and challenges encountered in creating and presenting self-composed poems through podcast-based multimodal activities. For the qualitative phase, ten participants who are not part of the 108 respondents will be purposively selected for audio-recorded interviews to obtain richer insights. Prior to data collection, the researcher will secure permits from the school principal and parents or guardians and obtain informed consent from participants, ensuring confidentiality, anonymity, and ethical compliance throughout the study.

## 5. Discussion of the results and reflection

Based on the results, **Table 1** showed the extent of effectiveness of the podcast-based ICT intervention in enhancing Grade 7 learners' pronunciation skills. The data showed an overall composite mean of 3.3, verbally interpreted as Strongly Agree, indicating that learners generally perceived the intervention as effective in improving their pronunciation during podcast production and related oral communication activities.

The findings of this study align with the insights of De Gala, who emphasized that students often struggle to understand reading materials due to a limited vocabulary. While traditional strategies involve consulting dictionaries or asking for assistance, reading and language learning become more efficient when learners can independently discover the meaning of unfamiliar words using context clues <sup>[5]</sup>. In the present study, learners similarly demonstrated autonomy in improving their pronunciation through digital tools, particularly by using digital dictionaries to listen to words and correct mispronunciations.

The highest-rated indicator was "Enhance pronunciation by using a digital dictionary to listen to words from their recorded poem and correct mispronunciations", which obtained a weighted mean of 3.4 and ranked first. The lowest-rated indicator, "Showcase improved pronunciation during the Share a Mic activity when responding to classmates' questions about their poem", received a weighted mean of 3.2. The result of the study was supported by the response of S7, who mentioned, "*This strategy was amazing and I learned a lot, especially in pronouncing the word correctly. Through listening to it in a digital dictionary, I became more confident to deliver my podcast.*" Meanwhile, S2 added, "*I was a bit nervous during the Share a Mic activity, but I was kinda happy listening to how I pronounced the word. Because of the mic and the speaker, I felt like a DJ answering questions.*" Hence, using podcasts as a learning platform not only supported the correction of mispronunciations but also helped build learners' confidence in oral expression. These results aligned with Gilakjani, who noted that technology-assisted pronunciation practice allowed learners to self-monitor and receive immediate feedback, enhancing articulation and prosodic features <sup>[6]</sup>. Similarly, Derwing and Munro emphasized that frequent engagement with recorded oral tasks increased learners' awareness of

pronunciation accuracy and contributed to the development of more intelligible speech over time <sup>[7]</sup>.

**Table 1. Pronunciation**

Indicators	WM	I	R
1. Demonstrate correct pronunciation when recording their original poem in podcast format.	3.3	SA	2.5
2. Apply proper stress, rhythm, and intonation to bring out the meaning of their self-composed poem.	3.3	SA	2.5
3. Practice articulation by rehearsing lines of the poem using ICT-based playback tools.	3.3	SA	2.5
4. Enhance pronunciation by using a digital dictionary to listen to words from their recorded poem and correct mispronunciations	3.4	SA	1
5. Showcase improved pronunciation during the Share a Mic activity when responding to classmates' questions about their poem	3.2	SA	5
Overall Composite Mean	3.3	Strongly Agree	

Note: Legend: Strongly Agree- SA, Agree- A; Weighted Mean-WM, Interpretation-I, Rank-R

Based on the results, **Table 2** presented the extent of effectiveness of the podcast-based ICT intervention in improving Grade 7 learners' fluency when delivering poetry. The findings revealed an overall composite mean of 3.3, interpreted as Strongly Agree, indicating that learners perceived the intervention as effective in developing their fluency in oral communication. All indicators obtained an equal weighted mean of 3.3, also interpreted as Strongly Agree, and shared the same rank. This consistency suggested that learners acknowledged improvement across various aspects of fluency, such as maintaining smooth speech delivery, sustaining natural pacing, engaging confidently in dialogue, and minimizing hesitation during oral tasks. Learners agreed that they were able to deliver their poem podcast smoothly, without unnecessary pauses or fillers, and sustain a 2–3-minute performance with natural pacing and flow. These results implied that repeated practice in recording and reviewing their poems helped them develop better control over speech rhythm and pacing. Furthermore, learners strongly agreed that they demonstrated improved fluency by minimizing hesitation in both poem delivery and class interactions.

The result of the study was supported by the response of S2, who said, *"I felt like I became more fluent in delivering the poetry that I wrote because of my frequent practice and whenever I listened to the audio file."* It was further supported by S1, who added, *"Our teacher made sure that we were ready to answer the possible questions; this allowed us to become more spontaneous during the Share a Mic activity."* The findings indicated that the podcast-based ICT intervention was effective in improving learners' fluency by providing opportunities for repeated oral practice, self-assessment, and peer collaboration. These results were supported by Nation and Newton, who emphasized that fluency development required meaningful oral practice and repeated speaking opportunities <sup>[8]</sup>. Likewise, Skehan noted that structured communicative tasks, such as oral recordings and peer exchanges, significantly contributed to the development of learners' speech flow and automaticity <sup>[9]</sup>.

**Table 2. Fluency**

Indicators	WM	I	R
1. Deliver their poem podcast smoothly without unnecessary pauses or fillers.	3.3	SA	1.5
2. Sustain a 2–3-minute poem performance with natural pacing and flow.	3.3	SA	1.5
3. Engage confidently in spontaneous dialogue during the Share a Mic activity.	3.3	SA	1.5



4. Maintain fluency while explaining the inspiration or theme behind their poem.	3.3	SA	1.5
5. Demonstrate improved fluency by minimizing hesitation in both poem delivery and class interaction.	3.3	SA	1.5
Overall Composite Mean	3.3	Strongly Agree	

Note: Legend: Strongly Agree- SA, Agree- A; Weighted Mean-WM, Interpretation-I, Rank-R

Based on the results, **Table 3** presented the extent of effectiveness of the podcast-based ICT intervention in enhancing Grade 7 learners' clarity of ideas when delivering poetry. The findings revealed an overall composite mean of 3.4, interpreted as Strongly Agree, indicating that learners generally perceived the intervention as effective in helping them express and organize their thoughts clearly during the creation and presentation of their poem podcasts. The highest-rated indicator was "Express ideas in their poem so that the theme or message is easily understood by listeners", which obtained a weighted mean of 3.6 and ranked first. This suggested that learners were able to communicate their intended messages effectively, making their poems more meaningful and accessible to the audience. The lowest-rated indicators were "Deliver the poem podcast with coherence, ensuring ideas are connected and meaningful" and "Respond to classmates' questions about the poem with clear and logical answers", both obtaining a weighted mean of

Although still interpreted as Strongly Agree, these results indicated that some learners encountered minor challenges in maintaining logical flow during delivery and articulating their thoughts clearly in interactive discussions.

The result of the study was supported by S10, who revealed, "*The poem that I delivered was diligently checked by my teacher; that's why it helped me organize my thoughts clearly, especially because I chose to write dramatic poetry.*" In addition, S3 added, "*The teacher guided us about the elements of poetry during the first and second week. It became easier to answer the questions, especially because I wrote and listened repeatedly to my poem.*" These results aligned with Anderson, who emphasized that structured oral communication tasks enhanced students' ability to organize and convey ideas clearly <sup>[10]</sup>. Likewise, Miller and McKenna highlighted that combining digital media with reflective oral activities supported learners' conceptual clarity and engagement in meaningful discourse <sup>[11]</sup>.

**Table 3.** Clarity of Ideas

Indicators	WM	I	R
1. Organize thoughts clearly when drafting their chosen type of poem.	3.5	SA	2
2. Express ideas in their poem so that the theme or message is easily understood by listeners.	3.6	SA	1
3. Explain the meaning and imagery of their poem clearly during the podcast reflection.	3.4	SA	3
4. Deliver the poem podcast with coherence, ensuring ideas are connected and meaningful.	3.3	SA	4.5
5. Respond to classmates' questions about the poem with clear and logical answers.	3.3	SA	4.5
Overall Composite Mean	3.4	Strongly Agree	

Note: Legend: Strongly Agree- SA, Agree- A; Weighted Mean-WM, Interpretation-I, Rank-R

Based on the results, **Table 4** presented the extent of effectiveness of the podcast-based ICT intervention in enhancing Grade 7 learners' confidence when delivering poetry. The findings revealed an overall composite mean of 3.3, interpreted as Strongly Agree, indicating that learners generally perceived the intervention as effective in strengthening their confidence during oral performances and podcast

presentations. The highest-rated indicator, “Develop confidence through repeated practice and performance of their poem”, obtained a weighted mean of 3.5, ranking first. This suggested that consistent rehearsal and exposure to performance tasks helped learners build greater confidence in public speaking and oral communication. The lowest-rated indicator, “Showcase self-assurance when classmates ask questions about their poem during the shared-microphone activity”, received a weighted mean of 3.2, though still interpreted as Strongly Agree. This suggested that while learners generally demonstrated confidence, some still experienced slight hesitation when responding to spontaneous questions from peers. The result of the study was supported by the statement of S9, who said, “*The podcast activity was an amazing experience, especially because I’m a fan of listening to podcasts on Spotify. I felt great and confident doing my own podcast.*” This was further supported by S7, who said, “*At first, I was nervous, but because of the process of recording and not presenting it in front of the class, I became more confident in expressing my feelings and emotions in delivering my poetry.*” The findings revealed that the podcast-based ICT intervention was effective in enhancing learners’ confidence by providing repeated opportunities for practice, exposure to performance tasks, and meaningful peer interaction.

**Table 4.** Confidence

Indicators	WM	I	R
1. Exhibit confidence while performing their poem through Project V.O.I.C.E.’s podcast feature.	3.3	SA	3.5
2. Showcase self-assurance when classmates ask questions about their poem during the shared-microphone activity.	3.2	SA	5
3. Develop confidence through repeated practice and performance of their poem.	3.5	SA	1
4. Participate willingly in both the poem presentation and peer discussion without fear of judgment.	3.4	SA	2
5. Display increased confidence by using voice projection and expressive tone in their podcast performance.	3.3	SA	3.5
Overall Composite Mean	3.3	Strongly Agree	

Note: Legend: Strongly Agree- SA, Agree- A; Weighted Mean-WM, Interpretation-I, Rank-R

Based on the results, **Table 5** presented the extent of effectiveness of the podcast-based ICT intervention in enhancing Grade 7 learners’ ICT integration when delivering poetry. The findings revealed an overall composite mean of 3.3, interpreted as Strongly Agree, indicating that learners generally perceived the intervention as highly effective in integrating technology to support oral communication and learning engagement. These findings were consistent with the assertion of De Gala, who explained that online teaching relies heavily on digital platforms such as Google Meet, Google Classroom, online resources, podcasts, and videos in facilitating language instruction. Similarly, the present study demonstrated that the use of podcast-based ICT tools effectively supported Grade 7 learners in delivering poetry, particularly in enhancing pronunciation, fluency, and reflective learning <sup>[12]</sup>. The highest-rated indicators were “Practice pronunciation and fluency by listening to their recorded poem and self-correcting” and “Improve their oral performance by applying teacher and peer feedback given through digital platforms”, both with a weighted mean of 3.5 and ranked first. These results suggested that learners used ICT tools effectively for self-assessment and performance improvement, demonstrating autonomy in applying digital feedback to enhance pronunciation, fluency, and overall oral proficiency. Meanwhile, the indicators “Utilize podcasting tools to record and edit their poem performance” and “Collaborate with peers using ICT tools during podcast discussions and Q&A

sessions” both received a weighted mean of 3.2, sharing the 4.5 rank. Although still interpreted as Strongly Agree, these results indicated that while learners effectively used digital tools for recording and collaboration, some were still in the process of developing more advanced editing skills or more seamless teamwork using online platforms. The result of the study was supported by S8, who mentioned, *“I used my phone in recording my podcast. In order to make my voice clearer, I repeatedly played it. I also asked my mom to listen to make sure that I pronounced the word correctly.”*

**Table 5.** ICT Integration

Indicators	WM	VI	R
1. Utilize podcasting tools to record and edit their poem performance.	3.2	SA	4.5
2. Practice pronunciation and fluency by listening to their recorded poem and self-correcting.	3.5	SA	1.5
3. Collaborate with peers using ICT tools during podcast discussions and Q&A sessions.	3.2	SA	4.5
4. Improve their oral performance by applying teacher and peer feedback given through digital platforms.	3.5	SA	1.5
5. Reflect on their poem podcast outputs to track personal growth in oral communication skills.	3.3	SA	3
Overall Composite Mean	3.3	Strongly Agree	

Note: Legend: Strongly Agree- SA, Agree- A; Weighted Mean-WM, Interpretation-I, Rank-R

The data in **Table 6** presented the learners’ perceptions of using podcast-based ICT integration in developing their multimodal literacy and oral communication skills in poetry learning. The findings revealed an overall composite mean of 3.3, interpreted as Strongly Agree, which indicated that the learners generally perceived podcast-based activities as highly effective in enhancing various aspects of their poetry learning and oral performance. The highest-rated indicator was “Improves my pronunciation and clarity when reciting poems through repeated podcast practice” with a weighted mean of 3.5, ranked first. Several indicators shared similar high rankings, each receiving weighted means between 3.4 and 3.3. The lowest-rated indicator, “Promotes my creativity as I experiment with sound effects and voice modulation in my recordings”, had a weighted mean of 3.2, though it was still interpreted as Strongly Agree. The results of the study were supported by S2, who explained, *“This activity provides an opportunity for me to practice and learn at my own pace. I was able to record it at home during my free time and at hours when I felt comfortable. This motivated me to do the activity because it was enjoyable.”* The findings indicated that podcast-based ICT integration was perceived as highly effective in developing multimodal literacy and oral communication skills among the learners. The intervention allowed them to improve pronunciation, enhance digital literacy, interpret poems more personally, and engage more actively in poetry learning through an interactive and technologically enriched environment.

These results were supported by Sze, who emphasized that podcast-assisted language activities enhanced learners’ oral expression, motivation, and confidence by providing repeated practice and opportunities for self-evaluation <sup>[13]</sup>. Likewise, Yeh found that multimodal podcast tasks significantly improved students’ oral fluency and engagement, as the combination of voice recording, digital editing, and creative expression encouraged active participation and deeper learning <sup>[14]</sup>.

**Table 6.** The learners' perceptions of using podcast-based ICT integration in developing their multimodal literacy and oral communication skills in poetry learning

Indicators	WM	I	R
1. Improves my pronunciation and clarity when reciting poems through repeated podcast practice.	3.5	SA	1
2. Strengthens my confidence in speaking by giving me a platform to record and share my voice.	3.4	SA	2.5
5. Promotes my creativity as I experiment with sound effects and voice modulation in my recordings.	3.2	SA	9.5
6. Motivates me to practice oral reading more frequently because recording podcasts feels enjoyable.	3.4	SA	2.5
8. Allows me to express my interpretations of poems in a personalized and authentic way.	3.2	SA	9.5
10. Strengthens my ability to deliver oral interpretations confidently during poetry presentations.	3.4	SA2.5	
Overall Composite Mean	3.3	Strongly Agree	

Note: Legend: Strongly Agree- SA, Agree- A; Weighted Mean-WM, Interpretation-I, Rank-R

Based on the results, **Table 7** presents the issues and challenges students encounter in creating and presenting their self-composed poems through podcast-based multimodal activities. The findings yielded an overall weighted mean of 3.17, interpreted as Agree, indicating that learners moderately experience challenges in composing and delivering their poems via podcast formats. The highest-rated indicators, both with a weighted mean of 3.9 and interpreted as Strongly Agree, were “I find it challenging to select the right words and expressions to match my poem’s meaning” and “I have difficulty explaining the message of my poem in simple words.” These results suggest that learners struggle most with expressing their intended meanings clearly and choosing appropriate vocabulary to convey emotions, themes, and ideas effectively. The next set of concerns included “I mispronounce words when I read my poem too quickly” and “I get distracted by my own mistakes in pronunciation, which affects my delivery”, each with a weighted mean of 3.8 and ranked third and fourth. These findings indicate that pronunciation difficulties and self-consciousness during recording significantly affect learners’ oral delivery. The results of the study were supported by S6, who said, “*The noise at home, especially the barking of our dog, stressed me while recording and affected my pronunciation. However, I coped by practicing repeatedly, even recording at midnight.*” Meanwhile, S5 added, “*I didn’t know how to use CapCut or edit the recording to minimize the noise, but by asking my friends and watching tutorials on YouTube and TikTok, I learned a lot and was able to present it well.*” The findings revealed that while students generally handle the technical components of podcast creation, they encounter substantial challenges related to word choice, message clarity, and pronunciation when presenting their self-composed poems.

**Table 7.** The issues and challenges that students encountered in creating and presenting their self-composed poems through podcast-based multimodal activities

Indicators	WM	I	R
1. I find it difficult to choose the type of poem (narrative, lyric, or dramatic) I want to write.	3.2	SA	8
2. I find it challenging to select the right words and expressions to match my poem’s meaning.	3.9	SA	1.5
3. I mispronounce words when I read my poem too quickly.	3.8	SA	3.5



4. I get distracted by my own mistakes in pronunciation, which affects my delivery.	3.8	SA	3.5
5. I pause too much or lose my flow when delivering my poem in a podcast.	3.0	A	9
6. I feel nervous, which causes me to stutter or hesitate during the recording.	3.7	SA	7
7. I have difficulty explaining the message of my poem in simple words.	3.9	SA	1.5
8. I struggle with using podcast tools (recording, editing, or playback features).	2.9	A	10
Overall Composite Mean	3.17	Agree	

Note: Legend: Strongly Agree- SA, Agree- A; Weighted Mean-WM, Interpretation-I, Rank-R

The results in **Table 8** indicated a strong negative correlation ( $r = -0.7624$ ) between learners' perceptions of podcast-based ICT integration in developing multimodal literacy and oral communication skills and the issues and challenges they encountered when creating and presenting their self-composed poems through podcast-based multimodal activities. With a  $P$ -value of  $< .00001$ , the relationship was statistically significant at the 0.05 level, leading to the rejection of the null hypothesis. This meant that as learners' positive perceptions of podcast-based ICT integration increased, the issues and challenges they faced decreased, demonstrating that effective use of podcast-based multimodal activities was associated with fewer difficulties in completing poetry-related tasks. The significant inverse relationship implied that podcast-based ICT activities effectively supported students in overcoming challenges related to poem production and presentation, particularly by enhancing their multimodal engagement, boosting their confidence, and improving their oral communication skills. This further suggested that integrating podcasts into poetry instruction could reduce learning barriers and foster a more supportive, interactive, and skill-enhancing environment for learners. These findings aligned with Santos and Castro, who found that multimodal digital platforms reduced task-related difficulties by increasing learners' engagement and providing flexible tools for self-expression and oral performance <sup>[15]</sup>. Similarly, Hung reported that podcast-based learning environments improved students' speaking abilities and lowered performance-related challenges by enabling repeated practice and self-paced learning <sup>[16]</sup>.

**Table 8.** Significant relationship between the learners' perceptions of using podcast-based ICT integration, and the Issues and challenges students encounter in creating and presenting their self-composed poems through podcast-based multimodal activities

Variables	Sample size	Pearson r correlation	P-value	Decision	conclusion
The learners' perceptions of using podcast-based ICT integration in developing their multimodal literacy and oral communication skills in poetry learning	108	-0.7624.	< .00001	Reject Ho	Significant
Issues and challenges students encounter in creating and presenting their self-composed poems through podcast-based multimodal activities					

Note: The  $P$ -value is  $< .00001$ ; The result is significant at  $P < .05$

The results in Table 4 indicated a strong negative correlation ( $r = -0.7624$ ) between learners' perceptions of podcast-based ICT integration in developing multimodal literacy and oral communication skills and the issues and challenges they encountered when creating and presenting their self-composed poems through podcast-based multimodal activities.

## 6. Action plan

**Table 9.** Action plan for Project V.O.I.C.E. (Valuing Oral Interaction through Communication and Expression)

Timeline	Activities	Description / Tasks	Persons Involved	Expected Output
June 2026	Project Orientation & Preparation	Conduct orientation for teachers, students, and parents about Project V.O.I.C.E.; prepare lesson guides, QR materials, and podcast templates.	School Head, English Teachers Parents Students	Project implementation plan; prepared materials
June–July 2026	Development of Centralized Podcast-Based Learning Resource	Compile videos, demo podcasts, pronunciation drills, and interactive PowerPoints; design QR codes for all materials.	English Teachers, ICT Coordinator Students LRMs Coordinator	Centralized digital repository (Google Drive/ QR hub) DacanLRMs Portal
July 2026	Teacher Capacity-Building (SLAC )	Training on podcast editing apps (e.g., Capcut, MP3 converter), designing ICT-integrated lessons, and performance-based assessment.	Master Teachers, ICT Coordinator Teacheres	Teachers equipped for implementation
August 2026	Quarter 1 Activities: Poetry & Spoken Word	Spoken poetry tasks, open-mic sessions, commentary sharing, “Share-a-Mic,” podcast creation for poem delivery.	English Teachers, Students	Poem podcast outputs; improved pronunciation & fluency
August 2026	Remediation Program 1	Address challenges in pronunciation, fluency, and vocabulary building (guided drafting, digital playback, drills).	English Teachers Students	Improved delivery and articulation
February 2027	Remediation & Enrichment 2	Address hesitation, nervousness; offer advanced narration and podcast editing tasks.	English Teachers	Improved confidence and performance mastery
March 2027	Final Evaluation & Documentation	Collect feedback, and research-based monitoring and evaluation of its effectiveness for the continuous improvement	English Teachers, Researcher Students	Final project evaluation & evidence-based report through research

## 7. Financial report

**Table 10** shows the financial report.

**Table 10.** Financial report

Activity	Eligible Expenditures	Quantity	Estimated Cost (PHP)
1. Project Orientation & Preparation	Printing of orientation guides, QR labels, and lesson templates	200 copies	1,000.00
2. Development of Centralized Podcast-Based Learning Resources	Flash drive for material storage	1 month	450.00
	Software subscription/app upgrade (CapCut Pro, MP3 converter)	1	350.00
3. Teacher Capacity-Building (SLAC)	Training materials (Bond paper, ink, printed modules)	-	800.00
4. Final Evaluation & Documentation	Printing of research tools, evaluation forms	-	600.00
Total		-	3450.00

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## Disclosure statement

The authors declare no conflict of interest.

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# A Comparative Study of the Japanese Case Particle *から* and the English Preposition *From*

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**Abstract:** As an agglutinative language, Japanese relies on particles to connect sentence constituents. Though Japanese particles carry no lexical meaning and cannot be used independently, they constitute one of the core difficulties in Japanese learning. English, as an inflected language, realizes grammatical features through inflectional changes. English prepositions are also devoid of lexical meaning, yet they undertake the function of connecting nouns and verbs, which shares certain commonalities with Japanese particles. For most Chinese learners of Japanese who take English as their second foreign language, they tend to transfer the usage of the English preposition *from* to the acquisition of the Japanese case particle *から* at the initial learning stage. Such language transfer may exert a positive effect at the beginning. Nevertheless, the two differ greatly in syntactic position and semantic connotation. As learning deepens, negative transfer frequently occurs and hinders the improvement of Japanese proficiency. This paper compares the similarities and differences between the Japanese case particle *から* and the English preposition *from*, aiming to provide references for Japanese language learners.

**Keywords:** *から* ; From; Second foreign language acquisition; Japanese learning; Case particle

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## 1. Introduction

This paper conducts a comparative analysis between the Japanese case particle *から* and the English preposition *from*. For most Chinese students learning Japanese with English as their second foreign language, the two items are easily regarded as semantic equivalents due to their shared basic implication of “starting point.” Such intuitive association often leads learners to transfer the usage of *from* directly to the acquisition of *から* in the early learning stage.

Although *から* and *from* overlap considerably in core meaning and some extended functions, they belong to different linguistic systems and follow distinct syntactic rules. Japanese, as an agglutinative language, relies heavily on post-nominal particles to organize sentence structure, while English, an inflected language, places prepositions before nouns to express grammatical relations<sup>[1-2]</sup>. Their differences in syntactic position,

semantic extension, and pragmatic usage are easily overlooked by foreign language learners, which may result in negative transfer and persistent grammatical errors.

Against this background, this paper first sorts out the major semantic and syntactic usages of *から* and *from* respectively, and then explores their similarities and differences. On this basis, it further puts forward feasible teaching suggestions, aiming to help learners distinguish the two expressions correctly, reduce mother-tongue transfer interference, and improve the efficiency of Japanese particle acquisition.

## 2. Meanings and usages of the Japanese case particle *から*

The *Great Japanese Dictionary* defines case particles as follows:

体言または体言に準ずるものに付いて、その体言が他の語とどんな関係で続くかを示す助詞。主語であることを示す「が」「の」... この語は山田孝雄の命名による。

To paraphrase the definition: case particles attach to nouns or noun-equivalent expressions, indicating the syntactic and semantic relations between the preceding noun and other words in a sentence. The particle *から* is closely related to predicates (verbs, adjectives, adverbs, etc.) in sentences. Apart from functioning as a case particle, *から* can also be placed at the end of a sentence as a conjunctive particle to express reason. Since this paper mainly makes a comparative study of the similarities and differences between Japanese case particles and English prepositions, the conjunctive particle *から* will not be discussed here. The meaning of the Japanese case particle *から* depends not only on the preceding noun or noun-equivalent element, but also on the subsequent sentence constituents. Only in this way can its specific meaning in a sentence be accurately determined. The major usages of the case particle *から* are summarized as follows <sup>[3]</sup>.

