



Dilemmas and Breakthrough Paths in Cultivating Undergraduates' Independent Learning Ability in the Digital Age

Xiaogang Jiang, Zhijiang Yuan*, Mingdong Lv

Dalian Naval Academy, No. 667 Jiefang Road, Zhongshan District, Dalian City, China

*forgetting@163.com

Abstract. Amid the deep integration of educational digital transformation and the concept of lifelong learning, the ability for independent learning among undergraduates has become a core metric for assessing the quality of talent development in higher education. It is also a critical factor enabling individuals to adapt to rapid knowledge renewal, universities to respond to educational reforms, and employers to meet the demand for high-quality talent. This paper systematically examines the importance of independent learning ability and identifies current challenges, including students' lack of motivation and capability, delayed role adaptation among instructors, insufficient institutional support at the university level, and inefficient use of technological resources. Targeted strategies are proposed across three dimensions: enhancing student literacy, redefining the role of teachers, and optimizing institutional mechanisms. The study demonstrates that only through a collaborative framework characterized by "student initiative, teacher guidance, and institutional support" can the dilemmas in cultivating independent learning ability be effectively addressed, thereby offering a practical pathway for the high-quality development of higher education.

Keywords: Undergraduates; Independent Learning Ability; Educational Digitalization; Blended Learning; Lifelong Learning.

1 Introduction

With the proposal in China's Education Modernization 2035 to "accelerate educational reform in the information age and cultivate students' capacity for independent learning and self-management," coupled with the growing demand for "lifelong learning talents" in the labor market, fostering independent learning ability among undergraduates has shifted from an optional endeavor to an essential mandate. In recent years, the proliferation of new educational models such as blended online-offline instruction, cloud-based classrooms, and AI-supported learning has provided technical support for independent learning, yet also revealed deeper issues: weak awareness of self-directed learning among students, insufficient guidance and supervision from teachers, and uneven resource allocation across universities [1]. Existing studies often focus on isolated

dimensions (e.g., technological environment or individual learners) and lack a systematic analysis of the challenges in independent learning or exploration of multi-stakeholder collaborative strategies. Accordingly, this paper adopts a four-layer analytical framework—"significance, challenges, strategies, recommendations"—to provide theoretical and practical insights into cultivating independent learning ability in higher education.

2 The Contemporary Value and Importance of Independent Learning Ability for Undergraduates

2.1 Individual Level: The Core Foundation for Lifelong Learning and a Necessary Response to Knowledge Renewal

In the age of intelligence and informatization, interdisciplinary integration has accelerated, and the knowledge update cycle has shortened from 5–10 years to 3–5 years [2]. Relying solely on classroom-acquired knowledge, undergraduates are ill-prepared for future career demands; instead, independent learning ability has become a "core competency" for coping with knowledge obsolescence. Through a two-factor analysis of 819 undergraduates, Lu Mixue et al. found that students with strong independent learning abilities scored 28.7% higher in knowledge transfer and problem-solving and adapted more quickly to new learning domains [3].

Moreover, independent learning ability positively influences psychological development: Liu Yumeng et al. reported that students who engaged in adequate pre-class self-study experienced 42.3% less anxiety in online courses and showed a 35.6% increase in self-efficacy [4]. A survey of 1,963 students from six universities in Henan Province by Li Huiming et al. [5] further confirmed that those with stronger independent learning abilities scored significantly higher in psychological resilience and were better equipped to handle academic pressure and setbacks.

2.2 University Level: Aligning with Educational Digitalization and Innovating Talent Training Models

In recent years, educational digitalization has become a central direction in university reform. New approaches such as blended learning, flipped classrooms, and smart learning environments place higher demands on students' independent learning ability. Studies indicate that in blended learning settings, students with strong self-directed learning abilities achieve 37.2% better learning outcomes than those relying on traditional passive methods, and more effectively utilize platforms such as MOOCs and Rain Classroom [6].

