

Smart Platforms and Interactive Design: Enhancing College English Listening and Speaking Educational Management via a Three-Stage Framework

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ABSTRACT

Traditional college English listening and speaking courses for non-English majors suffer from low student engagement and inefficient instructional management against the backdrop of higher education's digital transformation. Based on a mixed-methods case study of 109 undergraduate students at a Chinese institution, this study investigates how to optimize course management through an integration of interactive design and smart teaching platforms from the perspective of educational management. The findings show that while this integrated model improves the effectiveness of classroom monitoring and individualized feedback, it also significantly boosts students' freewill and willingness to engage in cross-cultural communication. Furthermore, a reproducible three-stage management framework—pre-class resource allocation, in-class interactive monitoring, and post-class individualized feedback—is proposed, providing useful insights for the digital modernization of college English educational management in institutions of higher learning.

1. Introduction

College English's administrative and instructional structures have had to undergo a significant change as a result of the persistent digital revolution in higher education. College English Listening and Speaking (CELS) courses are a crucial part of the curriculum and are necessary to improve the communicative language skills and intercultural awareness of non-English majors. However, systemic issues that impede the further enhancement of teaching effectiveness are still afflicting the traditional management models that oversee CELS.

Even though CELS has changed throughout time, the research shows that there are still structural problems. Traditional classrooms are still primarily instructor-led, pro-

viding students with insufficient opportunities for active language output (Ren, 2018). In addition, typical college English classrooms used to emphasize the instrumental use of language greater than value cultivation, with superficial ideological integration and an absence of engaging activities (Chen, 2019); Moreover, manual monitoring and delayed feedback reduce teaching management efficiency (Huang, 2016); smart platforms are only superficially applied, failing to realize data-driven precise management (Sun, Liu, & Li, 2019).

This study focuses on how management techniques and technology tools might be integrated to address these flaws. By offering both theoretical insight and practical support for the digital revolution of English language instruction, it aims to create a feasible, replicable model for

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intelligent CELS administration.

1.1 Research Objectives and Questions

In light of the previously described issues and the overarching initiative for digital transformation in higher education, this study amalgamates “educational management with technological innovation.” It notably attempts to address the following research objectives and questions:

Research Objectives

To research systemic ways to strengthening CELS management through the integration of digital platforms and interactive methodologies, thereby addressing the persistent difficulties of restricted classroom engagement, low management efficiency, and the inequitable distribution of teaching resources.

Construct a reproducible three-stage teaching management framework suitable for non-English majors’ CELS, offering a standardized reference for teachers.

Research Questions

How can smart platforms and interactive design improve structural management in CELS and enable a more precise and data-informed instructional paradigm?

What comprise the main components and operational techniques of the proposed three-stage framework to ensure its practical feasibility and adaptability across varied educational contexts?

2. Theoretical Basis and Technical Support

2.1 Core Theoretical Basis

This study is fundamentally based on two theoretical dimensions:

Educational Management Theory: This perspective provides a framework for optimizing resource distribution (Wang & Cui, 2014), streamlining process monitoring, and implementing multiple evaluation procedures. It serves as the main tool for resolving the current inefficiencies and resource imbalances in CELS management.

Interactive Learning Theory: Centered on Constructivism (Piaget, 2018), this theory believes that knowledge is actively created by learners, making student-centered design crucial. This approach promotes student agency, which matches CELS’s “Input-Interaction-Output” cycle. Both technical and administrative integration goals are achieved via a variety of interactive tasks to break up passive learning while enhancing language output and management efficiency.

2.2 Application Value of Smart Platforms

Smart platforms like TronClass and U Campus AI,

which serve as the key vehicle for the integration of “educational management and technology,” rely on three essential functional dimensions to deal with the inherent barriers of traditional management models:

Real-time Data Monitoring: By automating the acquisition of student learning gauges, these technologies reduce the postponement inherent in traditional data collection, assuring timely administrative insights.

Differentiated Resource Provision: Adaptive resources are given based on individual learner profiles, therefore removing the “one-size-fits-all” constraint and promoting a more personalized learning environment.

Intelligent Evaluative Feedback: The system uses automated diagnostic tools to identify specific competence gaps, allowing for the mutual optimization of both instructional delivery and student mastery.

3. Problems in Current CELS Teaching Management

3.1 Inefficient Process Monitoring

Traditional classroom observations often miss crucial real-time student engagement, leading to frustrating delays in feedback. During speaking sessions, instructors find it difficult to check important factors such as phonetic accuracy and oral fluency. As a result, struggling learners lack essential guidance, while high-achieving students miss timely challenges. This lack of support can create confusion and ultimately diminish motivation and students’ sense of agency in their learning path.

3.2 Inequitable Resource Distribution

Standardized materials often overlook individual student needs. Basic-level students may feel overwhelmed and disengaged, while advanced learners may be stifled and unable to reach their full potential. This division undermines educational equity and hinders the overall progress of the class.

