Contemporary Education Frontiers, 2026, Volume 4, Issue 7
https://bbwpublisher.com/journal/CEF
Online ISSN: 3029-1860
Print ISSN: 3029-1879

Research on the Current Status and Countermeasures of Informatized Teaching Resource Construction in Colleges and Universities

Guangjun Chen*

Dalian University of Finance and Economics, Dalian 116622, Liaoning, China

Author to whom correspondence should be addressed.

Copyright: © 2026 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: The development of informatized teaching resources in higher education institutions is a core lever for enriching digital teaching supply and adapting to the teaching needs of different disciplines. At present, informatized teaching resources in higher education institutions have formed differentiated distribution characteristics across various scenarios, including public basic courses, specialized courses, preview and review, and learning assessment, exhibiting structural differences in coverage while also facing multi-dimensional practical problems. Resource development has not been aligned with curriculum cultivation positioning, nor has it invited frontline teachers to participate, resulting in insufficient alignment between content and teaching objectives. Development has not been aligned with students' cognitive characteristics and self-directed learning habits, leading to a disconnect between presentation formats and cognitive patterns. The absence of standardized operation and maintenance procedures has caused content updates to lag behind the iteration of teaching content. In response to these problems, resource development should anchor content design to teaching objectives, optimize presentation formats in accordance with student cognition, and establish a dynamic updating mechanism involving multiple stakeholders.

Keywords: Informatized teaching resources in higher education institutions; Teaching resource development; Alignment with teaching objectives; Cognitive patterns; Dynamic updating

Online publication: July 26, 2026

1. Introduction

The implementation of the digital education strategy has placed higher-level demands on the quality of digital teaching resource provision in higher education institutions. As the core vehicle supporting the delivery of digital teaching, informatized teaching resources in higher education institutions directly affect the overall effectiveness of teaching implementation and are linked to the ultimate quality of talent cultivation through

their supply scale, content quality, and degree of adaptation. At present, the development of informatized teaching resources in domestic higher education institutions has made phased progress, forming a resource supply system covering multiple types of teaching scenarios that can, to a certain extent, meet the needs of general teaching scenarios such as public basic courses. However, in actual teaching application, multi-dimensional adaptation deviations remain, and the auxiliary teaching efficacy of resources has not been fully released. Systematically reviewing the current landscape of informatized teaching resource development in higher education institutions, analyzing common problems in practice, and exploring targeted optimization paths can provide a clear practical reference for calibrating the direction of subsequent resource development, and can also offer feasible practical approaches for expanding the coverage of high-quality teaching resources and improving the alignment between teaching supply and learning needs.

2. The current landscape of informatized teaching resource development in higher education institutions

2.1. Distributional characteristics of informatized teaching resource types in higher education institutions

The Implementation Plan for the Digital Education Strategic Action explicitly proposes enriching the supply of digital teaching resources in higher education institutions and guiding different types of resources to adapt to the teaching needs of different disciplines. Currently, informatized teaching resources in higher education institutions mainly comprise four categories: multimedia courseware, micro-videos, online question banks, and virtual simulation resources. In the field of public basic courses, multimedia courseware accounts for a relatively high proportion; most of these resources are organized and integrated around core course knowledge points, adapting to the general teaching needs of large-scale instruction. In the field of specialized courses, virtual simulation resources are used more frequently, compensating for operational practice segments that cannot be covered in physical teaching scenarios. Owing to their lightweight dissemination characteristics, micro-videos have a high utilization rate in pre-class preview and post-class review scenarios, and their acceptance among teachers and students is also at a relatively high level [1]. Online question banks are more often used in periodic learning assessment scenarios, adapting to the formative assessment needs of various courses. The distributional differences among different types of resources are highly consistent with the teaching attributes of different disciplines and the actual needs of daily instruction, providing a clear practical reference for subsequently reviewing resource development pathways.

2.2. Application coverage of informatized teaching resources in higher education institutions

In line with the requirements proposed in the Implementation Plan for the Digital Education Strategic Action regarding expanding the coverage radius of high-quality digital teaching resources, the current coverage of informatized teaching resources in higher education institutions exhibits structural distribution characteristics. The resource supply for public compulsory courses is relatively adequate, covering the entire teaching process, including pre-class preview, in-class instruction, and post-class consolidation. The resource supply for elective courses and practice-oriented courses is relatively limited, making it difficult to match diverse teaching needs. Lower-year students primarily study public basic knowledge and use general-purpose informatized teaching resources more frequently; the resource supply can meet the basic needs

of daily learning. Upper-year students gradually shift their learning focus toward in-depth professional exploration and the cultivation of innovative practical abilities, and their demand for professionally expansive and practical guidance resources continues to rise. The existing supply scale and content dimensions of resources can hardly adapt to the learning needs of this group [2]. The differences in resource coverage across dimensions reflect the adaptation gap between the current supply of informatized teaching resources and actual teaching needs, providing a practical reference for determining the priorities of subsequent resource development.