### 2.1. Indicating starting point

The case particle *から* attaches to time or place nouns to denote the temporal and spatial starting point <sup>[4]</sup>. In addition, in some sentences, *から* can also indicate the starting point of the sequence of an action or conduct.

(1) 何時から質問、回答に「ブランク」を設けたのですか。

(From what time did you start leaving blanks in questions and answers?)

(2) 羽田からアメリカへ帰るんだ。

(I returned to the United States from Haneda.)

(3) 1組から順番に受けていきました。

(We proceeded in order starting from Group One.)

Although the specific nuances of *から* in the three sentences above differ slightly, all carry the core meaning of a starting point. In Sentence (1), *から* follows an interrogative word of time to mark a temporal starting point, inquiring about the time when the relevant behavior began. In Sentence (2), *から* is attached to the place noun Haneda (Haneda Airport in Japan) to indicate a spatial starting point, denoting that the journey departs from Haneda Airport heading for the United States.

When *から* expresses a starting point as in Sentences (1) and (2), it is often collocated with *まで* to indicate a temporal or spatial scope. When referring to a location, as in Sentence (2), the particle *まで* can sometimes be replaced by *へ*. In Sentence (3), *から* follows 1組 to mark the sequential starting point of an action, meaning “starting from Group One”, namely that Group One takes the lead to perform the action first.



## 2.2. Indicating source or origin

The case particle から follows nouns referring to persons, organizations, and other entities to indicate the source or origin of goods and other things. In this usage, it is commonly followed by verbs conveying the meaning of “receiving” such as もらう, and is translated as “obtain from...”.

(4) 会社から賞をいただきました。

(I received an award from the company.)

Literally interpreted, this sentence means “I obtained an award from the company.” The subject 私 (I) is omitted and does not appear in the sentence. Here, から attaches to the organizational noun 会社, indicating that the award originates from and is conferred by the company.

## 2.3. Indicating cause or reason

The case particle から can follow nouns such as 不注意、風邪、争い to denote cause or reason. Different from から functioning as a conjunctive particle, the case particle から mostly takes objective facts, such as social and natural phenomena, as its rationale when expressing cause.

(5) ただ、不注意から交通事故を起こしてしまったのです。

(It was merely due to carelessness that the traffic accident occurred.)

In this sentence, から follows the noun 不注意, indicating that the traffic accident, a kind of social phenomenon, is caused by the driver’s inadvertence.

## 2.4. Indicating raw materials

The case particle から attaches to nouns of materials and raw materials to denote the substances that constitute or manufacture a product. Compared with the case particle で, which can also indicate raw materials, で is used for materials that are visually recognizable in the finished product, while から is applied to materials that can no longer be identified from the final product <sup>[5]</sup>.

(6) バターは牛乳から、マーガリンは植物油などからつくられる。

(Butter is made from milk, and margarine is made from vegetable oil.)

Sentence (6) illustrates the raw materials of butter and margarine. Both finished products are yellow solids, and their original raw materials—milk and vegetable oil—can no longer be visually distinguished.

## 2.5. Indicating judgment criteria

The case particle から can form fixed patterns with other verbs or particles to indicate the basis for judgment. Typical patterns include からいうと、からいえば、からいって、からすると、からすれば、からして、からしても、から見ると, all of which can be rendered as “judging from...; in terms of...”

(7) 討論の模様からすると、どうやらこの問題に精通している者も大勢いるようだった。

(Judging from the atmosphere of the discussion, there seemed to be quite a number of people well-versed in this issue.)

This sentence draws the conclusion that many people have a good command of the issue. The judgment is based on the observed situation of the discussion. Participants expressed their viewpoints actively during the discussion, and the above conclusion is drawn on this evidential basis.

## 2.6. Indicating quantitative standard

Collocated with the verbs する and ある, the case particle から forms the structures ～からする and ～か

らある , both implying the meaning of “exceeding a certain quantity.”

(8) それに歩合が今月だけでも八十万からはあるだろう。

(Besides, the commission alone for this month must be no less than 800,000 yen.)

In Sentence (8), *から* follows the quantifier 八十万 to emphasize a large quantity, conveying the implication of “at least.” The connotation suggests that the commission actually exceeds 800,000 yen.

## 2.7. Indicating the agent in passive sentences

In this usage, *から* is interchangeable with the particle *に* . It is frequently used in direct passive sentences to mark the agent who performs the action.

(9) 誰から教えられたのかは全く憶えていないが .....

(I cannot remember that I was taught by whom at all...)

Here, *から* follows the interrogative pronoun 誰 and marks the agent of the action 教える . The indirect object 私に is omitted in this sentence.

## 2.8. Indicating the initiator of an action

(10) それでは、私からお尋ねいたします。

(Now, I will ask the question.)

This sentence can be rephrased as それでは、私がお尋ねします . Both versions express the meaning of “I will ask the question.” Nevertheless, Sentence (10) carries a stronger sense of voluntariness and formality, implying the speaker takes the initiative to consult the other party respectfully.

## 2.9. Indicating the passage of a place

(11) わたしも思春期に病気になって、病院の窓から飛び降りようとしたことあるんだー

(I once fell ill during adolescence and even attempted to jump out of the hospital window.)

In Sentence (11), *から* precedes the location noun 病院の窓 . Different from the starting-point usage mentioned above, it here denotes a place of passage<sup>[7]</sup>. The speaker intends to express a change of position: moving from the inside of the hospital building to the outside, with the hospital window serving as the transitional passage of this movement.

Apart from the usages of indicating quantitative standard and marking the passive agent, the Japanese particle *から* is mostly translated into Chinese as “从 .....” or “由 .....” It is evident that the core semantic meaning of *から* lies in denoting a starting point.

## 3. Meanings and usages of the English preposition *from*

The Oxford English Dictionary defines a preposition as follows: “In grammar, a word used before a noun, noun phrase, or pronoun, serving to connect it with another word in a sentence.” Prepositions are primarily placed before nouns, noun phrases, and pronouns. Their grammatical function is to link the subsequent noun, noun phrase, or pronoun with other sentence constituents. The specific semantic usages of the preposition *from* are summarized below.

### 3.1. Indicating starting point

Placed before nouns of time or place, the preposition *from* conveys the meaning of a starting point,

corresponding to the Chinese equivalent “从 ... / 离 ....”

(12) You are 9.2 miles from destination.

(13) Mexico had undergone its own revolution from 1910 to 1917 and was advancing on its own revolutionary road.

(14) A lot of guys in here take queues from me because I am very used to doing it.

In Sentence (12), *from* precedes the destination and indicates the distance to it, taking the destination as the reference point. In Sentence (13), *from* precedes the time marker *1910* to mark the starting time of the Mexican bourgeois revolution, collocating with *to 1917* to indicate the ending time. The paired structure *from...to...* is commonly used to express a scope. In Sentence (14), *from* precedes the personal pronoun *me* and denotes the sequential starting point of an action, indicating that the act of queuing begins with the speaker.

### 3.2. Indicating source or origin

In this usage, *from* is generally preceded by verbs such as the linking verb *be*, *come*, *quote*, and *borrow*, to indicate the source of materials, viewpoints, and other contents.

(15) The interpretations in my Partisan article were quoted from sages cited in the Frankfurter Zeitung.

In this sentence, *from* follows the passive form of the verb *quote* and is followed by the source of literature, indicating that the author's viewpoints are derived from the Frankfurter Zeitung.

### 3.3. Indicating raw materials

When *from* denotes raw materials, it is frequently used in passive constructions and collocated with production-related verbs such as *make*.

(16) The pod was made from Lucky's plastic sheeting.

This sentence describes the material of the simple pod, which is constructed of plastic sheeting. The noun following *from* serves as the raw material of the pod.

### 3.4. Indicating avoidance or prevention

When expressing avoidance or prevention, *from* is usually preceded by verbs with protective or preventive connotations such as *prevent*, *protect*, and *keep*. The noun or gerund following *from* refers to the situation to be avoided or prevented.

(17) But she's in a very serious situation which prevents her from being here.

Here *from* is followed by the gerund *being*, suggesting that the severe situation keeps her from arriving here.

### 3.5. Indicating difference and distinction

When preceded by adjectives or verbs expressing dissimilarity, *from* carries a comparative implication, meaning “different from....”

(18) His physiology may be totally different from ours.

The item following *from* is the object of comparison, where *ours* refers to “our physiological structure.” The fixed collocation is different from what is adopted to express distinction.

### 3.6. Indicating basis or grounds

Positioned at the beginning or in the middle of a sentence, *from* forms fixed phrases such as *from my point of view* and *from my perspective*, denoting the basis for judgment.

(19) From what I understand, they paid taxes.

Here *from* is followed by a nominal clause. The clause *what I understand* acts as the evidential basis for the judgment that “they paid taxes.”

### 3.7. Indicating separation or departure

(20) It’s best to keep the fish separated from the vegetables until you’re ready to serve.

In this usage, *from* often follows verbs such as *separate*, *remove*, and *escape*, conveying the meaning of “to separate one thing from another; to depart from...”

## 4. Similarities between the Japanese case particle から and the English preposition *from*

### 4.1. Identical basic meaning

Both the Japanese case particle から and the English preposition *from* take “starting point” as their core semantic meaning. In most cases, both can be translated into Chinese as “从 ... / 由 ....” On this basis, they share some extended identical usages: starting point of time, location and sequence, source and origin, raw materials whose original form cannot be identified, and basis for judgment.

### 4.2. Identical part-of-speech property

The case particle から cannot be used independently and must attach to nominal expressions to indicate their semantic relations with other sentence elements. Likewise, the preposition *from* cannot stand alone; it is placed after verbs and before nouns to express the relation between verbs and nouns. In other words, both the case particle から and the preposition *from* belong to function words.

To sum up, the Japanese case particle から and the English preposition *from* share numerous parallel usages. They both possess the core meaning of “starting point”, from which extended similar semantic senses are derived, including source, raw material, and judgment basis. At the syntactic level, neither から nor *from* can appear independently in a sentence; they must collocate with other linguistic elements to perform syntactic functions.

## 5. Differences between the Japanese case particle から and the English preposition *from*

Nevertheless, the case particle から is not completely equivalent to the English preposition *from*, and there exist noticeable differences between the two.

### 5.1. Differences in syntactic position

As mentioned in Section 4.2, neither the case particle から nor the preposition *from* can be used independently. Specifically, Japanese case particles attach after nominal expressions (including nouns, numerals, and pronouns) to indicate the relational meaning between the nominal element and other sentence constituents. Its basic structure follows the pattern: N + から + V.

In English, a preposition is placed after a verb and before a noun or gerund, with the basic structure: V + from + N. In addition, as reflected in the previous examples, the English preposition *from* can follow not only verbs but also adjectives, and can even be placed at the beginning of a sentence. Overall, the positional distribution of English prepositions is more flexible than that of Japanese particles.

## 5.2. The compound particle *からの* vs. non-compound feature of *from*

The Japanese case particle *から* can combine with the particle *の* to form the compound case particle *からの*, which can directly precede a nominal expression. By contrast, the English preposition *from* cannot form compound structures with other prepositions.

## 5.3. Differences in extended meanings

The case particle *から* possesses unique extended usages that *from* does not have: it can indicate cause or reason, quantitative standard, and the agent in passive sentences.

Meanwhile, the English preposition *from* has its exclusive usages, including denoting prevention and avoidance, distinction and difference, as well as separation and detachment — semantic functions with no direct counterparts in the usages of *から*.

# 6. Pedagogical implications

## 6.1. Clarifying the typical features of the two languages

In teaching, teachers should first clarify that Japanese and English belong to different linguistic systems<sup>[7]</sup>. Japanese is an agglutinative language in which particles function as grammatical binders. Case particles follow nouns, connecting nominal elements with other sentence components and marking their syntactic and semantic relations.

By comparison, English is an inflected language. Prepositions generally precede nouns and likewise indicate the relational meaning between the subsequent noun and other sentence constituents. Clarifying the distinct sentence construction mechanisms of the two languages can deepen learners' understanding of *から* and *from*, and further improve learning efficiency.

## 6.2. Adopting inductive teaching and context-based instruction

In the teaching of the case particle *から*, it is insufficient to merely explain its meanings with simplistic descriptions such as “indicating starting point” or “expressing cause.” It is advisable for teachers to adopt an inductive teaching method rather than deductive instruction.

By providing abundant authentic examples, learners can classify and summarize the usages of *から* independently<sup>[8]</sup>. This approach not only consolidates learners' mastery of Japanese syntactic structures but also cultivates their autonomous learning ability. Moreover, learning within specific contexts helps learners memorize collocations more effectively and reduce grammatical errors.

# 7. Conclusion

This study concludes that the Japanese case particle *から* and the English preposition *from* share similarities in their core meaning of starting point and their lexical property as function words. However, they differ



significantly in syntactic position and extended semantic usages.

Chinese learners of Japanese with English as their second foreign language should avoid equating the English preposition *from* directly with the Japanese case particle から. It is preferable to acquire the usages of から in authentic contextual environments.

Japanese language teachers are also suggested to adjust teaching arrangements. Instead of listing all usages at the initial stage for rote memorization, teachers may provide typical examples first, guide students to summarize the core meaning of から by themselves, and then elaborate on its specific extended usages on the basis of prior comprehension. Such a teaching method can achieve better learning outcomes.

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# Reform and Practice of College Physics Teaching Based on the Concept of New Engineering Talent Cultivation

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**Abstract:** With the coordinated development of China's scientific and technological revolution and industrial transformation, the construction of new engineering disciplines has gradually become an important direction for the reform of higher engineering education in China. Its core goal is to cultivate more innovative and interdisciplinary talents who can adapt to the development needs of future industries. As a core basic course for all engineering majors, college physics undertakes the important task of imparting physical knowledge and connecting basic disciplines with engineering practice. In view of this, based on the core concept of new engineering talent cultivation, this paper systematically analyzes the epochal significance and existing problems of college physics teaching reform under the background of new engineering, and then puts forward practical reform strategies, so as to provide references for universities to promote the reform of college physics teaching.

**Keywords:** New engineering; Talent cultivation; College physics; Teaching reform; Practice

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## 1. Epochal significance of college physics teaching reform under the concept of new engineering talent cultivation

### 1.1. Matching the cultivation needs of core competencies for new engineering talents

The core competencies of new engineering talents mainly include solid basic ability, outstanding innovation ability, and good interdisciplinary literacy. College physics is an important carrier for cultivating these competencies. As a crucial natural science, physics contains thinking methods such as logical reasoning and abstract modeling, which provide important support for engineering students to solve complex engineering problems. Traditional college physics teaching focuses on the systematic imparting of knowledge but ignores the cultivation of students' thinking and practical abilities, making it difficult to meet the cultivation requirements of "emphasizing ability and pursuing innovation" for new engineering talents<sup>[1]</sup>. By carrying

out college physics teaching reform under the concept of new engineering talent cultivation, the concept can be better integrated into the whole process of college physics teaching, gradually breaking the traditional “knowledge instillation” mode. Teachers can better guide students to use physical knowledge to analyze specific engineering problems, which is conducive to the development of their abstract and innovative thinking.

### **1.2. Empowering technological innovation and industrial upgrading of emerging industries**

New engineering should focus on emerging industries such as artificial intelligence and new energy, whose technologies are usually based on physical principles. For example, machine learning algorithms in artificial intelligence use probability theory of statistical physics, and technologies such as photovoltaic power generation in the new energy industry apply various knowledge of semiconductor physics. As an important bridge connecting basic science and engineering applications, the reform of college physics teaching content and mode will greatly affect students’ understanding and application of emerging industrial technologies, and is also related to the technological innovation level and industrial competitiveness of China’s emerging industries <sup>[2]</sup>.

### **1.3. Promoting the iterative upgrading of college physics itself**

With the continuous development of the concept of new engineering talent cultivation, it has gradually provided a new direction for college physics teaching reform in China. It can effectively promote college physics to break the traditional teaching framework and facilitate its own iterative upgrading. Through the reform, college physics courses can absorb cutting-edge achievements and engineering application cases of physics in a more timely manner, which is conducive to further optimizing the curriculum content system. It can also help teachers innovate their teaching methods and means, gradually breaking the barriers of traditional disciplines and promoting the in-depth integration of physics with various engineering majors <sup>[3]</sup>. In addition, teaching reform can promote the construction of college physics teaching staff, urging teachers to update their educational concepts in a timely manner and improve their professional literacy and comprehensive engineering practical ability.

## **2. Existing problems in college physics teaching under the concept of new engineering talent cultivation**

### **2.1. Backward teaching concepts**

At present, college physics teaching in many universities still adopts traditional educational concepts, with the core of imparting knowledge and coping with examinations. Teachers ignore the cultivation of students’ innovation, practical ability, and interdisciplinary literacy in teaching, leading to a serious disconnection between actual teaching and the concept of new engineering talent cultivation. Teachers tend to emphasize theory over practice, focusing on the explanation of physical concepts and formulas, while neglecting to guide students to use physical knowledge to analyze and solve practical problems. As a result, it is difficult for students’ engineering and innovative thinking to be further developed <sup>[4]</sup>. In addition, some teachers do not adopt a “student-centered” teaching concept, ignoring individual differences and the professional needs of students. They often adopt a “one-size-fits-all” teaching mode without analyzing students’ majors and

basic levels, using the same teaching content and evaluation standards.

## **2.2. Outdated curriculum content**

Curriculum content is the core of college physics teaching reform under the concept of new engineering talent cultivation, and the key to improving the quality of new engineering talent cultivation. At present, the content of college physics courses in Chinese universities is outdated and overly theoretical, with many knowledge points seriously disconnected from engineering practice and cutting-edge physical technologies. The current college physics curriculum system in many schools is still dominated by classical physics, with teachers focusing on traditional content such as mechanics and thermology, and introducing little knowledge about modern physics, nano-physics, and new energy physics, making it difficult to meet the knowledge structure needs of talents for emerging industries<sup>[5]</sup>. The content of college physics lacks connection with engineering practice, mainly consisting of abstract concepts and formulas without specific engineering application cases and practical scenarios. This easily leads to students' difficulty in understanding the practical application value of physical knowledge, resulting in the phenomenon of "disconnection between learning and application." Moreover, the content of college physics teaching for different majors in many universities is basically the same, without targeted adjustment according to the characteristics of different majors, making it difficult to meet the learning needs of students in different majors<sup>[6]</sup>.

## **2.3. Single teaching methods**

Teaching methods are an important means to achieve the reform goals of college physics teaching under the concept of new engineering talent cultivation. However, college physics teaching in many universities in China still mainly adopts "lecture-based" teaching, with relatively simple and boring teaching methods. There is a lack of interaction and innovation between teachers and students, and between students and knowledge, making it difficult to stimulate students' learning interest and initiative, which is not conducive to achieving the goal of cultivating students' innovative ability under new engineering<sup>[7]</sup>. In classroom teaching, teachers usually dominate the class, and students mostly receive knowledge passively with little classroom interaction. This makes it difficult for students to participate deeply in the teaching process, which is not conducive to cultivating their independent learning ability and innovative thinking<sup>[8]</sup>. In addition, many teachers use traditional teaching methods. Although some universities have introduced multimedia teaching, teachers usually convert blackboard writing content into PPTs, lacking the application of new teaching means such as virtual simulation and online-offline blended teaching. For example, for some abstract physical concepts (such as quantum superposition, electric and magnetic fields) and complex physical experiments (such as high-energy physics experiments, precision optical experiments), traditional teaching means are difficult to display intuitively, which easily leads to students' difficulty in understanding and mastering relevant knowledge and skills.

# **3. Practical strategies for college physics teaching reform under the concept of new engineering talent cultivation**

## **3.1. Renew teaching concepts and anchor the cultivation goals of new engineering**

To improve the effect of college physics teaching reform under the concept of new engineering talent cultivation, attention must be paid to the renewal of teaching concepts. Establishing a teaching concept

compatible with new engineering talent cultivation can more effectively promote teaching reform. Therefore, educators can establish a “student-centered” teaching concept, respect individual differences and professional needs of each student, and dare to break the traditional “one-size-fits-all” teaching mode. Teachers should pay more attention to students’ learning process and ability improvement in teaching, gradually guiding them to shift from “passive acceptance” to “active learning and independent inquiry”<sup>[9]</sup>. Teachers should gradually change their role positioning from knowledge imparters to learning guides, focusing on guiding students to use the physical knowledge they have learned to analyze and solve practical problems in class, so as to gradually cultivate students’ engineering and innovative thinking. In addition, educators also need to establish a teaching concept of “emphasizing practice and pursuing innovation”, so as to better integrate practical teaching and innovative ability cultivation into the whole process of teaching, gradually breaking the “disconnection between theory and practice.” Teachers should try to guide students to combine physical knowledge with engineering practice<sup>[10]</sup>. Teachers should fully recognize the core role of practical teaching in new engineering talent cultivation, so as to better integrate innovative thinking and practical ability cultivation into every teaching link and better stimulate students’ innovative awareness. Moreover, educators also need to establish a teaching concept of “interdisciplinary integration”, which can better break the barriers between physics and various engineering majors, promote the in-depth integration of physical knowledge and professional knowledge, and gradually achieve the goal of basic courses serving professional learning.

### **3.2. Optimize curriculum content and realize connection with engineering practice and cutting-edge technologies**

The optimization of curriculum content is the core of college physics teaching reform under the concept of new engineering talent cultivation. Therefore, educators should build a curriculum content system of “basic core + professional adaptation + cutting-edge intersection” combined with the needs of new engineering talent cultivation, so as to better realize the in-depth connection between curriculum content and engineering practice and cutting-edge technologies. In teaching, teachers should further consolidate the basic core content, retain the core contents of mechanics, thermology, electromagnetism, and other aspects in classical physics, and be good at explaining the essence and application methods of physical concepts and formulas, so as to help students consolidate their physical foundation. At the same time, educators should simplify some overly complex theoretical derivations, continuously improve the practicality and transferability of physical knowledge, so that students can flexibly use the physical knowledge they have learned to solve some practical problems<sup>[11]</sup>. In addition, educators can add some professional adaptation content and adjust the content of college physics courses in a targeted manner according to the characteristics and needs of different majors, so as to better highlight the professional focus. For example, for mechanical majors, educators can add contents of mechanics and thermodynamics; for electronic information majors, educators can add contents of electromagnetism and optics in circuit design, so as to better realize the adaptation of knowledge and majors<sup>[12]</sup>.

Furthermore, educators also need to integrate some cutting-edge interdisciplinary content, and timely absorb some cutting-edge achievements and emerging knowledge of physics, such as quantum information, nano-physics, and new energy physics, which can effectively broaden students’ knowledge and horizons. In classroom teaching, teachers can introduce some engineering application cases, so as to better transform abstract physical knowledge into specific engineering scenarios, let students have a deeper understanding of



the application value of physical knowledge in emerging industries, and help cultivate their interdisciplinary literacy and innovation ability<sup>[13]</sup>.

### **3.3. Innovate teaching methods and improve classroom interaction and innovation**

The innovation of teaching methods is the key to improving the quality of college physics teaching reform under the concept of new engineering talent cultivation. Therefore, educators should dare to break the traditional “lecture-based” teaching mode, build a new “interactive and inquiry-based” teaching mode, and combine online-offline blended teaching means to further improve classroom interaction and innovation, so as to effectively stimulate students’ learning interest and initiative. In the practice of college physics teaching, educators can actively implement inquiry-based teaching to guide students to explore physical laws and phenomena more independently, so as to cultivate their innovative thinking and independent learning ability<sup>[14]</sup>. In addition, educators can also carry out project-based teaching. Combined with some practical engineering design project tasks, students can complete the whole process of project design, implementation, and summary in groups, which can more efficiently cultivate students’ practical ability and teamwork ability. For example, educators can design a project of “Design of New Energy Power Generation Device Based on Electromagnetic Induction”, and then let students use the physical knowledge they have learned to solve some practical engineering problems, which can greatly improve students’ engineering application ability.

Online-offline blended teaching is an important path for college physics teaching reform under the concept of new engineering talent cultivation. Teachers can combine online teaching platforms such as MOOCs and Xuexitong to further break the time and space constraints of traditional classrooms and achieve a higher level of online preview and offline teaching. For example, teachers can release some preview materials and teaching videos online, so that students can preview relevant knowledge in advance; in offline classes, teachers can focus on explaining the difficult and key points of college physics knowledge, organize students to carry out interactive discussions, experimental operations, and other activities. Through online preview and offline practice, students’ comprehensive ability and literacy will be further developed<sup>[15]</sup>. Moreover, to ensure the effect of college physics teaching reform under the concept of new engineering talent cultivation, teachers should further expand classroom interaction forms and further stimulate students’ learning interest through a variety of interactive methods, such as group discussions, classroom quizzes, and bullet-screen interactions, which can greatly improve students’ classroom participation. For example, when explaining optical knowledge, educators can carry out case analysis combined with some optical phenomena in life (such as rainbows, mirages), and then guide students to discuss the physical principles, which can help students understand the knowledge they have learned more deeply and intuitively and improve their comprehensive literacy.

