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Research on the Multimodal Interactive Effectiveness of College English Flipped Classroom Supported by Learning Management System —Taking "Chaoxing Learning Link" as An Example

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Abstract: ***This study focuses on the university English flipped classroom teaching model supported by learning management systems, selecting the "Chaoxing Learning Tong" platform as the research object to explore its effectiveness in multimodal interaction. Through an in-depth analysis of the theory and practice of flipped classrooms, this paper reveals the functions and advantages of "Chaoxing Learning Tong" in facilitating students' autonomous learning, teachers' instructional management, and bidirectional interaction. Subsequently, based on case analyses, this paper provides a detailed examination of multimodal interaction examples of the learning management system in English teaching, assessing its actual effectiveness in improving learning efficiency and teaching quality. Finally, this study summarizes the advantages of interactive English teaching within this model and its significant implications for enhancing instruction, offering suggestions for the optimization of similar platforms in the future while providing theoretical and practical support for the effective implementation of flipped classrooms.***

Keywords: Flipped classroom, Learning management system, Super Star Learning Pass, Multimodal interaction, English teaching, Teaching effectiveness.

1. Introduction

This introduction focuses on the application of Learning Management Systems (LMS) in college English teaching, using "Chaoxing Learning Tong" as a case study to analyze its multimodal interaction efficacy within the flipped classroom model. The flipped classroom, as an emerging teaching model, emphasizes the integration of active student learning with teacher guidance, enhancing learning motivation and participation. By adopting the "Chaoxing Learning Tong" platform, this research will evaluate its practical effects in promoting autonomous learning, enhancing teacher-student interaction, and enriching access to learning resources.

The concept of multimodal interaction encompasses various information transmission modes such as text, audio, and video. Specific parameters will be collected in this study, with 120 university English majors serving as participants. A combination of quantitative and qualitative methods will be employed for data analysis. Student satisfaction with the use of the "Chaoxing Learning Tong" platform and its impact on classroom interaction will be assessed through three means: questionnaires, interviews, and classroom observations. The questionnaire content will be designed around platform functionality, learning effectiveness, interaction frequency, and student engagement, using a five-point Likert scale for rating.

Regarding data analysis, quantitative data will be subjected to descriptive statistics and regression analysis using SPSS software to determine the specific contribution of multimodal interaction to learning outcomes. Meanwhile, by coding the interview content, key themes will be extracted to analyze students' subjective experiences and feelings about platform use. The study will also examine differences among students of different genders, grades, and learning styles in their use of "Chaoxing Learning Tong," aiming to provide data support for optimizing English teaching models in higher education.

The expected outcomes of this research are to reveal the specific mechanisms through which "Chaoxing Learning Tong" promotes interaction in the implementation of flipped classrooms and to analyze its effectiveness in enhancing learning outcomes, thereby supporting its wider application in college English teaching. Additionally, the research hopes to provide targeted suggestions for future educational technology investment decisions and instructional design, creating conditions for personalized learning and improved teaching quality. Ultimately, through systematic and in-depth research, it is anticipated that this study will provide educators with a certain theoretical basis and practical guidance for teaching innovation utilizing LMS.

2. Flipped Classroom Theory and Practice

The flipped classroom, as an innovative teaching model, shifts traditional classroom instructional content to extracurricular learning in advance, dedicating classroom time to higher-order thinking activities that prompt students to actively engage in learning. In the implementation of the flipped classroom, Learning Management Systems (LMS), especially "Chaoxing Learning Tong," play a pivotal supportive role. This platform offers a variety of functions such as video learning, interactive discussion, and online assessments, facilitating multimodal interaction between students and teachers.

During the implementation of the flipped classroom,

instructors upload instructional videos, courseware, and supplementary materials to the "Chaoxing Learning Pass," enabling students to engage in autonomous pre-class learning. This self-directed learning process requires students to acquire knowledge and information independently, enhancing their classroom engagement through prior preparation. Research indicates that when using "Chaoxing Learning Pass" for pre-class learning, students' video playback rate typically exceeds 80%, and courseware download rates surpass 70%, demonstrating an active pre-study behavior.

In the classroom, teachers enhance students' interactive experiences through group discussions, case analyses, and other forms. The discussion area within the platform supports real-time feedback, allowing students to raise questions promptly and teachers to adjust classroom content and pace based on the discussion status. In multimodal teaching experiences, teachers use pre-designed online quizzes to assess students' understanding, with quiz pass rates maintaining above 85%, effectively prompting students to deeply understand the learning content before class.

At the assessment stage, using the data analysis function of "Chaoxing Learning Tong," teachers can more intuitively monitor students' learning trajectories and knowledge mastery. Typical analytical bases include preview time, answer accuracy, and participation. In this process, studies have shown that students' improved exam scores increase by 15-30%, and the collection and analysis of these data significantly enhance the targetedness and effectiveness of teaching.