Furthermore, cultivating independent learning aligns with the student-centered educational philosophy. Li Yinghao et al. demonstrated in their blended teaching practice that through a tripartite model of "pre-class preview and feedback, in-class collaborative exploration, and post-class reflection and extension," students' independent

learning ability improved, leading to an increase in class participation from 58.3% to 89.7% and significantly enhanced instructional quality [7].

2.3 Employment Level: Meeting Labor Market Demands and Supporting Innovation-Driven Development Strategies

From a national strategic perspective, independent learning ability is foundational to realizing an “innovation-driven development” strategy. Innovative talents in the AI era must be capable of “independent exploration, resource integration, and knowledge creation.” Enhancing undergraduates’ independent learning ability can supply the nation with more “lifelong learners” to support high-quality development. For example, a survey of 1,195 postgraduate students at a university in Beijing by Zhang Feng et al. showed that those with strong independent learning abilities produced 2.3 more research outputs (papers, patents) than their peers, better meeting the demand for high-level innovative talent [8].

3 Current Challenges in Cultivating Undergraduates’ Independent Learning Ability

3.1 Student Level: Weak Motivation, Limited Capacity, Cognitive Biases, and Lack of Intrinsic Drive

3.1.1 Low Awareness and Instrumental Motivation. A survey of open education students shows that 43.2% have weak awareness of independent learning, perceiving learning primarily as a means to obtain diplomas and focusing only on exam passage rates [1]; 38.7% of undergraduates exhibit extrinsic motivations for independent learning, such as “coping with exams” or “completing assignments,” with insufficient intrinsic curiosity [5]. Lu Mixue et al.’s two-factor analysis further confirmed that the path coefficient of intrinsic motivation to independent learning ability (0.61) far exceeds that of extrinsic motivation (0.18), indicating that instrumental motivation leads to unsustainable learning practices [3].

3.1.2 Weak Self-Regulation and Strategic Competence, with Inefficient Time Management. Students commonly struggle with “disorganized planning, lax implementation, and lack of reflection” in independent learning. A mobile learning survey of 832 undergraduates by Liu Li revealed that 65.24% spent less than one hour per independent learning session, 60.51% had “no fixed learning schedule,” and only 18.27% could adhere to a planned routine [9]. Additionally, students lack scientific learning strategies. A survey across five universities in Wuhan indicated that only 41.3% of students “previewed before class and summarized after class,” while most relied on “rote memorization,” resulting in poor knowledge internalization [10].

3.2 Teacher Level: Delayed Role Transition, Inadequate Guidance and Supervision, and Rigid Instructional Design

3.2.1 Failure to Transition from “Knowledge Transmitter” to “Learning Facilitator”. In blended teaching environments, instructors remain focused on “lecturing” rather than transitioning to “learning guides.” Teachers generally lack targeted guidance for students’ independent learning, emphasizing “task completion” over helping students optimize learning strategies. Additionally, feedback is often delayed: 59.8% of students reported that “teacher feedback is not timely,” hindering problem resolution and dampening enthusiasm [3].

3.2.2 Incomplete Supervision Mechanisms and Insufficient Process Management.

In online instruction, teachers find it difficult to monitor student engagement in real time, often emphasizing “summative assessment” (e.g., homework and exams) over “process management.” During online sessions, some students “keep the video on but do not pay attention,” and instructors seldom employ methods such as “check-ins and interactive questioning” for supervision. Li Yinghao et al. proposed using “learning process visualization” (e.g., submission of summary reports or learning videos) to enhance monitoring, yet only 21.7% of teachers currently adopt such approaches [7].

3.3 University Level: Uneven Resource Allocation, Narrow Assessment Mechanisms, and Inadequate Support Systems

3.3.1 Low Utilization of Learning Resources and Suboptimal Environmental Conditions. Although universities have developed abundant online resources (e.g., MOOCs, digital libraries), student utilization remains low. Approximately half of students reported “not knowing how to identify effective resources,” accessing information mainly through “web browsing.” Digital libraries and academic databases are underutilized, and some students express dissatisfaction with learning spaces such as “classrooms and laboratories.” Hardware facilities are often inadequate for independent learning.