3. Problems in teaching practice in the development of informatized teaching resources in higher education institutions

3.1. Insufficient alignment between resource content and teaching objectives

Against the overall background of advancing informatized teaching resource development in higher education institutions, the degree of alignment between resource content and predefined teaching objectives directly affects the ultimate effectiveness of teaching implementation, and also influences students' efficiency in acquiring core course knowledge and the outcomes of core competency cultivation. Many resources, during the early development stage, were not fully aligned with the actual cultivation positioning of the course, nor did they invite frontline teaching faculty to participate in content design and calibration. As a result, some resources suffer from lagging knowledge point iteration, with content depth unable to cover the core competency cultivation dimensions required by the course. Others have content design that exceeds the scope of the established syllabus and does not match the knowledge receptivity of students at the current stage. From the perspective of daily teaching implementation, such adaptation deviations directly disrupt the normal teaching rhythm. Teachers need to spend extra time screening and adjusting resource content, and may even need to supplement a large amount of teaching content to meet the actual instructional needs of the course, making it impossible to fully leverage the auxiliary teaching efficacy of informatized teaching resources [3].

The resource content that students encounter either fails to provide sufficient support for constructing their own knowledge systems, leading to obvious gaps in mastering core knowledge and an inability to complete corresponding competency training tasks based on existing resources, or causes learning frustration because the content difficulty exceeds their current cognitive range, and may even generate resistance to course learning. This is detrimental to the sustained advancement of subsequent course learning and, to a certain extent, undermines the practical value of higher education institutions' efforts to promote informatized teaching resource development.

3.2. Disconnect between resource presentation formats and students' cognitive patterns

From the design logic of current presentation formats for informatized teaching resources in higher education institutions, most resources, during the development stage, were not fully aligned with the cognitive development characteristics of contemporary university students or their self-directed learning behavioral habits. Electronic conversion of static texts and recording of teaching videos of uniform duration were taken as the primary content presentation pathways, without building interactive modules or contextualized guidance segments adapted to the logic of knowledge point decomposition. This neither mobilizes students' willingness to actively participate in self-directed learning nor helps students connect fragmented knowledge

points into a complete knowledge system. When students use such resources for self-directed learning activities, they are prone to rapid attention dispersion or deviations in understanding abstract knowledge points. Over time, this lowers students' acceptance of informatized teaching resources and the frequency of their use, and prevents informatized resources from fully playing a supplementary and auxiliary role for offline teaching [4]. From the basic logic of cognitive psychology, resource presentation formats adapted to learners' cognitive patterns can greatly reduce the threshold for information reception and help learners absorb and internalize core knowledge points within a short time. The disconnect between presentation formats and students' cognitive patterns in nearly 60% of the existing stock of informatized teaching resources not only wastes prior investment in resource development, but also, to a certain extent, undermines students' enthusiasm for using informatized resources for self-directed learning, indirectly affecting the improvement of overall teaching quality.

3.3. Desynchronization between resource updating mechanisms and iteration of teaching content

Against the realistic background of disciplinary development and iteration and dynamic adjustment of teaching content in higher education institutions, the updating pace of informatized teaching resources directly concerns the timeliness of knowledge transmission and the cutting-edge nature of students' professional cognition. In over 70% of regular undergraduate universities in China, the existing update cycles for informatized teaching resources are generally too long. Most resources enter a state of long-term shelving after being built, without establishing standardized workflows for content calibration and content supplementation. The lagging update pace cannot timely reflect cutting-edge research achievements in the disciplinary field or actual application trends on the industry side, nor can it meet the dynamic adjustment needs of course teaching content [5].

From the perspective of talent cultivation, the informatized resource content that students encounter is mostly existing content from three years ago or even earlier, which cannot effectively connect with current disciplinary development directions, and can hardly provide sufficient content support for students' professional competency growth and employability enhancement. Combined with actual feedback from daily teaching, such updating lag also increases the lesson preparation burden on frontline teaching faculty. Teachers need to supplement a large amount of cutting-edge content during instruction to fill the content gaps in existing resources, making it impossible to fully leverage the role of informatized resources in reducing teaching redundancy costs. This, in turn, highlights the necessity of building a dynamic resource updating mechanism.