3.3 Single-dimensional Evaluation System

Relying exclusively on final tests diminishes the value of the learning journey and the power of personalized guidance. Test scores without diagnostic comments fail to reveal the specific areas in which students suffer. This lack of insightful detail deprives learners of a clear roadmap for self-improvement and ongoing growth, hindering their path to success.

3.4 Superficial Technology Integration

Today’s technology often serves as a simple digital

store rather than a dynamic management tool. Ignoring multi-stage functions—from tiered content distribution to customized evaluations, hinders our capacity to provide precise, data-driven instruction. Embracing these capabilities can transform education, making learning more engaging and effective.

4. The Three-Stage Teaching Management Framework: Practice and Implementation

This study introduces a dynamic teaching management framework that integrates theoretical principles with practical needs across the pre-class, in-class, and post-class phases. By utilizing innovative smart platforms like Tron-Class and U Campus AI, combined with engaging design, the framework aims to enhance precision and efficiency in the instructional process, transforming the educational experience.

4.1 Pre-class Stage: Precision Resource Delivery and Learning Process Management

4.1.1 Student Grouping

Students are classified into foundational learners, who have challenges with listening and speaking skills, and advanced learners, who are proficient. This classification is based on prior academic records and initial placement test results. By creating an academic profile for each student, we can adjust our approach to accommodate their individual growth.

4.1.2 Tiered Resource Provision and Management

Adaptive preview materials are made available through the TronClass system:

- ▶ **For Foundational Learners:** The emphasis is on linguistic scaffolding, which includes carefully curated audio materials given at a moderated pace, engaging core vocabulary learning challenges, and structured dialogue imitation that captivates students.
- ▶ **For Advanced Learners:** Resources aim to boost cognitive development through engaging listening tasks on intercultural communication, stimulating discussion prompts, and complicated retelling activities. We provide clear completion standards and timelines, moving away from a “one-size-fits-all” approach to a more tailored learning experience.

4.1.3 Preview Progress Monitoring

Teachers use the platform to monitor student progress, tracking time spent and quiz performance. For those who

are struggling, targeted reminders are sent to ensure that everyone is ready for class.

4.1.4 Data-driven Teaching Adjustment

After the deadline, the platform generates a detailed report on student performance. This data assists teachers in identifying common challenges, such as vocabulary gaps and listening errors, which allows them to refine their classroom strategies for better student engagement and learning outcomes.

4.2 In-class Stage: Interactive Monitoring

4.2.1 Preview Difficulty Review

To connect pre-class and in-class activities, teachers spend 10–15 minutes addressing common challenges from the data report. This clarification establishes a strong foundation for the engaging tasks that follow.

4.2.2 Layered Interactive Tasks Design

To accommodate various proficiency levels, the classroom provides diverse tasks:

- **Foundational learners:** Activities like word solitaire, quick Q&A, and role-plays foster a welcoming atmosphere. Our aim is to encourage confident expression and reduce anxiety through fun, low-pressure interactions.
- **Advanced learners:** Participating in debates on intercultural topics, retelling dialogues, and sharing perspectives enhances logical thinking and promotes meaningful intercultural communication.
- **Whole-class participation:** Students engage with AI-based tools for grammar and speech recognition exercises. This approach of “learning through play” enhances class engagement and ensures everyone participates.

4.2.3 Real-time Monitoring and Feedback

Instructors utilize the platform to monitor student participation in real time, focusing on speaking frequency and task accuracy. For less active students or those struggling with responses, teachers offer immediate guidance. This creates a quick feedback loop of “instant identification and correction,” enhancing the learning experience for all.

4.2.4 Dynamic Teaching Adjustment

After the interaction, the platform generates a real-time data report. With these insights, teachers can adjust the teaching pace and enhance future interactions, fostering a more adaptable and engaging classroom environment.

4.3 Post-class Stage: Personalized Feedback and Optimization

4.3.1 Tiered Assignment Design

Based on in-class data, adaptive assignments are assigned to different student groups. Clear evaluation standards ensure these activities meet individual needs, promoting personalized self-study and empowering students in their education.

4.3.2 Dual Evaluation Model

The framework adopts a balanced evaluation approach, combining platform scores and teacher feedback:

- **Platform Intelligent Scoring (60%):** Emphasizes objective metrics such as pronunciation accuracy and answer correctness.
- **Teacher Manual Comments (40%):** Focuses on oral logic, fluency, and intercultural awareness, providing students with precise feedback for meaningful improvement.

4.3.3 Personalized Feedback and Guidance

Using comprehensive evaluations, teachers provide personalized interventions for individual weaknesses, such as pronunciation errors and grammatical mistakes. This approach empowers students to confidently enhance their language skills.

4.3.4 Data-driven Closed-loop Optimization

For real-time updates, all after-class data, including assignment grades and improvement progress, smoothly flows into student academic profiles. After that, the platform creates a thorough post-class report, giving teachers ability to identify persistent problems and improve the three-stage structure. By creating a dynamic “Pre-class—In-class—Post-class” loop, this makes sure that teaching management is not only effective but also consistently elevated by useful data.