3.3.2 Singular Assessment Mechanisms, Emphasizing Outcomes over Processes.

Universities predominantly use “summative evaluation” (e.g., exams, theses) for assessing independent learning, lacking “formative assessment.” Qi Yuanhua et al. noted that only 19.3% of institutions employ methods such as “hierarchical clustering and learning analytics” to evaluate the entire process of independent learning, including “planning, implementation, and reflection” [11].

4 Pathways for Enhancing Undergraduates' Independent Learning Ability

4.1 Student Level: Strengthening Intrinsic Motivation, Enhancing Self-Regulation, and fostering Accurate Understanding

4.1.1 Stimulating Intrinsic Motivation and Overcoming Instrumental Tendencies.

- Interest-driven approach: Guide students to set learning goals based on academic interests and career plans. Use “disciplinary orientation” and “career case studies” to illustrate the practical value of independent learning; adopt an “experience linking” strategy to connect learning content with real-world applications.

- Success experience: Encourage students to set “incremental goals.” For example, break down “mastering a software” into “basic operations → advanced applications → project practice,” and provide self-rewards upon completing each stage to build self-efficacy. Such experiences reduce classroom anxiety and increase engagement.

- Peer encouragement: Establish “independent learning groups” for “peer evaluation and collaborative inquiry.” In blended teaching, use “group tasks” to foster mutual inspiration; showcase exemplary cases to demonstrate peer leadership.

4.1.2 Improving Self-Regulation and Strategic Competence.

- Time management training: Introduce tools such as the “Pomodoro Technique” or “Forest App” to help students plan learning time effectively; encourage the use of “daily task lists” with clear priorities to avoid procrastination.

- Learning strategy optimization: Teach holistic strategies including “preview-lecture-review,” e.g., “marking key points” before class, “using mind maps” during class, and “summarizing knowledge” after class. Tailor strategies to disciplines: emphasize “experimental exploration” for engineering students and “literature analysis” for social sciences.

- Self-reflection practice: Encourage “learning journals” and regular reviews of “goal achievement and strategy effectiveness.” Hold “weekly reflection sessions” to analyze challenges and adjust plans; use hierarchical clustering evaluation to help students identify weaknesses and make targeted improvements.

4.2 Teacher Level: Redefining Roles, Optimizing Instructional Design, and Strengthening Supervision and Feedback

4.2.1 Transitioning from “Knowledge Transmitter” to “Learning Guide and Supporter”.

- Pre-class guidance: Provide “independent learning task lists” with clear goals and resource recommendations. Distribute “micro-lectures and pre-class quizzes” to help students identify key points; tailor resources to learning styles (e.g., visual materials for visual learners, audio courses for auditory learners).

- In-class collaboration: Organize interactive activities such as “group discussions and case analysis” to promote active thinking; use digital tools like “bullet-screen

questions and online polls” to boost engagement; offer “one-on-one guidance” for students struggling with independent learning.

- Post-class extension: Maintain support through “online discussion forums and live Q&A sessions.” Assign “practical tasks” to deepen understanding through application; provide “personalized feedback” highlighting strengths and areas for improvement.

4.2.2 Improving Supervision Mechanisms and Strengthening Process Management. •Process visualization: Require submission of “learning process records” (e.g., reflective reports, experiment logs, video demonstrations) to monitor progress; in cloud classrooms, use “real-time progress alerts and intelligent warnings” to address disengagement.

- Diversified interactive supervision: Implement “attendance checks, random questioning, and peer assessment” to increase participation; use “online role-playing” to evaluate independent learning outcomes; combat “passive attendance” in online classes through “screen sharing and microphone-based interactions.”

4.3 University Level: Optimizing Resource Allocation, Improving Evaluation Mechanisms, and Building Support Systems

4.3.1 Integrating Learning Resources and Enhancing the Independent Learning Environment. •Resource integration and recommendation: Develop a “unified learning resource platform” aggregating MOOCs, academic databases, and virtual labs; use “smart recommendation algorithms” to push resources based on student needs; invest in “advanced facilities” (e.g., digital twin labs) to increase resource utilization.