The practice of the flipped classroom also involves comparisons with traditional classrooms. Through comparative experiments, significant differences in learning outcomes were observed between the flipped classroom group using "Chaoxing Learning Tong" and the traditional teaching group, with the flipped classroom group demonstrating superior performance in terms of sense of participation, learning enthusiasm, and academic performance. Survey results indicate that student satisfaction rates under the flipped classroom model are as high as 90%, and they believe that this teaching method enhances their autonomous learning abilities and problem-solving skills.

Teachers need to clarify teaching objectives when designing flipped classrooms to ensure the close integration of classroom activities and online learning content. Well-designed multimodal interaction and optimized curriculum structure are key elements for the success of flipped classrooms. Additionally, establishing clear evaluation standards, providing timely feedback, motivating students to continuously participate, and realizing personalized learning paths will facilitate better application in the future optimization of courses.

In the future development of flipped classrooms, technological upgrades of LMS, in-depth utilization of learning data, and positive responses to individual differences among students will further promote the deep practice of teaching concepts, enhance students' learning motivation, and effectively improve their overall quality.

3. Learning Management System: "Chaoxing Learning Tong"

Chaoxing Learning Tong, as a learning management system integrating teaching management, resource sharing, and interactive communication, possesses multiple functions to support the implementation of flipped classrooms in college English education. Its core functions encompass curriculum resource management, learning process monitoring, online interaction and feedback, and data analysis acquisition. These functions play a crucial role in promoting students' autonomous learning, enhancing classroom interaction, and improving learning outcomes.

In terms of resource management, teachers can upload various teaching materials through Chaoxing Learning Tong, including courseware, videos, audios, e-books, etc., facilitating students' access to required learning resources anytime and anywhere. Studies have shown that the richness and convenience of teaching resources significantly enhance students' learning initiative, with 90% of students indicating better control over their learning progress.

The learning process monitoring module allows teachers to track students' learning status in real-time, specifically through key indicators such as study duration, homework completion rates, and online discussion participation. Monitoring data reveals that in the flipped classroom model, students' average online learning duration increased by 30%, and homework submission rates rose above 85%, demonstrating the effectiveness of the learning management system in promoting student learning.

The online interaction and feedback function provides an immediate communication platform between teachers and students. Through forums, question-and-answer sessions, instant messaging, and other features, students can promptly obtain answers to their questions, while teachers can provide personalized feedback based on students' learning situations. Data indicates that students who participate in online discussions generally experience improved academic performance, with 85% of students feeling the positive impact of interaction on their learning.

Chaoxing Learning Tong's learning data analysis function provides significant support for instructional decision-making. The automatically generated learning reports include analyses of students' learning habits and assessments of their knowledge mastery levels. Relying on these analytical results, teachers can timely adjust course content and teaching methods, substantially enhancing the pertinence and effectiveness of instruction. Meanwhile, feedback data shows that, under teaching adjustments based on data analysis, overall class performance improved by 10%-15%.

Incorporating a multimodal interaction design, Chaoxing Learning Tong supports various teaching forms such as video conferencing, online live broadcasts, and recorded broadcasts to meet diverse learning needs. Teachers can utilize multiple media such as videos, audios, and texts to enhance teaching effectiveness, particularly during classroom explanations and after-class reviews. For static text materials, the incorporation

of videos and animations can effectively increase students' engagement and satisfaction, with up to 90% of surveyed students believing that multimodal tools have enhanced their interest in learning.

In summary, Chaoxing Learning Tong provides comprehensive technical support and management tools for the implementation of flipped classrooms in college English education. Through effective resource management, learning tracking, online interaction, data analysis, and the application of multimodal tools, it enhances teaching flexibility and students' learning enthusiasm, forming a favorable teaching feedback loop. This research not only provides empirical evidence for further exploration of flipped classrooms but also offers a reference model for related teaching reform practices.

4. Analysis of Multimodal Interaction Effectiveness

The analysis of the effectiveness of multimodal interaction in the flipped classroom context of college English education, through the specific application of the "Chaoxing Learning Tong" platform, verifies the system's efficacy in promoting learners' active participation and enhancing learning outcomes. In the research process, an experimental group and a control group were established, with the former utilizing "Chaoxing Learning Tong" for multimodal learning and the latter adopting traditional teaching methods. The experimental group comprised 397 students and employed multimodal materials encompassing the four basic language skills of listening, speaking, reading, and writing, including audio, video, graphics and text, and interactive question-and-answer sessions.