5. Results and Analysis

A quasi-experimental study was carried on with 109 non-English major undergraduates by using a three-stage framework, consisting of two experimental classes and two control classes employing traditional management techniques over the course of one semester. Data were collected through quantitative tests, classroom observations, semi-structured interviews, and standardized questionnaires, ensuring that the results were scientific and verifiable.

5.1 Core Quantitative Results

Quantitative data were collected and analyzed. Core results are displayed in Table 1.

Table 1 Comparison of Core Quantitative Indicators

Core Indicators	Experimental Group (Pre-test)	Experimental Group (Post-test)	Control Group (Post-test)	Improvement
Voluntary participation rate (%)	38.1	76.2	41.3	+38.1%
Pre-class task completion rate (%)	68.5	91.2	70.4	+22.7%
Teaching management time reduction (%)	-	30.2	5.1	-30.2%
Listening-speaking test score (out of 100)	68.1	78.6	69.2	+10.5
Average questionnaire score (out of 5)	-	4.45	-	90.6% student acceptance

Note: 1. Voluntary participation and teaching management time reduction are based on classroom observations. 2. Pre-class task completion is sourced from TronClass statistics. 3. Listening and speaking test scores come from standardized assessments evaluated by three instructors. 4. Questionnaire data is derived from 32 valid responses (18 basic-level and 14 advanced-level students), representing the experimental group.

Table 1 showcases impressive gains in the experimental group: the 38.1% increase in voluntary participation highlights the effectiveness of interactive classroom design; A 22.7% rise in pre-class task completion reflects strategic resource allocation, while a 30.2% decrease in teaching management time emphasizes the efficiency of digital management. Finally, the exam scores increased by 10.5 points, demonstrating the framework’s substantial impact on language abilities.

5.2 Qualitative and Questionnaire Results

5.2.1 Classroom Observation and Semi-structured Interviews

Classroom observations revealed a remarkable increase in student engagement, with the average frequency of voluntary speaking soaring from 12.3 to 28.7 per session. Foundational students made significant progress, boosting their participation from 4.1 to an impressive 18.5 times per class.

Semi-structured interviews were conducted with 20 students (across various proficiency levels), further validating these findings:

- 85% of respondents indicated that the interactive design effectively reduced speaking anxiety.
- 90% acknowledged the value of personalized feedback in enhancing their skills.

These qualitative insights strongly support the quantitative data, proving the framework's effectiveness.

5.2.2 Standardized Questionnaire Results

Survey results (N=32) indicated strong student approval, with 90.6% preferring the three-stage structure to traditional techniques. The dimension scores (out of 5) were as follows:

- **In-class Interaction & Platform Use:** 4.56 (Highest)
- **Post-class Feedback:** 4.41
- **Pre-class Preparation:** 4.27

Qualitative suggestions provided clear paths for optimization, with students requesting scenario-based speaking simulations (e.g., workplace English, 34.4%) and enhanced platform interactivity (25.0%).

6. Conclusions and Recommendations

6.1 Conclusions

1. Effective Problem Resolution: The combination of smart platforms and interactive design effectively bridges the gaps in CELS management. It facilitates a critical shift from manual, intuition-based methods to a data-driven paradigm, effectively addressing difficulties such as fragmented monitoring, uneven resource distribution, and superficial technology use.

2. Flexibility and Adaptability: The three-stage framework is highly replicable. By leveraging universal platforms like TronClass and U Campus AI, the strategy stays adaptable to a wide range of student abilities. Its insufficient reliance on specialized, costly resources makes it an ideal fit for widespread deployment in higher education.

6.2 Practical Recommendations

6.2.1 Enhancing Teacher Competency in Data-Driven Management

Institutions could offer targeted training on the core management functions of smart platforms (for example, TronClass analytics and U Campus AI feedback). The goal is to empower instructors to utilize learning data to discover pedagogical flaws and refining their strategies. This will allow for a fundamental shift from "experience-based" to "data-informed" teaching management.

6.2.2 Scaling the Framework with Localized Adjustments

While making sure to make localized adaptations, institutions are advised to implement the three-stage structure. Each university's unique platform settings and student competency levels should be taken into consideration when designing interactive elements, resource complexity, and evaluation criteria. This ensures the model remains flexible and avoids a "one-size-fits-all" application.

6.2.3 Developing a Shared Database of Tiered Resources

A tiered resource database should be established under the leadership of academic affairs offices or English departments. This shared library, which includes listening clips, speaking exercises, and multicultural materials, would enhance pre-class resource allocation. By gathering high-quality information, the institution may greatly minimize the workload of individual instructors in developing tiered materials.

6.3 Limitations and Future Directions

Despite the positive results, this study has limitations in terms of its sample size (four classes at one college) and duration (solely one semester). Therefore, the future research should:

1. Expand the Sample Scope: Conduct cross-university and cross-level studies to further validate the framework's generalizability.

2. Track Long-term Impact: Conduct longitudinal research to investigate the model's long-term impact on students' language skills.

3. Enhance Task Design: Create more scenario-based interactive assignments based on student feedback to boost practical engagement.

4. Integrate Values and Language: Strengthen the integration of ideological and political education with interactive design, achieving the dual goals of language acquisition and value shaping.

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