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# A Study on the Mechanisms of Enhancing Learning Motivation in Educational Psychology Courses in the Context of Artificial Intelligence

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**Abstract:** This study investigates the mechanisms through which artificial intelligence (AI) enhances learning motivation in Educational Psychology courses. Recognizing that such courses are often characterized by abstract theories and low student engagement, the research adopts a qualitative approach based on Grounded Theory to explore students' experiences with AI-supported learning. Data were collected through semi-structured interviews with ten undergraduate students majoring in English (Education Track), all of whom had prior experience using AI tools in their studies. The findings reveal that AI influences learning motivation through multiple interrelated pathways. Specifically, AI provides cognitive support by simplifying complex concepts, enhances learning efficiency by organizing knowledge and reducing workload, and fosters interactive engagement through dialogic learning experiences. These factors collectively contribute to the satisfaction of students' psychological needs for competence, autonomy, and relatedness, thereby promoting intrinsic motivation. However, the study also identifies potential negative effects, including over-reliance on AI leading to superficial learning and reduced independent thinking, as well as issues related to trust in AI-generated content. A theoretical model is proposed to illustrate both the facilitating and inhibiting mechanisms of AI in shaping learning motivation. The results highlight that the impact of AI is dynamic and moderated by factors such as usage strategies, trust levels, and learners' initial motivation. This study contributes to the literature by providing a process-oriented understanding of AI-supported motivation and offers practical implications for the balanced and pedagogically guided integration of AI in higher education.

**Keywords:** Artificial intelligence (AI); Learning motivation; Educational psychology; Grounded theory; Self-determination theory

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## 1. Introduction

In recent years, artificial intelligence (AI) has been increasingly integrated into higher education, significantly

transforming traditional teaching and learning practices. AI-powered tools, such as conversational agents (e.g., ChatGPT, DeepSeek, Kimi, etc.), offer learners immediate feedback, personalized support, and interactive learning experiences. These features enable students to access knowledge more efficiently and engage with learning content in more flexible and dynamic ways. Meanwhile, learning motivation is widely recognized as a critical factor influencing students' academic engagement and achievement. However, Educational Psychology courses are often characterized by abstract theories and complex conceptual frameworks, which may lead to difficulties in understanding and reduced learning motivation. Therefore, exploring how AI can support and enhance students' motivation in such courses has become an important issue in contemporary educational research.

Although existing studies have examined the impact of AI on learning performance and engagement, most have focused on quantitative outcomes rather than the underlying mechanisms of motivation<sup>[1-2]</sup>. In particular, there is a lack of process-oriented research investigating how AI influences students' learning motivation in specific disciplinary contexts. In addition, potential negative effects, such as over-reliance on AI and reduced independent thinking, have not been sufficiently addressed. To fill these gaps, this study adopts a qualitative approach based on Grounded Theory and conducts semi-structured interviews with undergraduate students majoring in English (Education Track). The aim is to explore how students use AI in Educational Psychology courses and to uncover the mechanisms through which AI enhances or inhibits learning motivation. By providing a deeper, process-based understanding and proposing a theoretical model, this study contributes to both theoretical development and practical applications in AI-supported education.

## **2. Literature review**

### **2.1. Learning motivation in higher education**

Learning motivation has long been recognized as a central factor influencing students' academic engagement, persistence, and achievement. Among the most influential theoretical frameworks, Self-Determination Theory (SDT) emphasizes that motivation is shaped by the satisfaction of three basic psychological needs: autonomy, competence, and relatedness<sup>[3]</sup>. When these needs are fulfilled, students are more likely to develop intrinsic motivation and sustain their engagement in learning activities. In higher education, learning motivation is particularly important in courses that are conceptually demanding and abstract, such as Educational Psychology. Previous studies have shown that students often experience difficulties in understanding theoretical content, which may lead to decreased interest and reduced motivation<sup>[4-5]</sup>. Thus, identifying effective ways to support students' motivation in such contexts remains a key concern in educational research.

### **2.2. Artificial intelligence in education**

With the rapid development of AI, its application in education has attracted increasing attention. AI-powered tools, such as intelligent tutoring systems, adaptive learning platforms, and conversational agents (e.g., ChatGPT, DeepSeek, Kimi, etc.), have been widely used to support learning. These technologies can provide personalized feedback, recommend learning resources, and facilitate interactive learning experiences. Previous research has demonstrated that AI can enhance learning efficiency, improve academic performance, and support self-regulated learning<sup>[6]</sup>. For example, AI systems can help students organize knowledge, clarify

complex concepts, and provide immediate responses to learners' questions <sup>[7]</sup>. In addition, the interactive nature of AI tools has been found to increase student engagement and participation <sup>[8]</sup>. However, some studies have also pointed out potential challenges associated with AI use, including over-reliance on technology, reduced independent thinking, and concerns about the accuracy of AI-generated content <sup>[9–10]</sup>. These mixed findings suggest that the impact of AI on learning is complex and context-dependent.

### **2.3. AI and learning motivation**

In recent years, an increasing number of studies have explored the relationship between AI and learning motivation. Some research indicates that AI can enhance motivation by reducing cognitive load, improving efficiency, and providing timely feedback <sup>[11–12]</sup>. These features may strengthen students' sense of competence and autonomy, thereby promoting intrinsic motivation. Moreover, the interactive features of AI tools can create a more engaging learning environment, which may enhance students' sense of relatedness and participation <sup>[13]</sup>. As a result, AI has the potential to support multiple dimensions of motivation simultaneously. Nevertheless, existing studies have largely focused on quantitative measures of motivation, such as motivation scales and performance indicators, while paying less attention to students' subjective experiences and the underlying mechanisms of motivational change. What is more, limited research has examined both the positive and negative pathways through which AI influences motivation.

### **2.4. Research gap**

Despite the growing body of literature on AI in education, several gaps remain. First, there is a lack of qualitative, process-oriented research that explores how AI influences learning motivation in specific disciplinary contexts, such as Educational Psychology courses. Second, the mechanisms through which AI affects motivation—both positively and negatively—have not been fully clarified. Third, the role of moderating factors, such as students' trust in AI and their usage strategies, remains underexplored. To address these gaps, the present study adopts a Grounded Theory approach to investigate the mechanisms of learning motivation enhancement in AI-supported learning environments. By focusing on students' lived experiences and perceptions, this study aims to provide a more comprehensive and nuanced understanding of how AI reshapes learning motivation.

## **3. Methodology**

### **3.1. Research design**

This study adopts a qualitative research design based on Grounded Theory, aiming to explore the underlying mechanisms through which AI influences learning motivation in Educational Psychology courses. Grounded Theory is particularly suitable for this study as it enables the generation of theoretical insights from empirical data and facilitates an in-depth understanding of participants' experiences and perceptions <sup>[14]</sup>. A semi-structured interview method was employed to collect rich, descriptive data. This approach allows flexibility in exploring participants' perspectives while maintaining consistency across interviews.

### **3.2. Participants**

The participants consisted of 10 undergraduate students majoring in English (Education Track), all in their third year of study at a comprehensive university (**Table 1**).



**Table 1.** Demographic characteristics of 10 participants

Participant	Gender	Age	Major	Year of Study	AI Usage Frequency	Learning Motivation Level
P1	F	21	English (Education Track)	Year 3	Frequent	Medium–High
P2	M	20	English (Education Track)	Year 3	Occasional	Low
P3	F	21	English (Education Track)	Year 3	Frequent	High
P4	M	22	English (Education Track)	Year 3	Very Frequent	Medium (Fluctuating)
P5	F	21	English (Education Track)	Year 3	Frequent	Medium–High
P6	M	22	English (Education Track)	Year 3	Frequent	Medium–High
P7	F	21	English (Education Track)	Year 3	Occasional	Medium
P8	M	22	English (Education Track)	Year 3	Moderate	High
P9	F	20	English (Education Track)	Year 3	Increasing	Low → Medium
P10	M	22	English (Education Track)	Year 3	Structured/ Frequent	High

To ensure diversity and balance in perspectives, the sample (**Table 1**) was designed to achieve a gender-balanced composition (5 male and 5 female participants). All participants had completed or were currently enrolled in an Educational Psychology course and had prior experience using AI tools (e.g., ChatGPT, DeepSeek, Kimi, etc.) to support their learning. A theoretical sampling strategy was adopted, selecting participants with varying levels of learning motivation (high, medium, and low) and different patterns of AI usage (frequent users, moderate users, and occasional users). Data collection continued until theoretical saturation was reached, indicated by the repetition of key themes and no emergence of new categories.

### 3.3. Data collection

Data were collected through semi-structured interviews, each lasting approximately 30–50 minutes. The interviews were conducted either online (via Tencent Meeting or WeChat) or face-to-face, depending on participants' availability. An interview protocol was developed based on the research objectives and included the following key dimensions: 1) Learning experiences in Educational Psychology courses; 2) Patterns of AI tool usage in learning; 3) Perceived changes in learning motivation; 4) Factors influencing motivation (both positive and negative); and 5) Underlying psychological mechanisms (e.g., autonomy, competence, relatedness). All interviews were audio-recorded with participants' consent and subsequently transcribed verbatim for analysis. To ensure confidentiality, all participants were anonymized and assigned codes (P1–P10).

### 3.4. Data analysis

The collected data were analyzed following the procedures of Grounded Theory, including open coding, axial coding, and selective coding. In the first stage (open coding), interview transcripts were examined line by line to identify meaningful units of data. Initial concepts were generated by labeling participants' statements, resulting in a large number of descriptive codes (e.g., “reduced learning difficulty”, “increased efficiency”, “AI dependency”, “interactive experience”). In the second stage (axial coding), relationships among the initial codes were identified and grouped into higher-level categories. These categories covered 1) Cognitive support (e.g., facilitating understanding); 2) Efficiency enhancement (e.g., saving time, organizing knowledge); 3)

Interactive engagement (e.g., dialogic learning experience); 4) Dependency and superficial learning; and 5) Trust and credibility of AI. In the final stage (selective coding), a core category was identified: AI-supported learning motivation enhancement mechanism. Around this core category, a theoretical framework was constructed, illustrating how AI influences learning motivation through multiple pathways, particularly by satisfying key psychological needs such as autonomy, competence, and relatedness. These pathways jointly contribute to the enhancement (or, in some cases, the inhibition) of learning motivation.

### **3.5. Trustworthiness**

To ensure the rigor and credibility of the study, several strategies were employed. First, prolonged engagement with the data and iterative coding processes were conducted to ensure accurate interpretation. Second, a clear coding procedure was followed, and categories were refined through constant comparison. Third, findings were grounded in participants' original statements to minimize researcher bias. Fourth, detailed descriptions of participants and research context were provided to allow readers to assess applicability to other contexts.

### **3.6. Ethical considerations**

All participants were informed about the purpose of the study and provided informed consent prior to participation. They were assured that their responses would remain confidential and would be used solely for academic research purposes. Personal identifiers were removed during transcription to protect participants' privacy.

## **4. Results**

Based on the analysis of the interview data, this study identified multiple pathways through which AI influences students' learning motivation in Educational Psychology courses. Through grounded theory analysis, a set of interrelated categories emerged, including cognitive support, efficiency enhancement, interactive engagement, dependency, and trust. These categories collectively explain how AI reshapes students' learning experiences and motivational patterns.

### **4.1. Cognitive support and reduction of learning difficulty**

One of the most prominent findings is that AI provides significant cognitive support, particularly by simplifying complex theoretical content and reducing learning difficulty. Many participants reported that Educational Psychology is "abstract" and "hard to understand," which often leads to frustration and low motivation.

For instance, P1 noted:

*"Some theories are really hard to understand just by reading the textbook, but AI can explain them in a much simpler way, so I feel less stressed when learning."*

Similarly, P9, who initially had low motivation, described a clear turning point:

*"At the beginning, I didn't want to study because it was too difficult. But when AI explained it with simple examples, I suddenly understood, and I felt more willing to continue."*

These findings suggest that AI reduces cognitive barriers, which in turn lowers frustration and enables students to re-engage with learning. This mechanism is particularly significant for students with initially low

motivation.

#### **4.2. Efficiency enhancement and sense of achievement**

Another important category is efficiency enhancement, as AI helps students organize knowledge, summarize key points, and complete tasks more quickly. This improved efficiency contributes to a stronger sense of achievement, which positively influences motivation.

As P6 explained:

*“AI helps me organize the content into a clear structure. When I see everything arranged logically, I feel like I can actually manage the material.”*

Similarly, P2 emphasized the role of AI in task completion:

*“Using AI makes assignments much easier to finish. I don’t feel as overwhelmed, so I’m more willing to start working.”*

These findings indicate that efficiency not only reduces workload but also enhances students’ perceived competence, thereby strengthening their motivation to engage in learning tasks.

#### **4.3. Interactive engagement and increased participation**

AI also promotes interactive engagement, transforming learning from a passive process into an interactive experience. Several participants described AI as a “learning partner” that supports dialogic learning.

For example, P5 stated:

*“It feels like I’m not studying alone. When I ask questions and get immediate responses, it’s like having a conversation, and that makes learning more interesting.”*

P3 further emphasized the exploratory nature of this interaction:

*“I can keep asking questions and go deeper into a topic. That makes me more curious and more motivated to learn.”*

This interactive dimension enhances students’ sense of engagement and participation, making learning more dynamic and sustaining their interest over time.

#### **4.4. Dependency and superficial learning**

Despite its benefits, AI also introduces potential negative effects, particularly over-reliance and superficial learning. Some participants reported that excessive dependence on AI reduces independent thinking and weakens deep understanding.

P4 clearly described this issue:

*“Sometimes I just let AI generate the answer, and I don’t really think about it myself. Later, I realize I don’t actually understand the content.”*

He further reflected on the long-term impact:

*“At first, it feels easier, but when I need to explain something in class, I can’t. That actually reduces my motivation.”*

This suggests that while AI may increase short-term efficiency, overuse can undermine deep learning and negatively affect long-term motivation.

#### **4.5. Trust and credibility as a moderating factor**

Another important finding is the role of trust in AI-generated content. Participants’ trust levels significantly

influenced how they used AI and how it affected their motivation.

For instance, P7 expressed skepticism:

*“Sometimes I feel that AI’s answers are not very accurate, so I still prefer to check the textbook. I don’t fully rely on it.”*

This lack of trust limited AI’s impact on learning motivation. In contrast, participants who trusted AI more were more likely to integrate it into their learning process.

These findings indicate that trust acts as a moderating factor, influencing the extent to which AI can affect motivation.

#### 4.6. Dynamic changes in learning motivation

The data also reveal that the impact of AI on learning motivation is dynamic rather than static. Different students experience different trajectories depending on their initial motivation and patterns of AI use.

For example, P9 described a clear transformation:

*“At first, I didn’t want to study at all. But after using AI to understand difficult parts, I became more interested and started to study more actively.”*

In contrast, P4 experienced a decline after initial improvement:

*“In the beginning, AI made learning easier, so I felt more motivated. But later, I relied on it too much, and my motivation actually dropped.”*

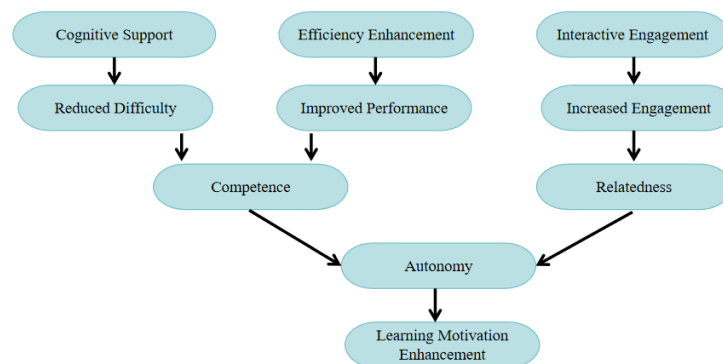
Meanwhile, self-regulated learners such as P8 demonstrated a more balanced pattern:

*“I usually try to think first and then use AI to check my understanding. That way, I feel I’m improving step by step.”*

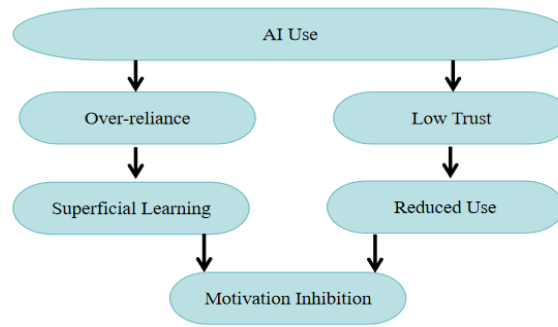
These patterns suggest that the effectiveness of AI depends on how it is used, highlighting the importance of self-regulation.

#### 4.7. Core mechanism of learning motivation enhancement

Through selective coding, a core mechanism emerged: AI enhances learning motivation by supporting understanding, improving efficiency, and facilitating interaction, while its effects are moderated by dependency and trust (Figures 1 and 2).



**Figure 1.** Positive mechanism model of learning motivation enhancement in AI-supported Educational Psychology courses



**Figure 2.** Negative mechanism model of learning motivation enhancement in AI-supported Educational Psychology courses

First, cognitive support reduces learning difficulty and facilitates understanding, thereby enhancing learners' sense of competence. Second, efficiency enhancement improves task performance and generates a sense of achievement, further strengthening competence. Third, interactive engagement promotes participation and creates a sense of relatedness, which sustains learning interest. These pathways collectively satisfy three basic psychological needs—autonomy, competence, and relatedness—ultimately leading to enhanced learning motivation.

At the same time, the model (**Figure 2**) also identifies two inhibitory mechanisms. Over-reliance on AI may result in superficial learning and reduced independent thinking, while low trust in AI may limit its use and effectiveness. These negative factors can weaken or even reverse the positive impact of AI on learning motivation.

Furthermore, the model (**Figures 1 and 2**) highlights the role of moderating variables such as AI usage strategies, trust levels, task difficulty, and initial motivation. These factors determine whether AI exerts a positive or negative influence on learning motivation.

## 5. Discussion

This study explored the mechanisms through which AI influences learning motivation in Educational Psychology courses. The findings provide important insights into both the positive and negative roles of AI in shaping students' motivational processes, and they can be meaningfully interpreted through existing theoretical frameworks, particularly Self-Determination Theory (SDT).

First, the results confirm that AI enhances learning motivation by supporting the fulfillment of three basic psychological needs—competence, autonomy, and relatedness—as proposed by Deci and Ryan (2012). Specifically, cognitive support provided by AI reduces learning difficulty and facilitates understanding, thereby strengthening students' sense of competence. This finding is consistent with previous studies showing that AI can reduce cognitive load and improve learning effectiveness. Similarly, efficiency enhancement enables students to manage learning tasks more effectively, which contributes to a sense of achievement and further reinforces competence. In addition, the interactive nature of AI tools promotes engagement and creates a sense of relatedness, supporting prior research that highlights the role of AI in enhancing learner participation and enjoyment.

Second, this study extends existing research by revealing the process-oriented mechanisms underlying



motivational changes. While previous studies have primarily focused on learning outcomes, the present findings demonstrate that AI influences motivation through multiple interconnected pathways, including cognitive, efficiency, and interaction pathways. These pathways jointly contribute to the development of intrinsic motivation by fostering interest and sustained engagement, which aligns with earlier work on the relationship between interest and learning processes. Furthermore, the findings highlight the importance of self-regulated learning, as students who actively manage their AI use (e.g., thinking before using AI) experience more stable and long-term motivational benefits. This supports prior research emphasizing the role of AI in promoting self-regulated learning.

However, this study also identifies important negative mechanisms, particularly over-reliance on AI and reduced independent thinking. These findings are consistent with recent research indicating that excessive dependence on AI tools may weaken cognitive abilities and deep learning. When students rely too heavily on AI-generated answers, they may experience superficial understanding, which can ultimately reduce their motivation. In addition, trust in AI emerged as a key moderating factor. Students who perceived AI as unreliable were less likely to use it effectively, limiting its impact on motivation. This finding echoes broader discussions on the challenges and risks of AI use in educational contexts.

## **6. Conclusion**

### **6.1. Summary of key findings**

This study investigated the mechanisms through which AI influences learning motivation in Educational Psychology courses using a Grounded Theory approach. Based on semi-structured interviews with 10 undergraduate students, the findings reveal that AI affects learning motivation through multiple pathways, including cognitive support, efficiency enhancement, and interactive engagement, while also being influenced by negative factors such as dependency and trust. The results demonstrate that AI can enhance learning motivation by reducing learning difficulty, improving efficiency, and increasing engagement, thereby satisfying learners' psychological needs for competence, autonomy, and relatedness. At the same time, excessive reliance on AI and concerns about its credibility may weaken its positive effects, highlighting the importance of balanced and reflective use.

### **6.2. Research contributions and limitations**

This study makes several contributions. First, it provides a process-oriented understanding of how AI influences learning motivation, complementing existing outcome-focused research. Second, it identifies both facilitating and inhibiting mechanisms, offering a more nuanced perspective on AI-supported learning. Third, it proposes a theoretical model that can guide future research and practice.

From a practical perspective, the findings suggest that educators should encourage students to use AI as a supportive tool rather than a substitute for independent thinking. Instructional design should incorporate structured AI use, such as prompting students to reflect, question, and apply knowledge. In addition, improving students' digital literacy and critical evaluation skills is essential for enhancing trust and effective use of AI.

Despite its contributions, this study has some limitations. The sample size is relatively small and limited to a specific disciplinary context, which may affect generalizability. Future research could adopt mixed methods or larger samples to validate and extend the findings across different subjects and educational

settings.

In general, AI has significant potential to enhance learning motivation, but its effectiveness depends on how it is integrated into learning processes. A balanced and pedagogically guided use of AI is essential for achieving sustainable motivational outcomes.

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## Disclosure statement

The author declares no conflict of interest.

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# The Structurally Shallow Treatment of Vocabulary Instruction in Core-Competency-Oriented Chinese Language Arts Classrooms and Its Improvement

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**Abstract:** In core-competency-oriented Chinese language arts teaching, the ultimate concern is how students understand, organize, and use language. Words are the basic units of reading comprehension and expressive production, and they also provide an important entry point for observing whether core competencies are enacted in classroom practice. The problem in current Chinese language arts classrooms is not that words are ignored, but that many forms of vocabulary instruction remain at relatively shallow levels, such as pronunciation correction, explanation of meanings, and removal of reading obstacles. They move less often toward contextual understanding, analysis of expressive effects, and students' active use of words. This article conceptualizes this phenomenon as a structurally shallow treatment and analyzes its manifestations and causes from three dimensions: objectives, activities, and assessment. It argues that improving vocabulary instruction does not require a separate and complicated instructional model. Rather, it requires reconstructing a learning process that moves from understanding lexical meaning, to grasping contextual meaning in the text, to analyzing expressive functions, and finally to using language. In this way, language development and use, a key expression in Chinese language curriculum standards, can be transformed from curriculum discourse into an observable classroom learning process.

**Keywords:** Core competencies; Vocabulary instruction; Structurally shallow treatment; Language development and use; Chinese language arts classroom

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## 1. Introduction

Core-competency-oriented reform in the Chinese language curriculum requires classroom teaching to move beyond knowledge transmission and test-oriented training, and to attend to the kinds of language experience

students develop through reading, communication, and writing. Both the 2022 Chinese Language Curriculum Standards for Compulsory Education and the senior high school Chinese curriculum standards emphasize that students should accumulate language, develop a sense of language, and learn to express themselves through concrete language practice <sup>[1-2]</sup>. This means that core competencies in Chinese language arts cannot remain at the level of abstract ideas. They need to be gradually formed through specific linguistic materials such as words, sentences, paragraphs, and whole texts.

Within the Chinese language arts core competencies, language development and use have a foundational position. In the Chinese curriculum standards, this expression refers to students' capacity to build, understand, and use language in meaningful contexts. Students' understanding of a text does not usually move directly to the theme; rather, it gradually unfolds through the meaning, color, tone, and combinational relations of individual words. Words connect textual content with students' own expressive experience. Students' reading comprehension, thinking, aesthetic experience, and cultural understanding ultimately depend on their understanding and expression of language. Words are among the most basic and dynamic units of language. Whether students can accurately understand key words in a text, perceive their contextual implications and expressive effects, and transform lexical experience gained from reading into oral and written expression directly affects the quality of Chinese language arts learning. Wang Rongsheng, Wu Zhonghao, and Wang Feng argue that word mastery requires students to connect lexical and contextual meanings in texts <sup>[3]</sup>. Yao Wenhan and Zhang Xinke also note that vocabulary accumulation can easily become fragmented and cognitively disconnected <sup>[4]</sup>.

However, the problem in real classrooms cannot simply be described as an absence of vocabulary instruction. Most Chinese language arts lessons deal with words, such as asking students to look up words before class, correcting pronunciation and explaining meanings in class, or practicing vocabulary discrimination in exercises. The key question is whether these practices support textual understanding, students' expression, and language use. In practice, vocabulary instruction often remains low-level, mainly removing reading obstacles. A word may have been explained, but not necessarily fully understood; students may know its meaning but may still be unable to explain its function in the text. This article describes such a phenomenon as structurally shallow treatment. Although vocabulary instruction is present in the classroom, vocabulary learning is not sufficiently developed across objectives, activities, and assessment. It fails to form a continuous process from lexical understanding to contextual interpretation, expressive analysis, and language use. This is not merely the result of an individual teacher's insufficient handling of words but a common implementation bias that may occur when core competencies enter the fine details of classroom practice.