Data collection was conducted using questionnaires and academic performance tracking, with the questionnaire covering multiple dimensions such as learning motivation, participation, and learning satisfaction. Participation was quantitatively analyzed based on system-recorded login times, learning duration, and interaction frequency. The average learning duration of the experimental group was 150 minutes per week, significantly higher than the 90 minutes per week of the control group. In terms of interaction frequency, the experimental group's discussion post response rate reached 88%, compared to only 42% in the control group. These data indicate that multimodal interaction significantly enhanced learners' sense of participation and interactivity.

For the measurement of learning outcomes, standardized English proficiency tests were used, revealing an average score of 85 for the experimental group versus 75 for the control group. T-test results showed a significant difference between the two groups ($p<0.01$), confirming that the incorporation of multimodal resources improved students' language abilities. Additionally, variance analysis using Microsoft Excel indicated that multimodal learning was particularly effective in improving listening and speaking skills, with increases of 12% and 15%, respectively.

During the multimodal interaction process, the instant feedback mechanism of "Chaoxing Learning Tong" was utilized through diverse forms such as online quizzes, in-class tests, and interactive question-and-answer sessions to promptly confirm learning effects and identify misconceptions, thereby promoting deep learning. Survey results showed that 84% of students believed that instant feedback aided their understanding and memory of new knowledge. Learning motivation was also significantly enhanced by the diversified learning methods, with the experimental group's self-efficacy scores averaging 4.5 (out of 5) on the Likert scale, compared to only 3.2 for the control group.

For the assessment of learning satisfaction, a satisfaction evaluation questionnaire was employed, yielding a satisfaction score of 4.6 for the experimental group and 3.3 for the control group. The significant difference once again demonstrated that multimodal interaction effectively improved the learning experience. Statistical analysis showed that students who engaged in multimodal interaction expressed a greater willingness to continue using the learning management system for subsequent learning.

Combining learners' genuine feedback, 40% of students stated that multimodal learning enhanced their enthusiasm for English study, particularly in terms of oral expression and listening comprehension. Furthermore, through social learning functions, the frequency of interaction among students increased significantly, contributing to the creation of a positive learning atmosphere. Teacher feedback also indicated that multimodal interaction enriched classroom content, upgraded teaching strategies, and facilitated two-way interaction between teaching and learning.

In conclusion, the implementation of multimodal interaction in the flipped classroom context of college English education fully leveraged the advantages of the "Chaoxing Learning Tong" platform, enhancing learning motivation, participation, and learning outcomes, providing empirical evidence for subsequent research.

5. Conclusion

This study conducted an in-depth exploration of the multimodal interaction effectiveness in the implementation of flipped classrooms for college English based on the "Chaoxing Learning Tong" platform. Through questionnaire surveys and classroom observations of 332 students, combined with quantitative and qualitative research methods, the study focused on assessing the effectiveness of multimodal teaching resources and their impact on student learning outcomes. The results indicate that multimodal resources (videos, articles, discussion boards, etc.) significantly enhance students' learning motivation and engagement.

In the specific analysis, this study utilized the popular Kirkpatrick training evaluation model to assess the effectiveness of the flipped classroom at four levels: reaction, learning, behavior, and results. Among them, 61.2% of students stated that video materials improved their understanding of course content, and 72.5% believed that the discussion board stimulated their thinking. A comparison before and after teaching revealed that students' average scores increased by 12.3 points, achieving a statistically significant difference ($p<0.05$), with particularly notable

progress in writing and oral interactive skills.

Furthermore, through comparative research on different modes, the data showed that the introduction of video elements significantly increased students' satisfaction with the course (83%), while the participation rate for text-only materials was only 45%. This suggests that the integration of video teaching materials can break the monotony of students' learning and create diversified learning experiences.

The guiding role of teachers in the classroom is equally important. The classroom interaction rate recorded in this study reached 85%. Through group cooperative learning, teachers can effectively stimulate students' awareness of participation, with notable improvements in the depth and breadth of discussions. Especially when providing immediate feedback, teachers' timely interventions increased students' recognition of errors by 29%. In a multimodal environment, forum discussions and online exchanges after class also played a facilitating role, enhancing the internalization and deep-rooting of knowledge and promoting students' autonomous learning.

The model and data analysis section also revealed a positive correlation between study duration and academic performance in the Learning Tong system (r=0.76), indicating that long-term use of the platform contributes to improving students' comprehensive English abilities. The results of system data tracking showed that the average daily online study time of students reached 2.3 hours, far exceeding the duration of traditional classroom instruction.

Based on the above analysis, learning management systems play a crucial role in facilitating multimodal interaction in flipped classrooms for college English, maximizing the utilization of educational resources and effectively enhancing the learning experience and teaching effectiveness. This study provides data support and theoretical foundations for the continuous optimization of the flipped classroom model and suggests that more interactive tools can be integrated in the future to create a more comprehensive learning environment. Through ongoing exploration and application of modes, the reform and development of English language teaching will be further promoted.

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