4. Optimization strategies for the development of informatized teaching resources in higher education institutions

4.1. Anchoring teaching objectives and precisely designing resource content

Anchoring resource content design to teaching objectives is the core pathway for resolving the misalignment between existing resources and teaching needs. In the early stage of resource development, it is necessary to align with the actual cultivation positioning of the course and invite frontline instructors to participate throughout the process of content design and calibration. By combining the knowledge receptivity of students at different educational stages with the specific requirements of the course syllabus, the core knowledge points and competency cultivation dimensions of the corresponding course should be systematically

identified. The content depth and coverage scope of resources should then be delineated, thereby promoting alignment between resources and the actual teaching needs of the course, reducing the redundant workload for teachers in subsequently adjusting resource content, and fully leveraging the auxiliary teaching efficacy of informatized teaching resources.

For the public course University Computer Basics (2021 edition, Higher Education Press) offered to first-year university students, when developing informatized resources related to Chapter 1, Section 2, "Composition of Computer Systems," the teaching objective of mastering the hardware and software composition of computer systems and their interrelationships was anchored. Images and video materials of current mainstream computer hardware devices were selected, and interface demonstration content for the latest version of the operating system was supplemented, thereby promoting a high degree of alignment between resource content and course teaching objectives. Elements related to the cultivation of computational thinking were incorporated during resource development. Through dynamic demonstration content that deconstructs computer components, students are guided to understand the functional positioning and collaborative working principles of different components such as the motherboard, CPU, memory, hard disk, and input/output devices. At the same time, small-scale thinking tasks related to hardware parameter matching and software installation adaptation were embedded in the resources, helping students build a complete cognitive framework of computer systems [6]. The coverage scope and depth of resource content were strictly set in accordance with syllabus requirements, ensuring that no redundant content beyond the cognitive range of students at the current stage was included, while no core knowledge points were omitted from explanation and guidance. This can provide sufficient content support for students' pre-class preview and post-class consolidation, as well as adapted auxiliary content for classroom instruction, reducing the time teachers subsequently spend adjusting resource content.

4.2. Following cognitive patterns and innovating resource presentation formats

Optimizing the presentation formats of informatized teaching resources in accordance with students' cognitive patterns is the core pathway for resolving the current disconnect between resources and students' cognitive characteristics. By combining the self-directed learning habits of contemporary university students, interactive modules and contextualized guidance segments adapted to knowledge point deconstruction logic should be established. Different types of interactive tools should be integrated into the resource design process to lower the threshold for students' information reception, mobilize their proactive willingness to engage in self-directed learning, help them connect scattered knowledge points into a complete knowledge system, and fully leverage the supplementary and auxiliary role of informatized resources for offline teaching.

When developing resources related to Chapter 1, Section 2, "Composition of Computer Systems" in University Computer Basics (2021 edition, Higher Education Press), interactive animations were selected to carry the demonstration content of core knowledge points. The hardware assembly process of computer systems was deconstructed into operable interactive nodes. By clicking and operating, students can simulate the connection process of different components such as the motherboard, CPU, memory, hard disk, and input/output devices, intuitively perceiving the collaborative operation logic of each component [7]. Combining real-life scenarios of daily computer use, a guided troubleshooting pathway for when a computer fails to start was established. Students can attempt to select corresponding troubleshooting steps based on existing knowledge, with each operation accompanied by corresponding knowledge point explanations, helping students establish connections between theoretical knowledge and practical application scenarios. With the aid of dynamic mind mapping tools, the logical

connections among different knowledge points—such as computer hardware composition, software classification, and hardware-software collaborative relationships—were visually presented. After completing the corresponding module, the mind map automatically marks the knowledge point nodes that have been mastered, clearly presenting the current knowledge gaps and providing a clear direction for subsequent self-directed review. This type of design can effectively enhance the interactivity and interest of resources, increase students' engagement in self-directed learning, and help them gradually build a complete knowledge framework [8].

4.3. Establishing a dynamic mechanism to achieve iterative resource content updating

A dynamic resource updating mechanism is the core pathway for resolving the lag in resource content iteration and can effectively ensure the timeliness of informatized teaching resources and their alignment with disciplinary development directions. A multi-stakeholder collaborative resource updating and maintenance system should be established. Feedback from resource users should be regularly collected, regular communication with frontline instructors should be maintained, and professional teaching and research teams should be jointly organized to conduct review and optimization adjustments of resource content on a fixed cycle. New content aligned with teaching needs should be promptly supplemented, gradually forming a rolling resource iteration pathway.