## **2. Research basis and problem space**

Existing studies have first confirmed the foundational status of vocabulary learning. In the past, words were often placed in the category of basic knowledge together with pronunciation, orthography, annotations, and dictation. Recent studies, however, suggest that words are not merely subordinate to character learning but should be understood within the formation of reading and expressive abilities. Research on the learning task cluster of language accumulation and organization further emphasizes that accumulation, organization, and use of language should be mutually connected <sup>[5]</sup>. These studies provide a basis for rethinking vocabulary



instruction.

Research on core competencies offers a broader curricular background for this view. Zheng Guomin and Li Yuhui emphasize that Chinese curriculum reform needs to grasp the educational function of the Chinese language curriculum and its direction of practical innovation <sup>[6]</sup>. Research on learning tasks further argues that Chinese language learning tasks should not be added as external classroom activities but should organize students' language learning within authentic Chinese language practice. Wen Yi and Cui Yunhuo discuss Chinese language learning tasks in relation to learning goals and learning processes <sup>[7]</sup>. Wang Rongsheng analyzes the meaning of Chinese language learning tasks from the text of curriculum standards <sup>[8]</sup>. Xu Peng and Wang Tongyan explain, from the perspective of disciplinary practice, that the educational pathway of the Chinese language curriculum should be realized through students' concrete language activities <sup>[9]</sup>. Wu Xinxin further emphasizes the role of learning task clusters in promoting changes in Chinese language teaching <sup>[10]</sup>. Taken together, these studies show that the enactment of core competencies must pass through operable classroom activities.

At the same time, studies of instructional design and assessment provide dimensions for diagnosing vocabulary instruction. Zheng Guihua points out that learning themes should focus on learning goals, integrate resources, connect learning activities, and promote learning progression <sup>[11]</sup>. Zhang Xinke and Yao Wenhan argue that, in the context of core competencies, the formulation of Chinese language teaching objectives still tends to be vague and overgeneralized <sup>[12]</sup>. If the teaching objective says that students should appreciate language, but classroom activities only explain word meanings; or if the lesson requires students to understand the text, but assessment only checks whether answers are correct, language learning will hardly deepen. Based on these studies, this article does not repeat the general claim that vocabulary learning is important. Instead, it asks whether a specific word is visible in classroom objectives, whether it is developed in learning activities, and whether it leaves evidence in assessment. This is the problem space of the article.

### 3. Analytical dimensions

Vocabulary instruction in this article refers mainly to instructional activities in reading lessons that focus on word meaning, textual context, expressive function, and transfer to use. It is not equivalent to checking new words, nor is it equivalent to dictionary explanations. Its value lies not only in helping students know what a word means, but also in helping them enter the text through words, understand language through the text, and form expressive ability through language. This definition also makes it possible to translate concrete issues in Chinese language arts classrooms into issues familiar to international readers, such as vocabulary learning and text comprehension.

This article does not treat vocabulary instruction as a small segment independent of reading instruction. Only when words enter textual relations can their functions in characterization, emotional expression, argumentative development, or register construction become visible. Only through explanation, comparison, and re-expression can students transform external word meanings into their own language experience. Therefore, the structurally shallow treatment discussed in this article does not mean that teachers have not taught words. It means that words have not been organized into a complete learning process.

The article analyzes the structurally shallow treatment of vocabulary instruction from three dimensions. First, the dimension of objectives concerns whether teaching objectives specifically point to the contextual

meaning and expressive function of key words, rather than being generally phrased as understanding words or appreciating language. Second, the dimension of activities concerns whether the classroom guides students to move from lexical meaning to contextual meaning in the text, and whether comparison, substitution, and questioning are used to analyze the expressive functions of words. Third, the dimension of assessment concerns whether teachers only evaluate whether a word's meaning has been correctly explained or whether they further evaluate students' ability to interpret, differentiate, and use words in relation to the text. Jing Hongchun's discussion of the consistency among teaching, learning, and assessment in Chinese language learning task design provides a useful reference for this analysis <sup>[13]</sup>.

On this basis, a relatively complete process of vocabulary learning can be summarized in four steps: understanding lexical meaning, grasping contextual meaning in the text, analyzing expressive function, and using language. Lexical meaning is the starting point; contextual meaning in the text is the key; expressive function analysis deepens learning; and language use is the destination. If classrooms stop at this first step, language development and use become stated objectives rather than lived learning processes.

## **4. Main manifestations of shallow treatment**

### **4.1. Vague objective statements**

The shallow treatment of vocabulary instruction is first reflected in the formulation of objectives. Many lesson plans include statements such as understanding key words, appreciating language, experiencing the author's feelings, or perceiving character images. Such statements are not wrong in themselves. However, if they do not further specify which words students should understand, to what depth, and through what form students should demonstrate their learning, they can hardly guide classroom activities effectively. For example, appreciating language may involve several levels: understanding word meanings, perceiving contextual implications, analyzing expressive effects, and learning ways of expression. If the objective remains general, the classroom may easily reduce it to explaining a few difficult words or asking students to use fixed answer patterns, such as the word vividly describes. In this case, words appear in the objective, but they do not become clear learning tasks.

### **4.2. Front-loading word treatment**

The second manifestation is the front-loading of word treatment in classroom activities. In many lessons, word treatment is arranged before reading: teachers first check pre-class preparation, correct pronunciation, explain meanings, and then move into textual analysis. This procedure can help remove basic reading obstacles. Yet the problem is that, once words are treated, subsequent reading often no longer returns to them. The hidden risk of this procedure is that it separates words from textual understanding. In fact, many words can only be truly understood when they are placed back into the text. Action verbs in fiction may reveal a character's situation; sensory words in prose may create an aesthetic atmosphere; conceptual words and connectives in argumentative texts may organize the logic of argumentation. If the classroom treats these words only as difficult words to be explained, without asking how they participate in characterization, emotional expression, or structural development, vocabulary instruction becomes merely instrumental.

### **4.3. Insufficient contextual analysis**

The key to vocabulary instruction is not whether students can recite dictionary meanings, but whether they

can understand how words generate meaning in a specific text. In actual classrooms, insufficient contextual analysis is mainly reflected in two aspects. First, teachers often treat word meanings as static answers. For instance, one word means slow, another means sad, and another indicates contrast. These explanations may not be wrong, but they do not show how the word relates to the character, situation, tone, or structure in that specific location. Second, students lack opportunities for comparison and differentiation. Without comparing the original word with possible substitutes, it is difficult to perceive the accuracy of the original expression; without connecting the word with the surrounding text, it is difficult to appreciate its implication. If reading instruction bypasses contextual meaning, it may move too early toward thematic generalization. Such themes are often conceptual conclusions rather than understandings gradually generated by students from language.

#### **4.4. Formulaic language appreciation**

In many classrooms and assignments, word appreciation is trained into fixed formulas, such as this word vividly describes and expresses the author's feelings. Formulaic training may reduce the difficulty of answering questions, but if it replaces analysis over time, students may learn to write stock phrases without explaining why a word is accurate, powerful, or meaningful. Analysis of a word's expressive function should at least involve accuracy, connotation, force, register, rhythm, and relation to the surrounding text. Words in different genres also function differently. Words in fiction are often related to characters and narration; words in prose are often related to perception and artistic mood; words in argumentative writing are often related to concepts and logic. Using one formula to handle all words obscures differences in language use.

#### **4.5. Limited assessment evidence**

The shallow treatment of vocabulary instruction is also reflected in assessment. In class, teachers often judge whether students understand a word by whether they can provide the correct meaning. Such an assessment is quick and clear, but it only measures the lowest level of understanding. Whether students can explain a word in context, compare expressive differences between two words, or use the word accurately in a new context is often not assessed. Liu Jinhua and Wu Xinxin's study of primary Chinese language classroom assessment points out problems such as unclear assessment targets and insufficient collection of evidence <sup>[14]</sup>. Although this study focuses on primary Chinese language classrooms, its findings are also useful for understanding assessment difficulties in vocabulary instruction. If assessment only focuses on whether word meanings are correct, classroom activities will naturally move toward standard answers. Students may then think that vocabulary learning means looking up words, memorizing explanations, and applying formulas, rather than understanding, differentiating, and using language.

### **5. Causes of shallow treatment**

#### **5.1. The influence of positioning vocabulary as basic knowledge**

For a long time, words have often been placed in the category of basic knowledge together with pronunciation, orthography, annotations, and dictation. This classification facilitates classroom management, but it also tends to lead teachers to treat vocabulary instruction as preparation before reading rather than as part of reading comprehension and expressive production. As a result, words are often assigned to pre-class preparation, lesson introduction, or after-class accumulation, and less often become objects of in-depth inquiry in class.

## **5.2. The thematic orientation of reading instruction**

Many reading lessons are eager to complete content comprehension, character analysis, emotional summary, and thematic extraction. Specific words become merely auxiliary materials leading to these conclusions. The problem is that if students do not go through the process from words to sentences, from sentences to paragraphs, and from paragraphs to the whole text, the theme may become a conclusion provided by the teacher rather than an understanding generated through students' language practice. Wang Rongsheng and Long Xiafei's study of reading aloud argues that the cultivation of basic Chinese language abilities is often obscured by teaching methods or external forms <sup>[15]</sup>. Vocabulary instruction faces a similar problem: the fact that a teacher has explained a word does not mean that students have formed the ability to understand and use it.

## **5.3. Insufficient transformation of textbook resources**

Chinese language arts textbooks include annotations, after-class exercises, language accumulation activities, and expression tasks. Yet these resources are often handled separately in the classroom. Words, reading, and expression do not form a continuous task. Students may complete word lookup, reading aloud, and question answering, but they do not form a complete learning process organized around words. Chen Xianyun's study of textbook language suggests that textbook language itself has the functions of organizing learning, indicating methods, and guiding expression <sup>[16]</sup>. Yang Bangjun's discussion of the relationship among curriculum standards, textbooks, and the college entrance examination also shows that recent assessment reforms are encouraging classrooms to return to textbooks and language practice <sup>[17]</sup>. However, this return still needs to be implemented in the micro-level language tasks of daily reading lessons.

## **5.4. Narrow assessment methods**

Compared with interpretation, differentiation, and transfer to use, judging whether a word's meaning is correct is easier to test and more convenient for quick feedback. Therefore, classroom assessment often remains at the level of whether the answer is correct. Yet the real quality of vocabulary learning lies in whether students can explain, differentiate, and use words well. Zhou Wenye and Dong Zehua propose that performance-based assessment should attend to the quality of students' performance in authentic tasks <sup>[18]</sup>. Zhang Jun and Qie Huimin also emphasize the importance of performance-based assessment for the formation of practical ability in Chinese language teacher education courses <sup>[19]</sup>. If vocabulary instruction cannot obtain similar performance evidence, it will be difficult to move beyond shallow treatment.

# **6. Suggestions for improving vocabulary instruction**

## **6.1. Clarifying vocabulary learning objectives**

Improving vocabulary instruction first requires revising instructional objectives. Objectives should not simply state that students will understand key words or appreciate language. Instead, they should clarify what kind of language performance students are expected to complete. For example, a lower-level objective may be that students can accurately state the basic meanings of several key words in the text. To serve core competencies, however, the objective should be further formulated as follows: students can explain the contextual meaning of key words with reference to the surrounding text and analyze their role in characterization, emotional expression, or argumentative logic. Such objectives shift vocabulary learning from explanation to interpretation and use, guiding subsequent activities and assessment <sup>[20]</sup>.



## **6.2. Connecting lexical meaning with context**

Vocabulary instruction should not stop at isolated explanation but should form a continuous sequence of activities. Classroom tasks can follow the order of identifying words, clarifying meanings, situating words in context, and using words. Identifying words means guiding students to find key words that support textual understanding rather than only dealing with words in annotations. Clarifying meanings means understanding basic meanings, common collocations, and connotations. Situating words in context means explaining their specific implications in the text and using substitution, deletion, or rearrangement to experience the accuracy and expressive force of the original wording. Using words means transferring vocabulary experience gained from reading into students' own expression through imitation, rewriting, continuation, or micro-writing. The significance of this process is that words no longer remain obstacles to reading but become connections between reading and expression.

## **6.3. Refining classroom questioning**

Classroom questioning should move from what does this word mean to why is this word used here. Around key words, teachers may design a series of questions: What is the basic meaning of this word? What additional implication does it have in this sentence? What would change if it were replaced by another word? Which surrounding sentences does it echo? What role does it play in character, emotion, atmosphere, or argument? Can you use this word in a new context? These questions are not complicated, but they can guide students from lexical meaning to contextual meaning in the text, and from understanding to expression. Comparing substitutes and using words in new contexts can help avoid formulaic word appreciation.

## **6.4. Adding performance-based assessment**

Assessment in vocabulary instruction should also change accordingly. Teachers should not only check whether students can provide standard explanations, but should also observe whether they can complete three kinds of performance. The first is interpretive performance: whether students can explain the specific meaning of a word in the text in their own language. The second is differentiating performance: whether students can compare the expressive differences between the original word and a substitute. The third is using performance: whether students can use the word accurately and appropriately in a new context. In practice, teachers may design small tasks such as vocabulary notes, word substitution comparison sheets, and micro-writing pieces. Assessment criteria need not be complicated; they may include accuracy of explanation, use of context, analysis of expressive function, and appropriateness of transfer.

## **7. Conclusion**

Vocabulary instruction is not a form of basic training outside core competencies; it is an important part of enacting language development and use. The current problem in Chinese language arts classrooms is not that words are completely ignored, but that vocabulary instruction is often fixed at the shallow level of explaining meanings and removing reading obstacles. It does not sufficiently enter contextual understanding, analysis of expressive function, or students' language use. As a result, it shows a structurally shallow treatment across objectives, activities, and assessment.

Improving this problem does not require constructing a new and complicated instructional model. It requires starting from specific words in the classroom and reconstructing the learning process of



understanding lexical meaning, grasping contextual meaning in the text, analyzing expressive function, and using language. When students can enter a text through a word and return from textual language to their own expression, core competencies can become observable, assessable, and developable language abilities. Therefore, a close understanding of how core competencies are enacted in Chinese curriculum reform can not only deepen local research on Chinese language arts classrooms, but also provide useful reference for language learning, text comprehension, and assessment improvement in international classrooms.

## Disclosure statement

The author declares no conflict of interest.

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# A Study on the Current Status of University Teachers' Digital Literacy Under the Background of Educational Digital Transformation

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**Abstract:** In the educational area, digital literacy is now an important capability required by university teachers. According to the national standard issued by the Ministry of Education, this investigation employs a mixed method combining questionnaires and semi-structured interviews to examine the digital literacy of 240 professors from four universities in Chengdu in five aspects: digital awareness, digital technology knowledge and skills, digital application, digital social responsibility, and professional development. The findings indicate that the overall digital literacy of university teachers is at a high level (mean score  $M=4.28$ ), however, there exists an obvious imbalance: the mean scores of digital social responsibility ( $M=4.41$ ) and professional development ( $M=4.33$ ) are higher, whereas those of digital application ( $M=4.19$ ) and digital technology knowledge and skills ( $M=4.20$ ) are lower, suggesting a situation where “moral concepts are strong but technical application is weak.” Analysis of the differences reveals that gender and educational background do not have a great influence, while age, teaching experience, academic position, and disciplinary background have a significant impact. For example, teachers aged 31–40 and having 11–15 years of teaching experience have the highest comprehensive digital literacy, but professors in arts and humanities always obtain the lowest scores in all dimensions. Therefore, based on these results, this research proposes targeted and detailed measures to enhance the digital literacy of university teachers, aiming to provide an empirical basis and practical suggestions for the transformation of higher education into a digital environment.

**Keywords:** Educational digital transformation; Digital literacy; University teachers; Teacher development; Higher education

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## 1. Introduction

The swift advancement of artificial intelligence, big data, cloud computing, and digital platform technologies has caused a notable modification in the educational field, making educational reform one of the prominent trends in modern higher education. These technologies not only change the ways of information transmission but also reconstruct the arrangement of teaching, the interaction between teachers and students, and the educational management system. During this process, university teachers play two significant parts, that of the reform implementers and the promoters of educational innovation. The successful completion of educational reform mainly relies on the ability of teachers to utilize digital technologies efficiently in the design of instruction, classroom teaching, assessment of learning, and cooperation in research. Now, digital literacy is not limited to the use of technical devices; it includes various skills enabling teachers to carry out instructional innovations, resource combination, value evaluations, and ongoing professional growth in the digital environment. In 2022, the Ministry of Education publicly announced the industry standard “Teacher’s Digital Literacy”, establishing for the first time a five-dimensional framework which consists of digital awareness, digital technology knowledge and skills, digital application, digital social responsibility and professional development. This standard provides a reliable basis for the evaluation and improvement of teachers’ digital literacy <sup>[1]</sup>.

Previous investigations about the digital literacy of Chinese teachers mainly concentrate on primary and secondary school teachers, whereas systematic studies concerning university professors, especially those in local universities, are relatively inadequate. Additionally, the current scholarship often deals with theoretical discussions without providing sufficient analyses based on empirical data.

Therefore, the research objects of this study are university teachers from four institutions in Chengdu. Based on the Ministry of Education’s standard of Teacher Digital Literacy and using a combination of questionnaire surveys and interviews, the study comprehensively examines the actual levels, distinctive features and existing issues of university teachers’ digital literacy, then investigates the influencing factors and puts forward corresponding improvement measures. The purpose is to offer practical guidance for enhancing the digital capability of university staff and to provide a theoretical basis for the digital transformation of higher education.

## **2. Research design**

### **2.1. Research participants**

This investigation examined university teachers from four educational institutions in Chengdu, using a method of random sampling combined with stratified sampling. Considering the significant differences among university teachers in terms of their disciplinary background, academic rank, teaching experience, and instructional tasks, the sample was organized to include a variety of teacher types in order to improve the representativeness of the results.

A total of 261 questionnaires were distributed, and 240 valid ones were collected, resulting in an effective response rate of 91.9%. The sample includes teachers from the fields of arts and humanities, science and engineering, economics and management, and medicine and agriculture, covering various professional title levels. Moreover, in order to obtain a deeper insight into the actual problems encountered by university teachers in improving their information literacy, eight experienced faculty members with different professional titles and academic disciplines were chosen for unstructured interviews, together with

the quantitative results.

The interviewees mostly come from teaching and research positions, such as junior teachers, mid-level key teachers, and full professors, which provides a fairly complete understanding of the present development of university faculty in digital literacy.

## 2.2. Research methods

### 2.2.1. Questionnaire survey

The questionnaire survey is the main way to obtain data in our research. The questionnaire was mainly established based on the MoE industry standard for Teacher Digital Literacy and then modified to suit the actual conditions of digital teaching in higher education, making sure that the measured aspects coincide with the research objects.

The questionnaire consists of two sections. The first section deals with the teachers' basic personal details such as gender, educational qualification, age, teaching experience, professional rank, and subject area. The second section evaluates their digital literacy by means of 19 items on a five-point Likert scale from 1 = "Strongly Disagree" to 5 = "Strongly Agree." The dimensional structure is shown in **Table 1**.

**Table 1.** Questionnaire dimensional structure

Primary Dimension	Secondary Dimension	Number of Items
Digital Awareness	Digital Cognition / Digital Willingness / Digital Volition	3 items
Digital Technology Knowledge & Skills	Digital Technology Knowledge / Digital Technology Skills	3 items
Digital Application	Digital Instructional Design / Digital Teaching Implementation / Digital Academic Assessment / Digital Collaborative Education	9 items
Digital Social Responsibility	Legal and Ethical Norms / Digital Security Protection	2 items
Professional Development	Digital Learning and Professional Training / Digital Teaching Research and Innovation	2 items

### 2.2.2. Interview method

To compensate for the limitations of the questionnaire survey in probing underlying causes, this study employed semi-structured interviews with eight university faculty members. The interview protocol covered five thematic areas:

- (1) Actual use of digital technology in teaching practice
- (2) Teachers' self-perception and self-assessment of their digital literacy
- (3) Primary difficulties encountered in digital teaching
- (4) Teachers' understanding of digital security and digital ethics
- (5) The role of digital technology in the integration of teaching and research, and practical recommendations

The basic information of the eight interviewees is presented in **Table 2**.

**Table 2.** Basic information of interview participants

ID	Gender	Teaching Exp.	Title	Discipline	Highest Degree
T1	Male	3 yrs	Teaching Assistant (Initial)	Science & Engineering	Master's
T2	Female	4 yrs	Lecturer (Intermediate)	Economics & Management	Master's
T3	Male	12 yrs	Associate Professor (Associate Senior)	Science & Engineering	Ph.D.
T4	Female	15 yrs	Associate Professor (Associate Senior)	Science & Engineering	Ph.D.



T5	Female	11 yrs	Associate Professor (Associate Senior)	Arts & Humanities	Master's
T6	Male	6 yrs	Lecturer (Intermediate)	Medicine & Agriculture	Ph.D.
T7	Female	22 yrs	Professor (Senior)	Arts & Humanities	Ph.D.
T8	Male	18 yrs	Associate Professor (Associate Senior)	Economics & Management	Ph.D.

### 2.3. Sample characteristics

The demographic characteristics of the sample are presented in **Table 3**. The overall sample structure is well-balanced and demonstrates good representativeness.

**Table 3.** Demographic characteristics of research participants

Category	Sub-category	Frequency	Valid Percentage
Gender	Male / Female	90 / 150	37.5% / 62.5%
Education	Master's / Ph.D.	169 / 71	70.42% / 29.68%
Age	≤30 / 31–40 / 41–50 / ≥51	28 / 108 / 70 / 34	11.67% / 45.00% / 29.17% / 14.17%
Teaching Exp.	0–5 yrs / 6–10 yrs / 11–15 yrs / 16–20 yrs / ≥21 yrs	47 / 72 / 63 / 40 / 18	19.58% / 30.00% / 26.25% / 16.67% / 7.50%
Title	Initial / Intermediate / Associate Senior / Senior	16 / 133 / 53 / 18	6.67% / 55.42% / 22.08% / 15.83%
Discipline	Arts & Humanities / Sci. & Eng. / Econ. & Mgmt. / Med. & Agri.	92 / 66 / 49 / 32	38.33% / 27.50% / 20.42% / 13.75%

A total of 240 valid responses have been obtained. The distribution of the sample regarding gender, educational background, age, teaching experience, professional title, and disciplinary background is similar to that of the full-time faculty in higher education, showing a balanced overall structure with good representativeness.

### 2.4. Reliability and validity of the questionnaire

#### 2.4.1. Reliability

The questionnaire data were entered into IBM SPSS Statistics 27.0 for reliability analysis. The overall Cronbach's alpha was 0.926, indicating an acceptable level of internal consistency among items and confirming that the questionnaire yields highly reliable results suitable for further analysis. The SPSS output is presented in **Table 4**.

**Table 4.** Questionnaire reliability test

Cronbach's Alpha	Number of Items
0.926	19

#### 2.4.2. Validity

The KMO measure of sampling adequacy was 0.905, exceeding the recommended threshold of 0.6. Bartlett's test of sphericity was statistically significant at the 0.05 level, confirming the factorability of the data and the appropriateness of factor analysis. The validity analysis results are presented in **Table 5**.

**Table 5.** Questionnaire validity test

Test	Statistic	Value
KMO Measure of Sampling Adequacy		0.905
Bartlett's Test of Sphericity	Approx. Chi-Square	2740.354
	df	171
	Sig.	.000

### 3. Results

#### 3.1. Overall digital literacy of university teachers

In accordance with the MoE industry standard of Teacher Digital Literacy, this research evaluated the digital literacy of university teachers in five aspects: digital awareness, digital technology knowledge and skills, digital application, digital social responsibility, and professional development. The main results are shown in **Table 6**.

**Table 6.** Descriptive statistics of the overall digital literacy of university teachers in Chengdu

Dimension	N	Min	Max	Mean	SD
Overall Digital Literacy	240	1	5	4.28	0.697
Digital Awareness	240	1	5	4.26	0.807
Digital Technology Knowledge & Skills	240	1	5	4.20	0.758
Digital Application	240	1	5	4.19	0.686
Digital Social Responsibility	240	1	5	4.41	0.778
Professional Development	240	1	5	4.33	0.786

The average digital literacy score of university teachers in Chengdu is 4.28, which indicates a relatively high general level. This shows that the teachers can satisfy the educational requirements caused by the digital transformation. In the five aspects, digital social responsibility ( $M = 4.41$ ,  $SD = 0.778$ ) and professional development ( $M = 4.33$ ,  $SD = 0.786$ ) have obtained higher scores, suggesting the teachers' strong sense of digital ethics and their comprehensive understanding of the significance of digitalization in career improvement. However, the scores of digital application ( $M = 4.19$ ,  $SD = 0.686$ ) and digital technology knowledge and skills ( $M = 4.20$ ,  $SD = 0.758$ ) are relatively low, indicating that there are still some weaknesses in practical digital techniques and their application in teaching and research fields.

#### 3.2. Dimension-level analysis

##### 3.2.1. Digital awareness

Digital awareness is required to improve digital literacy, which consists of digital cognition, digital willingness, and digital volition. The research indicates that the average digital awareness of university teachers is 4.26, suggesting a relatively high level (**Table 7**).

