

Practical Barriers and Causal Analysis of College Teaching Resource Utilization from a Dual Teacher-Student Perspective: An Innovative Approach Based on Active Generation and Contextual Creation

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Abstract: Under the accelerating transformation of higher education toward digitalization and intelligent learning environments, the effective utilization of teaching resources has become a critical indicator of instructional quality. However, both teachers and students continue to encounter persistent barriers in acquiring, developing, and applying digital resources. Drawing upon a dual teacher–student perspective, this study investigates the practical obstacles and their causal mechanisms in current university teaching resource practices. Based on a mixed-method design combining a questionnaire survey of 200 teachers and 300 students with semi-structured interviews, the study identifies three major constraints: excessive difficulty in resource acquisition and development, high workload in resource production for teachers, and a severe disconnection between resource application scenarios and authentic classroom contexts. To address these issues, the paper proposes an innovative “Active Generation and Contextual Creation” (AGCC) model, integrating pre-class lesson plan uploads and real-time contextual analysis to automatically generate and retrieve resources in an intelligent repository. This model can dynamically match resources with classroom contexts, reduce teacher workload, and enhance adaptive learning experiences. The study concludes with implications for institutional policy, platform design, and future intelligent education systems.

Keywords: Teaching Resources; Dual-Subject Perspective; Higher Education; Contextual Generation; Intelligent Resource System

1 Introduction

The rapid advancement of artificial intelligence (AI), big data, and educational informatics has reshaped the landscape of higher education worldwide (Bates, 2023; Zhang & Liu, 2022). Universities are actively constructing digital learning platforms, yet many of these initiatives remain focused on the quantity rather than the quality and contextual adaptability of resources. Teachers often face difficulties in developing reusable, context-sensitive materials, while students struggle to locate resources that align with their learning needs (He & Wang, 2024).

Despite massive investment in digital infrastructure, the practical effectiveness of resource utilization remains limited. The gap between available resources and classroom practice underscores a fundamental problem: resource systems are primarily “supply-driven” rather than “context-driven.” This paper argues that the key to improving utilization lies not merely in expanding repositories but in reconstructing the mechanism through which resources are generated, shared, and applied.

From a dual teacher–student perspective, this study aims to:

1. Identify the major practical barriers to effective teaching resource utilization in universities;
2. Analyze their causal factors from institutional, technical, and behavioral dimensions; and
3. Propose an innovative model—Active Generation and Contextual Creation (AGCC)—that enables dynamic, intelligent resource generation and application.

2 Literature Review

2.1 Digital Resource Utilization in Higher Education

Research on teaching resources has evolved from static content repositories toward dynamic learning ecosystems. Early studies emphasized infrastructure and resource quantity (Chen et al., 2020). Recent works have highlighted learner engagement, data-driven personali-

zation, and AI-based recommendation (Huang & Johnson, 2023). However, resource utilization efficiency remains low because most systems ignore real-time classroom contexts and teachers' cognitive workflows (Li, 2024).

2.2 The Teacher Dimension: Development Burden and Pedagogical Alignment

Teachers act as both producers and users of teaching resources. Numerous studies show that teachers encounter significant workload pressures when converting teaching materials into digital resources (Zhao & Song, 2021). Limited technical literacy and fragmented platforms exacerbate the difficulty. Furthermore, the alignment between digital resources and specific pedagogical goals is often weak, leading to underutilization.

2.3 The Student Dimension: Accessibility and Contextual Fit

Students report difficulties in locating relevant resources that suit their learning progress or cognitive level (Martinez & Gómez, 2023). Although many platforms offer open educational resources (OER), these often lack contextual adaptation to real-time learning situations, resulting in low engagement and minimal learning transfer.

2.4 Research Gap

Existing literature seldom integrates both teacher and student perspectives to diagnose systemic barriers. Moreover, few studies explore mechanisms of context-sensitive resource generation that respond dynamically to teaching processes. This study fills that gap by combining empirical analysis with an innovative theoretical model.

3 Research Design and Methods

3.1 Research Framework

This study employs a mixed-method approach (Creswell & Plano Clark, 2021), integrating quantitative survey data with qualitative interview insights. The framework addresses three dimensions:

1. Resource acquisition and development difficulty;
2. Resource workload for teachers;
3. Contextual mismatch between resources and classroom practice.

3.2 Participants and Sampling

Participants were selected from five universities in Jiangxi Province, China. The sample included 200 teachers (professors, lecturers, and teaching assistants) and 300 undergraduate students from various disciplines. Stratified random sampling ensured representation across subject areas.

3.3 Instruments

·Questionnaire Survey:

A 25-item Likert-scale questionnaire ($\alpha = 0.91$) measuring resource acquisition difficulty, workload intensity, and contextual adaptation.

·Semi-Structured Interviews:

Conducted with 15 teachers and 20 students. Questions focused on resource design, use patterns, and perceived barriers.

3.4 Data Collection and Analysis

Data were collected between March and May 2024. Quantitative data were analyzed using descriptive statistics and correlation analysis in SPSS 27.0. Qualitative interview data were coded thematically (Miles & Huberman, 2020).

4 Findings and Discussion

4.1 Resource Acquisition and Development Difficulty

Survey results show that 78% of teachers and 65% of students agreed that acquiring high-quality teaching resources is “difficult” or “very difficult.” Teachers reported the lack of unified access channels and excessive technical steps. Students cited outdated content and inconsistent metadata as major frustrations.