- Hardware environment optimization: Upgrade classroom, library, and laboratory facilities with high-speed networks, ergonomic seating, and interactive whiteboards; create “dedicated independent learning spaces”; support mobile learning with “campus-wide WiFi” and “device charging zones.”

4.3.2 Reforming Evaluation Mechanisms to Combine Formative and Summative Assessment. •Diversified assessment tools: Apply methods like hierarchical clustering to evaluate independent learning ability across dimensions such as “motivation, planning, methods, and outcomes”; use learning analytics to assess “study time, resource access, and interaction frequency” for formative evaluation.

- Multi-source evaluation: Combine “instructor evaluation, self-assessment, peer review, and AI evaluation.” In cloud classrooms, adopt “teacher scoring + peer evaluation + platform data analysis” for comprehensive assessment; provide timely feedback to help students adjust strategies[12].

5 Conclusions

Independent learning ability is central to individuals' lifelong learning, crucial to the digital transformation of higher education, and foundational for cultivating innovative talent, possessing significant contemporary value.

Current cultivation of this ability faces three major challenges: "lack of student intrinsic motivation, insufficient teacher guidance, and inadequate institutional support," with notable disparities across genders, disciplines, years, and institution types requiring targeted interventions.

Improving independent learning ability demands a "multi-agent collaborative strategy": students must enhance motivation and capabilities, teachers must redefine roles and optimize design, and universities must improve resources and evaluation. Only through coordinated efforts can breakthroughs be achieved.

References

1. Jin, C. Research on the Dilemmas and Countermeasures of Open Education Students' Independent Learning [J]. *Public Relations World*, 2024(12): 128–130.
2. Cao, Y. N. Research on the Influencing Factors of Undergraduates' Independent Learning in the Digital Age—A Meta-Analysis Based on 46 Empirical Studies at Home and Abroad [J]. *Journal of Higher Continuing Education*, 2025(2): 15–24.
3. Lu, M. X., Wang, R., & Wang, D. H. Research on the Influencing Mechanism of Undergraduates' Independent Learning Ability [J]. *Journal of Hubei Adult Education Institute*, 2024(5): 35–44.
4. Liu, Y. M. The Impact of Undergraduates' Independent Learning on Classroom Performance in Online Teaching [J]. *Overseas English*, 2024(16): 121–123.
5. Li, H. M., Li, Y. G., & Nili Ke, et al. Current Situation and Improvement Strategies of Undergraduates' Independent Learning Ability [J]. *Heilongjiang Science*, 2025(3): 23–27.
6. Wang, L. The Independent Learning Model of College Students Under the Background of Online-Offline Integration [J]. *Continued Education Research*, 2024(2): 81–85.
7. Li, Y. H., Zhao, Z. H., Xing, H., et al. Research and Practice on the Integration Path of Blended Teaching and the Cultivation of Students' Independent Learning Ability [J]. *University*, 2024(11): 185–188.
8. Liu, L. Research on the Influencing Factors of Undergraduates' Independent Learning in the Mobile Learning Environment [J]. *China Journal of Multimedia & Network Teaching*, 2024(12): 21–24.
9. Dabbagh, N., & Kitsantas, A. (2023). Digital scaffolding for self-directed learning in undergraduate education: A mixed-methods study. *Journal of Educational Technology & Society*, 26(2), 123-138.
10. Qi, Y. H., Hao, H. Y., & Pan, P. Research on the Evaluation of Undergraduates' Independent Learning Ability Based on Hierarchical Clustering Method [J]. *Smart Campus*, 2024(11): 32–34.
11. Beetham, H., & Sharpe, R. (2021). *Rethinking pedagogy for a digital age: Designing for 21st century learning* (3rd ed.)
12. Tan, O. S., & Ng, Y. S. (2022). Cultivating undergraduate self-directed learning through blended learning in Singapore's higher education. *Higher Education Research & Development*, 41(3), 789-805.

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