**Table 7.** Descriptive statistics of digital awareness of university teachers in Chengdu

Item	N	Min	Max	Mean	SD
Digital Cognition	240	1	5	4.22	0.863
Digital Willingness	240	1	5	4.30	0.975
Digital Volition	240	1	5	4.26	0.908

Among the sub-factors, the digital willingness obtained the highest score ( $M = 4.30$ ), showing that the majority of teachers have a strong desire to actively acquire digital technologies and take part in the reform of digital instruction. The digital volition scored 4.26, indicating that teachers generally show a high ability to adapt and a positive attitude towards continuous improvement when facing difficulties in digital teaching. The digital cognition scored relatively low ( $M = 4.22$ ), suggesting that the understanding of the deeper values of educational digitalization and its future development among some teachers needs to be strengthened.

From the interviews with some university teachers, it is known that they have recognized the significance of digital technology in modifying the teaching methods, particularly in establishing smart classrooms, delivering online courses, and enhancing cooperation in research. Most of the teachers are quite active in these fields. Teacher T3 mentioned, “I think that digital teaching will certainly develop into an inevitable trend, especially with the emergence of AI tools which significantly improve the efficiency of lesson preparation and strengthen the effectiveness of interactive teaching. I actively learn these tools and apply them in the classroom.” His high score of digital willingness indicates that the middle-aged backbone teachers strongly support the educational reform through digitization. However, some teachers indicated that they are not clear about the substantial changes brought by digitalization to their special courses. Teacher T7 stated, “Although the importance of digitalization is emphasized and I do use PowerPoint and online resources, in fact, I do not have a clear understanding of the essential differences that digitalization can bring to my course contents--it appears to be just a formal change.” This point of view agrees with his low score of digital cognition, suggesting that although some experienced teachers are aware of the existence of digitalization, they only consider it from the viewpoint of utilizing the tools rather than developing a comprehensive digital educational philosophy.

### 3.2.2. Digital technology knowledge and skills

Digital technology knowledge and skills include the basic knowledge of digital technologies and the operation abilities with digital tools. The survey shows a dimension mean of 4.20, which is higher than the average level but suggests considerable differences among individuals (Table 8).

**Table 8.** Descriptive statistics of digital technology knowledge and skills of university teachers in Chengdu

Item	N	Min	Max	Mean	SD
Digital Technology Knowledge	240	1	5	4.12	0.939
Digital Technology Skills	240	1	5	4.21	0.788

Digital technology knowledge obtained a relatively low score ( $M = 4.12$ ), indicating that some teachers have insufficient basic theoretical knowledge in fields such as artificial intelligence, big data analysis, and the working principles of teaching systems. The score of digital technology skills is 4.21, which is slightly higher than that of the knowledge component, showing that the teachers have a certain ability to use common teaching systems, apply online instructional aids, and combine digital resources.

Interview findings revealed that most teachers are proficient in using teaching platforms, learning management systems, and common AI-assisted tools for lesson preparation and classroom management; however, their competency in deeply applying data analytics tools, intelligent assessment systems, and research-oriented digital platforms remains considerably weaker, with digital skills largely confined to basic operational use. T2 (4 years of teaching experience) acknowledged: “I am fairly proficient with tools like

Chaoxing Learning Pass and Rain Classroom, and I use AI tools to help organize materials, but statistical software is a struggle—it seems rarely needed in my current work, so I have never systematically studied it.” T4 (15 years of experience) noted: “I use data visualization tools in research and have tried intelligent scoring assistance for grading student assignments in teaching, but the use of these advanced tools has mostly been self-taught—the institution has not provided systematic training specifically targeting such needs.” Some teachers also reported that technical barriers are not confined to advanced tools. T6 (6 years of experience) commented: “Sometimes when campus systems update or equipment is unstable, it disrupts the entire rhythm of a class—situations like that sometimes make me somewhat resistant to digital technology.” These accounts indicate a clear tool-tier gap in the digital skill development of university teachers: while proficiency with basic tools is adequate, the development of specialized, higher-order digital skills lacks effective institutional support.

### 3.2.3. Digital application

Digital application is the most central practical dimension of teacher digital literacy, encompassing digital instructional design, digital teaching implementation, digital academic assessment, and digital collaborative education (Table 9).

**Table 9.** Descriptive statistics of the digital application of university teachers in Chengdu

Item	N	Min	Max	Mean	SD
Digital Instructional Design	240	1	5	4.11	0.805
Digital Teaching Implementation	240	1	5	4.25	0.758
Digital Academic Assessment	240	1	5	4.17	0.795
Digital Collaborative Education	240	1	5	4.19	0.802

The survey results show that the use of digital methods by university teachers is generally above average, with considerable differences in various teaching activities. The score of digital teaching implementation is the highest ( $M = 4.25$ ), indicating that teachers frequently apply digital equipment in their daily classes. The scores of digital cooperative education ( $M = 4.19$ ) and digital academic assessment ( $M = 4.17$ ) are next, indicating a basic level of digital procedures in cross-disciplinary cooperation and process-oriented evaluation. However, the score of digital instructional design is relatively low ( $M = 4.11$ ), suggesting that, compared with the application of tools, the planning and design of curriculum based on digital concepts are weaker areas in the present use of digital methods by the teachers.

The interview results show the internal division of digital applications. Concerning the implementation of digital teaching, most teachers mentioned that they had already incorporated digital tools into their daily classes. T5 said, “At present, teaching platforms are usually used in each class, including attendance, material distribution, post-class discussion, and so on, which receives a positive response from the students and makes the interaction more abundant compared with before.” However, some teachers pointed out some difficulties in the design of digital instruction. T1 expressed, “Although I know I should make high-quality digital courses, I really have no idea how to begin. The training sessions organized by the school mainly focus on the operation of the platform, and nobody teaches me how to integrate digital concepts systematically throughout an entire course.” As for the digital cooperative education, T8 remarked, “Currently, cross-disciplinary and cross-departmental online cooperation is still quite difficult. The main problem lies in the fact that different departments use different systems, and there is no interoperability of the data, making the communication

very inconvenient.” From these descriptions, it can be seen that the shortcomings of digital applications are not due to the lack of teaching motivation of the teachers, but reflect the systematic institutional defects in the training of digital course design, the mechanism of platform interoperability, and the technical support infrastructure.

### 3.2.4. Digital social responsibility

Digital social responsibility encompasses legal and ethical norms and digital security protection. The survey results show that this dimension scored highest overall ( $M = 4.41$ ), indicating that university teachers demonstrate generally strong digital ethics and security awareness (**Table 10**).

**Table 10.** Descriptive statistics of digital social responsibility of university teachers in Chengdu

Item	N	Min	Max	Mean	SD
Legal and Ethical Norms	240	1	5	4.46	0.927
Digital Security Protection	240	1	5	4.36	0.827

Among the sub-dimensions, the scores for legal and ethical norms are the highest ( $M = 4.46$ ), showing that teachers generally have a strong digital ethical awareness and voluntarily observe the relevant laws, regulations, and professional codes of conduct in both online and teaching environments. The score for digital security protection is slightly lower ( $M = 4.36$ ), indicating that though teachers pay great attention to the protection of personal information and data security in actual work, there is still an opportunity for enhancement. Teachers usually abide by the online behaviour rules, value the protection of intellectual property rights, maintain academic integrity and respect students’ privacy, and exhibit a good sense of data security.

In the interviews, most teachers mentioned that they had acquired a strong sense of digital risk prevention during online teaching, research cooperation, and student information management, which helped them to take preventive measures against data leakage, especially academic dishonesty. Teacher T4 said, “In my academic research, I attach great importance to the confidentiality of data and citation standards. When supervising graduate students, I specially emphasize that the artificial intelligence tools should not be used to produce texts and the authenticity and novelty of theses must be ensured.” Teacher T5 also pointed out, “After recording and uploading online courses to the system, I make sure that the course materials do not infringe on copyright and remind the students to pay attention to the sources of the images and music used in their assignments.” However, from the aspect of digital security protection at the operational level, some teachers recognized a difference between their knowledge and actual actions. Teacher T1 admitted, “I know that data security is very important, but in fact, I do not give it much attention — sometimes I directly send the list of students’ names and scores to my colleagues by WeChat without careful consideration.” These cases support the survey result that the mean score of digital security protection ( $M = 4.36$ ) is slightly lower than that of legal and ethical norms ( $M = 4.46$ ), indicating that although the teachers’ normative awareness is generally high, their security behaviors in daily activities need to be strengthened and standardized.

### 3.2.5. Professional development

The professional development part evaluates the teachers’ capability to participate in lifelong learning, instructional research and technological improvements. The questionnaire indicates an average score of 4.33,



suggesting an overall satisfactory achievement (**Table 11**).

**Table 11.** Descriptive statistics of professional development of university teachers in Chengdu

Item	N	Min	Max	Mean	SD
Digital Learning and Professional Training	240	1	5	4.38	0.921
Digital Teaching Research and Innovation	240	1	5	4.28	0.874

University professors show a good understanding of the influence of digitalization on professional improvement. The scores for digital instruction and professional training were the highest ( $M = 4.38$ ), showing that teachers are usually ready to improve their digital teaching abilities by means of online training and e-learning courses. However, the score for digital teaching research and innovation was lower ( $M = 4.28$ ), indicating that there is potential for teachers to increase their participation and creativity in conducting such research and practice.

The interviews indicated the differences in the professional progress of the teachers. T3 said, “I often take part in new technology courses on Bilibili and other websites and read research papers on digital teaching; I think that keeping up to date is very important, or else one may be easily left behind.” This indicates that the intermediate teachers have a strong urge to improve themselves in their profession. However, some teachers believed that the digital training provided by their school had little practical value. T2 pointed out, “Our university conducts a digital teaching training every year, but the main topics concentrate on the operation of the platform; there is almost no guidance on the establishment of a real digital course or the application of data to improve teaching. There is a great gap between the training and the actual needs.” T7 also mentioned, “My research work is already very busy; if one wants to learn systematically about the innovation in digital teaching, it is difficult to find time, and the motivation is not strong enough. It is also hard to manage the present courses properly.” From these remarks, it can be observed that the obstacles to professional development come from both the individual’s time and motivation as well as the shortcomings of the institution in arranging the digital training programs — particularly in providing more specialized and substantial professional assistance during the short training period.

### 3.3. Differential analyses of university teachers’ digital literacy

To investigate the influences of various background factors on the digital literacy of university teachers, we carried out differential analyses in six aspects: gender, educational background, age, teaching experience, professional rank, and disciplinary background. The findings show that there is no statistically significant difference between gender and educational background in affecting digital literacy, while age, teaching experience, and professional rank have more notable influences.

#### 3.3.1. Gender differences in digital literacy

Independent samples t-tests revealed no statistically significant gender differences across any dimension of digital literacy ( $P > 0.05$ ), indicating that gender is not a primary determinant of digital literacy among university teachers (**Table 12**). In the digital awareness dimension, male and female teachers scored similarly, reflecting broadly comparable levels of academic literacy, educational philosophy, and receptiveness to digital teaching. Although male teachers scored marginally higher in digital technology knowledge and skills and digital application, the differences were negligible and non-significant; as digital instruction in

universities is still in an early stage of widespread adoption, the low operational threshold for teaching tools and comprehensive institutional digital training coverage means that no gender gap has yet emerged in technology proficiency or daily application. Female teachers performed slightly better in digital social responsibility and professional development, which may be partly attributable to the concentration of female teachers in arts and humanities disciplines in this study—disciplines that place greater emphasis on professional norms and development—yet the inter-group differences remain small. Overall, digital literacy among university teachers is more substantially shaped by disciplinary background, teaching experience, and digital training history, with individual differences attributable to gender being minimal.

**Table 12.** Independent samples T-test: Digital literacy differences by gender

Dimension	Gender	Mean	SD	t	P	Sig.
Digital Awareness	Male	4.25	0.811	-0.620	0.536	n.s.
	Female	4.28	0.800			
Digital Technology Knowledge & Skills	Male	4.22	0.731	0.196	0.845	n.s.
	Female	4.20	0.775			
Digital Application	Male	4.20	0.651	0.162	0.871	n.s.
	Female	4.19	0.705			
Digital Social Responsibility	Male	4.39	0.762	-0.485	0.628	n.s.
	Female	4.42	0.799			
Professional Development	Male	4.32	0.760	-0.230	0.818	n.s.
	Female	4.34	0.772			

Note: n.s. = not significant ( $P > 0.05$ )

### 3.3.2. Educational background differences in digital literacy

The findings show that there are considerable differences in the levels of digital literacy among teachers from different educational backgrounds ( $P < 0.05$ ), especially that the doctoral degree holders score much higher than those with master's degrees in all aspects (**Table 13**). In reality, doctoral degree holders usually bear more research duties and often use various digital software, data processing devices, and online academic resources frequently, so they have gained more experience in digital knowledge, technical abilities, and applications in teaching and research, resulting in better performance. On the other hand, the master's degree teachers in this sample are mainly distributed in the fields of arts and humanities, where lectures are the main teaching method, and they do not rely much on advanced digital tools and research-oriented technologies, which may affect the average score of the group. Moreover, doctoral degree teachers exhibit greater maturity in the planning of professional development and digital ethics, leading to their higher scores in digital awareness and digital social responsibility. In summary, the results indicate that higher educational qualifications are related to better overall digital literacy.

**Table 13.** T-test: Digital literacy differences by educational background

Dimension	Education	Mean	SD	t	P	Sig.
Digital Awareness	Master's	4.26	0.795	-2.316	0.021	*
	Ph.D.	4.39	0.762			
Digital Technology Knowledge & Skills	Master's	4.21	0.758	-2.452	0.015	*

	Ph.D.	4.35	0.725			
Digital Application	Master's	4.18	0.696	-2.462	0.010	*
	Ph.D.	4.33	0.671			
Digital Social Responsibility	Master's	4.37	0.788	-2.285	0.023	*
	Ph.D.	4.48	0.751			
Professional Development	Master's	4.32	0.779	-2.368	0.018	*
	Ph.D.	4.45	0.743			

Note: \*  $P < 0.05$

### 3.3.3. Age differences in digital literacy

Significant age-group differences in digital literacy were observed across all dimensions ( $P < 0.05$ ), with a clearly stratified age pattern (**Table 14**). Teachers aged 31–40 scored highest across all dimensions, followed by those aged 30 and below, then those aged 41–50, with teachers aged 51 and above scoring lowest. As the core workforce in university teaching and research, teachers aged 31–40 tend to have higher educational credentials, regularly rely on digital platforms and specialized software for coursework, research projects, and academic exchange, and more actively engage in technology-enhanced teaching training. Younger teachers ( $\leq 30$ ) grew up in a digitally pervasive environment, demonstrate high receptivity to emerging internet tools and teaching platforms, and are quick adopters, yet their limited teaching and research experience places their overall performance slightly below that of mid-career teachers. Teachers aged 41 and above possess solid instructional experience and professional self-discipline, but their long-established traditional pedagogical patterns are difficult to transform rapidly; coupled with the higher proportion of arts and humanities teachers in this subsample, who have less demand for advanced digital tools, performance in digital knowledge and instructional application weakens progressively with age. Notably, inter-group differences in digital social responsibility are relatively small, suggesting that university teachers across age groups maintain sound digital ethical awareness and professional self-regulation.

**Table 14.** One-way ANOVA: Digital literacy differences by age group

Dimension	Age Group	Mean	SD	F	P	Sig.
Digital Awareness	$\leq 30$	4.31	0.775	3.426	0.018	*
	31–40	4.38	0.752			
	41–50	4.29	0.783			
	$\geq 51$	4.21	0.796			
Digital Technology Knowledge & Skills	$\leq 30$	4.25	0.746	3.715	0.012	*
	31–40	4.34	0.721			
	41–50	4.22	0.758			
	$\geq 51$	4.14	0.772			
Digital Application	$\leq 30$	4.23	0.685	3.862	0.009	**
	31–40	4.32	0.663			
	41–50	4.20	0.712			
	$\geq 51$	4.11	0.730			
Digital Social Responsibility	$\leq 30$	4.40	0.768	2.953	0.033	*
	31–40	4.47	0.745			
	41–50	4.39	0.774			

Professional Development	≥51	4.34	0.788	3.541	0.016	*
	≤30	4.36	0.759			
	31–40	4.43	0.736			
	41–50	4.33	0.767			
	≥51	4.27	0.781			

Note: \*  $P < 0.05$ ; \*\*  $P < 0.01$

### 3.3.4. Teaching experience differences in digital literacy

Digital literacy has shown statistically significant differences among different teaching experience groups in digital awareness, digital technology knowledge and skills, and digital application ( $P < 0.05$ ), which follows an inverted-U pattern with higher scores in the middle group and lower scores at the other ends (**Table 15**).

Moreover, the teachers who have 11–15 years of experience showed the best results in digital application ( $M = 4.29$ ,  $SD = 0.859$ ) and professional development ( $M = 4.46$ ,  $SD = 0.662$ ), with small standard deviations indicating both a high general level of digital literacy and uniform performance in this category. These teachers combine experienced teaching methods with good abilities in digital learning and adaptation, which facilitates the proper combination of educational skills and digital technology - thus making them the top group in the improvement of digital literacy.

Novice teachers with 0–5 years of experience, who are very interested in using digital technologies, obtained lower average scores and larger standard deviations (for example,  $SD = 1.045$  in the digital application dimension), suggesting significant variations in their performance and continuous shortcomings in the organization of instruction and the compatibility of digital tools with teaching environments.

Teachers with 21 or more years of experience, influenced by long-entrenched traditional teaching models, scored lowest in digital awareness and digital technology knowledge and skills, lagging significantly behind mid-career peers in motivation and capacity for deep digital application.

**Table 15.** One-way ANOVA: Digital literacy differences by teaching experience

Dimension	Teaching Exp.	Mean	SD	F	P	Sig.
Digital Awareness	0–5 yrs	4.22	0.934	2.033	0.019	*
	6–10 yrs	4.41	0.937			
	11–15 yrs	4.39	0.731			
	16–20 yrs	4.34	0.678			
	≥21 yrs	4.03	0.991			
Digital Technology Knowledge & Skills	0–5 yrs	4.01	0.857	2.305	0.049	*
	6–10 yrs	4.20	0.914			
	11–15 yrs	4.28	0.724			
	16–20 yrs	4.34	0.574			
	≥21 yrs	3.99	0.896			
Digital Application	0–5 yrs	4.08	1.045	1.175	0.032	*
	6–10 yrs	4.19	0.834			
	11–15 yrs	4.29	0.859			
	16–20 yrs	4.26	0.618			
	≥21 yrs	4.06	0.848			

Digital Social Responsibility	0–5 yrs	4.23	1.127	1.551	0.188	n.s.
	6–10 yrs	4.35	0.914			
	11–15 yrs	4.49	0.690			
	16–20 yrs	4.48	0.652			
	≥21 yrs	4.29	0.974			
Professional Development	0–5 yrs	4.07	0.978	1.630	0.167	n.s.
	6–10 yrs	4.33	0.962			
	11–15 yrs	4.46	0.662			
	16–20 yrs	4.38	0.768			
	≥21 yrs	4.15	0.908			

Note: \*  $P < 0.05$ ; n.s. = not significant

### 3.3.5. Professional title differences in digital literacy

Significant variations in digital literacy were observed among different professional title groups in aspects of digital awareness, digital application, and professional development ( $P < 0.05$ ;  $P = 0.002$  for professional development, a highly significant difference), and the intermediate- and associate-senior-title teachers showed the greatest advantages in general (Table 16).

Moreover, the intermediate-title teachers showed a good level of digital awareness ( $M = 4.43$ ) and digital application ( $M = 4.28$ ,  $SD = 0.516$ ), having both high mean scores and small standard deviations, which indicate a high degree of digital literacy and uniform performance. The associate-senior-title teachers were superior in digital application ( $M = 4.40$ ), digital social responsibility ( $M = 4.50$ ), and professional development ( $M = 4.48$ ), thus being the best group in the aspect of digital literacy improvement. Both groups usually have heavy teaching and research tasks, often applying large language model platforms and intelligent teaching devices, and possess strong practical motivation and ability in the innovation and cooperation of digital teaching.

Senior-title teachers have a good performance in digital social responsibility ( $M = 4.29$ ), but get fewer marks in digital application ( $M = 4.19$ ) and professional development ( $M = 4.16$ ) compared with intermediate and associate-senior teachers, indicating a conservative attitude towards deep digital application and instructional innovation. The initial-title teachers, although they accept new technologies, score below average in digital awareness ( $M = 4.26$ ), digital application ( $M = 4.11$ ), and professional development ( $M = 4.06$ ), with larger differences in some respects (such as the standard deviation of professional development being 0.961), suggesting that their digital literacy has not reached a stable and mature application system yet.

Upon closer examination, the title-based differences in digital literacy fundamentally reflect differences in career development stage, instructional and research practice, and job requirements. Professional title is not a direct determinant of digital literacy, but rather an external marker of the professional identity acquired through sustained teaching practice and research accumulation—these process-driven practical experiences constitute the core driver of digital literacy development.

**Table 16.** One-way ANOVA: Digital literacy differences by professional title

Dimension	Title	Mean	SD	F	P	Sig.
Digital Awareness	Initial	4.26	0.903	4.965	0.020	*
	Intermediate	4.43	0.807			



	Associate Senior	4.14	0.652			
	Senior	4.39	0.931			
Digital Technology Knowledge & Skills	Initial	4.45	0.714	4.135	0.070	n.s.
	Intermediate	4.33	0.956			
	Associate Senior	3.97	0.609			
	Senior	4.20	0.876			
Digital Application	Initial	4.11	0.930	3.102	0.027	*
	Intermediate	4.28	0.516			
	Associate Senior	4.40	0.811			
	Senior	4.19	0.686			
Digital Social Responsibility	Initial	4.41	0.883	2.452	0.064	n.s.
	Intermediate	4.32	0.760			
	Associate Senior	4.50	0.916			
	Senior	4.29	0.776			
Professional Development	Initial	4.06	0.961	5.057	0.002	**
	Intermediate	4.33	0.649			
	Associate Senior	4.48	0.862			
	Senior	4.16	0.778			

Note: \*  $P < 0.05$ ; \*\*  $\zeta < 0.01$ ; n.s. = not significant

### 3.3.6. Disciplinary background differences in digital literacy

Statistically significant differences were found in the five digital literacy dimensions among teachers from the four disciplines—arts and humanities, science and engineering, economics and management, and medicine and agriculture ( $P < 0.05$ ) (**Table 17**). The scores of science and engineering teachers were the highest, followed by medicine and agriculture teachers in descending order, then economics and management teachers, and finally arts and humanities teachers, who obtained the lowest scores in all dimensions.

These distinctions in discipline are due to the different teaching and researching methods in each field. Science and engineering teachers usually make use of special software, data processing devices, and information-based experimental setups in their regular classes and research, which helps to develop a better understanding of digital knowledge and practical application. Whereas the medical and agricultural teachers frequently apply virtual simulation experiments, specific databases, and online academic resources, thus offering more varied digital application environments. As for the economics and management teachers, they mainly depend on statistical software and online practical training systems, and have an intermediate level of digital ability. In contrast, the art and humanities teaching is mainly conducted by lectures and offline creative activities, and there is a low requirement for special digital equipment; moreover, the considerable number of art and humanities teachers in the present sample lowers the average score in all aspects.

Digital social responsibility scores are very high and are clustered together in different fields (science and engineering: 4.46; medicine and agriculture: 4.43; economics and management: 4.41; arts and humanities: 4.37), showing little difference among the fields. This indicates that the teachers from all the fields have good digital ethical sense and can regulate their own behavior, which is influenced by the common professional training environment of higher education. The field of study mainly affects the digital technology ability and teaching application capability of the teachers, but its influence on digital social responsibility is relatively small, which has practical significance for the planning of personalized training programs.

**Table 17.** One-way ANOVA: Digital literacy differences by disciplinary background

Dimension	Discipline	Mean	SD	F	P	Sig.
Digital Awareness	Arts & Humanities	4.26	0.785	3.382	0.020	*
	Sci. & Engineering	4.39	0.746			
	Econ. & Management	4.33	0.762			
	Med. & Agriculture	4.36	0.751			
Digital Technology Knowledge & Skills	Arts & Humanities	4.19	0.773	3.756	0.013	*
	Sci. & Engineering	4.34	0.725			
	Econ. & Management	4.27	0.743			
	Med. & Agriculture	4.31	0.732			
Digital Application	Arts & Humanities	4.17	0.728	3.915	0.009	**
	Sci. & Engineering	4.32	0.674			
	Econ. & Management	4.25	0.695			
	Med. & Agriculture	4.29	0.683			
Digital Social Responsibility	Arts & Humanities	4.37	0.791	2.876	0.036	*
	Sci. & Engineering	4.46	0.748			
	Econ. & Management	4.41	0.765			
	Med. & Agriculture	4.43	0.754			
Professional Development	Arts & Humanities	4.29	0.782	3.453	0.018	*
	Sci. & Engineering	4.42	0.736			
	Econ. & Management	4.36	0.753			
	Med. & Agriculture	4.39	0.742			

Note: \*  $P < 0.05$ ; \*\*  $P < 0.01$

## 4. Discussion

### 4.1. Structural imbalance in overall performance and theoretical interpretation

The average digital literacy score for university teachers in Chengdu is 4.28, showing a relatively high level; however, there exists an obvious imbalance in different aspects: the scores of digital social responsibility ( $M = 4.41$ ) and professional development ( $M = 4.33$ ) are higher, whereas those of digital application ( $M = 4.19$ ) and digital technology knowledge and skills ( $M = 4.20$ ) are relatively lower. The situation of “strong normative cognition and weak technological application” is presented in all the sub-aspects—the willingness is higher than the cognition, the skills are higher than the knowledge, the implementation is higher than the design, and the legal norms are higher than the security practice, indicating that the transition from “knowing” to “doing” and from “awareness” to “deep application” is the most significant structural weakness in the present digital literacy improvement of university teachers. From the theoretical point of view, both Self-Efficacy Theory and Technology Acceptance Model (TAM) suggest that the perceived usefulness being greater than the perceived ease of use is an important mechanism leading to the structural differences between awareness and application<sup>[2]</sup>. In addition, the interview results confirm the main conclusion that the deficiencies in the digital literacy of teachers are not due to attitude resistance, but are fundamentally caused by the systematic institutional problems, such as the lack of practical training systems, insufficient guidance on digital instructional design, and the division of platform interoperability mechanisms. This will have a direct influence on the formulation of the institutional digital training policies: the focus should be changed

from “promoting awareness” to “strengthening capability”, with practical support as the main tool to bridge the transformational gap between awareness and application.