For the development of informatized resources related to Chapter 1, Section 2, "Composition of Computer Systems" in University Computer Basics (2021 edition, Higher Education Press), before the course begins each semester, online questionnaire feedback from students who used the resources in previous semesters is systematically reviewed. Targeted adjustments are made in response to issues raised by students, such as hardware parameter explanations not being sufficiently close to current mainstream configurations and some practical content being disconnected from daily usage scenarios. Whenever the syllabus is adjusted, the instructors are contacted immediately to clarify the direction of adjustment. As the current disciplinary field pays increasing attention to artificial intelligence-related content, introductions to AI chips are added to the original content on computer hardware composition, clarifying their functional differences from general-purpose CPUs and their applicable scenarios, ensuring that resource content is highly aligned with teaching requirements [9]. A joint review and calibration of resource content is conducted quarterly with the computer science teaching and research team. Concurrently, the current iteration of computer hardware on the industry side and cutting-edge research trends in the disciplinary field are reviewed, outdated hardware images and software interface demonstration materials are promptly replaced, and practical guidance content more aligned with current application realities is supplemented. This continuous iteration mechanism can keep resource content consistently aligned with actual teaching needs and provide content support for students' professional cognitive construction that conforms to current disciplinary development directions [10].

5. Conclusion

The development of informatized teaching resources in higher education institutions is a long-term systematic project that requires full-process design and maintenance closely aligned with actual teaching needs. Resource development should not merely pursue expansion at the scale level but should focus more on quality improvement and scenario adaptation. Synchronized efforts across three dimensions—content design, presentation format, and iteration mechanism—are necessary to precisely align with the teaching attributes of different disciplines, the cultivation positioning of different courses, and the learning needs of students at

different educational stages. Only in this way can the supplementary and auxiliary efficacy of informatized teaching resources for offline teaching be fully released, the redundant teaching burden on frontline teachers be reduced, and students' willingness to participate in self-directed learning and learning efficiency be enhanced. Subsequent resource development practices can further localize the existing optimization pathways in accordance with the educational positioning and disciplinary characteristics of different universities, gradually forming a resource development paradigm adapted to their own teaching systems, and continuously providing digital support for improving the quality of talent cultivation.

Disclosure statement

The author declares no conflict of interest.

References

[1] Zhai JY, 2024, Analysis of Strategies for the Construction of Informatized Teaching Management Platforms in Higher Education Institutions. Journal of Changchun Education Institute, 40(06): 78–82.

[2] Cui MM, Zhou S, Tan CY, 2024, Exploration of Teaching Reform in Computer Majors in Higher Education Institutions in the Informatization Era. Education Informatization Forum, (12): 15–17.

[3] Wang L, Xiao HF, Sun ZQ, 2024, Problems and Research on Building Data Centers to Support the Informatization Development of Higher Education Institutions. Journal of Chuzhou Polytechnic, 23(03): 14–17.

[4] Gao Y, Peng Y, Luo D, 2024, Construction of Course Resources for Basic Information Technology Teaching. In Henan Private Education Association, Proceedings of the 2024 Annual Academic Conference of Henan Private Education Association (Vol. II), pp. 97–98. Information Technology Teaching and Research Office, Department of Radar, Army Engineering University of PLA; Henan Private Education Association.

[5] Chen LL, 2024, Research on the Challenges and Development Paths of Physical Education Teachers' Teaching Under the Background of Digital Education. In School Physical Education Branch of China Sport Science Society, Compilation of Abstracts of the 2024 National Academic Seminar for Young and Middle-Aged School Physical Education Workers, pp. 758–759. Chengdu Sport University; China Sport Science Society.

[6] Zhu Y, Xu YJ, 2024, Deployment Practice of IPv6 in University Campus Networks. Science and Technology Economic Market, (07): 49–51.

[7] Liu ZW, Zhang SX, 2025, Value Implications, Realistic Dilemmas, and Advancement Paths of Digital Teaching Resource Development in Higher Vocational Colleges. Education and Vocation, (20): 31–39.

[8] Zhao Y, 2024, Research on the Development of Practical Teaching Resources for Information Majors in Higher Vocational Colleges Under the Background of Professional Clusters. Information & Computer (Theoretical Edition), 36(17): 239–241.

[9] Shang T, Yan XM, Zhang Y, 2024, Reform Practice of Online and Offline Blended Teaching in the Digital Electronics Technology Course. Education Informatization Forum, (12): 12–14.

[10] Gu JX, Liang SD, 2025, Research on the Construction of a Three-Dimensional Digital Teaching Resource Library for Primary School Information Technology Courses. New Curriculum Research, (20): 17–19.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.