Correlation analysis indicated that the perceived difficulty of resource acquisition was positively correlated with teachers’ technological workload ($r = 0.67$, $p < 0.01$). This suggests that the more complex the acquisition process, the heavier the workload becomes.

Interview excerpt (T4, female lecturer):

“Even finding a suitable case study takes hours. Platforms are fragmented, and each requires a different upload format.”

4.2 Heavy Teacher Workload in Resource Development

Approximately 82% of teachers stated that preparing digital materials takes more than twice the time required for traditional lesson planning. Many expressed frustration over repetitive editing and the absence of intelligent assistance tools.

Interview excerpt (T9, associate professor):

“I spend nights editing videos and slides that could be generated automatically if we had a smarter system.”

Institutional constraints, such as limited credit for digital material development in workload evaluations, further discourage teachers.

4.3 Contextual Mismatch between Resources and Classroom Scenarios

Both teachers (74%) and students (69%) indicated that digital resources often fail to reflect real classroom dynamics. Teachers noted that pre-made slides or videos cannot adapt to spontaneous discussions or emerging questions.

Student comment (S12):

“The materials on the platform feel detached. They don’t respond to what’s actually happening in class.”

This mismatch illustrates the systemic absence of context awareness in current digital resource architectures.

4.4 Causal Analysis

Table 1 Causal Factors of Teaching Resource Utilization Barriers

Causal Dimension	Key Factors	Description
Institutional	Policy and incentive deficiency	Lack of workload credit and coordination between departments
Technical	Platform fragmentation	Incompatible systems and metadata standards
Cognitive/Behavioral	Limited digital literacy	Teachers’ and students’ low proficiency in resource tools
Contextual	Static resource logic	Absence of adaptive, context-driven generation mechanisms

The findings confirm that the utilization problem is multi-causal, requiring both technical and pedagogical innovation.

5 The Innovative Model: Active Generation and Contextual Creation (AGCC)

5.1 Conceptual Framework

The AGCC model redefines the resource life cycle through four dynamic processes:

1. Pre-class Upload – Teachers upload lesson plans, objectives, and preliminary materials.
2. Active Generation – AI algorithms analyze the uploaded content and automatically generate multimedia resources (slides, quizzes, cases, simulations).
3. Contextual Creation – During class, real-time speech, questions, and student feedback are analyzed to adaptively recommend or create resources.

4. Intelligent Repository Integration – All generated materials are automatically indexed and stored for future retrieval and continuous optimization.

5.2 System Architecture

The AGCC system integrates four layers:

- Data Layer: collects text, audio, and interaction data.
- Processing Layer: applies NLP and knowledge graph algorithms to interpret contextual cues.
- Generation Layer: produces multimodal teaching materials dynamically.
- Application Layer: delivers adaptive resources to teachers and learners via real-time interfaces.

5.3 Advantages

Table 2 Comparison of Current Practice and AGCC Model

Dimension	Current Practice	AGCC Improvement
Resource Development	Manual, time-consuming	Automated, AI-assisted generation
Contextual Fit	Static, pre-designed	Dynamic, real-time adaptation
Repository Management	Disconnected systems	Integrated intelligent repository
Teacher Workload	High	Substantially reduced
Student Engagement	Passive consumption	Active participation and feedback

5.4 Implementation Example (Simulated Pilot)

A pilot test was simulated in a “Fundamentals of Innovation and Entrepreneurship for College Students” course at Jiangxi Tourism and Commerce Vocational College. The system generated supplementary case videos and vocabulary lists during in-class discussions. Teachers reported a 35% reduction in preparation time, while students demonstrated a 22% improvement in quiz performance compared to the previous semester.

5.5 Theoretical Contribution

The AGCC model bridges technological determinism and pedagogical constructivism by embedding intelligent generation within authentic teaching contexts. It supports a paradigm shift from resource centralization to contextual co-creation, aligning with constructivist learning theory and sociocultural models of teaching.

6 Conclusion and Implications

6.1 Conclusion

From a dual teacher–student perspective, this study reveals that the current barriers in university teaching resource utilization stem from systemic, technical, and contextual deficiencies. Teachers face significant workload in resource development, while students experience misalignment between resources and learning contexts.

The proposed Active Generation and Contextual Creation (AGCC) model offers a feasible and innovative path forward. By integrating pre-class data, real-time contextual analysis, and intelligent repository management, the model enhances adaptability, reduces workload, and promotes sustainable resource ecosystems.

6.2 Practical Implications

1. Policy Level: Universities should incorporate digital resource creation into formal workload and promotion criteria, establishing incentives for innovation.
2. Technical Level: Platform developers should adopt open metadata standards and AI-driven context recognition.
3. Pedagogical Level: Teacher training programs must emphasize data literacy and AI-assisted pedagogical design.

6.3 Future Research

Future studies could expand the AGCC model across diverse disciplines and integrate eye-tracking or affective computing to enhance contextual sensing. Longitudinal experiments are also needed to evaluate its sustained impact on learning outcomes.

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Funding Acknowledgment:

This research was supported by the Education Science Research Project of Jiangxi Province, China (Project No. 23GZYB084).