## 4.2. Discussion of the effects of demographic variables

There is no significant effect of gender ( $P > 0.05$ ), indicating that the policy resources should be focused on other variables that have greater differential influences, such as disciplinary background and teaching experience. The positive role of educational background mainly acts through the long-term and frequent use of special digital tools by doctoral students—“the internalization of digital skills promoted by research practice” is the main causal link, suggesting that university training should improve a “digital skill integration oriented” method. The non-linear relationship between age and digital literacy (with the best performance shown by teachers aged 31–40) supports the “career prime” hypothesis; the usage frequency driven by demands is the key mechanism for ability formation. For the senior teachers aged 51 and over, their poor performance is not only due to the decreased technology acceptance, but also to the cognitive inertia in terms of pedagogical values, which requires peer learning and case study seminars as the priority way to facilitate concept renewal. The inverted-U shaped effect of teaching experience shows different intervention requirements for the novice teachers (whose training system cannot meet the need of digital instructional design) and the experienced teachers (which show cognitive inertia); the differences in professional titles indicate the demand-driven distinctions across the career development stages; and the disciplinary differences act mainly through the disciplinary culture and the habitual use of digital tools in practice, which provide a basis for individualized training methods.

## 4.3. Limitations and future directions

This investigation has some disadvantages. Firstly, the sample consists of only four universities in Chengdu, which leads to a high degree of homogeneity in both geographical and institutional aspects; it is advisable to be careful when extending the results to other situations. Secondly, the use of self-report methods might cause subjective cognitive bias; in the future, objective performance indices, such as observations of digital teaching habits and student evaluation data, should be used for verification. Thirdly, the cross-sectional design does not allow for the longitudinal study of the changing process of digital literacy; further longitudinal research will be helpful in clarifying the causal relationships among the variables. Although there are these shortcomings, this study uses the MoE standard as its measurement basis to systematically reveal the actual level and the differences between groups of university teachers’ digital literacy in our local Chinese environment, offering an important starting point for subsequent research.

## 5. Conclusion

Based on the MoE industry standard Teacher Digital Literacy as a research framework, this investigation used a mixed-methods approach to thoroughly investigate the digital literacy level and group differences among 240 professors from four universities in Chengdu. The main findings are as follows.

Initially, the general digital competence of university teachers in Chengdu is at a relatively high level ( $M = 4.28$ ), but there exists a significant structural disparity, particularly in the situation of “strong normative understanding and weak practical use”, which is observed in all aspects. The cause of this structural deficiency lies in the lack of practical training systems and the disunity of platform interconnections;

therefore, the improvement of digital competence should be changed from “raising awareness” to “increasing ability.”

Second, there is no statistically significant difference between genders in digital literacy ( $P > 0.05$ ); hence, the policy resources should be mainly allocated to the variables showing greater variations, like disciplinary background and teaching experience.

Furthermore, an educational background has a significant positive influence, in which doctoral degree holders show better performance than those with master’s degrees in all aspects ( $P < 0.05$ ). The main causal relationship — “research experience leading to the acquisition of digital skills” — suggests that the university training programs should focus more on a “research-oriented integration of digital skills.”

Moreover, the relation between age and digital literacy is not in direct proportion, where the teachers aged 31–40 have the highest general ability and those aged 51 and above exhibit poorer performance. Their poor results are caused by the effect of cognitive inertia on educational values; therefore, appropriate intervention measures for different ages are required.

Fifth, the relation between teaching experience and digital literacy is in an inverted-U shape, and teachers with 11–15 years of experience show the best performance. The weaknesses of the new teachers indicate the lack of systematic guidance on digital instructional design in the training courses; the experienced teachers need a renewal of value as a must, and both categories require different and specific measures of intervention.

Sixth, intermediate- and associate-senior-title teachers demonstrate the strongest overall digital literacy; full professors perform more conservatively; and initial-title teachers exhibit the greatest internal differentiation. Professional title serves as an external marker of cumulative practical experience, with “demand driven by career development stage” constituting the core explanatory variable.

Seventh, disciplinary background exerts a significant and systematic influence on digital literacy, following a gradient pattern of science and engineering > medicine and agriculture > economics and management > arts and humanities ( $P < 0.05$ ). Disciplinary culture and the everyday embeddedness of digital tools in practice are the primary mechanisms; the comparatively small inter-disciplinary gap in digital social responsibility—shaped by the shared professional environment of higher education—provides an important basis for designing differentiated training strategies.

In conclusion, institutional administrators ought to establish a diversified and targeted digital literacy improvement system: taking disciplinary background as the basic unit, teaching experience and professional title as classification criteria, and following the sequence of “tool practice → curriculum integration → value renewal” for ability building, to carry out the corresponding policies in an integrated way. Further studies may increase the sample size, include longitudinal investigation methods and objective assessment indices, and clarify the causal processes by which each factor influences the development of teachers’ digital literacy.

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# Path Exploration of “One-Stop” Student Community Academy Management

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**Abstract:** In recent years, China's higher education has entered a stage of high-quality development, and the reform of education models has been continuously deepened. As a new talent cultivation model, the academy system has been widely promoted and practiced in colleges and universities. The academy system breaks the traditional disciplinary barriers of academic departments, takes the student community as the carrier, focuses on the all-round development of students, and builds an education platform integrating education, management, and services. As the core content of the academy system construction, the “one-stop” community management model integrates teaching, management, logistics, and other resources into the student community through resource integration, process optimization, and service innovation, providing students with all-round, all-time, and whole-process service support. It aims to create a community ecology featuring “cohabitation of teachers and students, integration of liberal arts and sciences, interdisciplinary interaction and personalized development.”

**Keywords:** Academy; One-stop community management; Student development; Educational function

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## 1. Introduction

The core mission of higher education in the new era is to foster virtue through education and cultivate socialist builders and successors with all-round moral, intellectual, physical, aesthetic, and labor development. The traditional student management model in colleges and universities is mostly based on academic departments, which have problems such as disconnection between management and services, scattered educational resources, and insufficient student participation, making it difficult to meet the diversified and personalized growth needs of students. Carrying out path exploration of the academy system management and in-depth analysis of its practical effects and existing problems is of great practical significance for improving the academy-based education model, upgrading the level of student management and services in colleges and universities, and promoting the all-round development of students.

## **2. Research background and significance of the role of “one-stop” student community management for students**

### **2.1. Research background**

At present, college students are characterized by active thinking, diverse needs, and strong self-awareness. The traditional student management model can no longer meet the diversified demands of students' growth and development. On the one hand, students have scattered and diverse needs in academic competitions, life services, mental health, career planning, and other aspects, requiring cross-departmental and multi-dimensional collaborative support <sup>[1]</sup>. On the other hand, problems such as scattered resources, poor communication, and lagging services among various departments in colleges and universities result in cumbersome procedures and a poor experience for students.

### **2.2. Research significance**

As an important exploration of education model reform in Chinese colleges and universities, current research on the academy system mostly focuses on macro-level aspects such as connotation interpretation and model construction, while research on the specific practical form of one-stop community management is relatively scarce, especially systematic research on its role for students <sup>[2]</sup>. By deeply analyzing the role of academy-based one-stop community management in students' ideological growth, academic development, comprehensive quality improvement, and mental health, and revealing the internal connection between one-stop community management and student development, this study can make up for the deficiencies of existing research and enrich the theoretical system of college student management. Sorting out the practical status of current academy-based one-stop community management and putting forward targeted optimization strategies combined with students' actual needs will help colleges and universities further integrate resources, improve collaboration mechanisms, upgrade service quality, promote the transformation of one-stop community management from “formalization” to “effectiveness”, and give full play to the educational advantages of the academy system <sup>[3]</sup>.

## **3. Research status at home and abroad**

### **3.1. Foreign research status**

The academy system originated from the residential college system in Western universities, such as the college system at the University of Oxford and the University of Cambridge in the UK, and the residential college system at Harvard University and Yale University in the US. Foreign research on the residential college system started early, mostly focusing on its educational function, management model, and community construction. For example, foreign scholars found through empirical studies that the residential college system can effectively improve students' academic performance, cultivate social communication ability and develop comprehensive quality by building a close teacher-student interaction network, creating a strong academic atmosphere and carrying out rich community activities. In terms of one-stop service management, relevant practices and research in foreign universities are also relatively mature <sup>[4]</sup>. Universities in the US, the UK, and other countries have generally established one-stop student service centers, integrating services such as admission and enrollment, student status management, academic counseling, employment guidance, and mental health to provide convenient and efficient services for students. Relevant studies show that the construction of one-stop service centers can significantly improve students' service experience, reduce transaction costs, and help

universities optimize management processes and improve management efficiency<sup>[5]</sup>.

### **3.2. Domestic research status**

Domestic research on the academy system began at the beginning of the 21st century, and relevant research has gradually increased with the advancement of academy system reform in Chinese colleges and universities. At present, domestic research mainly focuses on the following aspects: first, the interpretation of the connotation and value of the academy system, discussing its advantages in breaking disciplinary barriers, promoting the integration of liberal arts and sciences, and achieving holistic education; second, the model construction and practical exploration of the academy system, summarizing the construction models and operation experience of different universities, such as the “Academy-Department” dual system at Fudan University and the “Academy System + Tutor System” at Xi’an Jiaotong University; third, the innovation of student management and services under the academy system, exploring innovative paths of ideological and political education, academic guidance and life services for students under the academy system background<sup>[6]</sup>.

## **4. Path exploration of “one-stop” student community management in Xi’an International University**

### **4.1. Background and positioning**

In 2019, the Ministry of Education launched the pilot work of the comprehensive management model construction of a “one-stop” student community, promoting the sinking of educational resources to the student community, opening up the “last mile” of education, and building a comprehensive education pattern. As one of the first batches of pilot universities of the Ministry of Education’s “one-stop” student community and the only private university in Northwest China awarded the “National Party Building Demonstration University” by the Ministry of Education, Xi’an International University was selected into the list of national university demonstration “one-stop” student communities in 2025<sup>[7]</sup>. Based on its school-running characteristics, the university takes Zhengmeng Academy as the core carrier to promote the construction of a one-stop community management. Relying on its own “Yuhualong” campus culture, the university pioneered the “Department + Academy” student management and education model. Taking Zhengmeng Academy as the carrier of one-stop community management, it integrates Party building guidance, general education, and life services into students’ daily life, forming a unique education system<sup>[8]</sup>. As a residential academy, Zhengmeng Academy has five sub-academies corresponding to the five schools of the university, including the Business School, the School of Humanities and Arts, and the School of Medicine, realizing full coverage of “students in departments during classes, in academies after classes, online teaching and offline tutoring.” It has built a collaborative education model of “Department + Academy”, with the core positioning of “fostering virtue through education, serving students and promoting growth”, building the academy into a position for students’ ideological growth, a platform for academic development, a harbor for life services and a carrier for cultural inheritance.

Taking the academy as the carrier, integrating various educational resources of the university, centrally integrating the functions of students’ ideological education, academic guidance, life services, mental health and practical innovation, realizing a student management model of “one-stop” handling, “all-round” services and “whole-process” education. The core is to break departmental barriers, integrate resources, get close to students and serve students, and promote educational work to students<sup>[9]</sup>.

Drawing on the spirit of traditional Chinese academies, integrating modern higher education concepts, based on student residential communities, breaking the boundaries of majors and grades, focusing on general education, personality cultivation, and comprehensive quality improvement, forming a collaborative pattern of “department fostering talents + academy educating people” with the department system <sup>[10]</sup>.

## 4.2. Core measures

Party Building Guidance, Consolidating Ideological Foundation: Xi'an International University extends Party building work to the academy, establishing functional Party organizations in Zhengmeng Academy—Party member service stations and academy Party branches. Outstanding student League members, Party members, and activists for Party membership are selected to participate in the daily management of the academy. Activities such as “Model Party Member Dormitory Evaluation” are carried out to give play to the vanguard and exemplary role of League and Party members and strengthen students' ideological guidance.

Resource Integration, Optimizing Service Support: Constructing a hierarchical management service paradigm of “university-academy”, building a university-level “one-stop” student affairs service center, providing multiple services such as student status management, funding services, intelligent printing, and independent payment. Promoting the construction of an intelligent service platform, integrating multiple systems such as freshman orientation, dormitory management, and funding, realizing “one-stop” online handling of students' full-cycle services. Meanwhile, developing a student comprehensive quality evaluation system to track students' growth and form growth portraits <sup>[11]</sup>.

General Education, Cultivating Cultural Literacy: Constructing a general education system rooted in “rites” and “music.” Three cultural inheritance bases of “Beginning with Poetry”, “Establishing with Rites”, and “Perfecting with Music” are set up in Zhengmeng Academy. Required courses such as *Original Confucianism and Humanistic Accomplishment*, *Gujin and Xi'an Drum Music* are offered. Traditional culture clubs such as Qifang Tea Society, Qin Society, and Calligraphy Society are established. The “Yuhualong” College Students Culture and Art Festival is held annually to promote the inheritance of excellent traditional Chinese culture and improve students' humanistic quality <sup>[12]</sup>.

Student-Oriented, Strengthening Self-Management: Establishing the Academy Student Self-Discipline Management Committee, implementing the “Five Chiefs System” (dean, building chief, floor chief, club chief, dorm chief) management network, guiding students to realize self-management, self-service, self-education, and self-supervision. Building platforms such as academy afternoon tea, setting up a “response-to-complaints-immediately” service platform, empowering students to participate in academy governance, solving students' demands, and enhancing students' sense of subjectivity <sup>[13]</sup>.

Diversified Cultivation, Improving Comprehensive Ability: Establishing a peer tutor group, carrying out activities such as learning experience salons and employment lectures. Setting up positions such as innovation and entrepreneurship workshops and Mengxin Station, carrying out activities such as innovation and entrepreneurship, mental health, and skill training. Employing industry experts to settle in the community and holding post-skill competitions to comprehensively improve students' practical ability, innovative spirit, and professional literacy <sup>[14]</sup>.



## **5. Paths and exploration of “one-stop” student community management**

### **5.1. Strengthen ideological guidance and shape correct values**

Led by Party building, the “one-stop” student community management of the academy integrates ideological and political education into students’ daily life, effectively guiding students to establish a correct world outlook, outlook on life, and values. Through Party member service stations, ideological and political lectures, themed Party day and League day activities, the academy strengthens patriotism and collectivism education for students, allowing them to receive ideological edification imperceptibly. Activities such as “Model Party Member Dormitory” give full play to the vanguard and exemplary role of student Party members, driving students to be proactive and united, cultivating their patriotism and social responsibility<sup>[15]</sup>.

### **5.2. Support academic development and consolidate growth foundation**

The “one-stop” student community management of the academy breaks the boundaries of majors and grades, providing all-round support for students’ academic development and effectively making up for the deficiencies of traditional departmental academic guidance. On the one hand, an academic guidance team composed of professional teachers, counselors, and outstanding students is formed, offering academic counseling courses, postgraduate entrance examination seminars, and learning experience-sharing meetings to provide precise guidance for students’ learning difficulties, helping them master scientific learning methods and improve learning efficiency. The academy builds learning positions such as “Internet-famous book houses” and “reading clubs” to create a strong learning atmosphere. Self-study rooms are provided in dormitory buildings to encourage students to study independently and communicate in their spare time. The library provides books in dormitory buildings, offering convenient learning channels for students.

### **5.3. Improve comprehensive ability and promote all-round development**

The “one-stop” student community management of the academy focuses on the cultivation of students’ comprehensive quality, effectively improving students’ comprehensive abilities through diversified practical activities and management platforms. First, improve self-management ability: the Student Self-Discipline Management Committee and the “Five Chiefs System” management network allow students to directly participate in daily academy management, dormitory inspection and activity organization, exercising their organizational coordination, communication and self-restraint abilities in practice. Second, improve practical and innovative ability: the academy organizes skill competitions and social practice activities, providing a platform for students to show themselves and improve their abilities, cultivating their innovative thinking and practical ability. Third, improve interpersonal communication ability: breaking major and grade boundaries, students communicate and help each other in accommodation, activities, and study, effectively improving interpersonal relationships and cultivating teamwork awareness. In addition, labor education and volunteer service activities cultivate students’ labor values and dedication; cultural club activities improve their cultural literacy and aesthetic ability, realizing the all-round development of students’ morality, intelligence, physical education, aesthetics and labor.

### **5.4. Optimize life services and enhance sense of belonging and happiness**

The “one-stop” student community management of the academy is student-centered, integrating various life service resources to provide convenient and considerate life services for students, effectively solving practical difficulties and enhancing their sense of belonging and happiness. On the one hand, the one-



stop service center realizes “one-stop” handling of student affairs, reducing procedures and improving efficiency, allowing students to focus more on study and life. The application of intelligent platforms enables students to handle dormitory selection, payment, repair, and other business online, further improving service convenience. On the other hand, the academy sets up study rooms and psychological counseling rooms to provide mental health consultation and emotional counseling services, helping students relieve pressure and maintain physical and mental health. The “response-to-complaints-immediately” service platform and hotline are set up to collect students’ demands in time and solve problems in accommodation, catering and rights protection, making students feel the care of the university. Rich after-school life and a warm community atmosphere make students feel the warmth of “home” in the academy, enhancing their sense of identity and belonging to the university.

## 6. Summary

With the continuous deepening of higher education reform, “one-stop” student community management will become an important part of the education system in colleges and universities. As an innovation of the college education model, it plays a vital role in the growth and success of students. With the development of artificial intelligence, big data, and other technologies, digital technology can be integrated into “one-stop” student community management to build an intelligent education platform and improve the efficiency and quality of management services. By continuously optimizing the “one-stop” student community management model and solving existing problems, its educational function can be further exerted, the college education system can be continuously improved, better support for students’ growth can be provided, and contributions can be made to the development of higher education.

## Disclosure statement

The author declares no conflict of interest.

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# Mediation in the CEFR: Innovating Foreign Language Teaching in Sino-Foreign Cooperative Education

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**Abstract:** Against the background of Sino-foreign cooperative education, traditional foreign language teaching is constrained by exam-oriented modes, resulting in students' inadequate practical language proficiency and intercultural competence. Based on the CEFR Companion Volume, this paper explores the connotation and classification of mediation competence. The paper analyzes the major problems in current foreign language teaching and puts forward targeted implementation paths. Integrating mediation activities into teaching can shift the focus from mere skill training to cultivating students' ability of meaning construction and cross-cultural communication. It offers new ideas for foreign language teaching reform and talent cultivation in Sino-foreign cooperative education.

**Keywords:** Mediation; CEFR; Foreign language teaching; Sino-foreign cooperative education

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## 1. Introduction

Foreign language teaching is key to Chinese-foreign cooperative education. It needs to develop students' overall foreign language ability, especially communication and cross-cultural skills, which directly affect teaching quality and students' academic performance. However, foreign language teaching in most programs is still influenced by traditional models and exam-oriented education, leading to clear weaknesses. Students lack oral expression and quick-response skills, and their practical communication ability fails to meet overseas study requirements. Meanwhile, they have weak cross-cultural awareness and cannot adapt well to cultural differences. They face double difficulties in both language use and cultural adaptation. Therefore, it is urgent to explore foreign language teaching reforms suitable for cooperative education. The Common European Framework of Reference for Languages (CEFR) emphasizes communication, cross-cultural and multicultural competence, which closely matches the challenges and talent-training goals of foreign language teaching in cooperative programs. Its supplementary volume's new discussion on language mediation

activities offers a new perspective for competence development. Effective teaching reforms usually follow a gradual strategy: first, optimize the overlapping parts between existing local curricula and the CEFR, then target core elements of the framework that best suit local needs for key breakthroughs. Such selective adaptation is much more workable than complete transplantation <sup>[1]</sup>. Foreign language teaching in China's Sino-foreign cooperative education can be reformed based on the CEFR. However, it should be adapted to national conditions, student characteristics, and teaching needs. Its theories on language mediation activities can provide theoretical guidance and practical references for teaching model innovation and the development of students' overall competence.

## **2. Mediation in the CEFR companion volume (CEFRCV): Background and connotations**

The concept of mediation originates from profound changes in global language use. With the advancement of European integration and globalization, cross-linguistic and cross-cultural communication has become a normal part of daily interaction. Language no longer serves merely as a communication tool for native speakers, but frequently acts as a medium for people with different linguistic backgrounds to exchange ideas. Traditional foreign language evaluation systems, which take native speaker competence as the standard, can no longer adapt to the practical needs of real-world language use. The mediation concept helps bring states, languages, and cultures back together by providing a third area for dialogue to overcome a conflict-inducing dualism <sup>[2]</sup>. North's systematic discussion of mediation provides theoretical support for its inclusion in the CEFR. He divides mediation into four types: linguistic, cultural, social, and pedagogic mediation <sup>[3]</sup>. Against this background, the European Commission formally published the CEFRCV in 2020. It regards mediation as a core language ability equal to reception, production, and interaction, and explains its concepts, types, and standards in a complete and systematic way. These four main communication modes have replaced the traditional four skills: listening, speaking, reading, and writing. This is a revolutionary update. North points out that language is not a static thing to learn and study, but a process or action, which is called "linguaging." People express thoughts through language. He also stresses the importance of social interaction in reaching agreement and improving mutual understanding <sup>[1]</sup>. Some scholars on Reflection Day argue that language should no longer be seen as an object. Instead, it should be re-conceptualized as a process — linguaging, which centers on agency and mediation <sup>[4]</sup>. In the CEFR, "proficiency" encompasses the ability to perform communicative language activities ("can do ...") while drawing upon both general and communicative language competences (linguistic, sociolinguistic and pragmatic) and activating appropriate communicative strategies <sup>[5]</sup>. This theoretical shift no longer regards learners as passive receivers of linguistic signs. Instead, it recognizes learners' agency to actively construct meaning and take part in discourse practices. From the perspective of linguaging, language is no longer isolated learning content. It acts as a medium connecting people with each other, people with society, and thoughts with expressions. Value is created through real-life communication, interactive dialogue and meaning negotiation. Based on this logic, the CEFR-CV stresses that language education should not only focus on mastering language forms. More importantly, it should develop learners' overall ability to communicate, cooperate, express opinions and understand diverse cultures in real situations. It highlights that language is essentially a social practice. This offers a new theoretical model for curriculum design, teaching assessment and competence development in contexts such as Sino-foreign cooperative education and cross-cultural foreign language teaching.

The CEFR-CV describes mediation activities as follows: In mediation, the user/learner acts as a social agent who creates bridges and helps to construct or convey meaning, sometimes within the same language, sometimes across modalities (e.g. from spoken to signed or vice versa, in cross-modal communication) and sometimes from one language to another (cross-linguistic mediation). The focus is on the role of language in processes like creating the space and conditions for communicating and/or learning, collaborating to construct new meaning, encouraging others to construct or understand new meaning, and passing on new information in an appropriate form. The context can be social, pedagogic, cultural, linguistic, or professional <sup>[4]</sup>.

CEFR CV divides mediation into mediation activities and mediation strategies. Mediation activities include three parts. First, text mediation handles text and information exchange, such as sharing information, paraphrasing content, translating, notetaking, and text analysis. Second, conceptual mediation builds ideas and opinions through group discussion, cooperative research, and guided communication. Third, interpersonal mediation removes barriers in communication by clearing misunderstandings, solving disagreements, and improving interaction. Mediation strategies are skills to support these activities. The two main strategies are explaining new ideas by linking existing knowledge and simplifying texts to match learners' understanding levels.

Therefore, mediation is not equal to translation. Translation is only one type of crosslingual mediation. Mediation covers much more than language conversion. It includes explaining concepts and reaching agreement within one language, transferring meanings across different modes, and building communication and shared meaning based on cultural and social contexts. Essentially, mediation focuses on meaningmaking by users rather than mechanical language conversion. In teaching, teachers simplify professional knowledge, and students learn through cooperation. In crosscultural situations, mediation balances language rules and cultural differences to reduce communication gaps. For this reason, CEFR lists mediation competence as a separate core dimension. It moves beyond traditional listening, speaking, reading and writing skills and focuses on learners' overall ability to solve real problems and improve interpersonal communication. It guides foreign language teaching from skill training to communication competence development.

In addition, the CEFR Supplement Volume abandons the binary division of native and nonnative speakers, using neutral terms Language A and Language B instead. This weakens the absolute authority of nativespeaker standards in traditional teaching and breaks the "nativespeakeronly" evaluation mindset, giving secondlanguage learners more freedom to express themselves. In mediation activities, nativespeaker norms are no longer the only standard. All language users enjoy equal rights in meaning negotiation, discourse mediation, and crosslingual communication. Based on their thinking and knowledge from Language A, learners understand, transfer, and reconstruct Language B and take part in communication as language mediators. This equal position respects learners' individual language development paths, includes mediation and crosslingual transfer abilities in education, and matches the agency and social mediation highlighted in languaging theory.

In summary, from the perspective of language teaching, mediation activities connect learners with society, other people, and cultures, and integrate language with society and culture. Running through language input, output and interaction, they function to construct meaning and reshape the direction of foreign language teaching toward developing learners' intercultural and communicative competence.



### **3. Problems and needs of foreign language teaching in Sino-foreign cooperative education**

The Outline for Building a Powerful Education Nation (2024-2035) clearly states that education should cultivate talents for the Party and the country, and fully serve the development of Chinese-style modernization<sup>[6]</sup>. Guided by this strategy, the core goal of Sino-foreign cooperative education is to train international interdisciplinary talents with solid professional knowledge, strong language skills and outstanding cross-cultural competence. At present, artificial intelligence is developing rapidly, and machine translation is widely used. Traditional foreign language teaching faces great challenges of transformation. How to promote foreign language teaching reform and cultivate high-quality students with comprehensive practical abilities has become an important issue in foreign language education. In real teaching practice, foreign language teaching in Sino-foreign cooperative education still meets many practical problems. Students' foreign language ability not only directly affects their willingness to study abroad but also plays a key role in their further study and long-term development.

#### **3.1. Insufficient development of practical language ability**

Students in Chinese-foreign cooperative education programs generally have weak practical foreign language skills and lack independent thinking in expression, failing to meet the needs of international cross-cultural communication in study and real-life use. In practice, most students only master basic vocabulary and grammar and are good at exam-taking, but their real-life language use ability is very poor. In real-world foreign language communication, they cannot flexibly use language knowledge to form sentences or share ideas. They struggle to state personal opinions clearly and completely. Many students dare not speak, do not know how to speak, or give empty expressions. They mostly use fixed sentence patterns mechanically instead of sharing personal thoughts based on real situations. Their language use is rigid, and the problem of "dumb English" is common.

This problem has several deep-rooted causes. First, students in these programs generally have weaker basic foreign language skills than those in regular classes, with limited language input, which creates natural disadvantages for later language use and opinion expression. Second, long-term exam-oriented education makes students misunderstand foreign language learning. They simply regard it as memorizing words, doing grammar exercises, and taking tests. They ignore the communicative nature and practical value of language and never form the habit of thinking actively and expressing personal ideas in foreign languages.

Besides, traditional exam-centered foreign language teaching makes the problem worse. Teaching mainly focuses on grammar explanation, vocabulary memorization, and written test training, while greatly neglecting oral practice, situational communication, and critical thinking expression. There are a few teaching activities to guide students to think independently and share personal views. Such long-term single-style teaching and training only helps students deal with exams. They lack core abilities, including practical language use, critical expression, and cross-cultural communication, which finally leads to poor practical language skills and a weak ability to express personal opinions.

#### **3.2. Insufficient cultivation of cross-cultural competence**

Scholars have not reached a unified definition of cross-cultural competence. Sun Youzhong clearly states that its core meanings include: respecting global cultural diversity, having cross-cultural empathy and critical cultural awareness; mastering basic theoretical knowledge and analytical methods of cross-cultural research; understanding the history and current situation of target-language countries, as well as similarities and differences between Chinese and foreign cultures; interpreting and evaluating different cultural phenomena,

texts and products; communicating appropriately and effectively across cultures; and helping people from different linguistic and cultural backgrounds achieve effective cross-cultural communication <sup>[7]</sup>. It can be seen that cross-cultural competence is not merely simple cross-cultural communication behavior. It has richer connotations and a wider range of coverage, and is closely related to personal growth experience. Among these elements, cross-cultural communication ability is particularly vital. Cross-cultural communication takes place in various situations. It can occur between people who speak the same language but have different cultural backgrounds, or between those with different languages and cultural backgrounds.

With the continuous advancement of globalization and the rapid development of internet technology, people increasingly interact with diverse cultural groups worldwide, making cross-cultural competence more and more important. This importance is also reflected in language teaching. In foreign language classes, cross-cultural communication happens all the time between students from different cultural backgrounds, between teachers and students, and between students and foreign teachers. After graduation, students will communicate and cooperate with others in various situations throughout their lives, so cross-cultural competence is a lifelong essential skill. Besides, people with cross-cultural competence should also be able to mediate cross-cultural conflicts. They understand the cultural backgrounds of both sides and can help clear misunderstandings and rebuild communication from a cross-cultural perspective <sup>[6]</sup>.

In cross-border education environments, students study in a diverse setting where Chinese and Western cultures interweave, values collide, and behavioral norms differ. They face not only language-based communication tasks but also constant cognitive conflicts, social frictions and adaptation pressures caused by cultural differences.

However, traditional foreign language teaching has long focused mainly on language knowledge. It overemphasizes exam-oriented training such as vocabulary, grammar, reading and writing, while neglecting the development of students' cross-cultural awareness, cultural understanding and ability to handle cultural conflicts. As a result, students lack the necessary knowledge and strategies to deal with cultural differences.

In real cross-cultural communication, misunderstandings, barriers and even conflicts easily arise from differences in cultural backgrounds, thinking patterns and communication habits. When facing cross-cultural conflicts in class interactions, academic exchanges and overseas study and life, students often feel helpless. They cannot make rational judgments, communicate effectively or solve problems properly, which further affects their learning experience, academic performance and cross-cultural adaptation.

## **4. Implementation paths of mediation in foreign language teaching of Sino-foreign cooperative education**

### **4.1. Progressive development of students' mediation competence**

Educators no longer define language merely as “a carrier of culture”, but regard language and culture as an integrated whole. For both beginner and advanced learners, mediation competence should be cultivated from the very beginning of their studies. Teachers shall integrate mediation competence with other language skills and incorporate language-mediating activities into phased training objectives. At lower grade levels, priority is given to developing students' basic mediating and translational competence through tasks designed to foster cross-cultural awareness and cognitive skills, such as describing pictures and telling stories from illustrations, requiring students to rephrase information in daily contexts. At higher grade levels, emphasis shifts to cross-cultural communicative competence. Students are expected to reconcile cultural differences

and resolve communication conflicts in professional and daily cross-cultural interactions. Teachers guide students to compare different phenomena and cultures and express their own opinions, so as to develop their communication skills in cross-cultural settings. For instance, mediation activities can be designed around stereotypes, prejudices, exclusion, aggression, and cultural conflicts. Following the principle of progressing from simplicity to complexity, students are gradually guided to consolidate their fundamental language-mediating literacy and strengthen core mediating abilities including information rephrasing, meaning negotiation and communication mediation. Meanwhile, their cultural awareness, cultural empathy, cultural interpretation and cross-cultural critical thinking are nurtured, enabling them to engage in effective communication and cultural interaction in diverse contexts.

## **4.2. Optimizing cross-cultural teaching design**

Undoubtedly, language-mediating activities develop not only learners' comprehensive linguistic competence but also are inherently connected to the cultivation of cross-cultural competence. A range of mediating activities, including text analysis, information delivery, and commentary, can effectively enhance learners' communicative ability. The Common European Framework of Reference for Languages views learners as both social agents and cross-cultural mediators. When interacting with others or engaging with different cultures, learners first interpret and perceive diverse cultures on the basis of their personal social experiences.

In foreign language teaching in China, especially in non-first-tier cities where foreign residents are scarce, authentic foreign language environments are barely accessible, making classroom-based language contexts particularly crucial. The introduction of mediation into teaching enables the restructuring of teaching content centered on the cultivation of language mediation competence and the enrichment of mediation task materials based on real-life scenarios. Combined with existing textbooks and teaching resources, teaching can integrate cultural materials from both China and foreign countries and carry out targeted mediation activities with these materials as the starting point. Due to the fact that in foreign language instruction the learners meet not the target world "as it is", but rather a "pre-filtered construct" of the target world<sup>[8]</sup>. This is why mediating activities become more important. With these activities, learners use their existing knowledge to analyze and understand the outside world and build their own target world through them. Moreover, Foreign language learning, on the one hand, extends our socio-cultural experience to new dimensions, but on the other hand it also makes us aware of the specific features of our own world<sup>[7]</sup>.

## **5. Conclusion**

Linguistic mediation is a core linguistic competence concept proposed in the 2020 version of the CEFR to meet the demands of global cross-linguistic communication. This concept not only addresses existing problems and improves teaching quality in foreign language education for Sino-foreign cooperative education programs but also applies to various cross-linguistic teaching contexts. It significantly boosts learners' comprehensive linguistic competences, including communicative competence and intercultural competence. Introducing cross-linguistic mediation into foreign language teaching for Sino-foreign cooperative education and putting it into practice by restructuring teaching objectives, developing suitable teaching content, innovating teaching methods and adjusting assessment systems can effectively solve common problems such as students' poor oral skills and weak intercultural competence. It helps better achieve the goal of cultivating

international talents and provides a new direction for the reform of cross-linguistic foreign language teaching in China. As the demand for cross-linguistic communication keeps growing in the future, the practical value of cross-linguistic mediation in various foreign language teaching scenarios will become more prominent, calling for further in-depth practical exploration and theoretical research.

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# Research on the Influence of Generative AI on the Reconstruction Mechanism and Design Efficiency of Fashion Design Creative Process

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**Abstract:** In the background of the information age, the development of all walks of life depends on the blessing of intelligent technology, and the clothing industry is no exception. This paper deeply explores the supporting role of generative AI in the creative ecology of clothing. The traditional fashion design mode is inevitably limited by the lack of materials or a lengthy cycle, and generative AI breaks this limitation, and with its powerful content generation ability, it effectively builds a bridge between creativity and the market. It can fully integrate cross-domain cultural elements and material data and help designers quickly turn abstract inspiration into visual design drawings. In addition, AI shows great value in cost control and supply chain coordination, which helps enterprises significantly reduce R&D losses and quickly respond to flexible demand. The research shows that it is the only way for the garment industry to enhance its core competitiveness by building a man-machine collaborative design system.

**Keywords:** Generative AI; Fashion design; Creativity; Process; Reconstruction mechanism; Design efficiency

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## 1. Introduction

With the wide application of digital technology, generative AI has penetrated into all walks of life, and the field of fashion design has also ushered in new development opportunities. The traditional fashion design process mainly relies on the designer's long-term accumulated experience and inspiration in the workplace, which has some problems, such as a long creative cycle, slow iteration of scheme renewal, and homogenization of styles. It cannot adapt to the ever-changing development rhythm of the market, and it is even more difficult to meet the individual needs of customers. Generative AI has powerful data learning and content generation capabilities and can quickly generate creative and diverse design schemes, helping designers break through creative bottlenecks and improve design efficiency. Therefore, it is of great practical significance to study the reconstruction mode of generative AI on the fashion design creative process and



its influence on design efficiency. By analyzing the role of AI in inspiration, style generation, and scheme optimization, this paper discusses the advantages and practical path of the man-machine collaborative design mode, aiming to provide a useful reference for the digital transformation of the fashion design industry and promote design innovation and industrial upgrading.

## **2. The mechanism of reconstructing the clothing design creativity process using generative AI**

### **2.1. Data-driven reconstruction of inspirational sources**

Traditional fashion designers are often inspired by their own growth and learning experience, as well as personal experience in the workplace, with limited sources of inspiration and low efficiency <sup>[1]</sup>. Generative AI absorbs massive data, and through in-depth study of fashion data, classic styles, cultural elements, color matching, fabric materials, etc., it can quickly integrate cross-disciplinary and cross-style design elements based on data, providing designers with inexhaustible inspiration <sup>[2]</sup>. AI can automatically collect market data such as current fashion trends and consumer preferences, and effectively transform abstract concepts into visual design directions, so that inspiration acquisition can be transformed from subjective experience-driven to data-driven and subjective creativity. This reconstruction not only broadens the designer's inspiration boundary but also makes the design better meet the market demand and reduces invalid creation. Keywords, style requirements, fabric usage, and layout parameters can quickly generate a large number of original design schemes, which can integrate market demand data and effectively present the favorite styles of the market. Designers only need to input themes and styles.

### **2.2. efficient reconstruction of the design scheme generation mode**

In the traditional design process, there are many links from style drawing to rendering to series collocation, which takes a long time and costs a lot to modify <sup>[3]</sup>. Generative AI can generate dozens or even hundreds of sets of style drawings in different directions in a short time based on basic data such as grid, color, and silhouette, which greatly shortens the project output cycle. At the same time, AI can integrate different clothing style elements and automatically adjust the pattern according to the demand, which makes the design scheme more diverse and innovative, effectively solves the problem of a single scheme and slow iteration in traditional design, and realizes the efficient reconstruction of the design generation mode.

### **2.3. Precise reconstruction of design details optimization**

In traditional clothing design, designers will decide fabric selection and color matching according to different styles and styles of clothing, and on this basis, they will adjust the proportion and beautify the process. Every link needs repeated scrutiny by designers, with insufficient accuracy and low efficiency <sup>[4]</sup>. Generative AI will automatically match the fabric characteristics, color rules, and pattern proportions based on the database and fully intelligently optimize the design details. For example, AI can recommend suitable fabrics and techniques according to styles, automatically adjust the proportion of clothes according to the use requirements to improve the wearing comfort, optimize the pattern arrangement, and avoid visual imbalance. Through the accurate calculation of the data model, AI helps every link of design change from empirical judgment to data optimization, improves the scientific and practical design, and realizes the accurate reconstruction of details.

## **2.4. Market-oriented reconstruction of the iterative design process**

As we all know, the traditional fashion design process is cumbersome, presenting a lengthy cycle of conception, drawing, proofing, modification, and re-proofing. The efficiency of such a linear model design process is not significant, and it takes a long time to get market feedback <sup>[5]</sup>. The generative AI reconstructs the process into a closed-loop mode of rapid generation, intelligent adjustment, and batch optimization, which supports designers in completing the new iteration of various schemes in a short time. AI can dynamically respond to modification requirements, quickly adjust styles, colors, and details, and generate a new version of renderings, so that the design iteration method is faster and can better meet the diversified and personalized needs of the market. At the same time, AI can simulate the wearing effect of people with different body proportions and different scenes, predict the design problems in advance, reduce the later proofing cost and revision times, and promote the whole creative process to change from a slow cycle and high cost to fast iteration and low cost, and realize the market-oriented reconstruction of process iteration.

## **3. The impact of generative AI on fashion design creativity**

### **3.1. It can expand aesthetic boundaries**

In the background of the intelligent age, everyone can enjoy the benefits brought by intelligent technology. Generative AI breaks the limitations of creativity, lowers the technical threshold of fashion design, and makes creative expression no longer limited to designers from professional classes <sup>[6]</sup>. Consumers, minority brand owners, and even amateurs in non-professional fields can boldly innovate with the help of AI tools and finally transform their own aesthetics and ideas into visual design schemes. This change broke the aesthetic monopoly dominated by a few elites in the traditional fashion industry, gave birth to a large number of grassroots creations, allowed more people to participate in the design behavior, promoted the fashion aesthetics to shift from a single authoritative orientation to multiple symbiosis, and made fashion design a creative expression carrier that all people could participate in.

### **3.2. Can activate cultural heritage**

Today, with the broadening of aesthetic elements and aesthetic styles, more cultural elements and connotations have been injected into fashion design. Facing the massive cultural database, generative AI can deeply analyze the core genes of traditional costume patterns, non-legacy crafts and national costumes, and deconstruct and reorganize them into a design language suitable for contemporary aesthetics. AI perfectly solves the pain points of traditional cultural elements in modern design and promotes the perfect integration of traditional culture and fashion trends <sup>[7]</sup>. This not only provides a digital innovation path for non-genetic inheritance but also enables oriental aesthetics and regional culture to gain more vivid and commercial expression in the global fashion system, thus enhancing the cultural confidence and international competitiveness of fashion design.

### **3.3. Upgradeable industrial structure**

Generative AI can independently complete low-value-added labor such as basic drawing, pattern repetition, and style iteration, which makes the fashion design industry re-examine the talent structure and truly consider the compound talents needed by its own industry, forcing the fashion design industry to adjust the talent structure and value center <sup>[8]</sup>. The core competitiveness of designers is no longer drawing fast and much, but

conceptual planning, clothing decision-making, humanistic insight, and business logic. Industry resources gradually shift to strategic design and conceptual innovation, which promotes the upgrading of the entire garment industry from labor-intensive processing to knowledge-intensive creativity, truly enhances the overall creative level of the industry, and enhances the core barriers and irreplaceability of the industry as a whole.

### **3.4. Can build a green creative logic**

Relying on virtual simulation and data modeling technology, generative AI can accurately judge the fitness between design works and fabrics and predict fabric loss, pattern waste, and wearing life at the source of design. This resource optimization based on a data algorithm can minimize resource waste, realize minimalist design where less is more, and effectively meet the clothing needs of different consumer groups. In addition, AI can accurately match the characteristics of environmentally friendly fabrics and design requirements and reduce material waste and inventory backlog caused by design errors. This kind of forward-looking design based on data deeply embeds the concept of sustainable green development into the whole creative process, promotes the fashion design to shift from end management to source prevention, helps the organic combination of fashion and green development concepts, and promotes the garment industry to achieve low-carbon and circular green development.

## **4. Realistic challenges of generative AI-empowered fashion design**

The extensive application of generative AI in the field of fashion design improves design efficiency and innovation ability, but it also brings a series of challenges. First of all, from a technical point of view, the accuracy of generative AI in the field of fashion design is insufficient. The general generation model lacks a deep understanding of professional knowledge such as clothing structure, pattern logic, and process specification, which often leads to problems such as unbalanced proportions and infeasible processes. In addition, AI's ability to restore fine links such as complex tailoring, three-dimensional structure and dynamic pleats is limited, and it is difficult to meet high-end customization, fashion design and other scenes that require high technological accuracy. There is an obvious gap between technology and professional needs. Secondly, at the creative level, generative AI brings the double challenges of design homogeneity and weakening creative autonomy<sup>[9]</sup>. On the one hand, because the data integrates a large number of popular styles and classic elements, the design scheme generated by AI will inevitably fall into the dilemma of style convergence and element repetition, and it is difficult to generate original designs with high recognition. Many brands have experienced the phenomenon of excessive usage of templates after using products designed by AI, which leads to the market products not being able to meet individual needs. On the other hand, some designers rely too much on AI to generate results, which will gradually lose their independent thinking and inspiration mining ability, and the creative process will be weakened into keyword input and scheme screening, which will weaken the artistic unique value of fashion design. The ambiguity of creative dominance makes the designed works lack agility and the most sincere emotional expression in the heart, which cannot arouse the emotional resonance of customers. Thirdly, at the ethical and legal level, copyright ownership, data compliance, design plagiarism, and other issues have become risk points that need to be solved urgently in the industry. The training data of generative AI mostly comes from online public images or

finished design works. Unauthorized use of other people's design elements is widespread, and it is difficult to protect the copyright rights of original designers. Finally, from the perspective of talents, the lack of compound talents who know both professional knowledge and AI technology in the industry has become a key factor restricting the deepening of application. At present, most designers' understanding of AI tools only stays at the basic operation level, and it is impossible to improve the quality of generation by adjusting parameters, model training, data optimization, etc. However, technicians lack the professional knowledge of the fashion design industry, so it is difficult to develop a vertical model that really meets the needs of the industry. The imbalance of talent structure makes it difficult to upgrade the application of generative AI in fashion design from tool-aided to deep collaboration.

## **5. Countermeasures for the use of generative AI in the creative process of fashion design**

### **5.1. Building a vertical AI application system for fashion design**

Aiming at the problems of insufficient professional precision and structural logic deviation of generative AI in fashion design, we should start to optimize the technology and promote the deep transformation of the general model to the vertical field <sup>[10]</sup>. On the one hand, the exclusive database in the field of the fashion design industry is established, and professional information such as format specifications, process standards, physical properties of fabrics, ergonomic data, etc., is fully integrated. Through refined application and fine-tuning of models, AI's ability to understand the structure, cutting logic and process feasibility of fashion design specialty is improved, and invalid design output is reduced. On the other hand, the industry will promote the deep integration of generative AI and 3D simulation technologies, such as virtual fitting, to realize the accurate simulation of fabric drape, dynamic wrinkles and wearing effects, and open up the technical chain path of creative generation, virtual verification and practice landing. At the same time, develop lightweight and modular AI tools, lower the technology use threshold of small and medium-sized enterprises, promote the wide application of AI in the field of fashion design, and improve the overall technology application level of the industry.

### **5.2. The establishment of a man-machine collaborative design innovation mechanism**

In order to improve the personalization and innovation level of AI design in an all-round way, it is necessary to establish a man-machine cooperation mode with designers as the main part and AI as the auxiliary part. First of all, define the core position of designers in the creative process, accurately position the responsibilities of AI, position AI as a tool for inspiration expansion and efficiency improvement, not as a creative substitute, and encourage designers to control the aesthetic style of clothing and dominate the design direction by digging deep into the cultural elements in clothing design, so that the works of different designers have their own styles, which are deeply loved by the market and maintain the uniqueness and artistry of their works. Secondly, build a diversified creative guidance mechanism to support designers in combining cultural elements, regional styles, pioneering ideas, and AI generation capabilities, and stimulate the vitality of original design through cross-element and cross-style collisions. In addition, a design quality evaluation system is established, and AI generation schemes are screened from cultural connotation, aesthetic value, market adaptability, and other dimensions, so as to strengthen the original design orientation and promote the development of the fashion design industry in the direction of high quality.



### 5.3. Improve system guarantee and talent construction

Facing the realistic challenges such as vague copyright, shortage of talents, and insufficient industrial cooperation, it is necessary to build a long-term support system from both ends of the system and talents. At the institutional level, the industry should clarify the copyright ownership rules of AI generation design, standardize the sources of data use, resolutely crack down on infringement, and fully protect the rights and interests of original designers; Establish industry standards and ethical guidelines to guide the compliance and healthy application of AI technology. On the talent level, colleges and universities should further optimize the courses of fashion design, strengthen the deep integration of professional knowledge and AI technology, add digital modeling, data processing and other contents, and cultivate compound talents with artistic aesthetic and technical ability; Enterprises strengthen internal training, enhance the designer's AI tool application and creative collaboration ability, and establish a talent introduction mechanism to promote the deep integration of AI and design business. Through system norms and talent guarantee, the benign interaction between generative AI and the fashion design industry can be realized, and the high-quality and sustainable development of the industry can be promoted.

## 6. Conclusion

Generative AI has brought subversive changes to the creative process of fashion design, which has changed the design process of the fashion industry, reconstructed the traditional design logic, and significantly improved the design efficiency, bringing designers a brand-new design experience, keeping up with the market development trend, taking market demand as the basic criterion, and improving the use efficiency of design works. However, it is undeniable that the application of generative AI also brings some practical challenges, such as technical adaptation, creative homogenization, copyright norms, and other issues that need to be solved urgently. Only by continuously promoting the deep cultivation of technology, man-machine collaboration, system improvement and talent cultivation, and promoting the deep integration of AI and fashion design, can full play be given to the technical advantages and adhere to the originality and artistry of design, realize the double improvement of efficiency and creativity, and help the fashion industry to develop continuously in the direction of intelligence, personalization and high quality.

## Disclosure statement

The author declares no conflict of interest.

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# Research on Emotional Expression of Thick Painting Techniques in Contemporary Landscape Oil Paintings

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**Abstract:** Thick painting technique is an expressive creative method in oil painting. With the thick accumulation of pigments, the three-dimensional shaping of texture, and the emotional expression contained in brush strokes, the visual style and spiritual connotation of contemporary landscape oil painting are reconstructed. In terms of the development process of art history, the thick painting technique has gradually gotten rid of the function of simply reproducing objective things and turned to express emotion and spirit in depth from the embryonic stage of the classical period, the development of impressionism period, and the maturity of the contemporary era. In the process of contemporary landscape oil painting creation, artists use the material characteristics of the thick painting technique to integrate the objective form of natural landscape with their own subjective emotional experience, and convey natural artistic conception, life philosophy, and cultural feelings through the construction of texture, brushwork, and color. Based on the contemporary artistic environment, this paper deeply analyzes the artistic characteristics of thick painting technique and its function as an emotional carrier, explores the internal relationship between thick painting formal language and emotional core, comprehensively explains its aesthetic value and spiritual significance in contemporary landscape creation, and gives the corresponding emotional expression practice path, providing professional reference and academic opinions for perfecting the theoretical system of emotional expression in contemporary oil painting landscape and guiding artistic creation practice.

**Keywords:** Thick coating technique; Contemporary landscape oil painting; Emotional expression; Internal connection; Aesthetic value

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## 1. Introduction

Landscape oil painting is the key carrier for artists to express their feelings and show their natural and humanistic concepts, and the application of techniques is related to the depth and breadth of emotional

transmission. The thick coating technique is a core means to break through tradition and strengthen emotional expression in contemporary landscape oil painting with strong materiality, distinct texture, and free expression. Different from the delicacy and introversion of classical transparent contemporary landscape oil painting, it forms a relief stereoscopic touch by stacking and scraping pigments, builds a perception bridge from vision to touch, and builds a multi-dimensional carrier for emotional expression. Under the trend of contemporary pluralistic art integration, landscape oil painting has changed from objective representation to subjective expression, and thick painting technique has become the conscious choice of artists' emotional externalization and spiritual expression, combining the tension of Western expressionism with the artistic conception of oriental freehand brushwork. Based on this, this paper will deeply analyze its technical characteristics, explore the emotional relevance logic, tap into the aesthetic value, and provide theoretical support and practical guidance for the thick painting creation of contemporary landscape oil paintings.

## **2. The artistic characteristics and emotional carrier function of thick painting techniques**

### **2.1. The core artistic characteristics of the thick coating technique**

The core of the thick coating technique lies in the deep excavation of the material characteristics of oil painting pigments. Through the layered stacking and thick covering of thick pigments, three-dimensional texture is created, which breaks the traditional contemporary landscape oil painting's flat presentation mode. One of its outstanding characteristics is the remarkable texture. Pigments accumulate on the canvas to form a patchy surface structure, and the rough, heavy, and smart texture changes break through the constraints of the two-dimensional plane and give the picture a sculptural three-dimensional sense. Whether it is the neat lines left by the scraper or the thick color blocks stacked by the brush, the picture has a real tactile texture, which enhances the dual feelings of vision and touch. Secondly, the brushwork is expressive. In the state of thick painting, the traces of brush strokes are clearly discernible, and the changes in length, thickness, frustration and circulation become the direct expression of the artist's feelings. The rapid brushstrokes convey passionate emotions, while the soothing brushstrokes express a quiet state of mind. The rhythm and rhythm of brushstrokes directly reflect the inner fluctuations. Moreover, the color tension is strong. Thick-coated pigments have high color saturation and strong coverage, and the superposition of color layers can produce rich color levels and optical effects, and the contrast between cold and warm, light and dark, and fresh gray is more prominent. Color is no longer limited to the reproduction of objects, but has become an independent language for emotional expression. Finally, the freedom of expression space provides a broad world for artists to express their subjective feelings and personalities <sup>[1]</sup>.

### **2.2. Thick coating technique as the core function of emotional carrier**

Thick painting technique is the link of emotion transmission, which can closely connect the artist's subjective emotion and objective scenery. First, convey emotions with material characteristics. The thickness and thickness of pigments can be transformed into emotional symbols; thick stacking can convey a deep and strong feeling; thin painting can express a soft and tranquil meaning; rough texture shows bold and unrestrained; delicate and thick plastic reflects gentle and calm, and material characteristics accurately echo emotional state. Second, create an atmosphere with texture. Different texture forms can create different emotional artistic conceptions. Thick texture as hard as rock conveys vigor and grandeur, fluffy and soft

thick texture creates warmth and quietness, staggered and messy texture shows restlessness, flat and heavy color blocks show calmness and solemnity, and texture directly lays the emotional tone of the picture. Third, project emotions by brush strokes. Every brush stroke is the imprint of the artist's emotion, and the emotional state during creation will be naturally revealed through the strength, speed and direction of the brush stroke, thus realizing the emotional transmission of "the pen is the voice." Fourth, rely on color to strengthen resonance. Thick colors amplify emotional tension, warm colors convey enthusiasm, joy, and hope, cold colors create tranquility, melancholy, and vastness, and colors merge with texture and brush strokes to form a complete emotional expression system, which arouses strong resonance among viewers <sup>[2]</sup>.

### **3. The internal relationship between the language expression of the thick painting technique and the emotional core**

Thick painting language and emotional core are not isolated from each other, but build a complete logical chain of "material carrier-formal expression-spiritual transmission", which embodies the dialectical unity of technique and emotion, which is also the key to relevance logic in the abstract.

On the material level, the pigment characteristics and texture morphology of the thick coating technique are the basis of emotional expression. Emotional transmission needs the help of the physical properties of pigments. Without the material support of thick texture and vivid brushwork, it is difficult to find a concrete expression carrier of subjective emotion, which forms the basic connection of "material bearing emotion" and transforms emotion from abstract feeling to perceptual visual form.

On the formal level, there is a one-to-one relationship between texture, brushwork, color, and emotional core. The density, softness, and ups and downs of the texture correspond to the soothing, intense, and calm emotions; The importance, urgency, and trend of brush strokes correspond to the rhythm and fluctuation of emotions; The warmth and coldness of colors, fresh gray and shade correspond to the tone and tendency of emotions. This precise combination of form and emotion enables the thick painting technique to achieve "unity of form and meaning", and the change of form becomes the visual presentation of emotion, building a direct bridge between the technical language and the emotional core.

From the spiritual level, thick painting language is ultimately committed to the deep communication of the emotional core, and the fundamental purpose of technique application lies in spiritual expression and emotional expression. In contemporary landscape oil painting, the thick painting technique has surpassed the simple modeling function and become the artistic language of spiritual expression. Through individualized application of techniques, artists integrate natural feelings, humanistic feelings, and life philosophies, making formal language an extension of the emotional core, realizing the sublimation from visual expression to spiritual resonance, and achieving the deep connection between techniques and emotions <sup>[3]</sup>.

## **4. The aesthetic value and spiritual significance of the thick painting technique in contemporary landscape oil painting**

### **4.1. Contemporary aesthetic value presentation**

The thick painting technique brings brand-new aesthetic value to contemporary landscape oil painting. First, broaden the visual aesthetic boundary, break through the plane limitation of traditional contemporary landscape oil paintings, create a unique experience of blending touch and vision with three-dimensional texture and heavy texture, strengthen visual impact and artistic infection, and create a new aesthetic model

with concrete quantity and expressiveness. Secondly, enrich the aesthetic structure of form, upgrade the texture, brushwork, and color from modeling assistance to independent aesthetic elements, so that the language of technique has its own aesthetic value, and the viewer can feel the natural beauty and artistic beauty of technique at the same time, thus enhancing the aesthetic level of form. Third, to achieve the integration of traditional and contemporary aesthetics, which not only retains the aesthetic feeling of classic oil paintings, but also conforms to the trend of contemporary art pursuing individuality and subjective expression, and meets the aesthetic needs of the public, so that traditional landscape oil paintings can glow with new brilliance in the contemporary era.

## **4.2. Artistic spiritual significance**

Thick painting technique endows contemporary landscape oil painting with profound spiritual implication and unique artistic value. First, highlight the authenticity of emotional expression. The improvisation and intuition of thick painting technique enable artists to directly pour their inner feelings into the picture, abandon deliberate carving and false whitewashing, and return to the true nature of artistic expression of emotions. Second, inherit and carry forward the humanistic spirit. Thick-coated creation is integrated with awe of nature, nostalgia for native land, and thinking about life, which makes landscape oil painting go beyond the simple description of nature, bear the core of profound humanistic spirit, and promote the inheritance and development of the humanistic heritage of contemporary art. Third, promote the expression of the local spirit of oil painting. Combining the oriental freehand brushwork spirit with the western thick painting techniques, thick painting landscape oil painting contains oriental aesthetic artistic conception and cultural spirit, which helps China's contemporary oil painting to form a unique artistic spirit core and enhance the spiritual height and cultural recognition of local oil painting <sup>[4]</sup>.

## **5. The practical path of thick painting technique in emotional expression in contemporary landscape oil painting**

### **5.1. Rooted in natural perception, build a solid foundation for emotional expression**

Real natural perception is the key basis for the thick painting technique to realize emotional expression <sup>[5]</sup>. Only by going deep into nature can emotional expression be real and moving, and the separation between technique and emotion can be prevented. Creators need to abandon the mode of being divorced from reality and creating behind closed doors, actively participate in nature, go deep into natural environments such as mountains, wilderness, mountains and rivers, lakes and rivers, and capture the original texture, morphological characteristics and fresh breath of natural scenery in different seasons and different lighting conditions through whole-hearted observation and sketching, so as to transform visual intuitive impression into emotional touch in the deep heart and find the resonance between natural scenery and personal feelings.

### **5.2. Accurately control formal language to improve the accuracy of emotional expression**

Accurately controlling the three formal languages of texture, brushwork, and color is the key point to enhance the accuracy of the emotional expression of thick painting techniques. Creators should master the expression rules of thick painting techniques skillfully and flexibly choose suitable expression techniques according to different emotional expression themes and scenic artistic conception, so as to achieve the precise docking of techniques and emotions. When depicting bold and open natural landscapes such as mountains



and deserts, and conveying heroic and deep emotions, artists can use a scraper to pile them up in a large area and paint them with gravity strokes, so as to create a rough and hard texture with obvious ups and downs, and then match them with deep and heavy colors such as ochre, dark green and deep blue to highlight the heroic characteristics of emotions; When depicting quiet and gentle scenery such as countryside and woods, and conveying calm and soothing emotions, artists use the technique of stacking delicate brushes layer by layer and scraping gently to form a moist, smooth, delicate and soft texture, supplemented by light yellow, light green, off-white and other elegant and fresh colors to create a quiet atmosphere. At the same time, artists should pay attention to the unity and coordination of formal language, prevent the disorder of texture, brushwork, and color, and let the three elements work together around the core emotion to improve the accuracy of emotional expression in an all-round way, so that viewers can quickly perceive the core emotion of the picture through vision <sup>[6]</sup>.

### **5.3. Integration of diverse artistic experience, broaden the dimensions of emotional expression**

The creation of contemporary thick-coated landscape oil paintings should not be limited to a single artistic thinking, but should take into account the Western artistic concept and the oriental artistic spirit to achieve organic integration. On the one hand, drawing lessons from western expressionism, giving full play to the material characteristics of thick painting techniques, strengthening the direct expression of emotions and personality display, enhancing the visual tension of pictures, and making emotional expression more straightforward and shocking; On the other hand, it deeply absorbs the essence of Oriental freehand brushwork art, which is “blending scenes and depicting spirit with shapes.” It does not excessively pursue the realistic presentation of natural images and does not deliberately pursue the precise restoration of shapes. It focuses on creating artistic conception and conveying spiritual feelings, so that the works have both visual texture and artistic conception connotation <sup>[7]</sup>. At the same time, artists should integrate innovative thinking of contemporary art, conform to the aesthetic trend of the times, break through the traditional creative mode of thick painting moderately, and integrate the spirit of the times into the application of techniques and color matching, so that emotional expression can meet the spiritual world and aesthetic needs of contemporary people, so that thick painting landscape oil paintings have both traditional artistic connotation and contemporary artistic vitality, and broaden the dimensions of emotional expression in all directions.

### **5.4. Shaping personalized expression style, highlighting the uniqueness of emotional expression**

Individualization is the soul of artistic emotional expression. Only by creating a unique, creative style of thick painting can emotional expression avoid similarity and have a unique artistic charm. Creators should inherit the classic thick painting techniques, jump out of the framework, and gradually explore the application methods with personal characteristics according to their own aesthetic preferences, life experiences, emotional tendencies, and creative habits. In the aspect of texture shaping, artists can try a variety of stacking, scraping and painting techniques to create a unique texture effect; In the application of brush strokes, combined with their own creative rhythm, they form a brush stroke style of fast and slow, light and heavy; In terms of color matching, artists should build a color system that conforms to personal preferences and emotions, so that the application of techniques can be branded with a distinct personal imprint. At the same time, artists should stick to the original intention of creation, keep the purity of emotional expression, do not

blindly follow popular styles, and do not deliberately pile up techniques, so that thick painting techniques can truly serve the expression of inner feelings, so that each work carries unique spiritual sentiment and emotional connotation. In addition, artists can try new oil painting materials and media to enrich the texture and color expression, further enhance the recognition of personal style, make emotional expression more unique and infectious, and enhance the artistic vitality of works <sup>[8]</sup>.

## 6. Conclusion

Thick painting technique has become the key artistic language of emotional expression of contemporary landscape oil paintings with its unique material attributes and formal expressive force. It is closely connected with the emotional core and has aesthetic value and spiritual significance, which makes it occupy an important position in the field of contemporary oil painting. Thick painting techniques, from technical characteristics to emotional bearing, and then from formal construction to spiritual transmission, formed a complete logical framework of emotional expression. It not only enriches the visual aesthetics and formal implication of contemporary landscape oil paintings, but also conveys humanistic spirit and artistic emotion, and achieves an effective integration of techniques and spirit. If contemporary art creators can take root in natural perception, study formal language, integrate diverse ideas, and stick to their original intention, they can make thick painting techniques better help emotional expression and make landscape oil paintings have both artistic charm and spiritual thickness. In the wave of diversified development of contemporary art, thick painting techniques will continuously release artistic energy, inject impetus into the innovative development of contemporary landscape oil painting, and promote the improvement of the emotional expression system of oil painting art.

## Disclosure statement

The author declares no conflict of interest.

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# Exploration of AI-Empowered Interdisciplinary Integrated Project-Based Learning in Primary and Secondary Schools

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**Abstract:** In today's rapidly evolving technological landscape, AI is profoundly influencing and reshaping the educational ecosystem. Leveraging artificial intelligence to empower interdisciplinary project-based learning in primary and secondary schools has become a key theoretical and practical focus. Constructivist learning theory emphasizes context, collaboration, discourse, and meaning construction. This theory strongly supports interdisciplinary learning, while current applications of AI technology in creating contexts, facilitating efficient student collaboration and discourse, and enabling active meaning construction also represent a significant advancement in promoting constructivist learning theory. In practice, whether utilizing AI for resource organization and analysis, questionnaire design, learning design, or evaluation, it is essential to define clear roles, refine tasks, and provide specific requirements. AI tools are no longer mere question-and-answer thought partners; intelligent agents with robust reasoning and proactive tool utilization capabilities have become powerful assistants in implementing and evaluating project-based learning. The exploration of AI-enabled interdisciplinary project-based learning in primary and secondary schools demonstrates that technological advancements have driven rapid transformation in education. This will also hold profound contemporary significance for promoting educational equity, enhancing teacher and student capabilities, and ultimately achieving the goal of "delivering education that satisfies the people."

**Keywords:** Artificial intelligence; Project-based learning; Interdisciplinary integration; Human-AI collaboration

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## 1. Introduction

The rapid development of artificial intelligence technology has brought unprecedented transformation to primary and secondary school teaching. A combination of AI tools with diverse functions and abundant digital resources aids teachers in lesson preparation, implementation, and evaluation, while also fostering students' problem-solving abilities, innovative thinking, and collaborative spirit.

Interdisciplinary project-based learning emphasizes the integration of knowledge from different disciplines and promotes learning through solving real-world problems, facilitating meaningful construction. This process requires students to collaborate in problem-solving contexts, continuously practice and explore, and emphasizes “learning by doing”<sup>[1]</sup>.

The development of secondary school education must align with the needs of the times. Hui Jinpeng stated: “We will dedicate efforts to cultivating a large number of teachers with digital literacy, strengthening the construction of our teaching workforce, and integrating artificial intelligence technology into the entire process and every aspect of education, teaching, and management. We will study its effectiveness and adaptability to enable the younger generation to learn more proactively and allow teachers to teach more creatively.”

## **2. Theoretical support and practical significance**

The concept of project-based learning particularly emphasizes a student-centered approach, real-world problem-driven learning, and “learning by doing.” The integration of artificial intelligence provides intelligent support for project-based teaching, while also opening new perspectives for addressing various practical challenges in education, such as targeted personalized tutoring, teaching resource allocation, experimental safety precautions, equipment utilization, and process-oriented evaluation data support.

### **2.1. Theoretical support**

Artificial intelligence empowers interdisciplinary project-based learning in primary and secondary schools by leveraging AI technology to cultivate students’ comprehensive competencies. It creates contextual scenarios, enhances collaboration and dialogue, and promotes active meaning construction among students. This further exemplifies the application of constructivist learning theory supported by current technological advancements<sup>[2]</sup>.

### **2.2. Practical significance**

The important practical significance of empowering interdisciplinary integrated project-based learning in primary and secondary schools with artificial intelligence lies in the development of teachers’ digital literacy abilities, promoting the transformation of interdisciplinary learning in primary and secondary schools from “experience-driven” to “data-driven”, and better enhancing students’ problem-solving abilities and comprehensive literacy. All of these meet the requirements of educational innovation under the current trend of technological development.

#### **2.2.1. Promoting teacher professional development and innovative teaching models**

AI is not only an application tool but also a “thinking partner” for teachers and more likely an “expert-level colleague” around them. It has become a key force driving teaching change. The effective implementation of interdisciplinary integrated project-based learning empowered by artificial intelligence in primary and secondary schools requires teachers to fully master the modern educational technology of artificial skills: creating scenarios, paying attention to students’ personalized development, and achieving one of the goals of educational value. This puts forward new requirements for teachers’ digital literacy: how to use artificial intelligence to hand over basic tedious and repetitive work (such as data collection, organization, and analysis) to technology processing, so as to focus more on core educational work such as guiding students’ higher-order thinking and personalized guidance.



Building a new teaching relationship of human-machine collaboration: The human-machine collaborative education model complements human intelligence and machine intelligence through interaction, empowering interdisciplinary integrated project-based learning in primary and secondary schools with artificial intelligence, achieving resource preparation assistance, personalized guidance, intelligent tracking and evaluation, etc. These processes are dominated and dominated by humans, with human-machine complementarity. Of course, technology is no longer just a tool but a collaborative relationship of “student-teacher-machine”<sup>[3]</sup>.

### 2.2.2. Promote the development of students’ comprehensive literacy and ability to solve complex problems

Empowering interdisciplinary integrated project-based learning in primary and secondary schools with artificial intelligence is an important path to promote the development of students’ comprehensive literacy and ability to solve complex problems. Its main advantage lies in using real problems as the basis for creating scenarios, empowered by artificial intelligence, and promoting students’ thinking training and ability development.

This process, even with the powerful assistance of artificial intelligence, still requires students to take the lead in problem expression, critically face the output of AI, and avoid only becoming problem proposers. Therefore, in the process of project-based learning, it is necessary to further enhance students’ systematic thinking, collaboration ability, and digital literacy. Students are not only proficient in using AI tools but also able to master AI, solve complex problems in interdisciplinary learning, and adhere to human subjectivity and value judgments.

## 3. Overview of AI empowering interdisciplinary integration project-based teaching implementation in primary and secondary schools

### 3.1. Utilize artificial intelligence to grasp every effective resource

Utilize artificial intelligence to parse, transform, and store resources, as shown in **Figure 1**.



**Figure 1.** Screenshot of Tencent ima’s AI assisted video resource analysis. Source: [https://www.iqiyi.com/v\\_b19druling.html](https://www.iqiyi.com/v_b19druling.html)

As shown in **Figure 1**, use the “Recording Minutes” in “Tencent ima” to organize the text. Copy the organized text information to DeepSeek with requirements such as: “What inspirations does this have for interdisciplinary project-based learning in primary and secondary schools?”

When the task is assigned to DeepSeek, there is a presentation of the “thinking” process, which can be carefully reviewed as it reflects a logical thinking process that is crucial for interdisciplinary understanding in education. There are many parts of the thinking process that are worth learning from.

Afterwards, DeepSeek provided a very vivid example and direct inspiration for interdisciplinary project-based learning (PBL) in primary and secondary schools, as well as related insights.

Of course, further questions can be asked in the current conversation, such as: What are the related disciplines? DeepSeek provides recommendations for core disciplines, expanded disciplines, interdisciplinary topic classification, and key discipline combinations recommended by academic stage.

Note: Tencent ima, test version number: 2.5.1 (4262); DeepSeek is used for official website login.

Utilize artificial intelligence technology to organize and store a knowledge base.

### 3.2. Utilizing artificial intelligence for data collection

The project-based learning process requires attention to students' learning interests and existing foundations, as well as teachers' understanding of the integrated courses in project-based learning. Before conducting project-based learning, a questionnaire can be set up to collect relevant information.

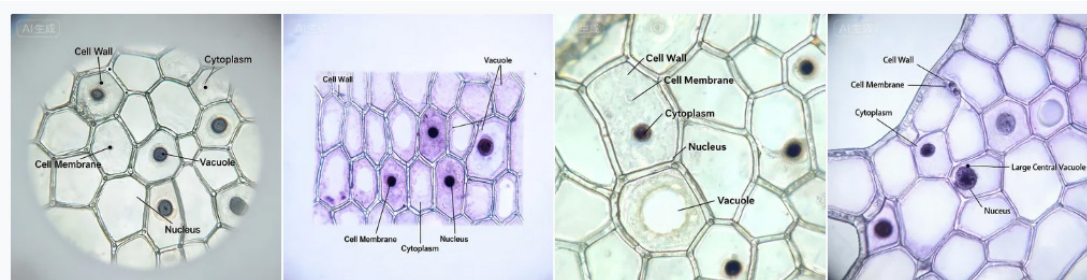
For project-based learning needs, such as before the interdisciplinary project “Exploring Technology-Empowered IoT”, for students and subject teachers to design questionnaires, DeepSeek can be used to design the questionnaire and export it in txt format. At this point, it should be “New Dialogue Mode.” Afterwards, on “Questionnaire Star” (<https://www.wjx.cn/app/themehtml/wjxai.aspx>), utilize AI to generate questionnaires, provide files to the platform, reorganize, check, and publish them. After collecting data, detailed analysis can be downloaded online to provide a basis for project-based learning.

### 3.3. Utilizing artificial intelligence to design and plan project-based learning

Using artificial intelligence tools such as DeepSeek to create course design drafts, during the “thinking” process of DeepSeek, the study will pay attention to how AI analyzes problems from multiple perspectives, provides suggestions for expanding thinking, and comprehensively searches for resources to produce course design drafts.

For content that requires graphical or tabular representation, graphs or tables should be created and further developed based on them. If some projects may involve instruments or drugs, is it necessary to purchase them, and is there a possibility of virtual experiments.

With the theme of “The Cell Structure of Onion” and the help of AI from text-to-image, such as Jimeng (<https://jimeng.jianning.com/ai-tool/generate?workspace=13190760540684>), select the role of a current student and obtain the image results shown in **Figure 2**. Even based on the generated images, videos can be generated for multi-angle observation.



**Figure 2.** AI-generated onion cell structure image (student perspective)

### 3.4. Utilizing artificial intelligence to implement and evaluate project-based learning

In the implementation process of project-based learning, on the one hand, the advantages of learning technology should be fully utilized, such as virtual simulation experiments, project data collection and analysis tools, interactive courseware, micro courses, etc., applied to project-based learning to effectively enhance students' scientific exploration ability.

On the one hand, AI agents can utilize the reasoning ability of large models to achieve task planning, decomposition, and integration, and can directly use tools such as manipulating computers, browsers, and calling plugin tools.

With the development of technology, it has become possible for teachers to use platforms to develop intelligent agents. For example, by using AI agents to create personalized models, knowledge graph technology can track students' understanding of concepts, while pushing suitable learning tasks and exploration projects for students, customizing personalized learning paths for each student, and cultivating students' core chemistry literacy. At the same time, evaluations for interdisciplinary project-based learning can be integrated to provide personalized feedback and improvement suggestions for students. As on the platform (<http://chatai.dljyxxzx.cn/?hometype=chat>), when setting model requirements and inputting student data for evaluation, provide evaluation suggestions.

From the above process, it can be seen that AI is no longer just a tool application, but a more suitable role is “thinking assistant” or “thinking partner.” The authors have gone through the process from issuing instructions to negotiating adjustments. It can be seen that AI has strong capabilities, but lacks clear background knowledge, goals, requirements, and even details of the information. So, providing background, context, goals, etc., to AI can effectively help solve related problems.

AI is not meant to replace teachers, but to liberate them from complex tasks and enable them to engage in more warm and creative education <sup>[4]</sup>.

## 4. Conclusion

Sam Altman, co-founder of OpenAI, an artificial intelligence laboratory, has repeatedly predicted that AI will have “doctoral-level” capabilities and has also mentioned that in the future, human work will rely on AI collaboration rather than being completely replaced. Faced with numerous artificial intelligence tools, one should choose according to their needs and use them wisely. Artificial intelligence empowers interdisciplinary integrated project-based learning in primary and secondary schools, based on the design of challenging interdisciplinary integrated project practices, promoting the improvement of teachers' digital literacy while also assisting students' comprehensive development of innovation and cooperation abilities and actively engaging in knowledge construction. At the same time, it helps to promote educational equity and assist in “providing satisfactory education for the people.”

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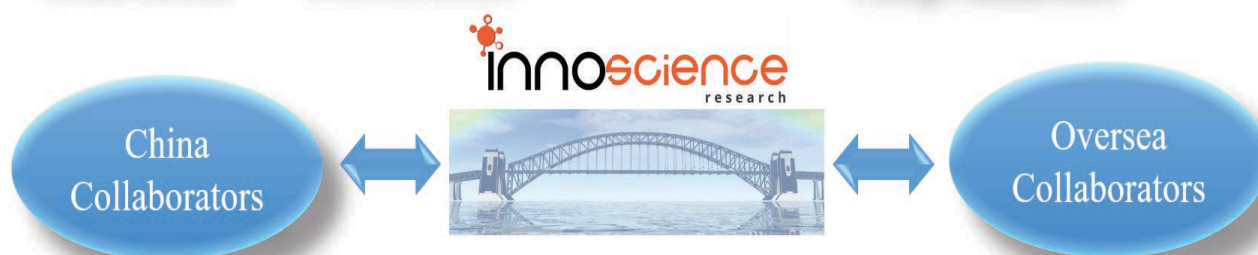
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